Social Media and Mental Health: A Collaborative Review

An ongoing open-source literature review posted and curated by Jonathan Haidt (NYU-Stern), Jean Twenge (San Diego State U), and Zach Rausch (NYU-Stern). You can cite this document as:

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This Google doc is a working document that contains the citations and abstracts of the published articles we have found that shed light on a question that is currently being debated in the USA and UK: ***Does social media use contribute to the rise of adolescent mood disorders (depression and anxiety) and related behaviors (especially self-harm and suicide) that began around 2012?*** *[See companion review for studies documenting this rise.] Is it a cause or just a correlate?*

This Google Doc is a work in progress. We (Haidt, Rausch, & Twenge) have not done an exhaustive search of citation databases. A Google Scholar search for ["social media" depression] yielded 72,000 hits in 2019. We begin instead with articles published in or after 2014 that are being cited by scholars on either side of the debate. We pick 2014 because the increase in adolescent depression and anxiety is not clearly visible until around 2013, and it takes a while for data to show up in a published paper. Also, Haidt & Rose-Stockwell (2019) argue that social media changed radically between 2009-2012, becoming more addictive and more toxic, so studies using data from before 2013 are not relevant to evaluating whether social media is harmful to teen mental health today. We invite fellow scholars to point us to studies we have missed, or to note ways in which we are misinterpreting the studies we cite below. Notes to fellow scholars are in green text.

We are not unbiased. Haidt came to the tentative conclusion that there is a causal link, and said so in his book (The Coddling of the American Mind, with Greg Lukianoff.) Twenge said the same thing in her book (iGen). Haidt's own research (presented in The Righteous Mind) says that we are likely to be motivated to find evidence to support the positions we took publicly. Like all people, we suffer from confirmation bias. But we take J.S. Mill seriously, and we know that we need help from critics to improve our thinking and get closer to the truth.

If you are a researcher and would like to notify us about other studies, or add comments or counterpoints to this document, please request access to the Google Doc, or contact Haidt directly, and he will set your permissions to add comments to the Google doc. This document is evolving based on feedback. A copy of the original document, as posted on Feb 7, 2019, is here.

Notes:

- The review contains comments added by other researchers: Chris Ferguson (Stetson U), Sarah Rose Cavanagh (Assumption College), Tom Hollenstein (Queens U., Canada), Kai Lukoff (U. Washington), Ian Goddard, Ray Aldred (??), Sonia Livingstone (London School of Economics), Bradley Riew (??), Madeleine George (Purdue), Raphaël Aubry (U of Geneva), Eric Osika (Saint Camille hospital Bry sur Marne France)....
- You can always find this doc linked from thecoddling.com/better-mental-health.
- Also see our companion review: Is there an increase in adolescent mood disorders, self-harm, and suicide since 2010 in the USA and UK? A review
- See also additional Google docs laying out evidence for trends in mental health and social media use in Australia, Canada, New Zealand, and other countries.
- Last updated: May 6, 2026

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INTRODUCTION

Two studies published in January 2019 suggested that there is little or no association between social media use and harmful mental health outcomes: Orben & Przybylski (2019) and Heffer, Good, et al. (2019). A third study published in January suggested that there is a more substantial link: Kelly, Zilanawala, Booker, & Sacker (2019). These three studies, all published in reputable journals in the same month, were getting attention from journalists, leaving many parents and policymakers confused about what

to believe. We (Haidt & Twenge) therefore thought it would be useful to gather together in one place the abstracts of the studies that are often referred to in these debates.

We divide the studies into three categories, based on which method they use: 1) cross-sectional correlational studies, 2) time lag or longitudinal studies, and 3) true experiments. Each method answers a different question. Finding answers to the three questions will allow us to address the question everyone cares about: *is social media contributing to the recent rise in anxiety, depression, self-harm, and suicide among American and British teenagers?* It is vital that we find answers to these questions, to inform legislation, lawsuits, and above all parents, millions of whom are asking questions like: *Should I let my 11-year old child have an Instagram or Snapchat account? If not now, then when? If yes, then should I impose any time limits?* We'll offer some suggestions for parents at the end of the document.

We structure this list of abstracts around three questions, each one addressed by a different kind of study. Within each question we present the studies that DO find a relationship in subsection 1, and the studies that DON'T find a relationship in subsection 2. For each study we offer a link to the original publication and we reprint the full abstract with no edits, other than **bold-facing** the most relevant parts to help you skim the document. We offer brief comments [in brackets] and show figures from some of the studies.

News, Sept. 17, 2021: Facebook's own internal research--leaked by whistleblower Frances Haugen to journalists at the *Wall Street Journal*--shows that they have known since 2018 that Instagram harms many teen girls. See the Wall Street Journal's **14 part expose'** on Facebook's effects on mental health, democracy, human rights, and other topics.

To hear the other side—disputing Haugen and the WSJ interpretation, see:

- Mark Zuckerberg's first response, a blog post on 10/5/21
- Facebook's main response to the WSJ: What our research really says about teen well-being and Instagram
- Stuart Ritchie, Is Instagram really bad for teenagers? "The quality of the company's secret research into mental health is abysmal"
- Laurence Steinberg, Does Instagram harm girls? No one actually knows.
- Farhad Manjoo, The moral panic engulfing Instagram

Then see responses to those responses:

- The WSJ responds to FB's blog post, including the full decks of slides presenting Facebook's research on Instagram's effects on teen girls: Facebook's documents about instagram and teens, published
- Haidt's essay in The Atlantic (11/21/21): The Dangerous Experiment on Teen Girls

Update (May, 2024): The After Babel Substack debate on social media and mental illness.

On February 22nd, 2023, Jon published Social Media is a Major Cause of the Mental Illness Epidemic in Teen Girls. Here's the Evidence.

In that post, Jon summarized the four major categories of studies from this Google Doc that bear on the question of social media use and teen mental illness: correlational studies, longitudinal studies, true experiments, and quasi (or natural) experiments. Since publication, a number of social scientists and statisticians have written essays arguing that he is wrong.

Here are the published critiques that we have found:

- Don't panic about social media harming your child's mental health – the evidence is weak. By Stuart Ritchie, at inews.co.uk
- "Some" Are Misrepresenting CDC Report Findings Specific To The Use Of Social Media & Technology By Youth. By The White Hatter, at The White Hatter Blog.
- Why I'm Skeptical About the Link Between Social Media and Mental Health. By Dylan Selterman, at Psychology Today.
- The Statistically Flawed Evidence That Social Media Is Causing the Teen Mental Health Crisis, by Jon's NYU colleague Aaron Brown, at Reason.com.
- Social Media and Youth Mental Health. By Chris Ferguson, at Psychology Today.

Here is Jon's response (published on April 17, 2023): Why Some Researchers Think I Am Wrong About Social Media and Mental Illness.

After the release of *The Anxious Generation*, psychologist Candice Odgers published a notable critique of the book in *Nature* (published March 29, 2024), titled The great rewiring: is social media really behind an epidemic of teenage mental illness?

Here is Jon's response to Odgers (published April 09, 2024). Yes, Social Media Really Is a Cause of the Epidemic of Teenage Mental Illness.

Zach and Jean have also written a series of articles responding to other skeptics who point to other explanations for the mental health crisis. You can find them all here.

* * * * * * * * * * * * * * *

CAUTIONS AND CAVEATS

1) *We all must beware of the risk of repeating previous moral panics over comics, TV, video games, etc*. Whenever a new fad or technology sweeps through the child or teen population, stories get written about how the new trend is harming children. These stories play well in a media environment that thrives on eliciting fear in parents. Later research often shows that there was no detectable harm. (See Moral Combat, by Markey & Ferguson, about video games; see this short review of moral panics about media tech, by Vaughn Bell, h/t to Sarah Rose Cavanaugh)

2) *We all must be mindful that psychology and other fields are now going through a "replication crisis"* as we discover that many -- perhaps half -- of published studies in some disciplines fail to replicate when other researchers try to do so. Much of the problem is due to the fact that researchers have so many degrees of freedom in how they interpret and analyze their data; they can sometimes find statistically significant results that are just random fluctuations in a sea of non-significant results. This is the problem that Orben & Przybylski (2019a) were responding to. So the studies below may not be as reliable as they seem; no one study is decisive. (We think that Orben & Przybylski is an advance, but is open to other interpretations too.) Don't read this document like a tally sheet, awarding victory to whichever side has more studies. It is easier to publish statistically significant results indicating an effect of screens or social media than it is to publish a failure to find such effects, which tend to be left in the "file drawer." But it is valuable to look through the studies that report effects to see if those effects are similar across studies, or if they are widely divergent.

3) *It is important to consult high quality review articles and meta-analyses*. We have now added these in section 5. We think it is helpful to read the details of particular studies in each category first.

4) *Context matters more than hours*: What kids are doing with their devices, how they do it, who they are, and above all *how it affects their relationships* matters more than how much time they spend doing it (see Clark, Algoe & Green, 2017; Waytz & Gray, 2018; and see comment from Sarah Rose Cavanaugh, at right). Unfortunately, nearly all

of the published research simply asks teens or parents to estimate the number of hours per day or week that the teen spends in various screen-based activities, and these estimates are often inaccurate. This is one reason why progress is slow; we need better data that will allow us to ask questions that are more nuanced than "does spending a lot of time on social media cause bad mental health outcomes." But keep this in mind as you consider the many studies that find associations that explain only a tiny amount of the variance: Those tiny numbers don't mean that the *relationship* is truly tiny; they mean that *the amount of variance we can explain with blurry and noisy measurement on both ends is tiny*. If we had perfect measurement on both ends, the numbers would go up, perhaps by a lot. [Commenter Bradley Riew suggests that we also try to "unbundle" the effects of social media use, distinguishing among at least these 4 negative effects: (a) Sleep deprivation, (b) Cyberbullying, (c) Negative emotion contagion, (d) Social comparison.]. For research documenting HOW American teens spend their "screen time" see: Rideout (2016) for an analysis using data from 2015, and see our new appendix 8.5, on time usage studies. [Is there anything more recent?]

5) *Social media use may impose external costs even on those who don't use it*. The hypothesis tested in most of the studies in this review is that there is a dose-response relationship: more hours-per-week, above the "safe" amount, causes more harm to the individual who consumes more. But if social media is part of the reason for the rise in teen depression/anxiety that began around 2012 (see our companion review), the causal path need not run through individual users. It may be that a middle-school community changes when many or most of its members get Instagram or Snapchat accounts. Kids may become more cruel, fearful, superficial, gossipy, or appearance-obsessed, and this could make many students more depressed and anxious, even if they do not use social media, or use it only lightly. So *the fact that most of the studies below can explain only a small portion of the variance in outcomes does not mean that social media has only tiny effects*. The network or group-wide or emergent effects could be quite large, and these would not be picked up by studies where the independent variable was how many hours each kid reported spending per week on "social networking sites." See the book Connected, by Christakis and Fowler, for an accessible presentation of these network effects. See this paper showing such effects for depression. See these links for recent evidence (2021) that teens and especially girls are developing Tourette's syndrome symptoms via emotional contagion from TikTok "influencers." Emotions spread through networks; you are affected not just by your friends, but by your friends' friends' friends. (But see also a critique of this work here, and a response here.)

When most teens moved online en masse, between 2010 and 2012, depression rates began to rise, even for kids who are not on social media. Jon explains the

difference in this Nature essay, and this blog post from Chris Said illustrates how network effects can differ from individual-level effects. The kid who doesn't join doesn't stay happy either:

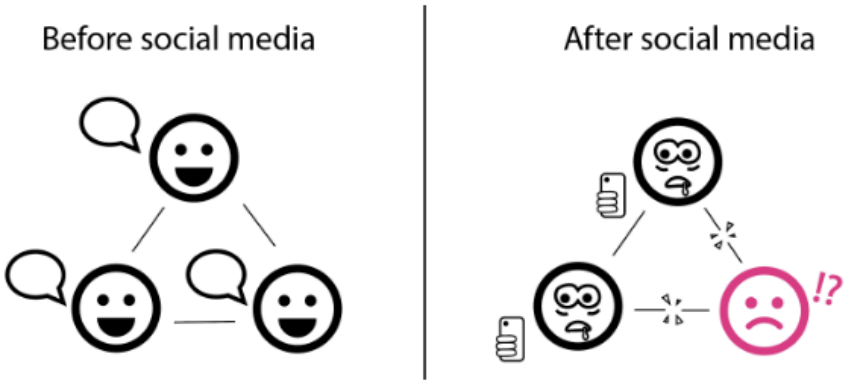

Figure 2. *Social media as a trap.*

--A related topic: the beneficial social effects that accrue to most students when schools ban cell phones, as in this Australian high school. We need systematic research on the effects of phone bans to evaluate these group-wide effects. We'll collect such research in Appendix 8.13.

6) *There are benefits to social media use,* and digital media more generally, for some kids in some contexts. These benefits are not considered in this review, which is focused on trying to understand whether the move onto social media platforms between 2009-2012 can help to explain the sudden sharp rise in depression/anxiety that began in multiple countries around 2012. A report that tries to tally the costs and benefits is the American Academy of Pediatrics 2016 report: Children and Adolescents and Digital Media [Thanks to Sarah Rose Cavanaugh, and Kai Lukoff, for making this point and suggesting this report]. Researchers who are documenting these benefits, or finding ways to maximize them, include Nicholas Allen (U. Oregon; see his exchange with Haidt here), … who else?

7) This Google doc is not about "screen time" or "digital media use" or video games. We agree with our critics that "screen time" is hard to define, and is not consistently associated with bad mental health outcomes, or is associated only weakly. We agree that video games are sometimes associated with good mental health outcomes. This review is focused on **social media usage**, which generally shows stronger links to poor mental health than does screen time or video game time. (See Haidt's Twitter thread on this point.) However, we do include many of the larger and more important studies that looked only at "screen time" because most of the studies that get cited looked only at

screen time. [In the text below, Jon is highlighting the relevant words in abstracts showing studies that used only screen time in light red, and those that had a measure of social media use in light green. Studies that allowed us to zoom in on girls, or that show a sex difference, are indicated by highlighting the key words in light blue. Those rare studies that included preteens have the key words in light orange, and the searchable key-word "preteen" inserted.] What we most need now is resolution within the category of social media. Are there any studies that allow us to compare using Instagram vs. TikTok vs. Snapchat? Also, we have almost nothing on effects on pre-teens; are there any good studies contrasting effects on 10-12 year olds with effects on 13-16?]

8) If you want to read *essays and articles in the popular press* that are skeptical of the link between social media use and mental health outcomes, see:

- Resnick (2019) Have smartphones really destroyed a generation? We don't know. *Vox.*
- Denworth (2019). Social Media Has Not Destroyed A Generation. *Scientific American*. (Gives a summary of Orben/Przybylski's studies)
- Popper (2020). Panicking About Your Kids' Phones? New Research Says Don't. *New York Times.*
- Here is Facebook's own post: *Hard Questions: Is Spending Time on Social Media Bad for Us?*
- Metherell (2023). On The 'Overwhelming Evidence' For Social Media Destroying Kids' Brains. *Wellcome-UCL.*
- *We need to update this: Any suggestions from 2023 or 2024?*

9) If you want to read short overviews of the academic literature, see:

- Twenge (2019). Why increases in adolescent depression may be linked to the technological environment. *Current Opinion in Psychology*.
- Abi-Jaoude, Naylor & Pignatiello (2020). Smartphones, social media use and youth mental health. *CMAJ* (Canadian Medical Association Journal).
- Haidt, testimony to the Senate Judiciary Committee, Subcommittee on Technology, Privacy, and the Law, May 4, 2022.
- [find a review that is critical of the link. Any suggestions?]

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QUESTION 1: IS THERE AN ASSOCIATION BETWEEN SOCIAL MEDIA USE AND BAD MENTAL HEALTH OUTCOMES?

This is the most basic question, asking about correlations in real-world data. Is it the case that kids who use social media are doing worse than kids who don't? What about heavy users, are they doing worse than light-to-moderate users? What about girls versus boys, or older teens versus younger teens? These questions are typically answered by examining large nationally representative datasets. These correlational studies cannot prove causality; we cannot assume that social media use *caused* any bad outcomes that "go along" with it. Causality could be the reverse process (perhaps depression causes teens to become heavier users of social media), or there could be a third variable that causes both social media use and depression/anxiety. But these studies are common and important first steps in the quest to answer many social science puzzles. What goes with what, and for whom?

Nearly all researchers now agree that there are correlations between (crude measures of) time spent using social media and (crude self report measures of) mental health problems, but there is heated disagreement about the size and significance of these effects. Some researchers believe the correlations are in the ballpark of r = .04, and are of no practical significance; others find that the correlations are between r = .10 and r = .20, which is the size of many other public health threats. (See Gotz, Gosling & Rentfrow, 2021, for an argument that effects of this size are "The Indispensable Foundation for a Cumulative Psychological Science.")

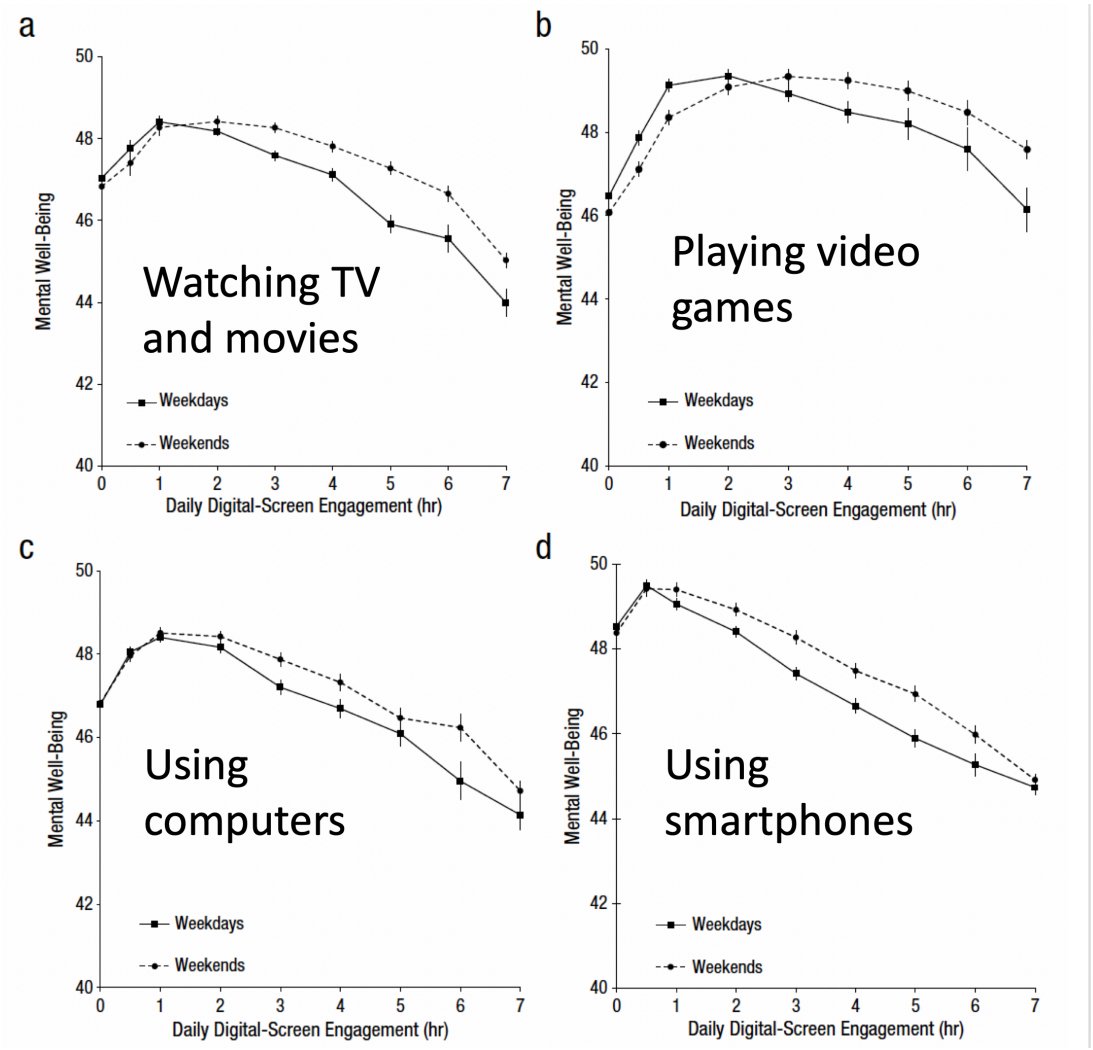
1.1 STUDIES INDICATING AN ASSOCIATION WITH BAD MENTAL HEALTH OUTCOMES

1.1.1 Przybylski & Weinstein (2017). A large-scale test of the goldilocks hypothesis: Quantifying the relations between digital-screen use and the mental well-being of adolescents. *Psychological Science*.

ABSTRACT: Although the time adolescents spend with **digital technologies** has sparked widespread concerns that their use might be negatively associated with mental

well-being, these potential deleterious influences have not been rigorously studied. Using a preregistered plan for analyzing data collected from a representative sample of English adolescents (n = 120,115), we obtained evidence that the links between digital-screen time and mental well-being are described by quadratic functions. Further, our results showed that these links vary as a function of when digital technologies are used (i.e., weekday vs. weekend), suggesting that a full understanding of the impact of these recreational activities will require examining their functionality among other daily pursuits. **Overall, the evidence indicated that moderate use of digital technology is not intrinsically harmful and may be advantageous in a connected world.** The findings inform recommendations for limiting adolescents' technology use and provide a template for conducting rigorous investigations into the relations between digital technology and children's and adolescents' health.

[COMMENT from Haidt: The authors find curvilinear effects in which one or two hours a day is associated with better outcomes than is zero usage, yet after that, outcomes become worse. The lowest "goldilocks point" and sharpest drop is for "using smartphones," which is the category likely to include most social media use. The highest "goldilocks point" and shallowest drop is for "playing video games," as you can see here:]



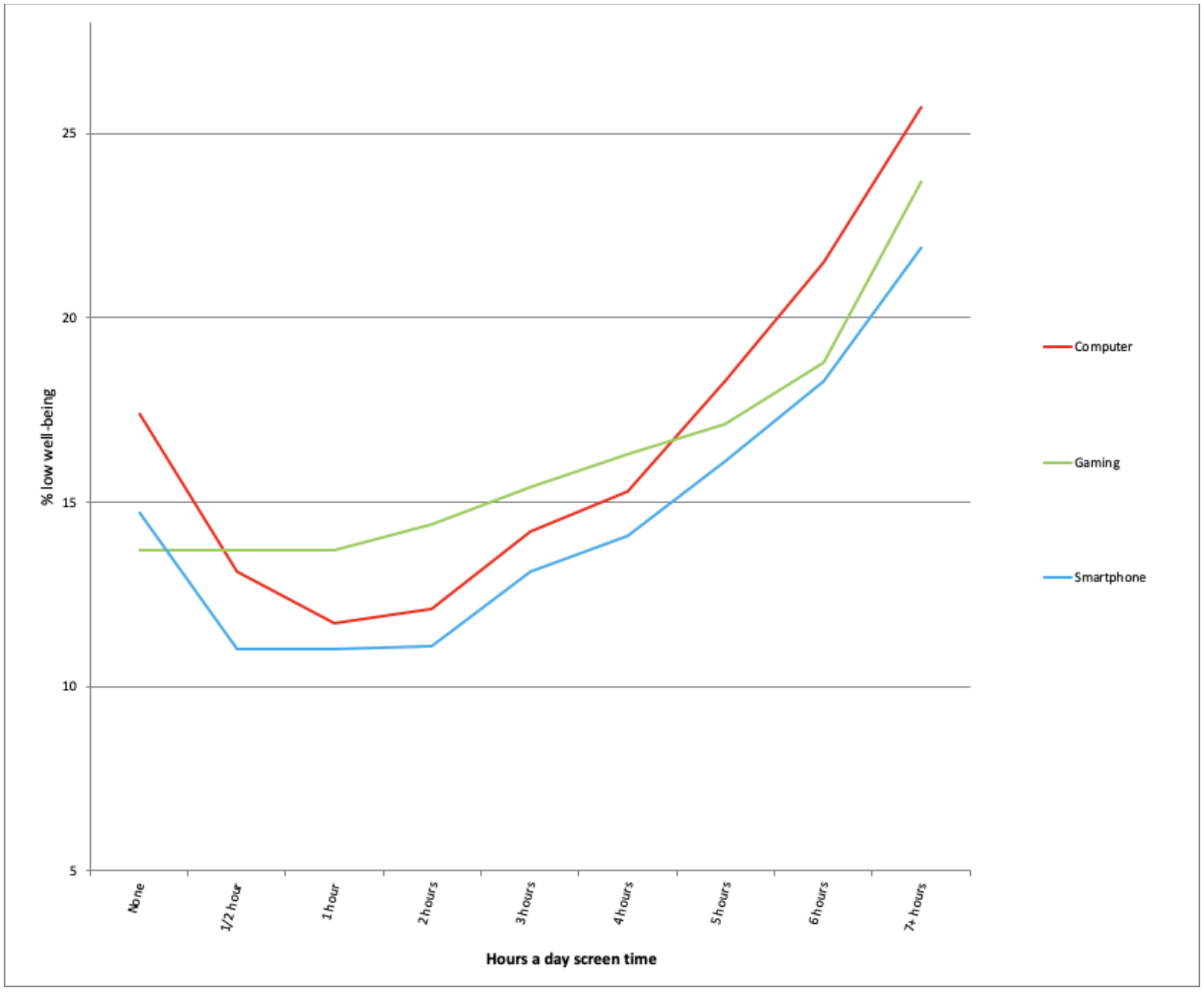
Source: Przybylski & Weinstein (2017), p. 207, with labels added.

[We [Haidt & Twenge] agree with the authors' claim that "moderate use of digital technology is not intrinsically harmful and may be advantageous in a connected world." We think the "Goldilocks hypothesis" is true, as it shows up in several other studies listed below. It says that *heavy* use of smartphones is associated with reduced well-being. We expect--given other findings below--that the association would be even larger if the graphs were redrawn just for girls, and if they could be limited to social media use (as opposed to "smart phones" or "screen time" more generally).]

[COUNTERPOINT (From Andrew Przybylski, via Twitter, who quoted this text from the paper:) "These analyses indicated that the possible negative effects of excessive screen time found that the average effect size (Cohen's d) for engagement in excess of the inflection points was –0.18. In other words, these negative slopes accounted for 1.0% or

less of the observed variability in the mental well-being of the young people in the sample. Exploratory analyses examining links between individual difference measures in the data set and well-being provide some context to interpret these modest relationships.were less than a third of the size of the positive associations between well-being and eating breakfast regularly (d = 0.54) or getting regular sleep (d = 0.58). Although the coefficients we have reported are statistically significant, it is noteworthy that the size of both the linear and the quadratic relations between screen time and wellbeing were noticeably diminished in half the cases once control factors were accounted for, and that incremental increases in screen time above moderate levels accounted for very little of the variability we observed in mental Well-being."]

[RESPONSE to Przybylski [from Twenge]: The use of percent variance explained may be obscuring practically important associations. In the same dataset used by Przybylski & Weinstein, which he notes explains only 1% of the variance, twice as many heavy smartphone users (vs. light) were low in well-being, as shown here:



Source: Twenge & Campbell (2019). Includes demographic controls.

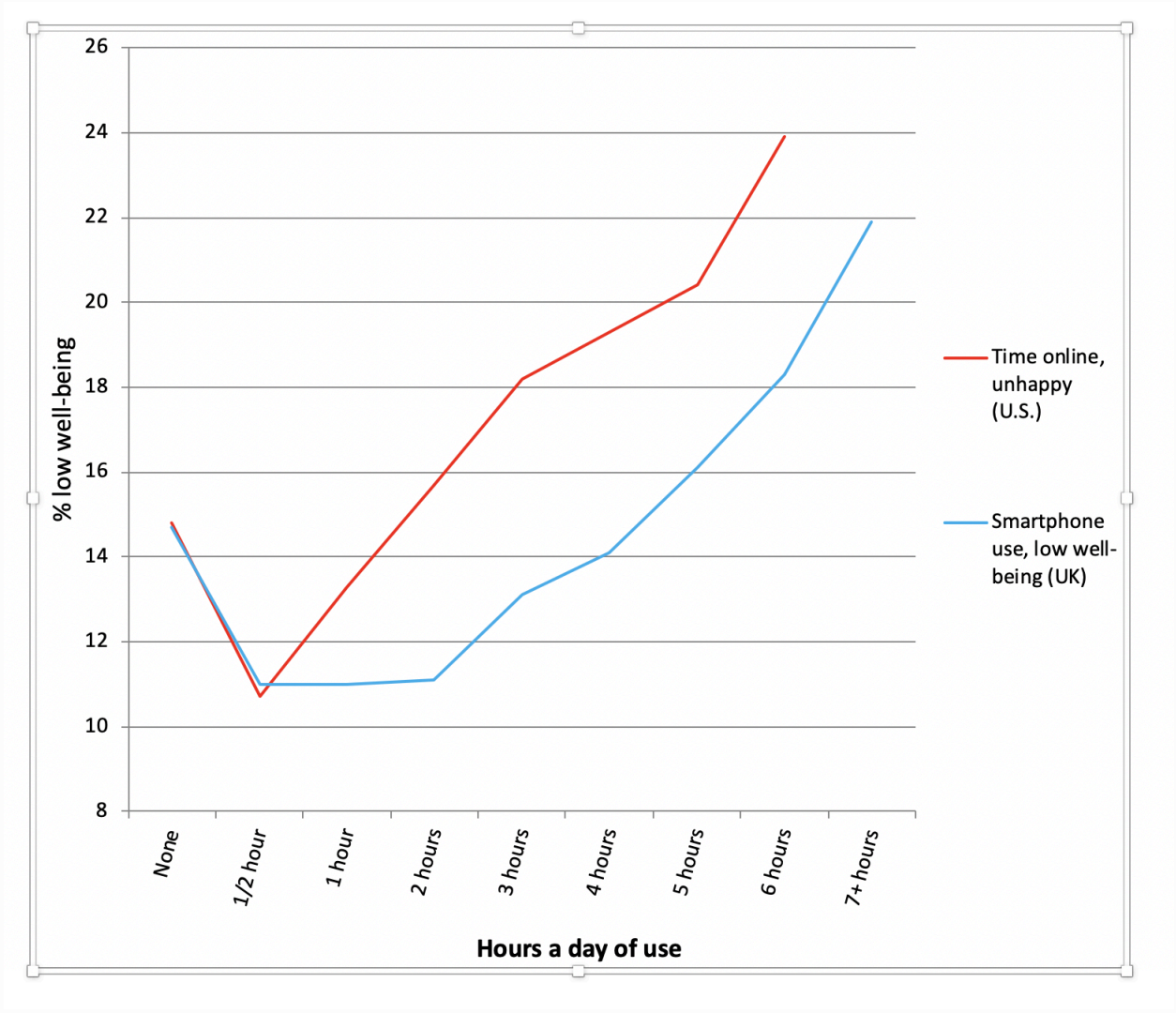
The same doubling of low well-being appeared for light vs. heavy computer users. For gaming, 73% more heavy users had low well-being compared to light users. Thus, when the data are analyzed by examining low well-being within levels of use rather than percent variance explained, the associations are more than practically important.]

1.1.2 Twenge, & Campbell (2019). Digital media use is linked to lower psychological well-being: Evidence from three datasets. *Psychiatric Quarterly*.

ABSTRACT: Adolescents spend a substantial and increasing amount of time using digital media (smartphones, computers, social media, gaming, Internet), but existing studies do not agree on whether time spent on digital media is associated with lower psychological well-being (including happiness, general well-being, and indicators of low

well-being such as depression, suicidal ideation, and suicide attempts). **Across three large surveys of adolescents in two countries (*n* = 221,096), light users (<1 h a day) of digital media reported substantially higher psychological well-being than heavy users (5+ hours a day). Datasets initially presented as supporting opposite conclusions produced similar effect sizes when analyzed using the same strategy. Heavy users (vs. light) of digital media were 48% to 171% more likely to be unhappy, to be in low in well-being, or to have suicide risk factors such as depression, suicidal ideation, or past suicide attempts. Heavy users (vs. light) were twice as likely to report having attempted suicide.** Light users (rather than non- or moderate users) were highest in well-being, and for most digital media use **the largest drop in well-being occurred between moderate use and heavy use**. The limitations of using percent variance explained as a gauge of practical impact are discussed.

[COMMENT [from Twenge]: As Rosnow and Rosenthal (1989, 2003) and Abelson (1985) showed decades ago, percent variance explained is not a valid measure of practical importance. More recently, Funder and Ozer (in press) described percent variance explained (r squared) as “not merely uninformative; for purposes of evaluating effect size, the practice is actively misleading.” Thus, some of the discrepancy in conclusions between studies might be due to analysis strategy. Sure enough, when datasets initially presented as supporting different conclusions are analyzed in the same way, the results are the same:



Source: Twenge & Campbell (in press)

[The graph above shows smartphone use in the dataset used by Przybylski & Weinstein and time online from the dataset used in 1.1.11 (Twenge et al., 2018, *Emotion*). Note that both show the "Goldilocks" J-curve effect, with well-being most favorable at low levels of use, with issues increasing after ½ hour online or 2 hours using the smartphone in total. Both also show a doubling of low well-being from light to heavy use.]

[A note on data sources: Przybylski & Weinstein made their data available on OSF, and the Monitoring the Future data used by Twenge are publicly available here: https://www.icpsr.umich.edu/icpsrweb/NAHDAP/index.jsp).]

1.1.3 Twenge, Joiner, Rogers, & Martin (2018). Increases in depressive symptoms, suicide-related outcomes, and suicide rates among U.S. adolescents after 2010 and links to increased new media screen time. *Clinical Psychological Science*.

ABSTRACT: In two nationally representative surveys of U.S. adolescents in grades 8 through 12 (*N* = 506,820) and national statistics on suicide deaths for those ages 13 to 18, adolescents' depressive symptoms, suicide-related outcomes, and suicide rates increased between 2010 and 2015, especially among females. **Adolescents who spent more time on new media (including social media and electronic devices such as smartphones) were more likely to report mental health issues, and adolescents who spent more time on nonscreen activities (in-person social interaction, sports/exercise, homework, print media, and attending religious services) were less likely**. Since 2010, iGen adolescents have spent more time on new media screen activities and less time on nonscreen activities, which may account for the increases in depression and suicide. In contrast, cyclical economic factors such as unemployment and the Dow Jones Index were not linked to depressive symptoms or suicide rates when matched by year.

FIGURE FROM THE PAPER:

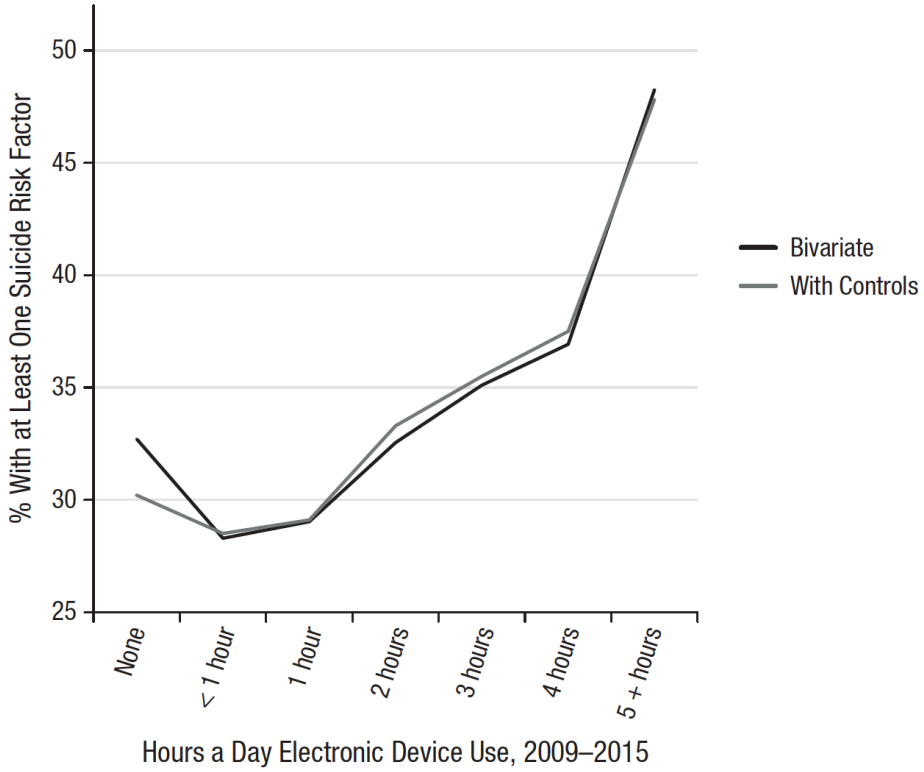


Fig. 2. Exposure-response relationship between electronic device use and having at least one suicide-related outcome, bivariate and with demographic controls for race, sex, and grade, 9–12th graders, Youth Risk Behavior Surveillance Survey (YRBSS), 2009–2015.

Source: Twenge, Joiner, Rogers, & Martin (2018), p. 12.

COMMENT: This study also finds a “Goldilocks” effect -- a J curve. Teens who use “electronic devices” for more than 5 hours per day are much more likely to report suicide-related ideation and other risk factors than kids who use such devices for just one hour per day. (Note that YRBSS does not allow us to break out social media use specifically; just “electronic device use,” as opposed to TV use.)

1.1.3a Ophir, Lipshits-Brazilier, & Rosenberg (2019). New-media screen time is not (necessarily) linked to depression: Comments on Twenge, Joiner, Rogers, and Martin (2018). *Clinical Psychological Science.*

ABSTRACT: In this commentary, we raise seven methodological concerns regarding Twenge, Joiner, Rogers, and Martin (2018), among which are inaccurate research measurements, negligible correlations between the main variables, insufficient and inadequate statistical analyses, and problematic interpretation of the results. In fact, the

negligible associations between screen activities and depression, their decrease when demographic variables are controlled, and their fading away to nil among boys challenge the article's title and conclusions, according to which increases in depressive symptoms are attributed to increases in new-media screen use. This conclusion cannot be deduced from the reported results and could be misleading to the general public.

1.1.3b Twenge, Joiner, Rogers, & Martin (2020). Considering all of the data on digital media use and depressive symptoms: Response to Ophir et al. *Clinical Psychological Science.*

ABSTRACT: We have documented increases since 2012 in depressive symptoms, suicide-related outcomes, and suicide and identified associations between digital-media use and depressive symptoms and suicide-related outcomes across two data sets: Monitoring the Future (MtF) and the Youth Risk Behavior Surveillance System (YRBSS). Ophir, Lipshits-Braziler, and Rosenberg's criticisms of the MtF data (this issue; pp. 374–378) are addressed by the YRBSS data, which included a measure of digital-media use in hours. Ophir et al. assumed that the displacement of nonscreen activities by screen activities occurs only at the individual level, whereas in fact, time displacement at the group or cohort level may be more important. Some discrepancies in the literature can be traced to the use of percentage variance explained; in fact, heavy (vs. light) digital-media users are considerably more likely (often twice as likely) to be depressed or low in well-being across several large data sets.

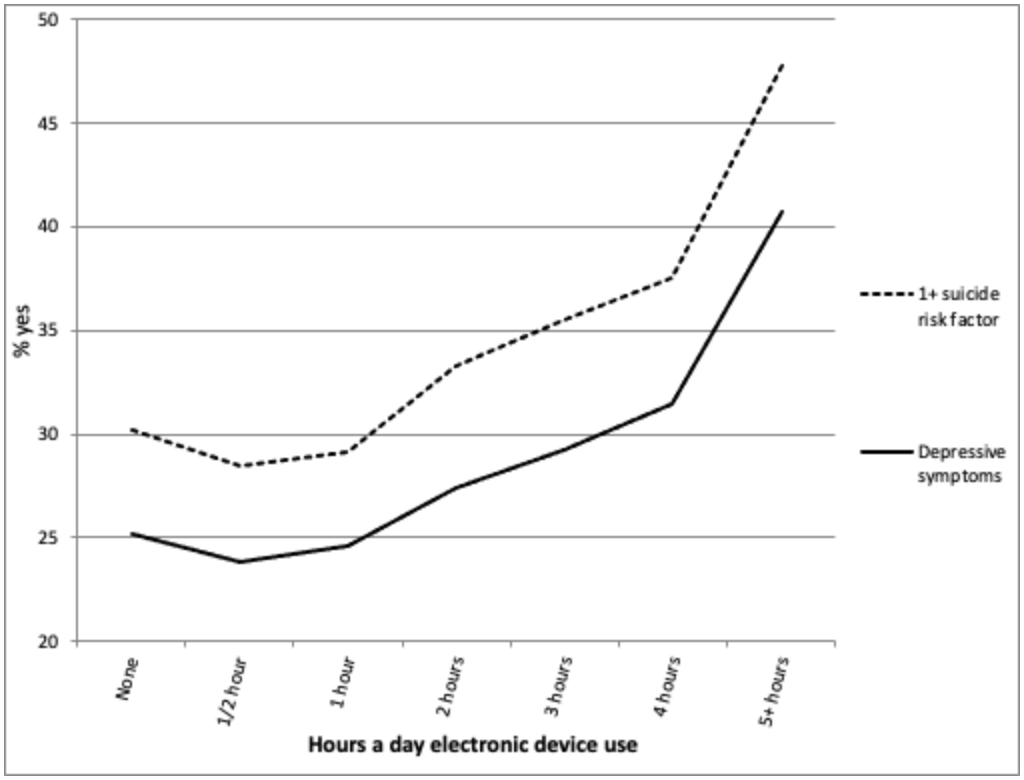


Figure 1: Exposure-response relationship between electronic device use and a) having at least one suicide-related outcome/ risk factor or b) depressive symptoms (feeling sad or hopeless for two weeks or more in a row), U.S. 9–12th graders, Youth Risk Behavior Surveillance Survey (YRBSS), 2009–2015.

1.1.4 Kelly, Zilanawala, Booker, & Sacker (2019). Social Media Use and Adolescent Mental Health: Findings From the UK Millennium Cohort Study. *EClinicalMedicine (Lancet).*

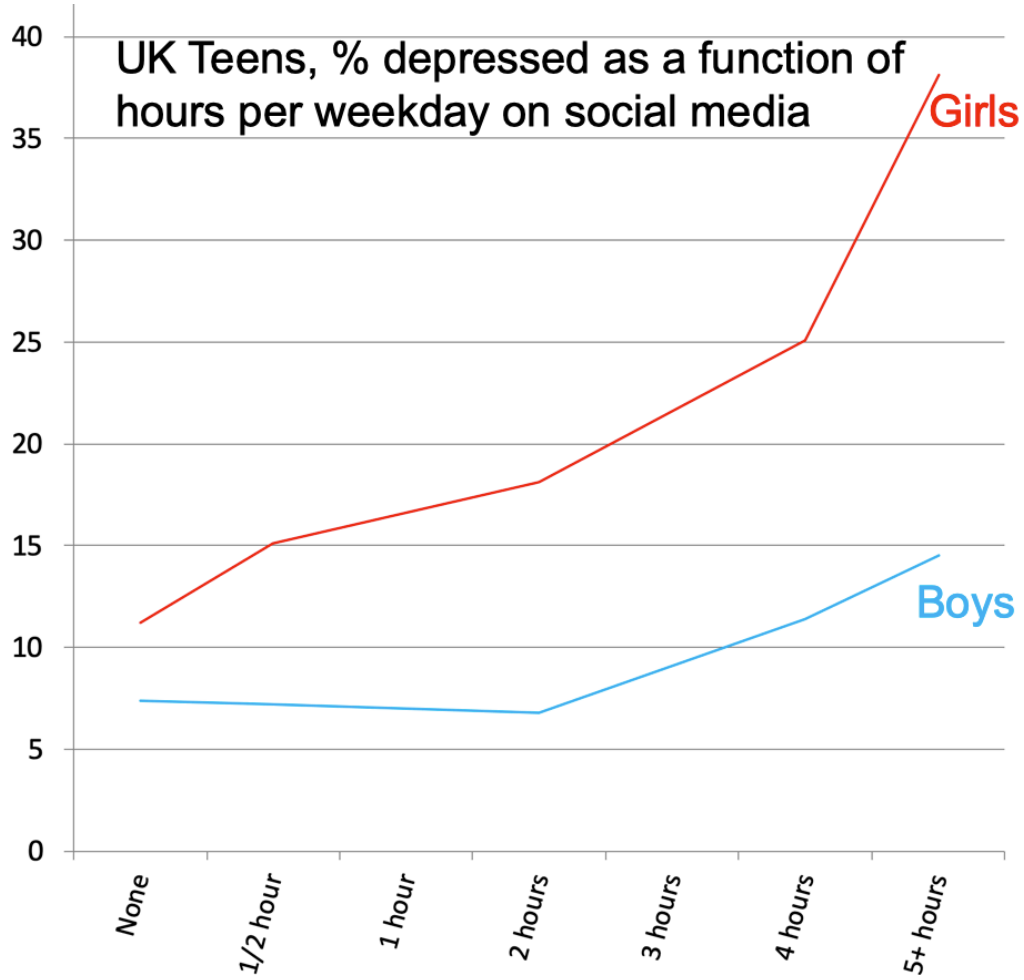
ABSTRACT: Background: Evidence suggests social media use is associated with mental health in young people but underlying processes are not well understood. This paper i) assesses whether social media use is associated with adolescents' depressive symptoms, and ii) investigates multiple potential explanatory pathways via online harassment, sleep, self-esteem and body image.
Methods: We used population based data from the UK Millennium Cohort Study on 10,904 14 year olds. Multivariate regression and path models were used to examine associations between social media use and depressive symptoms.

Findings: **The magnitude of association between social media use and depressive symptoms was larger for girls than for boys**. Compared with 1–3 h of daily use: 3 to <5 h 26% increase in scores vs 21%; ≥5 h 50% vs 35% for girls and boys respectively.

Greater social media use related to online harassment, poor sleep, low self-esteem and poor body image; in turn these related to higher depressive symptom scores. **Multiple potential intervening pathways were apparent**, for example: greater hours social media use related to body weight dissatisfaction (≥5 h 31% more likely to be dissatisfied), which in turn linked to depressive symptom scores directly (body dissatisfaction 15% higher depressive symptom scores) and indirectly via self-esteem.

Interpretation: **Our findings highlight the potential pitfalls of lengthy social media use for young people's mental health**. Findings are highly relevant for the development of guidelines for the safe use of social media and calls on industry to more tightly regulate hours of social media use.

[FIGURE WE CREATED FROM THE PAPER:]



Percent of UK adolescents with "clinically relevant depressive symptoms" by hours per weekday of social media use, including controls. Haidt and Twenge created this graph from the data given in Table 2 of Kelly et al. (2019), page 6.

[COMMENT: Heavy users have more than double the rate of depressive symptoms as non-users or light users, and the relationship is stronger for girls.]

1.1.5 Rosen, Lim, Felt et al. (2014) Media and technology use predicts ill-being among children, preteens and teenagers independent of the negative health impacts of exercise and eating habits. *Computers in Human Behavior.*

ABSTRACT: The American Academy of Pediatrics recommends no screen time for children under the age of 2 and limited screen time for all children. However, no such guidelines have been proposed **for preteens and teenagers.** Further, research shows

that children, preteens, and teenagers are using massive amounts of media and those with more screen time have been shown to have increased obesity, reduced physical activity, and decreased health. This study examined the impact of technology on four areas of ill-being–psychological issues, behavior problems, attention problems and physical health–among children (aged 4–8), preteens (9–12), and teenagers (13–18) by having 1030 parents complete an online, anonymous survey about their own and their child's behaviors. Measures included daily technology use, daily food consumption, daily exercise, and health. Hypothesis 1, which posited that unhealthy eating would predict impaired ill-being, was partially supported, particularly for children and preteens. Hypothesis 2, which posited that reduced physical activity would predict diminished health levels, was partially supported for preteens and supported for teenagers. Hypothesis 3, that increased daily technology use would predict ill-being after factoring out eating habits and physical activity, was supported. **For children and preteens, total media consumption predicted illbeing while for preteens specific technology uses, including video gaming and electronic communication, predicted ill-being. For teenagers, nearly every type of technological activity predicted poor health.** Practical implications were discussed in terms of setting limits and boundaries on technology use and encouraging healthy eating and physical activity at home and at school.
[Note: this study is early, 2014; look for more recent work like this, with preteens]

1.1.6 Lin, Sidani, Shensa et al. (2016) Association between social media use and depression among U.S. young adults. *Depression and Anxiety*.

ABSTRACT: BACKGROUND: Social media (SM) use is increasing among U.S. young adults, and its association with mental well-being remains unclear. This study assessed the association between SM use and depression in a nationally representative sample of young adults.
METHODS: We surveyed 1,787 adults ages 19 to 32 about SM use and depression. Participants were recruited via random digit dialing and address-based sampling. SM use was assessed by self-reported total time per day spent on SM, visits per week, and a global frequency score based on the Pew Internet Research Questionnaire. Depression was assessed using the Patient-Reported Outcomes Measurement Information System (PROMIS) Depression Scale Short Form. Chi-squared tests and ordered logistic regressions were performed with sample weights.
RESULTS: The weighted sample was 50.3% female and 57.5% White. **Compared to those in the lowest quartile of total time per day spent on SM, participants in the highest quartile had significantly increased odds of depression (AOR = 1.66, 95%**

CI = 1.14-2.42) after controlling for all covariates. Compared with those in the lowest quartile, individuals in the highest quartile of SM site visits per week and those with a higher global frequency score had significantly increased odds of depression (AOR = 2.74, 95% CI = 1.86-4.04; AOR = 3.05, 95% CI = 2.03-4.59, respectively). All associations between independent variables and depression had strong, linear, dose-response trends. Results were robust to all sensitivity analyses.
CONCLUSIONS: **SM use was significantly associated with increased depression**. Given the proliferation of SM, identifying the mechanisms and direction of this association is critical for informing interventions that address SM use and depression.

[COMMENT: This study was unusual in finding linear trends, not curves (although Kelly et al, 1.1.4, also found fairly linear effects -- so **perhaps linear trends are more common for social media on its own, whereas there is a "goldilocks" function for "digital media" more generally**). It is also different from the others in being a survey of millennials (born before 1995) rather than Gen Z. (Participants were mostly in their 20s when surveyed in or around 2015)

1.1.7 Moved to 5.47 [Liu, Wu, & Yao (2016). Dose–response association of screen time-based sedentary behaviour in children and adolescents and depression: a meta-analysis of observational studies.**]**

1.1.8 Kremer, Elshaug, Leslie, Toumbourou, Patton & Williams (2014). Physical activity, leisure-time screen use and depression among children and young adolescents. Journal of Science and Medicine in Sport.
[Thanks to Ian Goddard for suggesting this article]

ABSTRACT: Objectives: Adolescent mental disorders remain a relatively neglected area of research, despite evidence that these conditions affect youth disproportionately. We examined associations between physical activity, leisure-time screen use and depressive symptoms among Australian children and adolescents.
DESIGN: Large cross-sectional observational study.
METHODS: Self-reported physical activity and leisure-time screen behaviours, and depressive symptoms using the Short Mood and Feeling Questionnaire were assessed in 8256 students aged 10–16 years (mean age = 11.5 years, SD = 0.8).
RESULTS: **Thirty three percent of the sample reported moderate to high depressive symptoms, with rates higher among females** (OR = 1.18; 95% CI: 1.02, 1.36; p = 0.001). Increased opportunities to be active at school outside class (OR = 0.70; 0.58, 0.85; p < 0.001), being active in physical education classes (OR = 0.77; 0.69, 0.86; p < 0.001), greater involvement in sports teams at school (OR = 0.77; 0.67,

0.88; p < 0.001) and outside of school (OR = 0.84; 0.73, 0.96; p = 0.01) were all independently associated with lower odds for depressive symptoms. Meeting recommended guidelines for physical activity (OR = 0.62; 0.44, 0.88; p = 0.007) and, for 12–14 year olds, leisure-time screen use (OR = 0.77; 0.59, 0.99; p = 0.04) were also independently associated with lower odds for depressive symptoms.
CONCLUSIONS: **Higher levels of physical activity among children and young adolescents, and lower levels of leisure-time screen use among young adolescents, are associated with lower depressive symptoms.** Longitudinal studies are needed to understand the causal relationships between these variables.

[COMMENT: Note the different findings for 12-14 year olds, compared to older teens.]

1.1.9 Robinson, Bonnette, Howard, Ceballos, Dailey, Lu, & Grimes (2019). Social comparisons, social media addiction, and social interaction: An examination of specific social media behaviors related to major depressive disorder in a millennial population. *Journal of Applied Biobehavioral Research*.
[Thanks to Ian Goddard for suggesting this article]

ABSTRACT: Although studies have shown that increases in the frequency of social media use may be associated with increases in depressive symptoms of individuals with depression, the current study aimed to identify specific social media behaviors related to major depressive disorder (MDD). **Millennials** (N = 504) who actively use Facebook, Twitter, Instagram, and/or Snapchat participated in an online survey assessing major depression and specific social media behaviors. Univariate and multivariate analyses were conducted to identify specific social media behaviors associated with the presence of MDD. **The results identified five key social media factors associated with MDD.** Individuals who were more likely to compare themselves to others better off than they were (p = 0.005), those who indicated that they would be more bothered by being tagged in unflattering pictures (p = 0.011), and those less likely to post pictures of themselves along with other people (p = 0.015) were more likely to meet the criteria for MDD. Participants following 300 + Twitter accounts were less likely to have MDD (p = 0.041), and those with higher scores on the Social Media Addiction scale were significantly more likely to meet the criteria for MDD (p = 0.031). **Participating in negative social media behaviors is associated with a higher likelihood of having MDD**. Research and clinical implications are considered.

COMMENT: The associations found in this study are almost certainly partly due to reverse correlation: people who are already depressed/anxious are going to do more

social comparison and be more upset about an unflattering photo. But the study is helpful as a reminder that it's not just total hours that matter, it's what teens are doing during those hours. Three hours a day may cause real damage for a depressed teen, but may be neutral or positive for a mentally healthy and highly sociable teen.

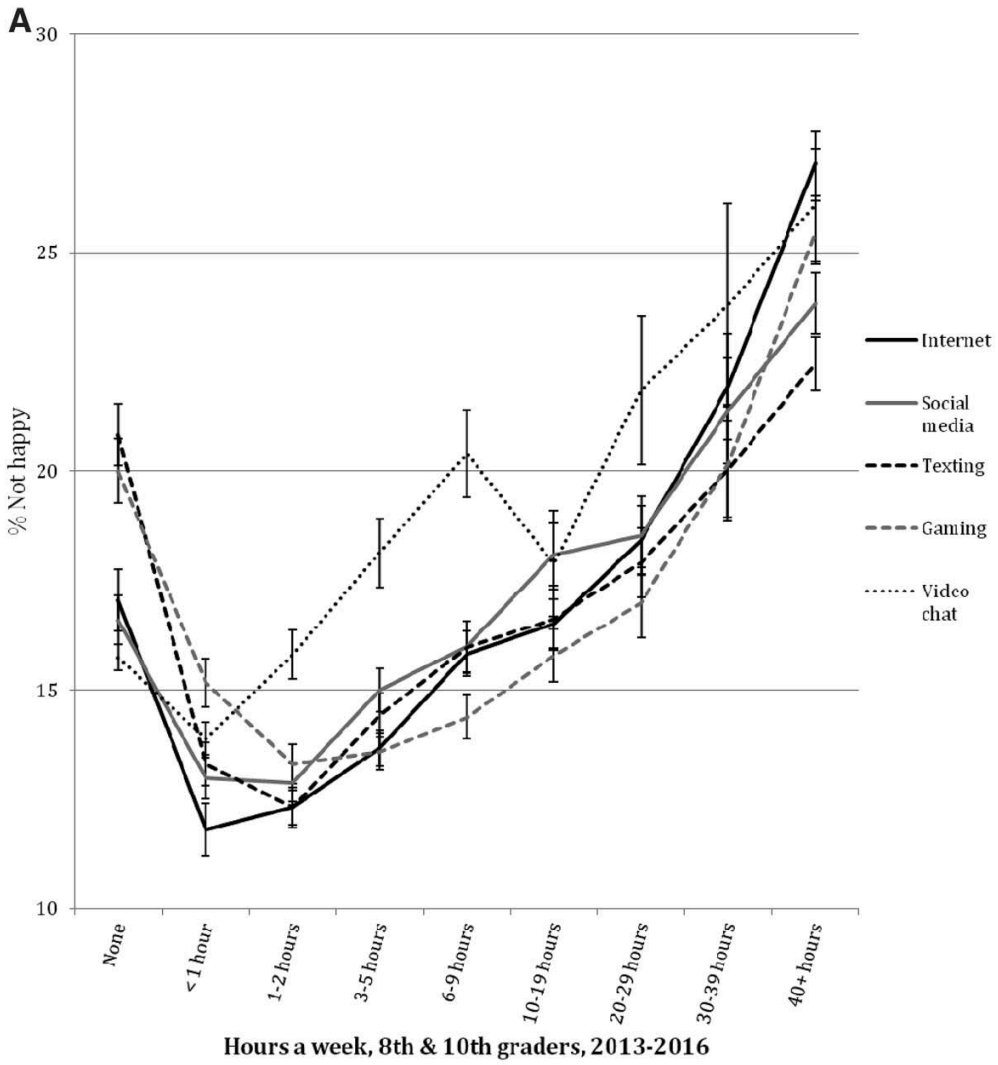
1.1.10 Boer… & Stevens (2020). Adolescents' Intense and Problematic Social Media Use and Their Well-Being in 29 Countries. *The Journal of Adolescent Health: Official Publication of the Society for Adolescent Medicine*.

ABSTRACT: PURPOSE: This study examined (1) whether intense and problematic social media use (SMU) were independently associated with adolescent well-being; (2) whether these associations varied by the country-level prevalence of intense and problematic SMU; and (3) whether differences in the country-level prevalence of intense and problematic SMU were related to differences in mobile Internet access.
METHODS: Individual-level data came from 154,981 **adolescents (meanage = 13.5)** from 29 countries that participated in the 2017/2018 Health Behaviour in School-aged Children (HBSC) survey. **Intense SMU was measured by the time spent on social media, whereas problematic SMU was defined by symptoms of addiction** to social media. Mental (life satisfaction and psychological complaints), school (school satisfaction and perceived school pressure), and social (family support and friend support) well-being were assessed. Country-level data came from aggregated individual-level data and data from the Organisation for Economic Co-operation and Development (OECD) on Internet access.
RESULTS: **Two-level regression analyses indicated that in countries with a lower prevalence of intense SMU, intense users reported lower levels of life satisfaction and family support and more psychological complaints than nonintense users. In contrast, in countries with a higher prevalence of intense SMU, intense users reported higher levels of family support and life satisfaction than nonintense users, and similar levels of psychological complaints.** In all countries, intense users reported more friend support than nonintense users. **The findings regarding problematic SMU were more consistent: In all countries, problematic users reported lower well-being on all domains than nonproblematic users.** Observed differences in country-level prevalence rates of intense and problematic SMU could not be explained by mobile Internet access.
CONCLUSIONS: Adolescents reporting problematic SMU are particularly at risk of lower well-being. In many countries, intense SMU may be a normative adolescent behavior that contributes positively to specific domains of their well-being.
FIGURE (described as a "graphical abstract"):

1.1.11 Twenge, Martin, & Campbell (2018). Decreases in psychological well-being among American adolescents after 2012 and links to screen time during the rise of smartphone technology. *Emotion*.

ABSTRACT: In nationally representative yearly surveys of United States 8th, 10th, and 12th graders 1991–2016 (N = 1.1 million), psychological well-being (measured by self-esteem, life satisfaction, and happiness) suddenly decreased after 2012. Adolescents who spent more time on electronic communication and screens (e.g., social media, the Internet, texting, gaming) and less time on nonscreen activities (e.g., in-person social interaction, sports/exercise, homework, attending religious services) had lower psychological well-being. **Adolescents spending a small amount of time on electronic communication were the happiest.** Psychological well-being was lower in years when adolescents spent more time on screens and higher in years when they spent more time on nonscreen activities, with changes in activities generally preceding declines in well-being. Cyclical economic indicators such as unemployment were not significantly correlated with well-being, suggesting that the Great Recession was not the cause of the decrease in psychological well-being, which may instead be at least partially due to the rapid adoption of smartphones and the subsequent shift in adolescents' time use.

FIGURE FROM PAPER:



Source: Twenge, Martin, & Campbell (2018) Figure 5A.

COMMENT: Once again, there's the "Goldilocks" J-curve -- the fewest are unhappy at low levels of use, and the number unhappy increases from there. For time on the Internet, twice as many heavy users are unhappy as light users.

1.1.12 Primack, Shensa, Sidani, et al. (2017). Social media use and perceived social isolation among young adults in the U.S. *American Journal of Preventive Medicine*. [h/t Ray Aldred]

ABSTRACT: Introduction. Perceived social isolation (PSI) is associated with substantial morbidity and mortality. Social media platforms, commonly used by young adults, may

offer an opportunity to ameliorate social isolation. This study assessed associations between social media use (SMU) and PSI among U.S. young adults.
METHODS: Participants were a nationally representative sample of 1,787 U.S. adults aged 19–32 years. They were recruited in October–November 2014 for a cross-sectional survey using a sampling frame that represented 97% of the U.S. population. SMU was assessed using both time and frequency associated with use of 11 social media platforms, including Facebook, Twitter, Google+, YouTube, LinkedIn, Instagram, Pinterest, Tumblr, Vine, Snapchat, and Reddit. PSI was measured using the Patient-Reported Outcomes Measurement Information System scale. In 2015, ordered logistic regression was used to assess associations between SMU and SI while controlling for eight covariates.
RESULTS: In fully adjusted multivariable models that included survey weights, **compared with those in the lowest quartile for SMU time, participants in the highest quartile had twice the odds of having greater PSI (AOR=2.0, 95% CI=1.4, 2.8). Similarly, compared with those in the lowest quartile, those in the highest quartile of SMU frequency had** more than three times the odds of having greater PSI (AOR=3.4, 95% CI=2.3, 5.1). Associations were linear ($p<0.001$ for all), and results were robust to all sensitivity analyses.
CONCLUSIONS: **Young adults with high SMU seem to feel more socially isolated than their counterparts with lower SMU.** Future research should focus on determining directionality and elucidating reasons for these associations

[COMMENT: This study was done with millennials only, in 2014.]

1.1.13 Sampasa-Kanyinga, & Lewis (2015). Frequent use of social networking sites is associated with poor psychological functioning among children and adolescents. *Cyberpsychology, Behavior, and Social Networking*.

ABSTRACT: Social networking sites (SNSs) have gained substantial popularity among youth in recent years. However, the relationship between the use of these Web-based platforms and mental health problems in children and adolescents is unclear. This study investigated the association between time spent on SNSs and unmet need for mental health support, poor self-rated mental health, and reports of psychological distress and suicidal ideation in a representative sample of middle and high school children in Ottawa, Canada. Data for this study were based on **753 students** (55% female; *M*age=14.1 years) **in grades 7–12** derived from the **2013 Ontario Student Drug Use and Health Survey**. Multinomial logistic regression was used to examine the associations between mental health variables and time spent using SNSs. Overall,

25.2% of students reported using SNSs for more than 2 hours every day, 54.3% reported using SNSs for 2 hours or less every day, and 20.5% reported infrequent or no use of SNSs. **Students who reported unmet need for mental health support were more likely to report using SNSs for more than 2 hours every day than those with no identified unmet need for mental health support. Daily SNS use of more than 2 hours was also independently associated with poor self-rating of mental health and experiences of high levels of psychological distress and suicidal ideation.** The findings suggest that students with poor mental health may be greater users of SNSs. These results indicate an opportunity to enhance the presence of health service providers on SNSs in order to provide support to youth.

Figure:

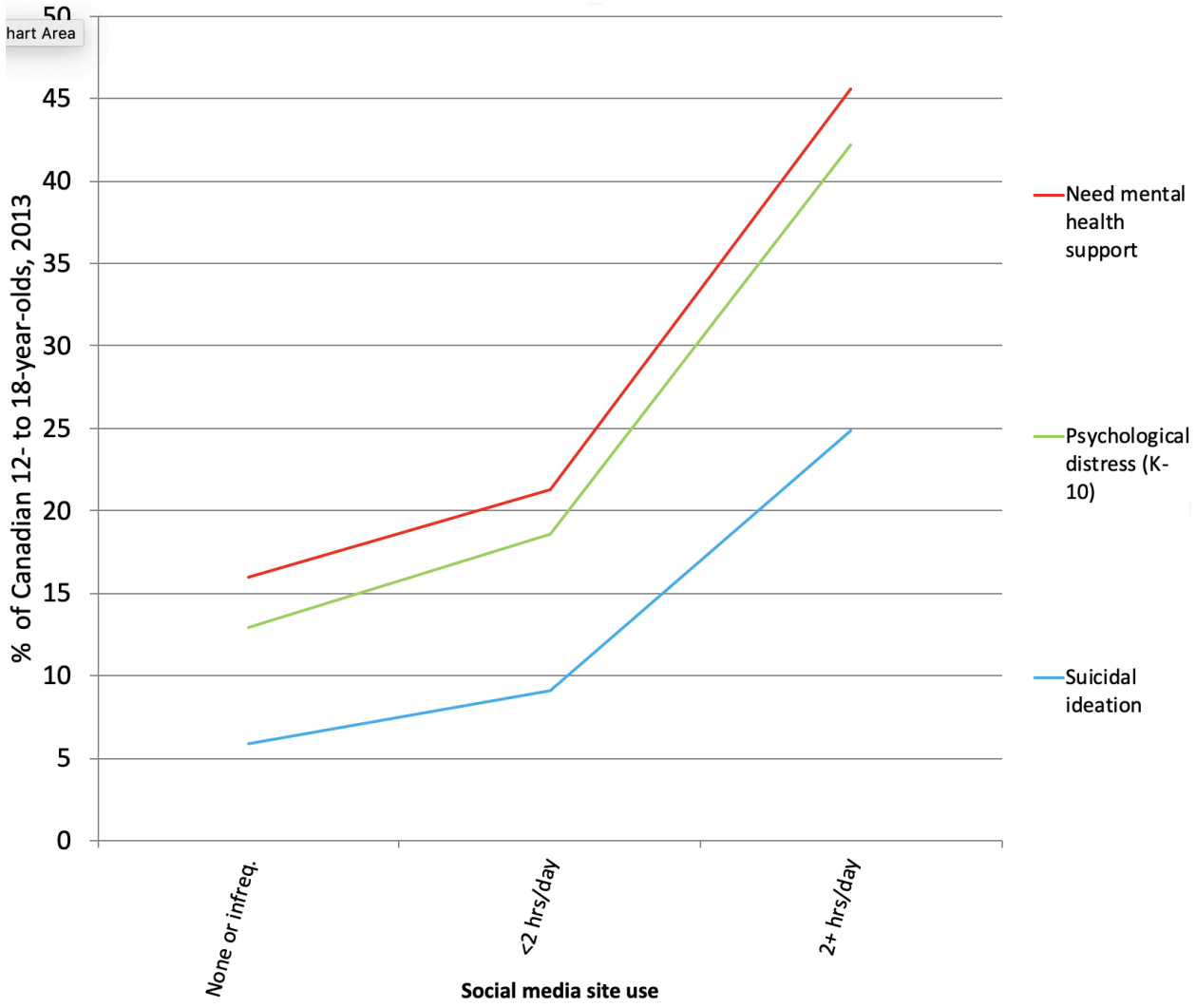


Figure: Percent with mental health issues by level of use of social media sites, Canadian adolescents [Graphed by Jean Twenge]

[COMMENT: This study finds very large associations between social media use and mental health issues. Trends are somewhat linear rather than J shaped. Compared to non-users, heavy users are 3 times more likely to need mental health services and to experience high psychological distress and 4 times more likely to have seriously considered suicide.]

1.1.14 Primack, Bisbey, Shensa et al. (2019). The association between valence of social media experiences and depressive symptoms. *Depression and Anxiety.*

ABSTRACT: BACKGROUND: Social media (SM) may confer emotional benefits via connection with others. However, epidemiologic studies suggest that overall SM is paradoxically associated with increased depressive symptoms. To better understand these findings, we examined the association between positive and negative experiences on SM and depressive symptoms.
METHODS: We conducted a cross-sectional survey of 1,179 full-time students at the University of West Virginia, aged 18 to 30, in August 2016. Independent variables were self-reported positive and negative experiences on SM. The dependent variable was depressive symptoms as measured using the Patient-Reported Outcomes Measurement Information System. We used multivariable logistic regression to assess associations between SM experiences and depressive symptoms controlling for sociodemographic factors including age, sex, race/ethnicity, education, relationship status, and living situation.
RESULTS: Of the 1,179 participants, 62% were female, 28% were non-White, and 51% were single. After controlling for covariates, **each 10% increase in positive experiences on SM was associated with a 4% decrease in odds of depressive symptoms**, but this was not statistically significant (adjusted odds ratio [AOR] = 0.96; 95% confidence interval [CI] = 0.91–1.002). **However, each 10% increase in negative experiences was associated with a 20% increase in odds of depressive symptoms** (AOR = 1.20; 95% CI = 1.11–1.31). When both independent variables were included in the same model, the association between negative experiences and depressive symptoms remained significant (AOR = 1.19, 95% CI = 1.10–1.30).
CONCLUSIONS: **Negative experiences online may have higher potency than positive ones because of negativity bias.** Future research should examine temporality to determine if it is also possible that individuals with depressive symptomatology are inclined toward negative interactions.

[NOTES: On negativity bias, see this review paper, or see the new book by Tierney and Baumeister, *The Power of Bad.* Studies across a variety of domains often find that bad

events are four or five times more powerful than good events, so if people have three times as many good interactions or social comparisons on social media as bad interactions or social comparisons, the net effect on the person may be negative.]

1.1.15 Nesi & Prinstein (2015). Using social media for social comparison and feedback-seeking: Gender and popularity moderate associations with depressive symptoms. *Journal of Abnormal Child Psychology.* [H/T Bradley Riew]

ABSTRACT: This study examined specific technology-based behaviors (social comparison and interpersonal feedback seeking) that may interact with offline individual characteristics to predict concurrent depressive symptoms among adolescents. A total of 619 students (57 % female; mean age 14.6) completed self-report questionnaires at 2 time points. Adolescents reported on levels of depressive symptoms at baseline, and 1 year later on depressive symptoms, frequency of technology use (cell phones, Facebook, and Instagram), excessive reassurance-seeking, and technology-based social comparison and feedback-seeking. Adolescents also completed sociometric nominations of popularity. Consistent with hypotheses, **technology-based social comparison and feedback seeking were associated with depressive symptoms. Popularity and gender served as moderators of this effect, such that the association was particularly strong among females and adolescents low in popularity. Associations were found above and beyond the effects of overall frequency of technology use, offline excessive reassurance-seeking, and prior depressive symptoms.** Findings highlight the utility of examining the psychological implications of adolescents' technology use within the framework of existing interpersonal models of adolescent depression and suggest the importance of more nuanced approaches to the study of adolescents' media use.

[NOTE: this study is not a straight longitudinal study focused on effects at Time 2 of hours spent on social media after Time 1; rather, it examines the more specific associations of depressive symptoms with Technology-Based Social Comparison and Feedback Seeking (SCFS). **The more kids do this, the more depressed they are, especially girls, and adolescents who are low in popularity.**]

FIGURE:

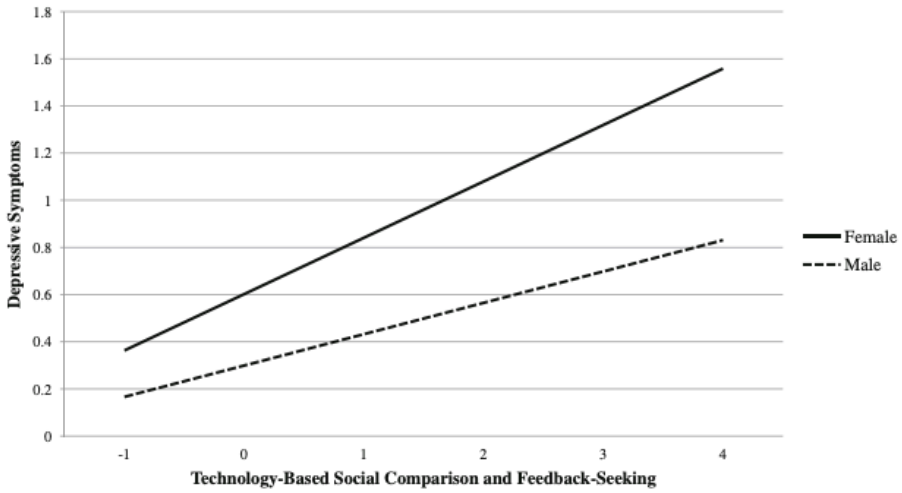


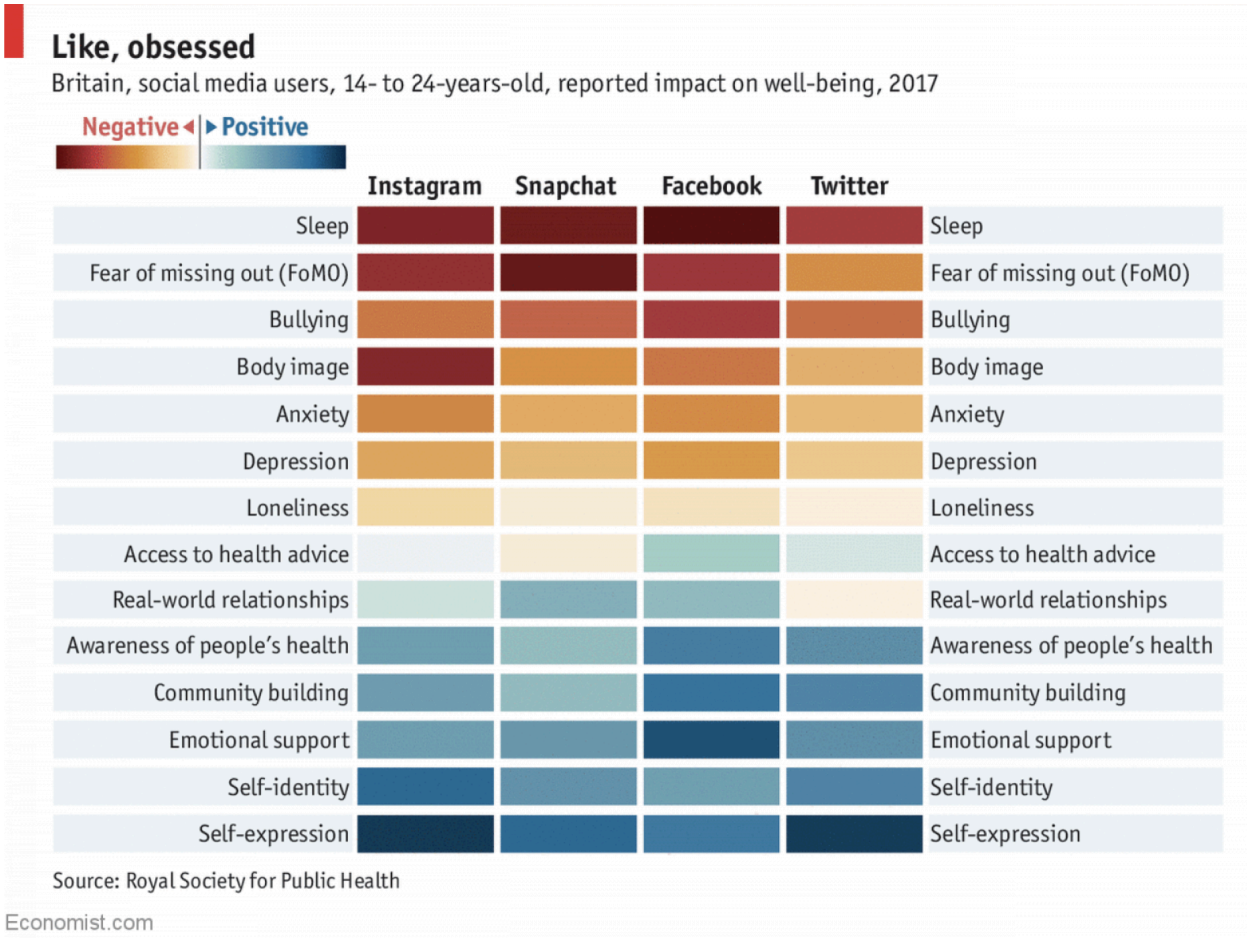
Fig. 1 Plot of simple slopes for technology-based social comparison and feedback-seeking (SCFS) by gender interaction on depressive symptoms. Note that technology-based SCFS is mean centered

1.1.16 Hoare… & van Sluijs (2020). Association of Child and Adolescent Mental Health With Adolescent Health Behaviors in the UK Millennium Cohort. *JAMA Network Open*.

ABSTRACT: IMPORTANCE: There is potential for mental health status to act as a determinant of an individual's ability to engage in healthful lifestyle behaviors.
OBJECTIVE: To investigate the associations of parent-reported mental health problems during childhood and self-reported mental health problems in adolescence with health behaviors in adolescence.
DESIGN AND PARTICIPANTS: This cohort study used data from wave 4 (collected in 2008) and wave 6 (collected in 2015) of the Millennium Cohort Study, a UK population-representative longitudinal study of young people born during 2000 to 2001. Wave 4 included data on parent-reported mental health issues for children at age 7 years. Wave 6 included data on self-reported mental health problems as well as health behaviors for the same children at age 14 years. Data were analyzed July 5, 2020.
EXPOSURES: Mental health problems at age 7 years were parent-reported using Strengths and Difficulties Questionnaire. Mental health problems at age 14 years were self-reported using the Short Mood and Feelings Questionnaire.
MAIN OUTCOMES AND MEASURES: Health behaviors at age 14 years were the main outcome of interest. Sleep duration; fruit, vegetable, and soft drink consumption; and social media use were self-reported using recall on a typical day. Regression models were calculated for each lifestyle variable, with mental health change from ages 7 to 14 years as the exposure variable. Data were weighted to account for the potential clustering of region of sampling and adjusted for nonresponse.

RESULTS: A total of 9369 participants were included in waves 4 and 6 of the Millennium Cohort Study, including 4665 (48.1%) girls and 6014 participants (81.9%) who were born in England. **Adolescents who self-reported mental health problems at age 14 years only were less likely to have at least 9 hours of sleep (odds ratio [OR], 0.39; 95% CI, 0.34-0.45) and to consume fruit (OR, 0.55; 95% CI, 0.46-0.65) and vegetables (OR, 0.66; 95% CI, 0.52-0.83) reported greater use of social media (b = 0.62; 95% CI, 0.49-0.75) compared with individuals who did not have mental health problems at both time points.** Similarly, those with mental health problems at both time points were less likely to achieve 9 hours sleep (OR, 0.68; 95% CI, 0.51-0.90), consume fruit (OR, 0.39; 95% CI, 0.26-0.58) and vegetables (OR, 0.57; 95% CI, 0.35-0.91), and reported greater social media use (b = 0.63; 95% CI, 0.34-0.91). CONCLUSIONS: These findings suggest that the presence of depressive symptoms at ages 7 and 14 years and at age 14 years only were associated with some health behaviors in adolescence. These findings are particularly important given that independent health behaviors can deteriorate and become habitual during adolescence, and adolescence is a known time for the first emergence of mental health problems that continue into adulthood.

1.1.16 Royal Society for Public Health, survey of British teens ages 14-24, done in 2017. As reported in The Economist, which produced this graph showing what the teens themselves see as the effects--good and bad--of the most popular platforms. [It would be useful if someone would go into the original data and break this out by both sex and age-group]



1.1.17 Twenge & Martin (2020). Gender differences in associations between digital media use and psychological well-being: Evidence from three large datasets. *Journal of Adolescence.*

ABSTRACT: We drew from three large, representative surveys of 13- to 18-year-old adolescents in the U.S. and UK (total N = 221,096) examining digital media use in hours per day and several measures of psychological well-being separately in each of the three datasets. Results: **Adolescent girls spent more time on smartphones, social media, texting, general computer use, and online, and boys spent more time gaming and on electronic devices in general**. A**ssociations between moderate or heavy digital media use and low psychological well-being/mental health issues were generally larger for girls than for boys**. Light users of digital media were slightly higher in well-being than non-users, with larger differences among boys. **Among both genders, heavy users of digital media were often twice as likely as low users to**

be low in well-being or have mental health issues, including risk factors for suicide.

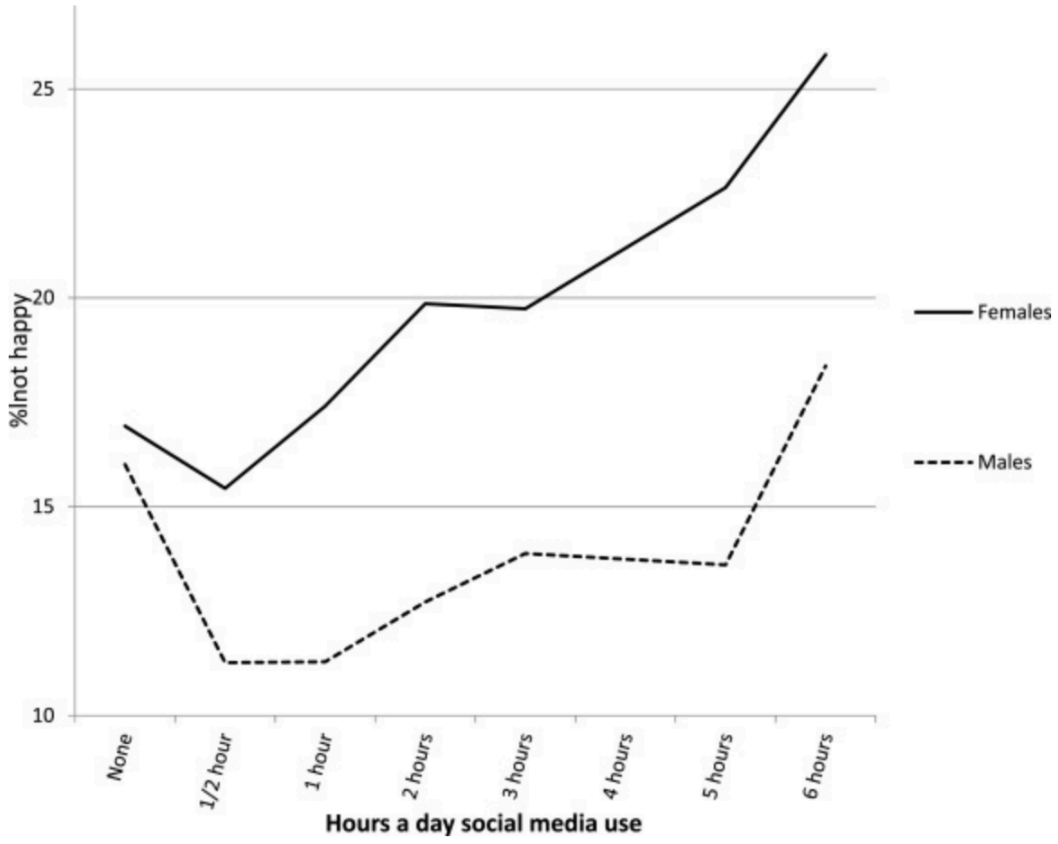


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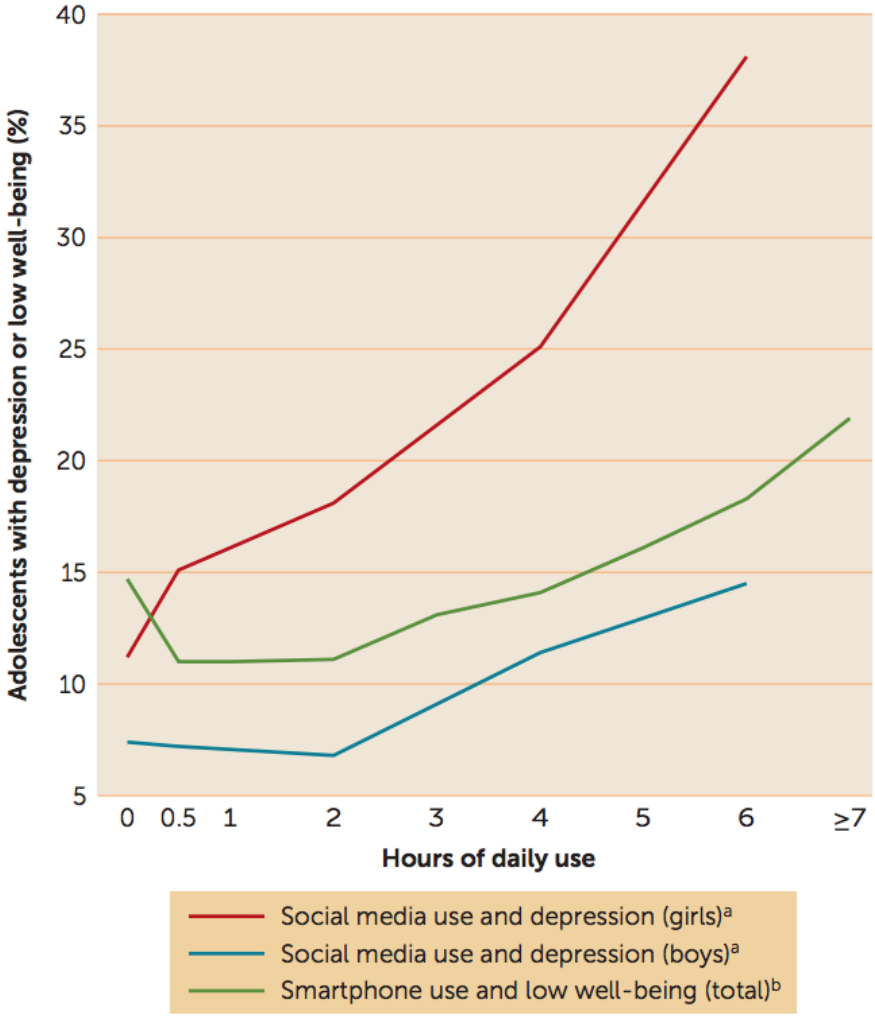
Fig. 4. Percentage of males and females unhappy by hours a day of social media use, MtF.

1.1.18 Twenge, J.M. (2020). Increases in Depression, Self-Harm, and Suicide Among U.S. Adolescents After 2012 and Links to Technology Use: Possible Mechanisms. *Psychiatric Research and Clinical Practice,* 1-7.

ABSTRACT: OBJECTIVE: Increases in depression among adolescents have been concurrent with increases in digital media use. In this article, recent trends in mental health among U.S. adolescents and young adults are discussed and theories about their possible connection with concurrent increases in digital media use are presented.

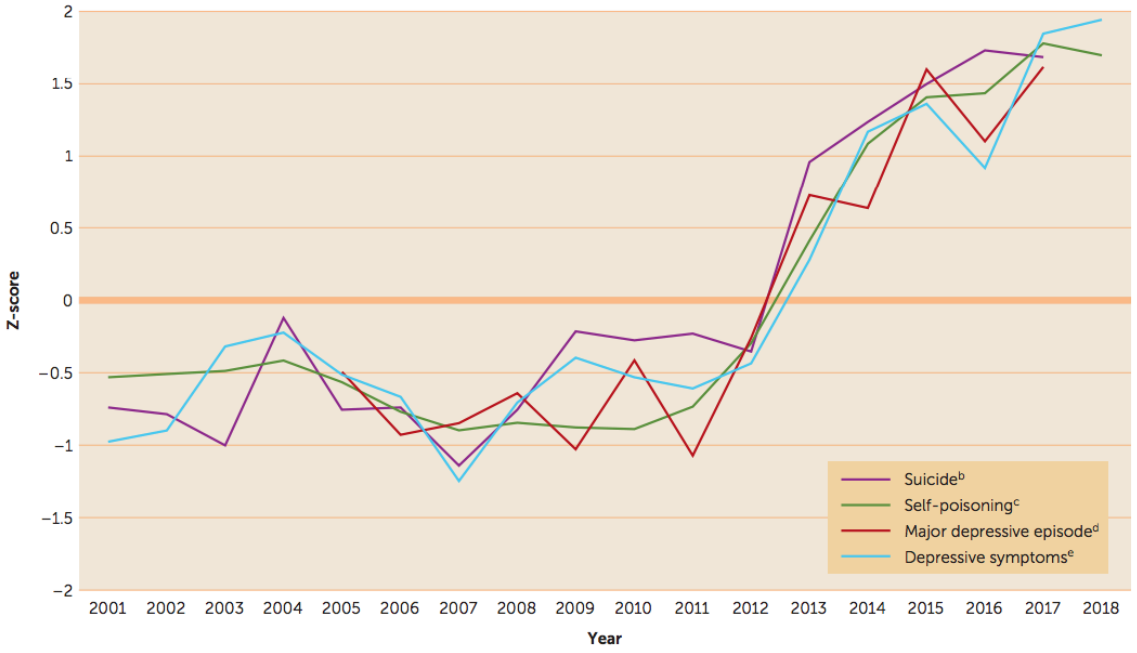
METHODS**:** Large studies of trends in mental health in the 2000s and 2010s are described and possible mechanisms for the trends are discussed based on existing literature.
RESULTS: After remaining stable during the early 2000s, the prevalence of mental health issues among U.S. adolescents and young adults began to rise in the early 2010s. These trends included sharp increases in depression, anxiety, loneliness, self-harm, suicidal ideation, suicide attempts, and suicide, with increases more pronounced among girls and young women. There is a growing consensus that these trends may be connected to the rise in technology use. Increased digital media and smartphone use may influence mental health via several mechanisms, including displacement of time spent in in-person social interactions, individually and across the generation, as adolescent cultural norms evolve; disruption of in-person social interactions; interference with sleep time and quality; cyberbullying and toxic online environments; and online contagion and information about self-harm.
CONCLUSIONS: U.S. adolescents and young adults are in the midst of a mental health crisis, particularly among girls and young women. The rise of digital media may have played a role in this problem via several mechanisms.

FIGURE 2. Proportion of adolescents with depression or low psychological well-being, by hours a day of social media or smartphone use



[a] Source: Kelly et al. (23).
[b] Source: Przybylski and Weinstein (25) and reanalyzed by Twenge and Campbell (28).

FIGURE 1. Indicators of poor mental health among U.S. girls and young women, 2001–2018[a]



[a] Standard deviations are within means at the generational level, not at the individual level, and thus should not be used to calculate individual-level effect sizes.
[b] Source: Centers for Disease Control and Prevention. Suicide rates among 12- to 14-year-old girls.
[c] Source: Spiller et al. (14). Self-poisoning among 13- to 15-year-old girls.
[d] Source: Twenge et al. (11). Major depressive episode among 14- to 15-year-old girls.
[e] Sources: Keyes et al. (8) and Twenge et al. (9). Depressive symptoms among eighth-grade girls.

1.1.19 Downey & Gibbs (2020). Kids These Days: Are Face-to-Face Social Skills among American Children Declining? *American Journal of Sociology.*

ABSTRACT: Many social commentators posit that children's social skills are declining as a result of exposure to technology. But this claim is difficult to assess empirically because it is challenging to measure "social skills" with confidence and because a strong test would employ nationally representative data of multiple cohorts. No scholarship currently meets these criteria. The authors fill that gap by comparing teachers' and parents' evaluations of children's social skills among children in the Early Childhood Longitudinal Study 1998 and 2010 cohorts. **The authors find no evidence that teachers or parents rate children's face-to-face social skills as poorer among more recent cohorts**, even when accounting for family characteristics, screen time use, and other factors. In addition, within cohorts, children with heavy exposure to screens exhibit similar social skills trajectories compared to children with little exposure to screens. **There is a notable exception—social skills are lower for children who access online gaming and social networking many times a day**. Overall, however, the results represent a challenge to the dominant narrative that social skills are declining due to technological change.

[NOTE FROM HAIDT: This study takes the view that there is a “moral panic” over screen time that is not justified by the data. I agree. As in so many studies in this document, the data do not support a claim that “screen time” or “device use” is bad for kids. But our literature review is focused on *social media*, and **this paper DOES report a decline in social skills [or rather, a reduction in normal development of social skills] for those who are heavy users of social media.** The effect size is comparable to that found in many other studies (see bottom of p. 1056). It should also be noted that this study only went up through 5th grade -- around age 11, an age at which few kids have become heavy social media users, yet even still, the authors found a reduction in social skills associated with heavy use.]

1.1.20 Primack, B.A., Shensa, A., Escobar-Viera, C.G., Barrett, E.L., Sidani, E., Colditz, J.B., & James, E. (2017). Use of multiple social media platforms and symptoms of depression and anxiety: A nationally-representative study among U.S. young adults. *Computers in Human Behavior*.

ABSTRACT: INTRODUCTION: While increased time spent on social media (TSSM) has been associated with depression and anxiety, the independent role of using multiple social media (SM) platforms is unclear.
METHODS: We surveyed a nationally-representative sample of 1787 U.S. young adults ages 19–32. Depression and anxiety symptoms were measured using the Patient-Reported Outcomes Measurement Information System (PROMIS). We assessed use of multiple SM platforms with an adapted Pew Internet Research scale. We used ordered logistic regression models to assess associations between use of multiple SM platforms and mental health outcomes while controlling for eight covariates, including overall TSSM.
RESULTS: **Compared to those who used 0–2 social media platforms, participants who used 7–11 social media platforms had substantially higher odds of having increased levels of both depression (Adjusted Odds Ratio [AOR] = 3.0, 95% CI = 1.9–4.8) and anxiety symptoms (AOR = 3.2, 95% CI = 2.0–5.1). Associations were linear (p < 0.001 for all)** and robust to all sensitivity analyses.
CONCLUSIONS: Use of multiple SM platforms is independently associated with symptoms of depression and anxiety, even when controlling for overall TSSM. These associations are strong enough that it may be valuable for clinicians to ask individuals with depression and anxiety about multiple platform use and to counsel regarding this potential contributing factor.

1.1.21 Barthorpe, Winstone, Mars, & Moran. (2020). Is social media screen time really associated with poor adolescent mental health? A time use diary study. *Journal of Affective Disorders*.

ABSTRACT: BACKGROUND: There is increasing concern regarding the potential impact of social media use on the mental health of young people. Previous research has relied heavily on retrospective accounts of social media screen-time. Yet recent evidence suggests that such self-report measures are unreliable, correlating poorly with more objective measures of social media use. In principle, time use diaries provide a less biased measure of social media use.
METHODS: We analysed cross-sectional data from the Millennium Cohort Study to explore associations between social media screen-time as recorded in time use diaries (TUD) and key mental health outcomes – self-harm in the past year, depressive symptoms (Short Mood and Feelings Questionnaire), self-esteem (shortened Rosenberg scale) – in adolescence. Social media TUD data were available for 4,032 participants (25.4% aged 13; 73.5% aged 14; 1.1% aged 15).
RESULTS: Following adjustment for confounders, **a greater amount of time spent on social media was associated with an increased risk of self-harm (adjusted OR per 30-minute increase in weekday use: 1.13, 95% CI 1.06 to 1.21) and depression (adjusted OR=1.12, 95%CI 1.07 to 1.17) and lower levels of self-esteem (adjusted B = -0.12, 95%CI -0.20 to -0.04) in females.** Findings were similar for weekday and weekend use.
LIMITATIONS: The cross-sectional nature of the data limits inference in relation to the causal direction of these associations.
CONCLUSIONS: Future research should examine the direction of the associations with self-harm and other mental health outcomes and explore how adolescents engage with social media as well as how much time they spend online.

DEFINITION OF TERMS: The four classes were labelled *High Communicators* (47.8% of the sample), *Moderate Communicators* (33.1%), *Broadcasters* (12.6%) and *Minimal* (6.5%). The distinction between the non-minimal classes relates to the intensity of messaging and differences in propensity for sharing content with others. *High Communicators* were characterised by frequent messaging and socialising with more moderate content sharing (posting selfies, opinions and other content) and browsing; *Moderate Communicators* were characterised by moderate messaging and browsing but minimal content sharing; ***Broadcasters* were characterised by frequent content sharing in addition to messaging, socialising and browsing**; *Minimal* users were characterised by non-use of social media, or infrequent messaging and browsing.

Composite scores based on conditional probabilities for each social media activity are displayed in Figure 2, which shows that Broadcasters were characterised by higher probabilities across all 13 SMU activities. Probabilities of messaging, arranging to meet friends, music, gaming, interests and looking at photos were only slightly higher than the High Communications class, however much larger differences were found for content sharing activities such as sharing selfies, photos, quizzes, and opinions.

ADDITIONAL NOTES: SELF-HARM: Odds of self-harm were higher for Broadcasters than for Moderate Communicators (fully adjusted Odds Ratio (AOR) = 3.74, 95% CI: 2.35–5.96), with some evidence of increased odds for Broadcasters compared to Minimal users (AOR = 1.95, 95% CI: 0.92–4.14). Odds were also higher for High Communicators compared to Moderate Communicators (AOR = 3.16, 95% CI: 1.93–5.18). Odds of self-harm were higher for Broadcasters compared to High Communicators in unadjusted analysis (model 0) but attenuated to the null following adjustment for demographic covariates (model 1) and screen-time (model 2). No differences were found between the Moderate Communicators and Minimal users.
ANXIETY: Odds of anxiety were higher for **Broadcasters compared to Minimal users (AOR = 2.57, 95% CI: 1.13–5.82) and High Communicators (AOR = 1.93, 95% CI:** 1.04–3.57). Odds were also higher in Broadcasters compared to Moderate Communicators in model 2 (AOR = 2.64, 95% CI: 1.50–4.62) but attenuated to the null following adjustment for baseline anxiety (model 3). Odds of anxiety were higher for High Communicators than Moderate Communicators in unadjusted models (OR = 1.75, 95% CI: 1.24–2.47), but lower in fully adjusted models (AOR = 0.72, 95% CI: 0.52–0.99). There was some evidence of increased odds for Moderate Communicators compared to Minimal users (AOR = 1.85, 95% CI: 0.97–3.54). Odds of anxiety were higher for High Communicators compared to Minimal users in model 1 (AOR = 2.39, 95% CI: 1.11–5.15) but the association attenuated to the null following adjustment for screen-time.
DEPRESSION: In fully adjusted models, **odds of depression were higher for Broadcasters compared to any other group** [Broadcasters vs. Minimal AOR = 2.34, (95% CI: 1.15–4.79); Broadcasters versus High Communicators AOR = 1.83 (95% CI: 1.16–2.87); Broadcasters versus Moderate Communicators AOR = 2.22 (95% CI: 1.45–3.39)]. There was no evidence of a difference between any of the other user types.

1.1.22 Mougharbel, & Goldfield (2020). Psychological Correlates of Sedentary Screen Time Behaviour Among Children and Adolescents: A Narrative Review. *Current Obesity Reports*.

ABSTRACT: PURPOSE: The aims of this narrative review were to (1) synthesise the literature on the relationship between screen time and important mental health outcomes and (2) examine the underpinning factors that can influence this association.
RECENT FINDINGS: Paralleling the rise of mental health issues in children and adolescents is the ubiquitous overuse of screens, but it is unclear how screen time is related to important mental health outcomes and whether this association differs by gender, age and screen type.
METHODS: Medline/PubMed, PsychINFO and Google Scholar databases were searched on December 2019 for articles published mainly in the last 5 years. The search focused on two main concepts: (i) screen time and (ii) mental health outcomes including anxiety, depression, psychological and psychosocial well-being and body image concerns.
RESULTS: Sixty studies were included in the review. **Higher levels of screen time were associated with more severe depressive symptoms. We found moderate evidence for an association between screen time and poor psychological well-being and body dissatisfaction especially among females. Relationships between screen time and anxiety were inconsistent and somewhat gender specific. Social media use was consistently associated with poorer mental health.**
SUMMARY: Higher levels of screen time are generally associated with poorer mental health outcomes, but associations are influenced by screen type, gender and age. Practitioners, parents, policy makers and researchers should collectively identify and evaluate strategies to reduce screen time, or to use screens more adaptively, as a means of promoting better mental health among children and adolescents.

1.1.23 Ivie, Pettitt, Moses, & Allen. (2020). A meta-analysis of the association between adolescent social media use and depressive symptoms. *Journal of Affective Disorders*.

ABSTRACT: BACKGROUND: The association of adolescent social media use with mental health symptoms, especially depression, has recently attracted a great deal of interest in public media as well as the scientific community. Some studies have cited statistically significant associations between adolescent social media use and depression and have proposed that parents must regulate their adolescents' social media use in order to protect their mental health.
METHOD: In order to rigorously assess the size of the effect that has been reported in the current scientific literature, we conducted a meta-analysis of studies that measured the association between social media use specifically and depressive symptoms amongst early- to mid- adolescents (11-18 years-old). We searched Psychnet, PubMed,

and Web of Science with the following terms: online social networks, social media, internet usage, facebook, twitter, instagram, myspace, snapchat, and depression.
RESULTS: **We found a small but significant positive correlation (k=11 studies, *r*=.11, *p*<.01) between adolescent social media use and depressive symptoms. There was also high heterogeneity (*I*2=95.22%) indicating substantial variation among studies.**
CONCLUSIONS: **High heterogeneity along with the small overall effect size** observed in the relationship between self-reported social media use and depressive symptoms **suggests that other factors are likely to act as significant moderators of the relationship.** We suggest that future research should be focused on understanding which types of use may be harmful (or helpful) to mental health, rather than focusing on overall use measures that likely reflect highly heterogeneous exposures.

1.1.24 Twenge, & Farley (2020). Not all screen time is created equal: Associations with mental health vary by activity and gender. *Social Psychiatry and Psychiatric Epidemiology.*

ABSTRACT: PURPOSE: Previous research on associations between screen media use and mental health produced mixed findings, possibly because studies have not examined screen activities separately or accounted for gender differences. We sought to examine associations between different types of screen activities (social media, internet, gaming, and TV) and mental health indicators separately for boys and girls.
METHODS: We drew from a nationally representative sample of 13–15-year-old adolescents in the UK (*n* = 11,427) asking about hours per day spent on specific screen media activities and four mental health indicators: self-harm behavior, depressive symptoms, life satisfaction, and self-esteem.
RESULTS: **Hours spent on social media and Internet use were more strongly associated with self-harm behaviors, depressive symptoms, low life satisfaction, and low self-esteem than hours spent on electronic gaming and TV watching. Girls generally demonstrated stronger associations between screen media time and mental health indicators than boys (e.g., heavy Internet users were 166% more likely to have clinically relevant levels of depressive symptoms than low users among girls, compared to 75% more likely among boys).**
CONCLUSION: Thus, not all screen time is created equal; social media and Internet use among adolescent girls are the most strongly associated with compromised mental health. Future research should examine different screen media activities and boys and

girls separately where possible. Practitioners should be aware that some types of screen time are more likely to be linked to mental health issues than others.

FIGURES:

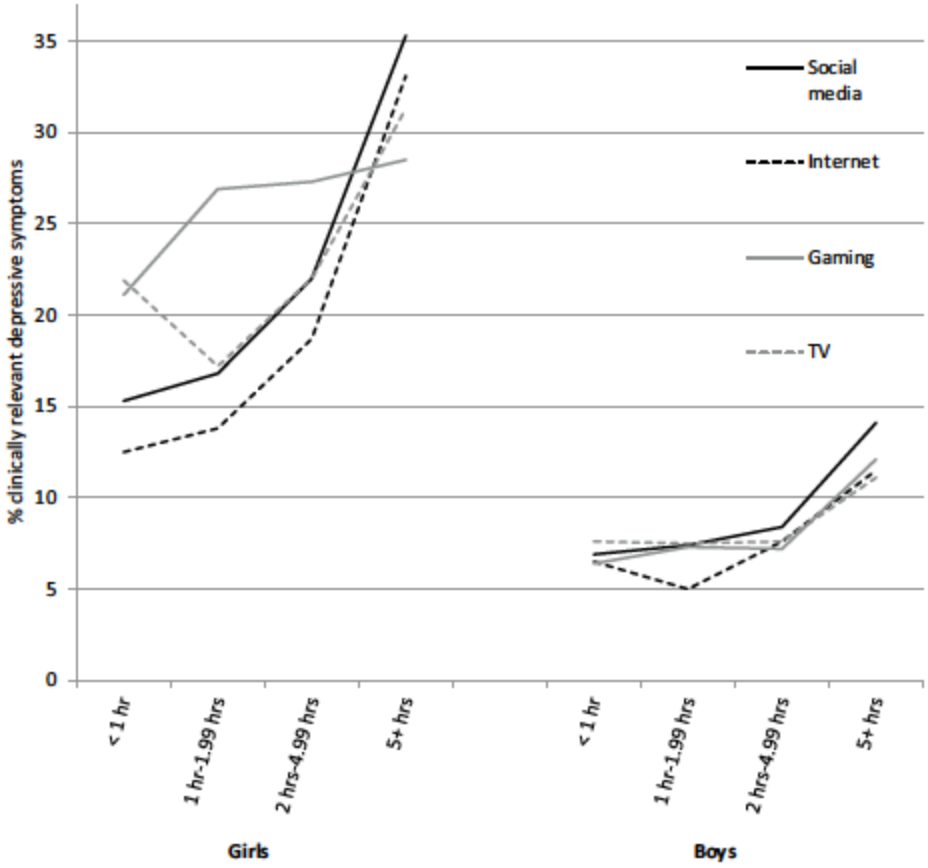


Fig. 2 Hours per day of four types of screen media and percent with clinically relevant symptoms of depression, girls and boys

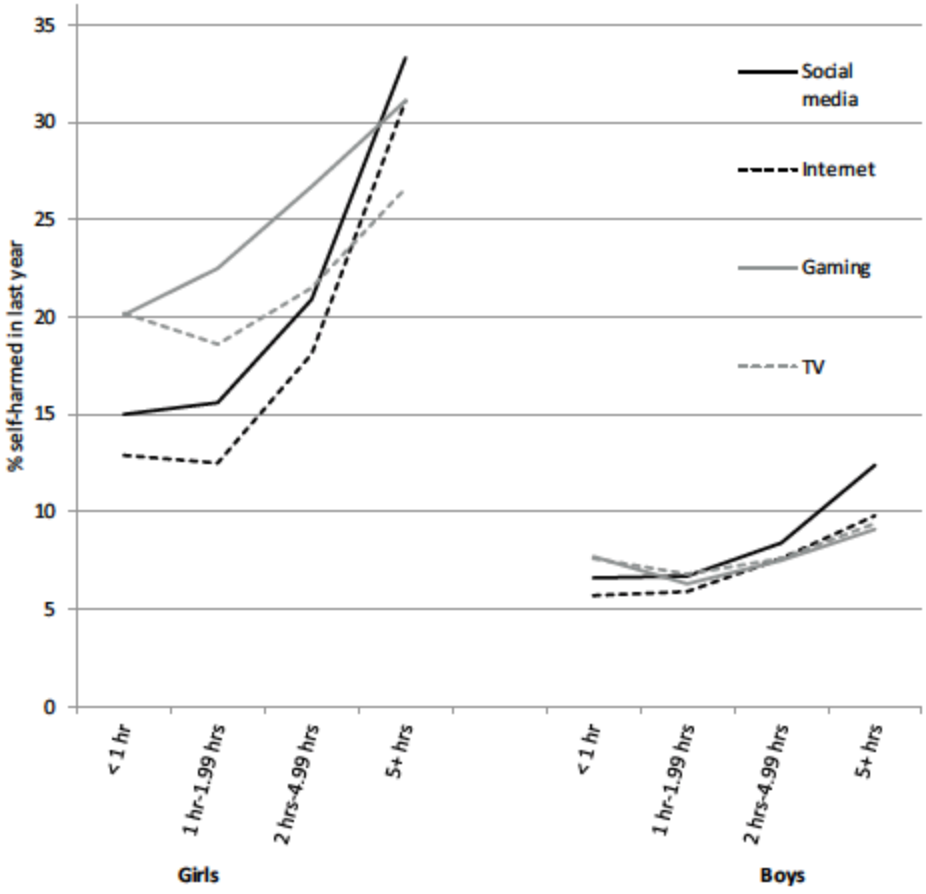


Fig. 1 Hours per day of four types of screen media and percent engaging in self-harm, girls and boys

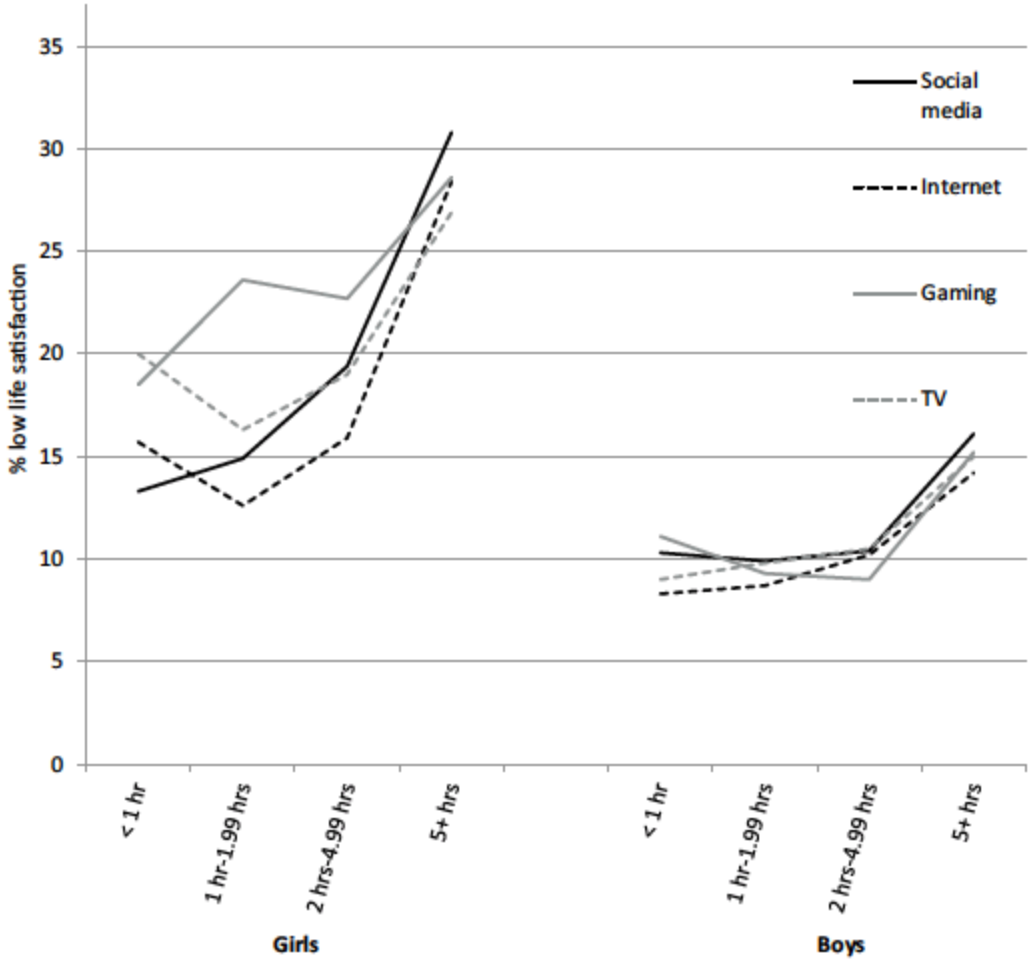


Fig. 3 Hours per day of four types of screen media and percent low in life satisfaction, girls and boys

1.1.25 Satici, Gocet Tekin, Deniz, & Satici (2022). Doomscrolling Scale: Its Association with Personality Traits, Psychological Distress, Social Media Use, and Wellbeing. *Applied Research in Quality of Life*.

ABSTRACT: Doomscrolling is a fairly new concept in mental health research which has attracted significant attention in recent years. This paper consists of three separate studies examining doomscrolling. In Study I (N = 378), both 15-item and 4-item forms of Doomscrolling Scale (DS) were confirmed by confirmatory factor analysis. Item Response Analysis demonstrated that all items had strong discriminative power. Different reliability coefficients supported the high reliability of DS. In Study II (N = 419),

both correlation and network analysis indicated that doomscrolling was significantly associated with big five personality traits, social media addiction, fear of missing out, and some features of social media usage. In Study III (N = 460), the relationship of doomscrolling with psychological distress and wellbeing indicators -life satisfaction, mental well-being and harmony in life- were investigated. Structural equation modeling indicated that **the relationship between doomscrolling and wellbeing indicators were mediated by psychological distress.** This comprehensive and pioneering study on doomscrolling has highlighted the individual and social impacts of doomscrolling.

1.1.26 McNamee, Mendolia, & Yerokhin (2021). Social media use and emotional and behavioral outcomes in adolescence: Evidence from British longitudinal data. *Economics & Human Biology.*

ABSTRACT: We investigate the relationship between social media use and emotional and behavioural outcomes in adolescence using data from a large and detailed longitudinal study of teenagers from the UK. We use individual fixed effects, propensity score matching and treatment effects with Inverse Probability Weighted Regression Adjustment, controlling for a rich set of children's and family's characteristics and using comprehensive sensitivity analyses and tests to assess the potential role of unobserved variables. **Our results show that prolonged use of social media (more than 4 hours per day) is significantly associated with poor emotional health and increased behavioural difficulties, and in particular decreased perception of self-value and increased incidence of hyperactivity, inattention and conduct problems.** However, limited use of social media (less than 3 h per day) compared to no use has some moderate association with positive peer relationships.

1.1.27 Vuorre, Orben, & Przybylski (2021). There is no evidence that associations between adolescents' digital technology engagement and mental health problems have increased. *Clinical Psychological Science.*

ABSTRACT: Digital technology is ubiquitous in modern adolescence, and researchers are concerned that it has negative impacts on mental health that, furthermore, increase over time. To investigate whether technology is becoming more harmful, we examined changes in associations between technology engagement and mental health in three nationally representative samples. Results were mixed across types of technology and mental health outcomes: **Technology engagement had become less strongly associated with depression in the past decade, but social-media use had become**

more strongly associated with emotional problems. We detected no changes in five other associations or differential associations by sex. There is therefore little evidence for increases in the associations between adolescents' technology engagement and mental health. Information about new digital media has been collected for a relatively short time; drawing firm conclusions about changes in their associations with mental health may be premature. We urge transparent and credible collaborations between scientists and technology companies.

1.1.28 Geng, Gu, Wang & Zhang (2021). Smartphone addiction and depression, anxiety: The role of bedtime procrastination and self-control. *Journal of Affective Disorders.*

ABSTRACT: BACKGROUND: Owing to the widespread use of smartphones, researchers have an increasing interest in smartphone addiction. The purpose of this study is to look into the outcomes of smartphone addiction while answering when and how smartphone addiction may predict university students' depression and anxiety.
METHODS: Primary data were collected from 355 students studying in different universities in China. Participants completed Smartphone Addiction Scale-Short Version (SAS-SV), Bedtime Procrastination Scale (BPS), Self-control Scale (SCS) and Depression-Anxiety-Stress Scale (DASS). PROCESS macros in SPSS24.0 were used to examine the moderated mediating effects.
RESULTS: **Smartphone addiction Scale scores were positively correlated with depression, anxiety among university students through bedtime procrastination. Self-control was found to play the moderating role such that the mediated relationships were weak for students with high self-control.**
LIMITATIONS: This study is a cross sectional study, so we cannot make causal inferences.
CONCLUSIONS: Individuals with smartphone addiction are inclined to postpone their bedtime and further experience more depression and anxiety. Self-control serves as a protective factor for bedtime procrastination, depression and anxiety.

1.1.29 Leventhal, Cho, Keyes, Zink, Riehm, Zhang, & Ketema (2021). Digital media use and suicidal behavior in U.S. adolescents, 2009-2017. *Preventive Medicine Reports.*

ABSTRACT: U.S. adolescent suicidal behavior and digital media use prevalence have contemporaneously increased this decade in population-level ecological analyses. The purpose of this study was to determine whether these two trends are directly associated

by using multi-year person-level data to test whether the association of year with suicidal behavior was mediated by digital media use. Data were from the Youth Risk Behavior Surveillance System (2009-2017), a nationally-representative biennial cross-sectional self-report survey of U.S. students (N=72,942). Mediation analysis was used to estimate the proportion of cross-year changes in suicidal behavior that were mediated by concurrent changes in leisure-time digital media use. Past-year suicidal behavior in 2011 (19.6%), 2013 (20.4%), 2015 (21.7%), and 2017 (20.5%) increased relative to 2009 (17.1%). Hours of daily digital media use in 2011 (mean[SD]=2.65[1.86]), 2013 (mean[SD]=3.02[2.08]), 2015 (mean[SD]=2.97[2.12]), and 2017 (mean[SD]=3.01[2.18) increased vs. 2009 (mean[SD]=2.31[1.81]). **The association of survey year with suicidal behavior was mediated by digital media use—20.5%(95%CI=16.2, 24.8), 34.3%(95%CI=24.5, 44.1), 22.8%(95%CI=17.3, 28.0), and 41.4%(95%CI=33.9, 49.5) of cross-year suicidal behavior prevalence increases (vs. 2009) for 2011, 2013, 2015, and 2017, respectively, were mediated by concurrent digital media use increases. Therefore, small proportions of the 2009-2017 increases in U.S. adolescent suicidal behavior are associated with concurrent increasing digital media use trends.** Further exploration of these trends is warranted.

1.1.30 McAlister, Hisler, Blake, Twenge, Farley, & Hamilton (2021). Associations Between Adolescent Depression and Self-Harm Behaviors and Screen Media Use in a Nationally Representative Time-Diary Study. *Research on child and adolescent psychopathology*.

ABSTRACT: Screen media use is associated with mental health problems among adolescents. However, few studies have examined screen media use using contemporaneous time diaries (rather than retrospective reports), compared associations across specific screen media activities or by gender, or examined associations with self-harm behaviors. Participants were 13- to 15-year-old adolescents completing time diaries (n = 4,252) for one weekday and one weekend day in the 2015 administration of the Millennium Cohort Study, a nationally representative birth cohort study of UK adolescents. Participants also completed a measure of depressive symptoms and reported whether they had engaged in self-harm in the last year. **Girls who spent 2 + hrs/day, compared to < 2 h/day, on digital media were more likely to self-harm (for social media use, adjusted relative risk [ARR] for self-harm = 1.46, 95% CI = 1.17, 1.82; for internet use, ARR = 1.80 [1.20, 2.70]). Girls spending more time on digital media were also more likely to be depressed (for social media, ARR = 1.29 [1.03, 1.63]; for internet use, ARR = 1.75 [1.19, 2.59]). Associations with gaming, texting/e-mailing, and TV/video watching among girls were mostly not**

significant. Associations for boys were mostly not significant. Girls who use digital media (especially social media and the internet) more hrs/day are more likely to have clinically significant levels of depressive symptoms and prior history of self-harm, though gaming, texting/e-mailing, and TV/video watching showed few associations. Screen media use was mostly not significantly associated with self-harm or depression among boys.

1.1.31 Semken & Rossell (2022). Specification analysis for technology use and teenager well-being: Statistical validity and a Bayesian proposal. *ArXiv (Pre-print)*.

ABSTRACT: A key issue in science is assessing robustness to data analysis choices, while avoiding selective reporting and providing valid inference. Specification Curve Analysis is a tool intended to prevent selective reporting. Alas, when used for inference it can create severe biases and false positives, due to wrongly adjusting for covariates, and mask important treatment effect heterogeneity. As our motivating application, it led an influential study to conclude there is no relevant association between technology use and teenager mental well-being. We discuss these issues and propose a strategy for valid inference. Bayesian Specification Curve Analysis (BSCA) uses Bayesian Model Averaging to incorporate covariates and heterogeneous effects across treatments, outcomes and sub-populations. BSCA gives significantly different insights into teenager well-being. It provides strong evidence that technology has relevant associations with teenager well-being: **(1) well-being is negatively associated with electronic device usage, (2) social media use is negatively associated with self-assessed well-being but positively associated with parent-assessed well-being, and (3) has a stronger negative association with self-assessed well-being for girls compared to boys.** Bayesian model averaging, treatment effect inference, selective reporting, social media, adolescents, mental health

1.1.32 Svensson, Johnson, & Olsson (2022). Does gender matter? The association between different digital media activities and adolescent well-being. *BMC Public Health.*

ABSTRACT: BACKGROUND: Previous research on the relationship between social media use and well-being in adolescents has yielded inconsistent results. We addressed this issue by examining the association between various digital media activities, including a new and differentiated measure of social media use, and well-being (internalizing symptoms) in adolescent boys and girls.

METHOD: The sample was drawn from the four cross-sectional surveys from the Öckerö project (2016–2019) in eight municipalities in southern Sweden, consisting of 3957 adolescents in year 7 of compulsory education, aged 12–13. We measured the following digital media activities: playing games and three different activities of social media use (chatting, online sociability, and self-presentation). Our outcome measure was internalizing symptoms. Hypotheses were tested with linear regression analysis.

RESULTS: **Social media use and playing games were positively associated with internalizing symptoms. The effect of social media use was conditional on gender, indicating that social media use was only associated with internalizing symptoms for girls. Of the social media activities, only chatting and self-presentation (posting information about themselves) were positively associated with internalizing symptoms. Self-presentation was associated with internalizing symptoms only for girls.**

CONCLUSION: Our study shows the importance of research going beyond studying the time spent on social media to examine how different kinds of social media activities are associated with well-being. Consistent with research in psychology, our results suggest that young girls posting information about themselves (i.e. self-presentation) might be especially vulnerable to display internalizing symptoms.

FIGURE:

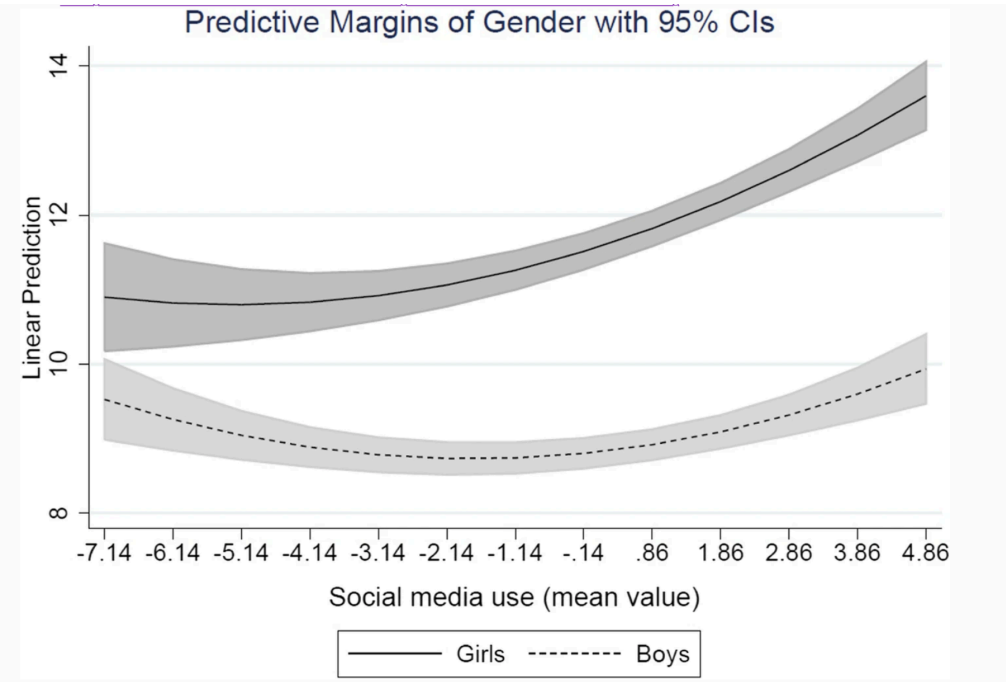


Fig. Interaction between gender and social media use (low value = seldom; high value = often) in the association with predicted values of internalizing symptoms (high value = more symptoms)

1.1.33 Price, Legrand, Brier, van Stolk-Cooke, Peck, Dodds, Danforth, & Adams (2022). Doomscrolling during COVID-19: The negative association between daily social and traditional media consumption and mental health symptoms during the COVID-19 pandemic. *Psychological Trauma: Theory, Research, Practice, and Policy*.

ABSTRACT: OBJECTIVE: Consumption of traditional and social media markedly increased at the start of the COVID-19 pandemic as new information about the virus and safety guidelines evolved. Much of the information concerned restrictions on daily living activities and the risk posed by the virus. The term doomscrolling is used to describe the phenomenon of elevated negative affect after viewing pandemic-related media. The magnitude and duration of this effect, however, is unclear. Furthermore, the effect of doomscrolling likely varies based on prior vulnerabilities for psychopathology, such as a history of childhood maltreatment. It was hypothesized that social and traditional media exposure were related to an increase in depression and PTSD and that this increase was moderated by childhood maltreatment severity.
METHOD: Participants completed a baseline assessment for psychopathology and 30 days of daily assessments of depression, PTSD, and pandemic-related media use.
RESULTS: Using multilevel modeling, **social media exposure was associated with**

increased depression and PTSD. This association was stronger for those with more severe maltreatment histories. Furthermore, those with more severe baseline psychopathology used more social media during this period. **These relations were not observed for traditional media sources.**
CONCLUSIONS: These results suggest that regular viewing of pandemic-related social media is associated with increases in psychopathology for those with existing vulnerabilities. Those with such vulnerabilities should adopt strategies to limit social media consumption.

1.1.34 Naeemi, & Tamam (2017). The Relationship Between Emotional Dependence on Facebook and Psychological Well-Being in Adolescents Aged 13–16. *Child Indicators Research*.

ABSTRACT: In most countries, Facebook is one of the top social networking sites among children and adolescents. Several studies have investigated the effect of Facebook dependency on individuals' psychological well-being. However, inadequate studies have examined the impacts of Facebook in eudaimonic well-being. The current study explores how emotional dependence on Facebook relates to psychological well-being in eudaimonic approach. A total of 401, 13 to 16 years old who studied at an upper secondary school in Malaysia participated in this study. We expected a negative association between emotional dependence on Facebook and psychological wellbeing. The moderation effect of self-efficacy was examined in the current research. The results of structural equation modeling revealed that **emotional dependence on Facebook negatively effects adolescents' overall psychological well-being.** The influence was more pronounced on autonomy, purpose in life, and positive relationship with others. The results also demonstrated that high self-efficacy did not reduce negative impacts of Facebook emotional dependence on adolescents' psychological well-being.

1.1.35 Hartas (2021). The social context of adolescent mental health and wellbeing: Parents, friends and social media. *Research Papers in Education*.

ABSTRACT: Concerns about mental health difficulties in young people, mid-adolescent girls in particular, are on the rise. Many explanations ranging from peer pressure and bullying, to social media and gender inequality, have been offered for the rise in mental health problems. This study utilised data from the Millennium Cohort Study (Wave 6) to examine 14-year-olds' mental health and wellbeing in relation to familial and peer interactions, gender, socio-economic factors and social media use. **Across measures**

of mental health and wellbeing, the findings showed that girls fared much worse than boys, particularly in experiencing negative feelings and low self-concept and life satisfaction and in self-harming. Teenage girls appeared to have become the new 'high risk' group. The findings from this study have implications for young people's mental health and wellbeing especially as seen through the lens of income and gender inequality. Given the current political concerns about young people's mental health, this study is hoped to contribute to an informed debate about individual wellbeing within a broader social milieu.

EXCERPT: Compared to **young people who spent 5 to 7 h or more daily on social networking sites, those who spent less than 2 h and between 2 and 5 h daily were 44% and 31% less likely to report negative feelings; 44% and 31% less likely to report low self-concept; and 37% and 29% less likely to report lower life satisfaction. As the hours spent daily visiting social network sites increased, there was a 32% increase in the likelihood of self-harm.** Girls were nearly three times more likely than boys to spend 5 to 7 h or more on social media.

1.1.36 Cebollero-Salinas, Orejudo, Cano-Escoriaza, & Íñiguez-Berrozpe (2022). Cybergossip and Problematic Internet Use in cyberaggression and cybervictimisation among adolescents. *Computers in Human Behavior*.

ABSTRACT: Research on cyberbullying has focused on personal and contextual factors. However, little is known about its relationship with habitual behaviours associated with easy access to the Internet, such as cybergossip and problematic Internet use, as well as the role that gender and age play in relation with these variables. Knowledge about these subjects could contribute to the elaboration of new preventive and educational approaches. This study therefore aims to analyse the influence that cybergossip and problematic Internet use have on cyberaggression and cybervictimisation, considering differences in age, gender, and the age at which the first smartphone was owned. 1013 adolescents between 12 and 18 years old (M = 14.0, SD = 1.42) (56.4% girls) from thirteen Spanish educational centres participated. The results, obtained through structural equation modelling, show that there is a high association between the four constructs, and explain a high variability of cyberaggression and cybervictimisation. It is relevant that **cybergossip has a greater influence on the cyberaggression of girls, on subjects who are 12–14 years old, and on victims aged 15–18,** while problematic Internet use has a greater influence on the cybervictimisation of boys and subjects who are 12–14 years old. Furthermore, **the fact of having had a smartphone before the age of 11 leads to a higher level of**

cyberaggression, explained by cybergossip and problematic Internet use. These results allow us to establish new channels of intervention.

1.1.37 Jaidka (2022). Cross-platform-and subgroup-differences in the well-being effects of Twitter, Instagram, and Facebook in the United States. *Scientific Reports*.

ABSTRACT: Spatial aggregates of survey and web search data make it possible to identify the heterogeneous well-being effects of social media platforms. This study reports evidence from different sources of longitudinal data that suggests that the well-being effects of social media differ across platforms and population groups. The well-being effects of frequent social media visits are consistently positive for Facebook but negative for Instagram. Group-level analyses suggest that the positive well-being effects are experienced mainly by white, high-income populations at both the individual and the county level, while the adverse effects of Instagram use are observed on younger and Black populations. The findings are corroborated when geocoded web search data from Google is used and when self-reports from surveys are used in place of region-level aggregates. **Greater Instagram use in regions is also linked to higher depression diagnoses across most sociodemographic groups.**

[NOTE from Haidt: this study is of adults, although it notes that Instagram may have particularly deleterious effects on counties with more young people.]

1.1.38 Weiß, Baumeister, Cohrdes, Deckert, Gründahl, Pryss, & Hein (2022). Extraversion moderates the relationship between social media use and depression. *Journal of Affective Disorders Reports*.

ABSTRACT: BACKGROUND: There is evidence that extraversion and associated frequent personal and digital social contacts are associated with mental health, reflected in reduced risk for anxiety or depression. However, excessive social media use (SMU) has been related to a decrease of mental health. We test how extraversion moderates the effect of SMU on anxiety and depression at times of social distancing.
METHODS: Data were collected with an app-based survey combined with passive sensing of social media usage time. We analyzed SMU (objective average duration of communication app usage) and cross-sectional questionnaire data from 486 adults (mean age = 42.42). Using multiple regression models, we tested how SMU, extraversion and their interaction relate to individual depression and anxiety scores.

RESULTS: **Depression scores were associated with a higher SMU** and lower extraversion. There was a significant positive relationship between SMU and extraversion that predicted higher depression scores.
LIMITATIONS: In the present sample, there is a recruitment bias, since only data from smartphones running iOS were included. Future research should also take a closer look at the purpose behind SMU.
CONCLUSIONS: We conclude that extraversion might be a protective factor for depression, which can turn into a harmful one if it is related to higher SMU. Thus, the interplay between SMU and extraversion needs to be considered when predicting individual differences in mental health.

1.1.39 Robertson, Twenge, Joiner, & Cummins (2022). Associations between screen time and internalizing disorder diagnoses among 9- to 10-year-olds. *Journal of Affective Disorders*.

ABSTRACT: BACKGROUND: Children and adolescents spend an increasing amount of time with screen media. Identifying correlates of youth mental disorders has become more urgent with rates of depression, self-harm, suicide attempts, and suicide deaths rising sharply among U.S. children and adolescents after 2012. This study examined the relationship between screen time and internalizing disorders in preadolescent children between the ages of 9 and 10.
METHODS: Participants were 9- and 10-year-old youth (n = 11,780) in the baseline of the multi-site Adolescent Brain and Cognitive Development Study (ABCD). Youth reported the number of hours a day they spent watching TV shows or movies, watching videos online, playing video games, texting, using social media, and video chatting. Youth responded to an abbreviated version of the Kiddie Schedule for Affective Disorders and Schizophrenia (K-SADS-5), a semi-structured clinical interview measuring current and past symptoms of internalizing disorders using DSM-5 criteria.
RESULTS: **Youth spending 2 or more hours (vs. less than 2) a day with screen media were more likely to fit criteria for depressive disorders, self-harm, and suicidal ideation or attempts, even after adjustment for demographic covariates. For anxiety disorders, associations with digital media use (social media, texting, gaming, and online videos) were stronger than with screen time generally.**
LIMITATIONS: This is a cross-sectional study utilizing retrospective screen time reports, which limits our ability to determine causality and the accuracy of the reports.
CONCLUSIONS: Preadolescents who spend more time using screens, especially digital media, are more likely to fit DSM-5 criteria for internalizing disorders.

1.1.40 Lee, Jin Jeon, Kang, Shin, Jung, & Jae Jung (2022). Social media use and mental health during the COVID-19 pandemic in young adults: A meta-analysis of 14 cross-sectional studies. *BMC Public Health.*

ABSTRACT: BACKGROUND: Public isolated due to the early quarantine regarding coronavirus disease 2019 (COVID-19) increasingly used more social media platforms. Contradictory claims regarding the effect of social media use on mental health needs to be resolved. The purpose of the study was to summarise the association between the time spent on social media platform during the COVID-19 quarantine and mental health outcomes (i.e., anxiety and depression).
METHODS: Studies were screened from the PubMed, Embase, and Cochrane Library databases. Regarding eligibility criteria, studies conducted after the declaration of the pandemic, studies that measured mental health symptoms with validated tools, and studies that presented quantitative results were eligible. The studies after retrieval evaluated the association between time spent on social media platform and mental health outcomes (i.e. anxiety and depression). The pooled estimates of retrieved studies were summarised in odds ratios (ORs). Data analyses included a random-effect model and an assessment of inter-study heterogeneity. Quality assessment was conducted by two independent researchers using the Risk of Bias Assessment Tool for Nonrandomized Studies (RoBANS). This meta-analysis review was registered in PROSPERO (https://www.crd.york.ac.uk/PROSPERO/, registration No CRD42021260223, 15 June 2021).
RESULTS: Fourteen studies were included. **The increase in the time spent using social media platforms were associated with anxiety symptoms in overall studies (pooled OR = 1.55, 95% CI: 1.30–1.85), and the heterogeneity between studies was mild (I2 = 26.77%). Similarly, the increase in social media use time was also associated with depressive symptoms (pooled OR = 1.43, 95% CI: 1.30–1.85), and the heterogeneity between studies was moderate (I2 = 67.16%).** For sensitivity analysis, the results of analysis including only the “High quality” studies after quality assessment were similar to those of the overall study with low heterogeneity (anxiety: pooled OR = 1.45, 95% CI: 1.21–1.96, I2 = 0.00%; depression: pooled OR = 1.42, 95% CI: 0.69–2.90, I2 = 0.00%).
CONCLUSIONS: **The analysis demonstrated that the excessive time spent on social media platform was associated with a greater likelihood of having symptoms of anxiety and depression.**

1.1.41 Yang, Yan, & Hussain (2022). The relationships between smartphone distraction, problematic smartphone use and mental health issues amongst a Chinese sample. *The Social Science Journal*.

ABSTRACT: Smartphone distraction (SD) has been reported as an important factor associated with problematic smartphone use (PSU). The present study explored the relationship between SD, PSU, and mental health problems using the newly developed Smartphone distraction Scale (SDS). A total of three hundred and twenty smartphone users (Mage = 20.30, SD = 1.67) completed a questionnaire that comprised psychometric scales for the aforementioned variables. Results showed that SD was significantly correlated with PSU, anxiety, depression and stress. PSU fully mediated the relationships from SD to anxiety and depression. PSU partially mediated the relationship between SD and stress. The four-factor SDS was reliable and obtained good model fit in confirmatory factor analysis. **This study suggests that being distracted by smartphone use can be associated with mental health issues while the level of PSU might be the bridge of this link.** The present study is one of very few studies to examine SD in China, which aimed to investigate the relationships between SD, PSU and mental health issues (stress, anxiety and depression), and adopt the newly developed SDS in the Chinese context. Further studies are needed to explore the complex mechanism between SD and mental health.

1.1.42 Aslan (2022). 'Investigation of the relationship between smartphone addiction and social loneliness in high school students.' *Vulnerable Children and Youth Studies*.

ABSTRACT: This study was carried out with the aim of evaluating the relationship between smartphone addiction and social and emotional loneliness in high school students. It was planned to be descriptive and cross-sectional. This study was conducted between November and December 2019. 'Student Identification Form', 'Smartphone Addiction Scale – Short Form' and Social and Emotional Loneliness Scale were used to collect data in the study. In the statistical analysis of the data, number, percentage values, independent samples t-test, ANOVA, correlation and regression were used. A statistically significant difference was found between school type, income status, daily internet usage time, the state of having a computer and smartphone, and smartphone addiction scale mean scores ($p < 0.05$). **A positive correlation was found between smartphone usage and social and emotional loneliness ($r = 0.216$, $p = 0.001$). Daily internet usage, smartphone usage time, and social media engagement predicted smartphone addiction by 36% ($R2 = 0.36$, $p < 0.001$). A**

significant relationship was found between smartphone addiction and loneliness in high school students.

1.1.43 Azhari, Toms, Pavlopoulou, Esposito, & Dimitriou (2022). Social media use in female adolescents: Associations with anxiety, loneliness, and sleep disturbances. *Acta Psychologica*.

ABSTRACT: Social Media Disorder (SMD) is characterised by the intense and excessive use of social media. Although previous studies have shown that SMD was associated with poor mental health, research across types of usage and platforms remain limited. Here, we conducted an initial investigation of social media usage across platforms and its relation to anxiety, sleep and loneliness in female adolescents. Forty one 16- to 19-year-old British female adolescents were administered online questionnaires. Intensity of social media activity across Facebook, Instagram, Snapchat and Twitter was measured with the Social Media Disorder Scale. Anxiety was indicated by the Beck Anxiety Inventory Trait, loneliness was examined via a short three-point questionnaire and sleep quality was measured via both the Pittsburgh Sleep Quality Index and self-reported seven-day sleep diaries. Results showed that, **compared to those without SMD, users with SMD experienced elevated levels of loneliness and had less sleep on average, and during the weekdays in particular.** Only frequency of posting on Facebook, but not general usage, was associated with poorer sleep quality. These preliminary findings showed that social media disorder across platforms and usage could potentially have different associations to mental health and sleep.

1.1.44 Vannucci, Flannery, & Ohannessian (2017). Social media use and anxiety in emerging adults. *Journal of Affective Disorders*.

ABSTRACT: INTRODUCTION: Social media use is central to the lives of emerging adults, but the implications of social media use on psychological adjustment are not well understood. The current study aimed to examine the impact of time spent using social media on anxiety symptoms and severity in emerging adults.
METHODS: Using a web-based recruitment technique, we collected survey information on social media use and anxiety symptoms and related impairment in a nationally representative sample of 563 emerging adults from the U.S. (18–22 years-old; 50.2% female; 63.3% Non-Hispanic White). Participants self-reported the amount of time they spent using various social media sites on an average day, and responded to anxiety questionnaires

RESULTS: Hierarchical regression revealed that **more time spent using social media was significantly associated with greater symptoms of dispositional anxiety (B=0.74, 95% CI=0.59–0.90, p<0.001), but was unrelated to recent anxiety-related impairment** (B=0.06, 95% CI=0.00–0.12, p=0.051), controlling for age, gender, race/ethnicity, and education level. Logistic regression also revealed that **more daily social media use was significantly associated with a greater likelihood of participants scoring above the anxiety severity clinical cut-off indicating a probable anxiety disorder** (AOR=1.032, 95% CI=1.004–1.062, p=0.028).
LIMITATIONS: Study limitations include the cross-sectional design and reliance on self-report questionnaires.
CONCLUSIONS: Given the ubiquity of social media among emerging adults, who are also at high risk for anxiety disorders, the positive association between social media use and anxiety has important implications for clinicians. Gaining a more nuanced understanding of this relationship will help to inform novel approaches to anxiety treatment.

1.1.45 Primack, Shensa, Escobar-Viera, Barrett, Sidani, Colditz, & James (2017). Use of multiple social media platforms and symptoms of depression and anxiety: A nationally-representative study among U.S. young adults. *Computers in Human Behavior.*

ABSTRACT: INTRODUCTION: While increased time spent on social media (TSSM) has been associated with depression and anxiety, the independent role of using multiple social media (SM) platforms is unclear.
METHODS: We surveyed a nationally-representative sample of 1787 U.S. young adults ages 19–32. Depression and anxiety symptoms were measured using the Patient-Reported Outcomes Measurement Information System (PROMIS). We assessed use of multiple SM platforms with an adapted Pew Internet Research scale. We used ordered logistic regression models to assess associations between use of multiple SM platforms and mental health outcomes while controlling for eight covariates, including overall TSSM.
RESULTS: **Compared to those who used 0–2 social media platforms, participants who used 7–11 social media platforms had substantially higher odds of having increased levels of both depression (Adjusted Odds Ratio [AOR] = 3.0, 95% CI = 1.9–4.8) and anxiety symptoms (AOR = 3.2, 95% CI = 2.0–5.1). Associations were linear (p < 0.001 for all) and robust to all sensitivity analyses.**
CONCLUSIONS: Use of multiple SM platforms is independently associated with symptoms of depression and anxiety, even when controlling for overall TSSM. These

associations are strong enough that it may be valuable for clinicians to ask individuals with depression and anxiety about multiple platform use and to counsel regarding this potential contributing factor.

1.1.46 Napp, & Breda (2022). Daily Use of Social Media Is Associated with More Body Dissatisfaction of Teenage Girls in a Large Cross-Cultural Survey. *I Z A Institute of Labor Economics.*

ABSTRACT: Most teenagers spend several hours per day on social media. We provide a large-scale investigation of the relationship between social media daily usage and body dissatisfaction among a sample of more than 50,000 15 y.o. students. **This relation is positive and large for girls—higher use of social networks is associated with higher dissatisfaction about their body—and negative for boys. The positive relation for girls is observed in all eight countries included in the study, covering very different cultural contexts (e.g., Georgia, Ireland, Spain, Mexico, Panama or Hong Kong). It is observed for all girls, no matter their body mass index (BMI), their academic performance, and their socioeconomic background. Instrumenting social networks consumption by students' or students' peers' internet access at home while controlling finely for other students' or students' peers' household characteristics suggests that the relationship between social media consumption and girls' body dissatisfaction could be causal.**

1.1.47 Woods, & Scott (2016). #Sleepyteens: Social media use in adolescence is associated with poor sleep quality, anxiety, depression and low self-esteem. *Journal of Adolescence*.

ABSTRACT: This study examined how social media use related to sleep quality, self-esteem, anxiety and depression in 467 Scottish adolescents. We measured overall social media use, nighttime-specific social media use, emotional investment in social media, sleep quality, self-esteem and levels of anxiety and depression. **Adolescents who used social media more – both overall and at night – and those who were more emotionally invested in social media experienced poorer sleep quality, lower self-esteem and higher levels of anxiety and depression. Nighttime-specific social media use predicted poorer sleep quality after controlling for anxiety, depression and self-esteem.** These findings contribute to the growing body of evidence that social media use is related to various aspects of wellbeing in adolescents.

In addition, our results indicate that nighttime-specific social media use and emotional investment in social media are two important factors that merit further investigation in relation to adolescent sleep and wellbeing.

1.1.48 Kandola, Owen, Dunstan, & Hallgren (2021). Prospective relationships of adolescents' screen-based sedentary behaviour with depressive symptoms: The Millennium Cohort Study. *Psychological Medicine*.

ABSTRACT: BACKGROUND: Frequent use of screen-based devices could be a modifiable risk factor for adolescent depression, but findings have been inconsistent and mostly from cross-sectional studies. We examined prospective associations of video gaming, social media, and internet use with depressive symptoms in adolescents.
METHODS: A total of 11 341 adolescents from the Millennium Cohort Study, a representative, UK population-based. The main outcome was depressive symptoms from a Moods and Feelings Questionnaire (age 14). Exposures were frequency of video game, social media, and internet use (age 11). Physical activity (effect modifier) was measured by self-report.
RESULTS: The fully adjusted models indicated that boys playing video games most days, at least once a week, and at least once a month at age 11 had lower depression scores at age 14 by 24.2% (IRR = 0.77, 95% CI 0.66–0.91), 25.1% (IRR = 0.75, 95% CI 0.62–0.90), and 31.2% (IRR = 0.69, 95% CI 0.57–0.83), compared with playing less than once a month/never. **In girls, compared with less than once a month/never, using social media most days at age 11 was associated with 13% higher depression scores at age 14 (IRR = 1.13, 95% CI 1.05–1.22).** We found some evidence of associations between using the internet most days and depressive symptoms compared with less than once a month/never in boys (IRR = 0.86, 95% CI 0.75–1.00). More frequent video game use was consistently associated with fewer depressive symptoms in boys with low physical activity, but not in those with high physical activity.
CONCLUSIONS: Different types of screen-time may have contrasting associations with depressive symptoms during adolescence. Initiatives to address adolescents' screen-time may require targeted approaches.

1.1.49 Barry, Sidoti, Briggs, Reiter, & Lindsey (2017). Adolescent social media use and mental health from adolescent and parent perspectives. *Journal of Adolescence.*

ABSTRACT: This study investigated adolescent and parent reports of adolescent social media use and its relation to adolescent psychosocial adjustment. The sample consisted of 226 participants (113 parent-adolescent dyads) from throughout the United States, with adolescents (55 males, 51 females, 7 unreported) ranging from ages 14 to 17. **Parent and adolescent reports of the number of adolescents' social media accounts were moderately correlated with parent-reported DSM-5 symptoms of inattention, hyperactivity/impulsivity, ODD, anxiety, and depressive symptoms, as well as adolescent-reported fear of missing out (FoMO) and loneliness. Lastly, anxiety and depressive symptoms were highest among adolescents with a relatively high number of parent-reported social media accounts and relatively high FoMO.** The implications of these findings and need for related longitudinal studies are discussed.

1.1.50 Atwal (2022). Screen Time and Mental Health in Canadian Youth: An Examination of Nationally Representative Data. *Psychological Reports*.

ABSTRACT: As screens have become ubiquitous in modern-day society, investigating the effects of high screen time on mental health is highly warranted. In the past decade, many studies have determined that higher levels of screen time engagement are associated with adverse mental health outcomes like anxiety and depression. However, the nature of the relationship between screen time and mental health requires further investigation to gain a better understanding of its mechanisms and properties. The purpose of this study is to utilize a nationally representative data set to (1) examine how factors like sex, age, and socioeconomic status moderate the relationship between screen time and mental health in Canadian youth and (2) determine whether this relationship supports the Goldilocks hypothesis or an exposure-response curve. It was hypothesized that (1) young, female, lower socioeconomic status individuals will be more strongly associated with poor mental health, and that (2) mental health will peak at low screen time usage, therefore, supporting an exposure-response curve. A series of moderation analyses concluded that **young, male, lower socioeconomic status individuals strongly moderated the relationship between screen time and poor mental health compared to their counterparts. Furthermore, three out of the four mental health (presence of mood disorder, presence of anxiety disorder, and depression severity) measures peaked at an average of 12 hours and 19 minutes of screen time per week, hence, supporting the exposure-response curve.**

FIGURES:

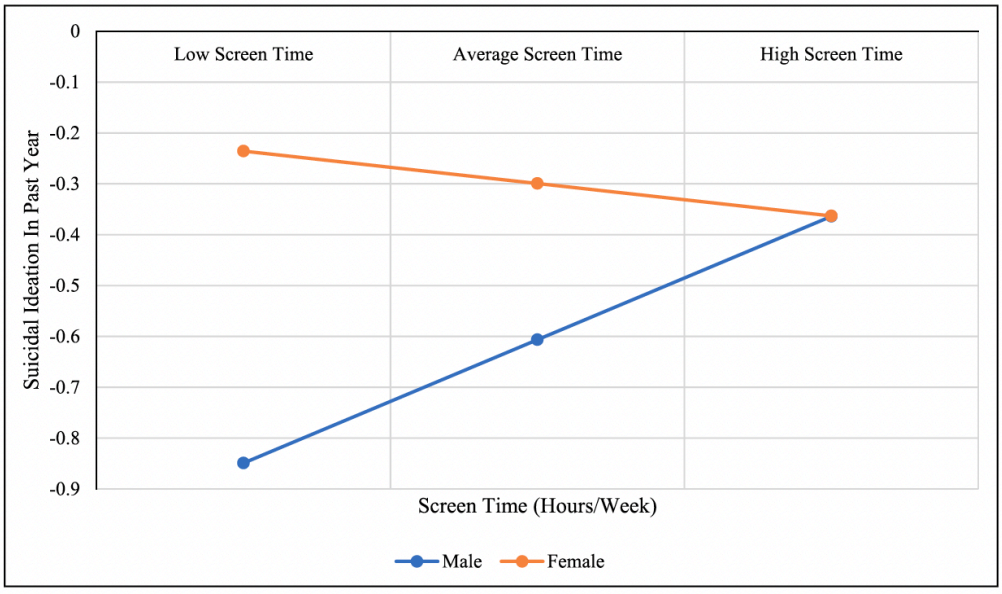


Figure 1. Interaction plot for screen time and suicidal ideation in past year moderated by sex.

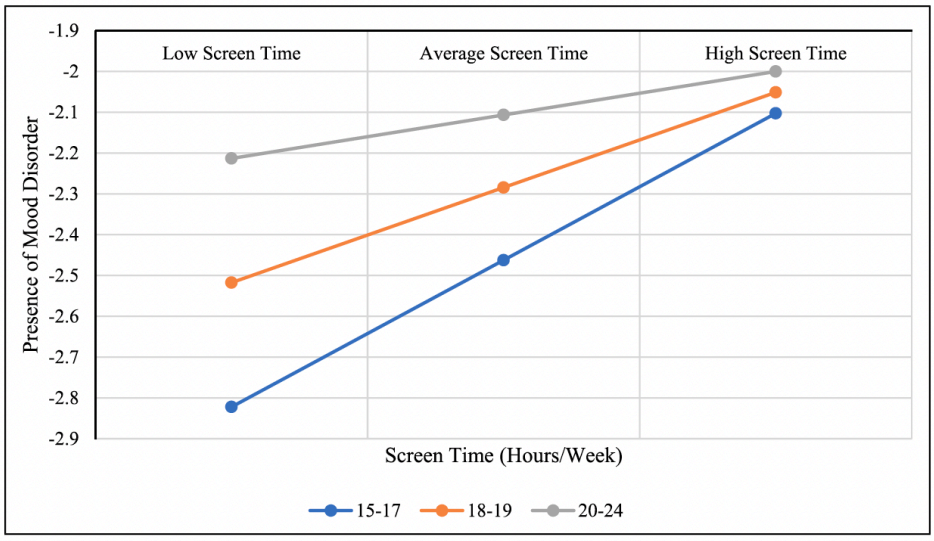


Figure 2. Interaction plot for screen time and presence of mood disorder moderated by age.

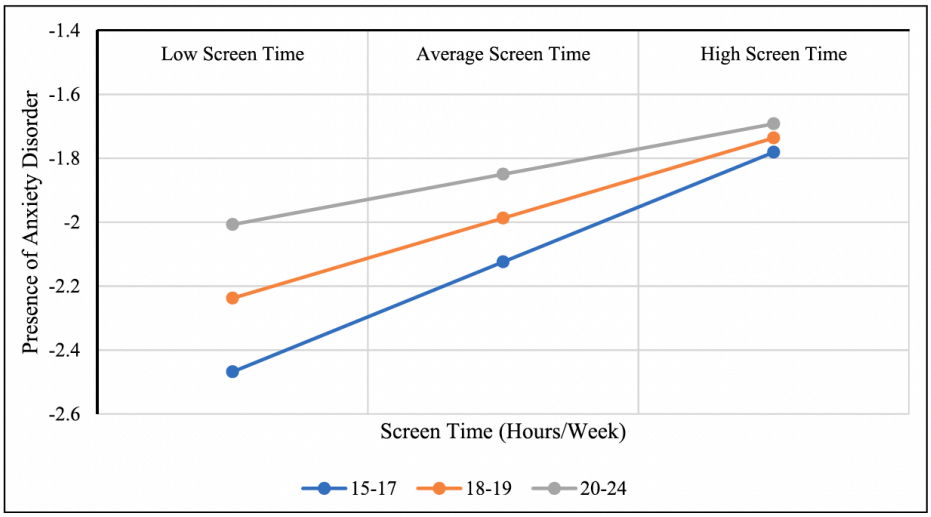


Figure 3. Interaction plot for screen time and presence of anxiety disorder moderated by age.

1.1.51 Satici, Gocet Tekin, Deniz, & Satici (2022). Doomscrolling Scale: Its Association with Personality Traits, Psychological Distress, Social Media Use, and Wellbeing. *Applied Research in Quality of Life*.

ABSTRACT: Doomscrolling is a fairly new concept in mental health research which has attracted significant attention in recent years. This paper consists of three separate studies examining doomscrolling. In Study I (N = 378), both 15-item and 4-item forms of Doomscrolling Scale (DS) were confirmed by confirmatory factor analysis. Item Response Analysis demonstrated that all items had strong discriminative power. Different reliability coefficients supported the high reliability of DS. In Study II (N = 419), both correlation and network analysis indicated that doomscrolling was significantly associated with big five personality traits, social media addiction, fear of missing out, and some features of social media usage. In Study III (N = 460), the relationship of doomscrolling with psychological distress and wellbeing indicators -life satisfaction, mental well-being and harmony in life- were investigated. Structural equation modeling indicated that **the relationship between doomscrolling and wellbeing indicators were mediated by psychological distress.** This comprehensive and pioneering study on doomscrolling has highlighted the individual and social impacts of doomscrolling.

1.1.52 Vuong, Jarman, Doley, & McLean (2021). Social Media Use and Body Dissatisfaction in Adolescents: The Moderating Role of Thin- and Muscular-Ideal Internalisation. *International Journal of Environmental Research and Public Health*.

ABSTRACT: Internalisation of appearance ideals moderates the relationship between exposure to media images and body dissatisfaction. To date, the role of thin- and muscular-ideal internalisation in the context of social media remains under explored, particularly for boys. As such, we aimed to explore how social media use (Instagram and Snapchat) was related to body dissatisfaction, and whether thin- and muscular-ideal internalisation would moderate this relationship in a sample of 1153 adolescent boys and girls (55.42% males; Mage = 13.71, SD = 1.14). As hypothesised, **social media use, and thin- and muscular ideal internalisation were positively correlated with body dissatisfaction in both genders. In moderation analyses, thin-ideal internalisation emerged as the only variable that had a significant effect on body dissatisfaction in both genders. Additionally, the influence of social media use on body dissatisfaction was moderated by muscular-ideal internalisation in boys, whereby for boys with high muscular-ideal internalisation, greater social media use was associated with greater body dissatisfaction.** The two-way (muscular x thin-ideal internalisation) and three-way interaction (social media use x thin-ideal internalisation x muscular-ideal internalisation) effects on body dissatisfaction were non-significant. These findings emphasise the importance of considering the sociocultural environment (i.e., new media influences) as frameworks

for understanding body dissatisfaction and suggest targeting of internalisation of appearance ideals in body dissatisfaction prevention programs.

FIGURE:

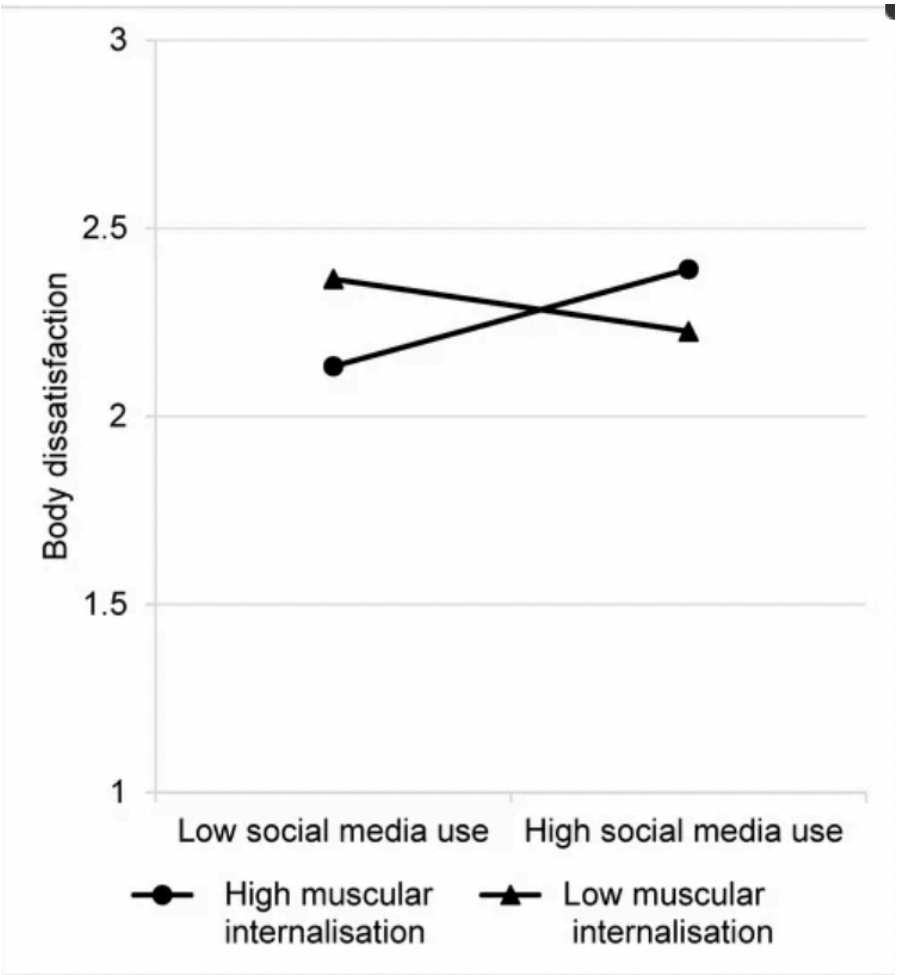


Figure. The two-way interaction effect of muscular-ideal internalisation and social media use on body dissatisfaction in boys.

1.1.53 Brailovskaia, Krasavtseva, Kochetkov, Tour, & Margraf (2022). Social media use, mental health, and suicide-related outcomes in Russian women: A cross-sectional comparison between two age groups. *Women's Health*.

ABSTRACT: BACKGROUND: Women who belong to the age group "emerging adulthood" (18 to 29 years) are vulnerable to mental health issues and suicide-related outcomes.
OBJECTIVES: This study investigated potential predictors of suicide-related outcomes in females emerging adulthood and compared them to older women. Design and

Methods: Data of 2537 women from Russia (group “18 to 29 years”: n=1123; group “>29 years”: n=1414) on lifetime suicide-related outcomes, (problematic) social media use, daily stress, depression and anxiety symptoms, and positive mental health were assessed via online cross-sectional surveys.
RESULTS: The younger group spent significantly more time on social media use than the older group. It had significantly higher levels of daily stress, problematic social media use, depression and anxiety symptoms, and suicide-related outcomes. The older group showed significantly higher levels of positive mental health. **Only in the younger group, problematic social media use significantly mediated the relationship between daily stress and suicide-related outcomes in a moderated mediation analysis. Positive mental health significantly moderated the association between problematic social media use and suicide-related outcomes. Specifically, the higher the positive mental health level, the less close the link between both variables.**
CONCLUSION: The current results reveal that young women in Russia could be at enhanced risk for daily stress, problematic social media use, and low levels of mental health. The interaction between these variables could foster suicide-related outcomes. Public governmental communication in Russia should call attention to potential negative impact of intensive social media use.

1.1.54 Khan, Lee, Rosenbaum, Khan, & Tremblay, (2021). Dose-dependent and joint associations between screen time, physical activity, and mental wellbeing in adolescents: An international observational study. *The Lancet Child & Adolescent Health*.

ABSTRACT: BACKGROUND: Mental wellbeing in adolescents has declined considerably during past decades, making the identification of modifiable risk factors important. Prolonged screen time and insufficient physical activity appear to operate independently and synergistically to increase the risk of poor mental wellbeing in school-aged children. We aimed to examine the gender-stratified dose-dependent and joint associations of screen time and physical activity with mental wellbeing in adolescents.
METHODS: We used data from three rounds of Health Behaviour in School-aged Children cross-sectional surveys (2006, 2010, and 2014) **from 42 European and North American countries. Survey participants, aged 11 years, 13 years, and 15 years,** provided self-reported information by completing an anonymous questionnaire that included items on health indicators and related behaviours. We used the self-reported variables of life satisfaction and psychosomatic complaints as indicators of adolescents'

mental wellbeing, combining these with the self-reported discretionary use of screens and engagement in physical activity. We used generalised additive models and multilevel regression modelling to examine the gender-stratified relationships between mental wellbeing and screen time and physical activity.

FINDINGS: Our sample included 577,475 adolescents (mean age 13·60 years, SD 1·64), with 296 542 (51·35%) girls and 280 933 (48·64%) boys. The mean reported life satisfaction score (on a scale of 0–10) was 7·70 (95% CI 7·69–7·71) in boys and 7·48 (7·46–7·50) in girls. **Psychosomatic complaints were more common among girls (mean 9·26, 95% CI 9·23–9·28) than boys (6·89, 6·87–6·91). Generalised additive model analyses showed slightly non-linear associations of screen time and physical activity with life satisfaction and psychosomatic complaints for girls and boys. Detrimental associations between screen time and mental wellbeing started when screen time exceeded 1 h per day, whereas increases in physical activity levels were beneficially and monotonically associated with wellbeing.** Multilevel modelling showed that screen time levels were negatively associated with life satisfaction and positively associated with psychosomatic complaints in a dose-dependent manner. Physical activity levels were positively associated with life satisfaction and negatively associated with psychosomatic complaints in a dose-dependent manner. Joint associations of screen time–physical activity with mental wellbeing showed that, compared with the least active participants with more than 8 h per day of screen time and no physical activity, most of the other screen time–physical activity groups had considerably higher life satisfaction and lower psychosomatic complaints.

INTERPRETATION: **Higher levels of screen time and lower levels of physical activity were associated with lower life satisfaction and higher psychosomatic complaints among adolescents from high-income countries.** Public health strategies to promote adolescents' mental wellbeing should aim to decrease screen time and increase physical activity simultaneously.

FIGURE:

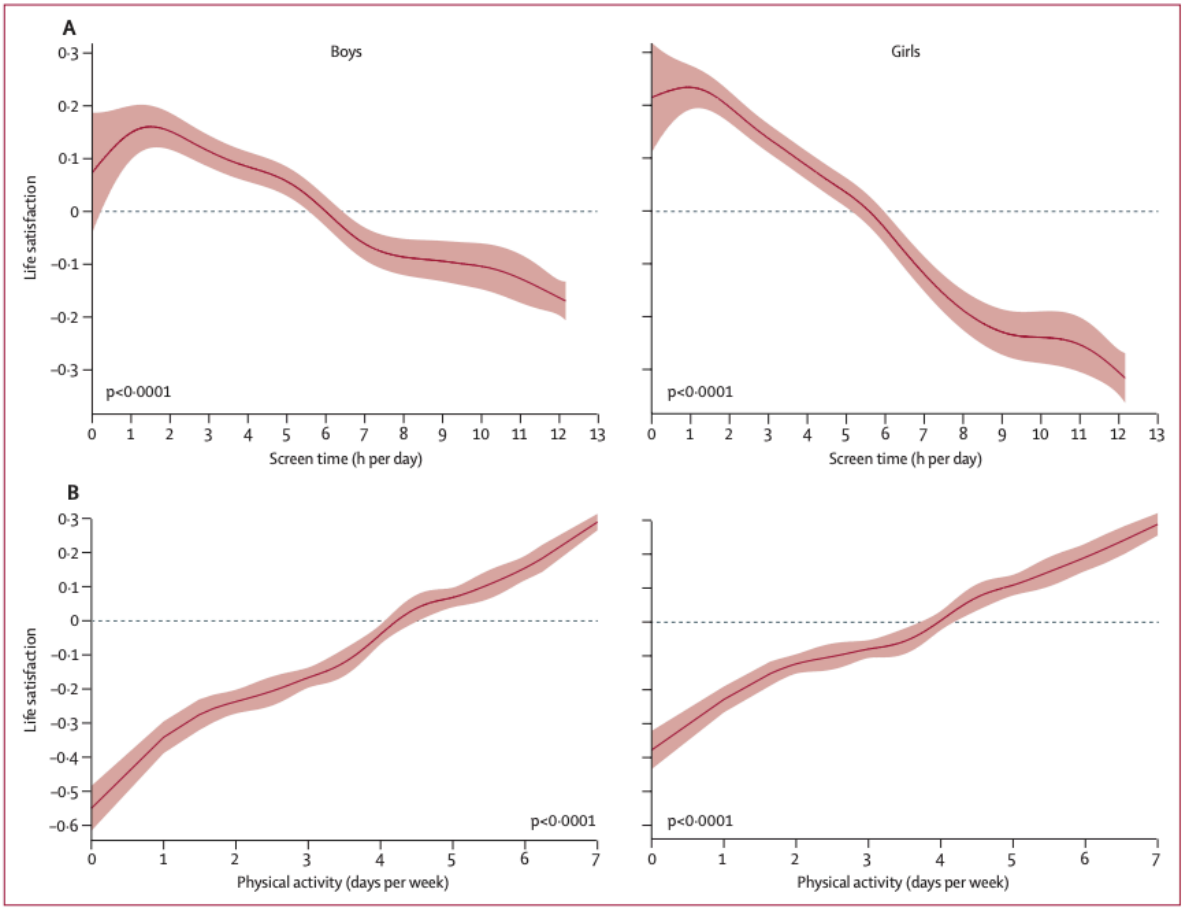


Figure 1: **Generalised additive models of life satisfaction as a function of daily screen time (A) and physical activity (B)**
Shaded area represents 95% CIs. p values are from χ^2 tests of non-linearity.

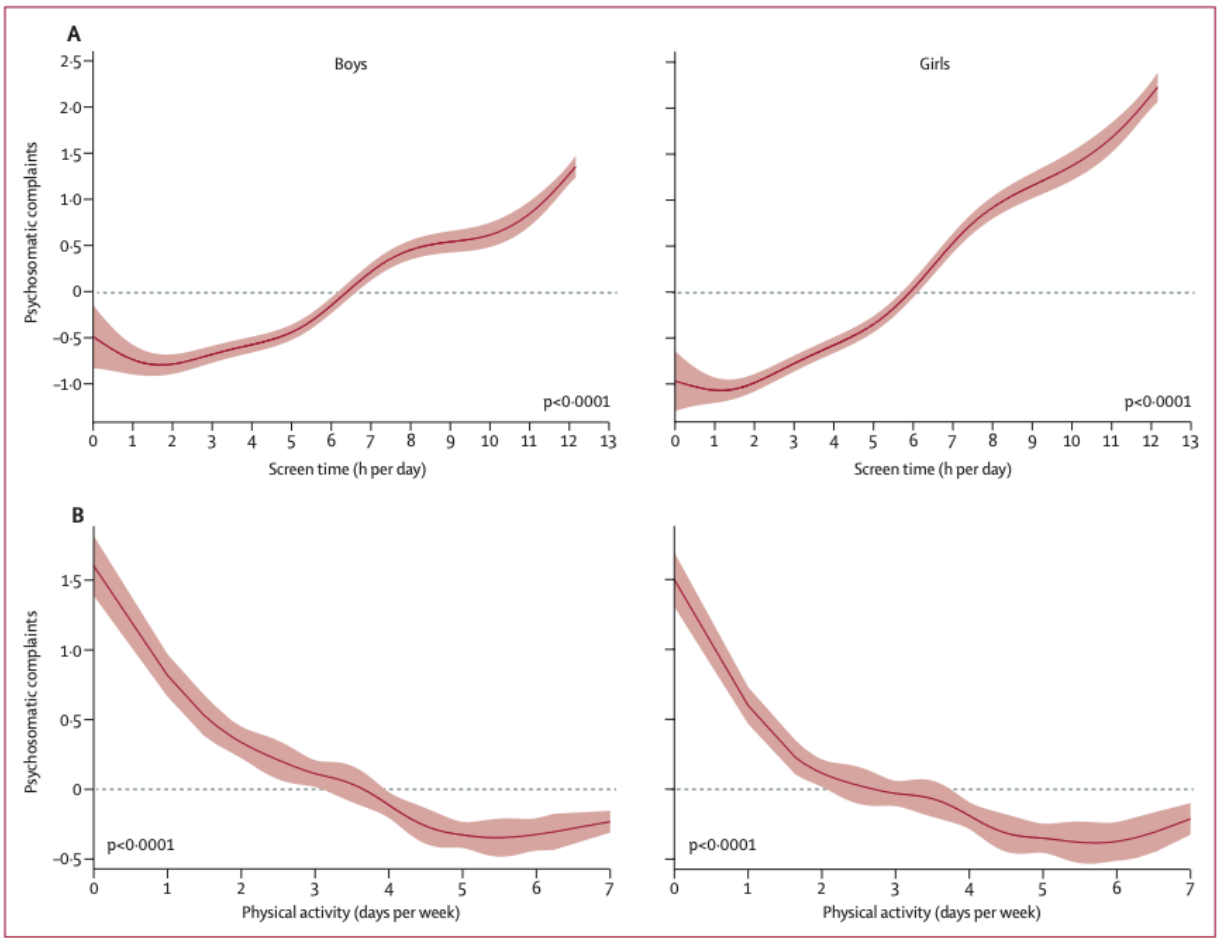


Figure 2: **Generalised additive models of psychosomatic complaints as a function of screen time (A) and physical activity (B)**
Shaded area represents 95% CIs. p values are from χ^2 tests of non-linearity.

1.1.55 Kim, & Kim (2023). Social Media Affordances of Ephemerality and Permanence: Social Comparison, Self-Esteem, and Body Image Concerns. *Social Sciences*.

ABSTRACT: Instagram provides users with different features, including posts and stories. Instagram post stays on the users' feeds permanently unless the content is deleted. An Instagram story has an ephemeral nature as the uploaded content vanishes after 24h. Through a survey of 224 respondents, this study explored individuals' psychological constructs when using different Instagram features. Instagram usage pattern (i.e., use of different features (video, emoji, etc.), categories of content (food, selfie, etc.) that users usually post, reasons for editing photos (slim body, flawless skin, etc.), amount of time to create and upload a post/story), social comparison, self-esteem, and body image concerns based on the user's perception of ephemerality and permanency were examined. **Results demonstrated that the perception of ephemerality on Instagram stories were negatively related to social comparison**

and body image concerns. In addition, the longer the amount of time the user spent on posting either a post or story on Instagram, the higher the likelihood the user was to socially compare. Overall, the findings align with previous research suggesting that Instagram users who socially compare are likely to have lower self-esteem and higher body image concerns.

1.1.56 Kwak, Kim, & Ahn (2022). Impact of Internet usage time on mental health in adolescents: Using the 14th Korea Youth Risk Behavior Web-Based Survey 2018. *PLOS ONE*.

ABSTRACT: Dependency on the Internet in daily life is increasing, and the negative consequences this dependence may have on mental health are not sufficiently understood. The aim of this study was to investigate the relationship between Korean adolescents' Internet usage time and their mental health. This cross-sectional study included 29,811 high school students ages 16–18 from the 2018 Korea Youth Risk Behavior Web-Based Survey. Participants' mean Internet usage time was 193.4±1.6 min/day. Internet usage time was associated with sex, grade level, type of school, living arrangement, economic status, academic achievement, and experience of school violence. **With regard to mental health, subjective health status, stress, feelings of sadness, and suicidal ideation were also related to Internet usage time.** The group with more than average Internet usage had poorer subjective health, higher level of stress, and had feelings of sadness and suicidal ideation compared to the group with less than average Internet usage. To effectively manage Internet usage time, interventions to lower Internet usage and leisure programs that could replace Internet usage need to be developed.

1.1.57 Anderl, Hofer, & Chen (2023). Directly-measured smartphone screen time predicts well-being and feelings of social connectedness. *Journal of Social and Personal Relationships*.

ABSTRACT: Previous findings on the relationship between smartphone use and well-being have been mixed. This may be partially due to a reliance on cross-sectional study designs and self reported smartphone usage. In the current study, we collected screen time data by directly tracking participants' (N = 325, ages 1480 years, 58% women) smartphone usage over a period of 6 days. We combined this tracking with ecological momentary assessment, asking participants three times per day about their psychological well-being and feelings of social connectedness. Smartphone screen time

was determined for the hour directly before each assessment. **Results revealed that at times when participants used their smartphone more in the hour before an assessment, they reported lower psychological well-being and lower social connectedness.** A bidirectional relationship emerged between smartphone screen time and social connectedness, suggesting a potential “vicious cycle” whereby smartphone usage leads to reduced social connectedness, which promotes more smartphone usage.

1.1.58 Kerr & Kingsbury (2023). Online digital media use and adolescent mental health. *Statistics Canada.*

ABSTRACT: BACKGROUND: Online digital media are a central part of adolescents' lives, providing opportunities for social connection. However, some research has suggested that online digital media use may be negatively associated with mental health. Little population-based research has examined associations between various types of online digital media use and adolescent mental health.
DATA AND METHODS: Data from 13,600 adolescents aged 12 to 17 were drawn from the 2019 Canadian Health Survey on Children and Youth. Adolescents reported on how frequently they used social media, video or instant messaging, and online gaming, as well as their general mental health, eating disorder symptoms and, for those aged 15 to 17, suicidal ideation and attempt. Logistic regression was used to estimate the odds of each outcome from the frequency of each type of digital media use, stratified by sex.
RESULTS: **Associations were noted between the frequency of social media and video and instant messaging use, and general mental health, eating disorder symptoms, and suicidal ideation and attempt. After cybervictimization and sleep adequacy were accounted for, associations with eating disorder symptoms remained significant for girls and boys.** Never participating in online gaming was associated with lower odds of lower general mental health and suicidal ideation among girls, but not boys.
INTERPRETATION: Different types of online digital media use are differentially associated with mental health outcomes, and associations differ between sexes. The associations between social media and video or instant messaging, and mental ill health may be partially explained by the experience of cybervictimization and sleep adequacy. More research on online gaming, particularly among girls, is needed to clarify associations with mental health.

1.1.59 Liu, Kamper-DeMarco, Zhang, Xiao, Dong, & Xue (2022). Time Spent on Social Media and Risk of Depression in Adolescents: A Dose-Response Meta-Analysis. *International Journal of Environmental Research and Public Health*.

ABSTRACT: Adolescent depression is a worldwide public health concern and has contributed to significant socioeconomic burden. Investigating the association between time spent on social media (TSSM) and depression may provide guidance toward the prevention and intervention of adolescent depression. However, related literature reported mixed findings in terms of the relationship between TSSM and depression in adolescents. Hence, we conducted a comprehensive dose-response meta-analysis to clarify this issue. We conducted a systematic title/abstract and topic search of the relative terms in Web of Science, PubMed, PsycINFO databases through 9 January 2022. Odd ratios (ORs) were used to examine the pooled effect size of the association between TSSM and risk of depression. Dose-response analysis was evaluated by a generalized least squares trend estimation. Twenty-one cross-sectional studies and five longitudinal studies including a total of 55,340 participants were included. Overall, more TSSM was significantly associated with a higher risk of depression symptoms (OR = 1.60, 95%CI: 1.45 to 1.75) with high heterogeneity (Q(29) = 105.9, p < 0.001; I2 = 72.6%). The association was stronger for adolescent girls (OR = 1.72, 95%CI: 1.41 to 2.09) than boys (OR = 1.20, 95%CI: 1.05 to 1.37). Five studies with seven reports were included in dose-response analysis. **There was a linear dose-response association of TSSM and risk of depression. The risk of depression increased by 13% (OR = 1.13, 95%CI: 1.09 to 1.17, p < 0.001) for each hour increase in social media use in adolescents.** TSSM is associated with depression in a linear dose-response and gender-specific manner, which suggests the need for better monitoring of adolescent social media use. However, motivation, content, and engagement on and exposure to social media use may also be important contributing factors, making it necessary to interpret the current findings with caution. Therefore, further research is required to clarify not only the causal link between TSSM and depression by randomized control studies but also the influence of other factors, such as active vs. passive social media use or different types of engagement or environments in which social media is used.

FIGURE:

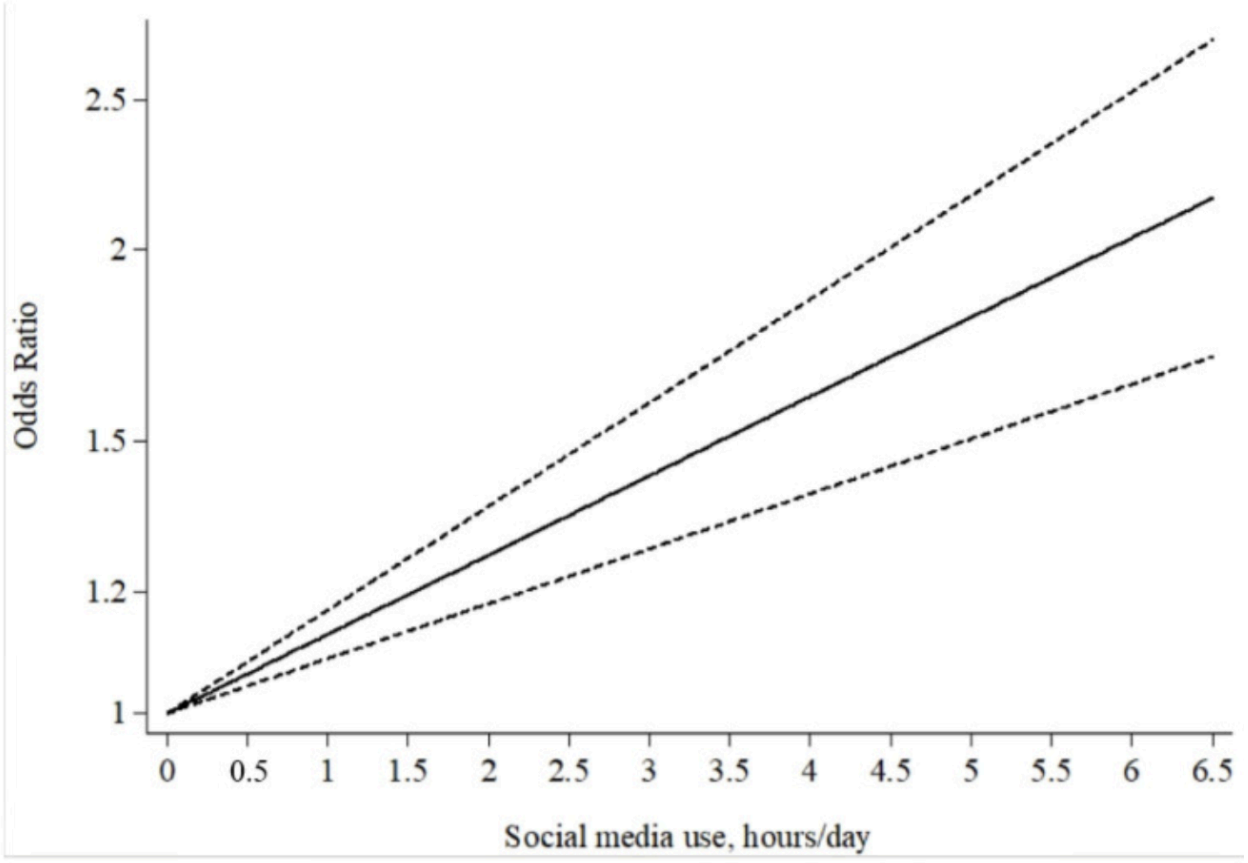


Figure. The generalized least squares trend estimated dose–response of time spent on social media and risk of depression in adolescents. Time of social media use was modelled with a restricted cubic spline in a two-stage random-effects dose–response model. The ORs are plotted on the log scale. Dashed lines represent the 95% CIs for the spline model. No social media use served as the referent category.

1.1.60 Shafi, Nakonezny, Romanowicz, Nandakumar, Suarez, & Croarkin (2021). Suicidality and self-injurious behavior among adolescent social media users at psychiatric hospitalization. *CNS Spectrums*.

ABSTRACT: BACKGROUND: The current study sought to examine the relationship between documented social media use and suicidality and self-injurious behaviors in adolescents at the time of psychiatric hospitalization.
METHODS: We retrospectively identified adolescents (aged 12-17 years) hospitalized on an inpatient psychiatric unit during 1 year. Abstracted information included documented social media use, demographic variables, documented self-injurious behaviors, the Patient Health Questionnaire-9, and the Suicide Status Form-II. Logistic

regression was implemented to examine the effect of social media use on the risk of self-injurious behaviors and suicidality.
RESULTS: Fifty-six adolescents who used social media were identified and matched with 56 non-social media users. **Those with reported social media use had significantly greater odds of self-injurious behaviors at admission (odds ratio, 2.55; 95% confidence intervals, 1.17-5.71; P = .02) vs youth without reported social media use. Adolescents with reported social media use also had greater odds of increased suicidal ideation and suicide risk than those with no reported use, but these relationships were not statistically significant.**
CONCLUSIONS: Social media use in adolescents with a psychiatric admission may be associated with the risk of self-injurious behaviors and could be a marker of impulsivity. Further work should guide the assessment of social media use as part of a routine adolescent psychiatric history.

1.1.61 Hawes, Zimmer-Gembeck, & Campbell (2020). Unique associations of social media use and online appearance preoccupation with depression, anxiety, and appearance rejection sensitivity. *Body Image*.

ABSTRACT: Social media (SM) can create a climate of social comparison and preoccupation with appearance, which can pose risks for emotional problems, such as depression and social anxiety. In this study, 763 adolescents and young adults reported time spent and intensity of social media use and preoccupation with both general and appearance-related (AR) social media activities and content. Associations were investigated with markers of depression and social anxiety symptoms and appearance sensitivities – appearance anxiety and appearance rejection sensitivity (appearance-RS). **Social media use was positively associated with symptoms of depression, social anxiety, appearance anxiety, and appearance-RS. General and AR preoccupation had unique and positive associations with depression and social anxiety symptoms and with appearance sensitivities. AR preoccupation was also found to strengthen the relationship between time spent on social media and appearance-RS.** Although there were gender differences on all measures, with young women scoring higher on all measures, there was no evidence that gender moderated the effects of AR social media preoccupation. Findings support emerging evidence that social media engagement and behavior, particularly activities involving appearance comparisons and judgements, may be more of a risk to depression and social anxiety symptoms and appearance sensitivities than simply the frequency of social media use.

1.1.62 Halldorsdottir, Thorisdottir, Meyers, Asgeirsdottir, Kristjansson, Valdimarsdottir, Allegrante, & Sigfusdottir (2021). Adolescent well-being amid the COVID-19 pandemic: Are girls struggling more than boys? *JCPP Advances*.

ABSTRACT: BACKGROUND: Differential effects of the coronavirus SARS-CoV-2 (COVID-19) pandemic and associated public restrictions on adolescent girls and boys are emerging but have not been elucidated. This study examined gender differences across broad indicators of adolescent well-being during the COVID-19 pandemic in Iceland, and explored potential explanations for these differences.
METHODS: In total, 523 youth (56.5% girls) born in Iceland in 2004 completed measures on mental health problems (depressive symptoms, anger and suicide attempts) and measures designed for this study to assess broad indicators of adolescent well-being (e.g., day-to-day life, academic performance, family and peer relationships, and mental and physical health) and behavioral changes during the COVID-19 pandemic. Mental health problems during the pandemic were compared to expected scores based on nationwide ratings of same-aged peers in 2018.
RESULTS: Although both boys and girls appeared affected, girls reported a greater negative impact across all the broad indicators of well-being and behavioral change during COVID-19 than boys, and their depressive symptoms were above and beyond the expected nationwide scores ($t(1514) = 4.80$, $p < .001$, Cohen's $d = 0.315$). **Higher depressive symptoms were associated with increased passive social media use and decreased connecting with family members via telephone or social media among girls, and decreased sleeping and increased online gaming alone among boys.** Concern about others contracting COVID-19, changes in daily and school routines, and not seeing friends in person were among the primary contributors to poor mental health identified by youth, particularly girls.
CONCLUSIONS: Adolescents were broadly negatively affected by the COVID-19 pandemic and accompanying restrictions; however, this negative impact was more pronounced in girls. The findings suggest that a steady routine and remaining socially connected may help youth cope with the uncertainty and social restrictions associated with a pandemic. Moreover, healthcare providers, teachers, and other professionals should pay close attention to depressive symptoms among girls during a pandemic.

1.1.63 Birgisson, Hysing, Eriksen, Johannsson, & Gestsdottir (2023). The relationship between online communication and adolescents' mental health: Long-term evaluation between genders. *Scandinavian Journal of Public Health*.

ABSTRACT: AIMS: In a relatively short time, online communication has become an important part of adolescents' lives, and concerns have been raised about its potential effects on mental health. The first aim was to compare mental health status and online communication in 15-year-old Icelanders born in 1988 and in 1994. The second aim was to assess whether the relationship between online communication and mental health has changed among 15-year-old Icelanders from 2003 to 2015 across genders. METHODS: Analysis used data from self-reports from 2003 (N=385, 51% males) and 2015 (N=302, 42% males). Mental health was assessed with subscales of Symptom Checklist 90 and online communications with self-reports. To evaluate the difference in anxiety and depression, a factorial analysis of variance was conducted between gender and years. Multigroup structural equation modelling was used to assess the change in the relationship between years.
RESULTS: **Symptoms of anxiety and depression remained unchanged for males. Symptoms of depression increased for females, while anxiety was stable between 2003 and 2015. In 2003, there was no relationship between online communication and mental health. However, in 2015, an association was found for females.**
CONCLUSIONS: Depression is getting worse for adolescent females, and an association between time spent online communicating and mental health emerged for them in 2015, which did not exist in 2003. These findings add to the possibility that online communication is harmful for mental health, but more detailed studies are still needed.

1.1.64 Tng, & Yang (2023). Nuanced relationships between indices of smartphone use and psychological distress: Distinguishing problematic smartphone use, phone checking, and screen time. *Behaviour & Information Technology*.

ABSTRACT: Recent theoretical and empirical accounts maintain that different indices of smartphone use—including problematic smartphone use, phone-checking, and screen time—tap distinct facets of smartphone use. This highlights the importance of disentangling potentially unique associations between facets of smartphone use and psychological distress outcomes. The present study examined fine-grained relationships between several smartphone-use indices and facets of psychological distress. Further, we probed whether sex modulated the relationships between smartphone-mediated behaviours and distress outcomes. Using structural equation modelling, we analysed data from young adults (N = 364) and evaluated the associations of smartphone-related behaviours—problematic use, phone checking, and overall screen time—with depression, anxiety, and stress. **We found that phone-checking frequency predicted greater depression, anxiety, and stress levels, while problematic smartphone use**

predicted anxiety levels above and beyond the effects of other indices. Further, smartphone screen time predicted depression, but not other distress-related outcomes. We also found an interaction effect such that the positive relation between problematic smartphone use and stress was more pronounced for females than males. Our results held true when key covariates (age, sex, socioeconomic status, negative affect, and neuroticism) were accounted for. These findings underscore the importance of distinguishing indices of smartphone use in relation to psychological distress.

1.1.65 Mojtabai (2023). *Problematic Social Media Use and Internalizing Symptoms in Adolescents* [Preprint]. In Review.

ABSTRACT: PURPOSE: This study examined time trends in significant child and adolescent internalizing symptoms and explored the association of excessive and problematic social media use with these symptoms.
METHODS Time trends in internalizing symptoms were assessed using data from five waves of the international survey of Health Behavior in School-aged Children (HBSC), conducted between 2001 and 2018 (N=1,036,869). The associations of frequent and problematic social media use with significant internalizing symptoms were assessed by hierarchical multinomial logistic regression using data from 2001-2002 and the 2017-2018 survey waves. Causal direction between social media use and internalizing symptoms was assessed using linear non-gaussian acyclic models (LiNGAM).
RESULTS: **Prevalence of more severe internalizing symptoms increased from 6.7% in 2001-2002 to 10.4% in the 2017-2018 survey waves. The increase was especially large among 15-year old and older girls: from 10.9% to 19.1%. The difference in prevalence of more severe internalizing symptoms across survey waves was fully explained by problematic social media use.** LiNGAM analysis confirmed the causal direction of social media use variables with internalizing symptoms.
CONCLUSIONS: The study findings suggest that widespread use of social media may explain the increased prevalence of internalizing symptoms in adolescents in recent years.

1.1.66 Müller, Dreier, Beutel, Duven, Giralt and Wölfling (2016). A hidden type of internet addiction? Intense and addictive use of social networking sites in adolescents, *Computers In Human Behavior*

ABSTRACT: PURPOSE: We wanted to explore, if use of social networking sites is related to addiction symptoms and psychosocial distress and which variables (demography, personality) predict addictive use.
METHODS: A representative sample of n = 9173 adolescents (12–19 years) was enrolled. Self-report questionnaires assessed demography, frequency of social networking sites use, internet addiction, personality, and psychosocial distress.
FINDINGS: Gender-specific associations were found between frequency of use of social networking sites and addiction criteria, especially regarding preoccupation and loss of control. **Adolescents using social networking sites intensely were more often classified with internet addiction (4.1% boys, 3.6% girls) and displayed higher psychosocial distress.** Frequency of social networking sites use and its addictive use were predicted by similar variables except for extraversion that was only related to frequency of use. **Since the intense use of social networking sites can be related to addictive symptoms and is accompanied by psychosocial distress it might be considered as another form of addictive online behavior.**

1.1.67 Tørmoen, Myhre, Kildahl, Walby, & Rossow (2023). A nationwide study on time spent on social media and self-harm among adolescents. *Scientific Reports*.

ABSTRACT: Self-harm among adolescents has increased in many countries, but few studies have examined possible explanations. One explanation could be the changes in the way adolescents socialize and use of social media. We explored the relationship between past year self-harm and time spent on social media, employing data from a nationwide cross-sectional survey among students in grades 8 through 11 in Norway (N = 37,268). **The association was estimated in logistic regression models and we adjusted for identified confounders and stratified on gender, age group and depressive symptoms. A total of 16.1% of the study population reported to have self-harmed in the past year. This proportion was elevated among those spending more than 3 h daily on social media (unadjusted OR = 2.74 (CI 2.58.–2.90)). Adjustment for confounders modified the association (OR = 1.49 (CI 1.39–1.60)).** In stratified analyses, adjusted OR did not differ significantly by gender or age. The association between time spent on social media and self-harm was weaker among adolescents with severe depressive symptoms (adjusted OR = 1.38 (CI 1.22–1.55)), than among those with mild or no symptoms (adjusted OR = 1.70 (CI 1.56–1.86)). Risk of **self-harm was elevated among those who spent 3 or more hours daily on social media, also after controlling for other factors.** Further studies are needed to explore the nature and underlying mechanisms of this association. Strengthening the evidence will help informing the development of adequate measures to prevent self-harm.

1.1.68 Mirea, Mildner, Kelley, Gillan, Nook, & Niv (2024). Depression is associated with higher sensitivity to social media rewards. [Preprint]

ABSTRACT: The interaction between social media use and mental health is of great public health concern. Studies so far, largely employing self-reported measures of social media use, have produced inconclusive evidence regarding the impact of social media on mental health. Focusing on objective behavioral markers and the psychological mechanisms underlying how users interact with social media platforms could be key to greater insight on this topic. Here we use Twitter data to study how depression modulates a central behavioral process on social media: the response to the social rewards (e.g. likes, shares, views) users receive when they post. Reinforcement learning theory predicts that social media rewards will reinforce posting behavior, such that receiving more likes will lead to posting more frequently and spending more time on the platform. However, laboratory tasks often show blunted reinforcement learning in depression, suggesting a potential attenuation of the effects of social rewards on posting behavior. Across 3 datasets with varied measures of depression and data collection strategies (over 17 million tweets from 7744 users in total, including a pre-registered replication), **we consistently found that depression was associated with a larger reinforcing effect of likes on posting on the next day. In other words, users with depression showed heightened sensitivity to social media rewards, in contrast to findings from laboratory-based tasks.** These results identify a psychological mechanism that may **link social media use to poor mental health**, and underscore the importance of testing the generalizability of in-lab computational psychiatry findings to real-world environments.

1.1.69 Carter, Payne, Rees, Sohn, Brown, & Kalk (2024). A multi-school study in England, to assess problematic smartphone usage and anxiety and depression. *Acta Paediatrica*.

ABSTRACT: AIM: To assess the association between problematic smartphone usage and anxiety and depression in adolescents.
METHODS: A cross-sectional study in five schools in the UK were included. The primary outcome was moderate anxiety (GAD-7 ≥10) symptoms and secondary outcomes were moderate depression symptoms (PHQ-9 ≥10) and insomnia. Problematic smartphone usage was assessed using screentime and the Smartphone Addiction Scale. A multi-level logistic regression was fitted and adjusted Odds Ratio

(aOR) with 95% confidence intervals (95% CI) reported. A mediation analysis was conducted.
RESULTS: Of the five included schools, 657 adolescents aged 16–18 years were enrolled. The median age was 17.5 years (17–18 [IQR]) and 508 (77.3%) were female. Of these 188 (28.6%) exhibited moderate anxiety and 226 (34.4%) moderate depression symptoms. Almost two thirds (421, 64.1%) have tried to cut down their smartphone use and 81 (12.5%) wanted help to reduce use. **Problematic smartphone use was associated with increased anxiety (aOR = 2.03, 95% CI 1.28–3.23); depression (aOR = 2.96, 95% CI 1.80–4.86); and insomnia (aOR = 1.64, 95% CI 1.08–2.50).** Screentime was not associated with anxiety (β = 0.99, 95% CI 0.91–1.08); or depression (β = 0.98, 95% CI 0.89–1.07). Problematic smartphone use had a significant direct, indirect and total effect on both anxiety and depression.
CONCLUSION: Problematic smartphone usage was associated with anxiety and depression, independent of screentime. Interventions are needed to reduce problematic use.

1.1.70 van der Wal, Beyens, Janssen, & Valkenburg (2024). Social Media Use Leads to Negative Mental Health Outcomes for Most Adolescents.

[Note: This article has not yet been peer reviewed, but we post it because it is by one of the major researchers in the field, Valkenberg.]

ABSTRACT: The rising prevalence of mental health problems among adolescents has prompted increased scrutiny of social media as a contributing factor. Previous research has produced mixed results, likely due to the varying impact of social media on different dimensions of mental health. To advance understanding in this area, this study examined how social media use affects three critical dimensions of adolescent mental health – well-being, self-esteem, and friendship closeness. Specifically, we examined whether adolescents experienced consistent (unity) or contrasting (duality) effects across these dimensions by analyzing 44,211 daily diaries from 479 adolescents over 100 days. We found that **the majority of adolescents (60%) experienced unity in negative effects of social media**, suggesting that social media use is a contributor to mental health issues. Moreover, **13.6% of adolescents experienced duality in effects**, indicating that social media use simultaneously harms and benefits different dimensions of their mental health. Exploratory analyses demonstrated the importance of considering platform-specific effects, revealing **negative impacts of TikTok, YouTube, and Instagram use and positive or null effects of Snapchat and WhatsApp use on the three dimensions of mental health**. Our findings highlight the need for tailored

strategies that account for the varying impacts of social media on adolescent mental health.

1.1.71 Brailovskaia & Margraf (2020). Decrease of well-being and increase of online media use: Cohort trends in German university freshmen between 2016 and 2019. *Psychiatry Research*.

ABSTRACT: Research from the U.S. described a decrease of subjective well-being and an increase of online media use in young adults today. The present study investigated whether similar trends occur in Germany. Data of overall 1985 university freshmen (four cohorts: 2016: N=658, 2017: N=333, 2018: N=562, 2019: N=432) were collected by online surveys in the years 2016 to 2019. The comparison of the four cohorts revealed a significant increase of depression, anxiety and stress symptoms, as well as of the use of social platforms from 2016 to 2019. In contrast, positive mental health (PMH) significantly decreased over the years. No significant changes of the gaming behavior were found. **A slight significant positive relationship occurred between the negative variables of well-being and online media use**. The **association between PMH and online media use was significantly negative**. Thus, cohort trends found in the U.S. can at least rudimentarily be replicated in Germany. Young adults in 2019 seem to have lower levels of well-being and to engage in more use of social platforms than older cohorts.

1.1.72 Brailovskaia & Margraf (2023). Less sense of control, more anxiety, and addictive social media use: Cohort trends in German university freshmen between 2019 and 2021. *Current Research in Behavioral Sciences*.

ABSTRACT: The COVID-19 outbreak brought many challenges for everyday life that could affect mental health. The present study investigated cohort trends of sense of control, anxiety symptoms and (addictive) social media use (SMU) in German university freshmen between 2019 (before the pandemic outbreak) and 2021 (after the pandemic outbreak). Data of overall 1,378 freshmen (three cohorts: 2019: N = 407, 2020: N = 563, 2021: N = 408) were collected by online surveys. The comparison of the three cohorts revealed a significant decrease of sense of control from 2019 to 2021 (effect size: Cohen's d = 0.29 to 0.36). In contrast, anxiety symptoms (d = 0.25 to 0.28), time spent daily on SMU (d = 0.18 to 0.36), and addictive SMU (d = 0.26 to 0.31) increased. In all

cohorts, we found the same result patterns. **Anxiety symptoms and the SMU variables were significantly positively correlated** (r = 0.171 to 0.469, p < .001). Sense of control was significantly negatively correlated with the other assessed variables (r = -0.112 to -0.279, p < .05 and p < .001). Moreover, **anxiety symptoms mediated the relationship between sense of control and addictive SMU**. Thus, the COVID-19 outbreak and its consequences for daily life could affect the sense of control, anxiety symptoms and addictive SMU of freshmen in Germany. Potential ways how to protect young people against these potential negative effects are discussed.

1.1.73 Visier-Alfonso, López-Gil, Mesas, Jiménez-López, Cekrezi, & Martínez-Vizcaíno (2024). Does Socioeconomic Status Moderate the Association Between Screen Time, Mobile Phone Use, Social Networks, Messaging Applications, and Mental Health Among Adolescents? *Cyberpsychology, Behavior, and Social Networking*.

ABSTRACT: The aim of this study was to examine the relationship between different screen time (ST)-related behaviors and mental health conditions such as depression, anxiety, and stress. In addition, this study aimed to determine the moderating role of socioeconomic status (SES). This was a cross-sectional study and included data from 620 adolescents, aged 12–17 years, from the Valle de Ricote, Region of Murcia, Spain. Mental health was assessed using the Depression, Anxiety, and Stress Scale (DASS-21). Overall ST, mobile phone use, social network use, and messaging application use were measured using validated questionnaires. SES was assessed using the Family Affluence Scale-III. The results indicated that **overall ST was significantly associated with symptoms of depression at the mean SES** (unstandardized beta coefficient [B] = 0.005, p = 0.023) **and 1 standard deviation (SD) below the mean** (B = 0.007, p = 0.011), and with stress only 1 SD below the mean (B = 0.006, p = 0.011). No significant associations were found for anxiety and stress across all socioeconomic levels. Mobile phone use exhibited a strong positive association with symptoms of depression (B = 0.891, p < 0.001), anxiety (B = 0.530, p = 0.014), and stress (B = 0.790, p < 0.001) at 1 SD below the mean SES. Similar patterns were observed for mean SES, albeit with slightly weaker associations. Conversely, **social network use was positively associated with all three DASS-21 scales, particularly at 1 SD below the mean SES, with the strongest associations found for symptoms of depression (B = 0.327, p < 0.001), anxiety (B = 0.325, p < 0.001), and stress (B = 0.318, p < 0.001).** Furthermore, messaging application use did not show significant associations with symptoms of depression, anxiety, or stress across any SES levels. In conclusion, social inequalities may influence the associations between various ST-related behavior and symptoms of depression, anxiety, and stress among

adolescents. These findings may have implications for the design of effective interventions to improve symptoms of depression, anxiety, and stress in this population.

1.1.74 Clayborne, … & Lang (2024). Associations between social media use and positive mental health among adolescents: Findings from the Canadian Health Behaviour in School-aged Children Study. *Journal of Psychiatric Research*.

ABSTRACT: Social media use (SMU) has rapidly increased among children and adolescents in the past decade, and has been linked with poorer mental health. However, moderate SMU can facilitate connectedness among peers, which may have positive impacts for well-being – these associations are underexplored. This study examined the associations between SMU and several indicators of PMH in a nationally representative sample of 13,113 adolescents in grades 6 to 10 from the 2017/2018 cycle of the Canadian Health Behavior in School-aged Children (HBSC) study. SMU was measured using a four-level composite of intensity (non-active, active, intense) and problematic SMU (addictive-like symptoms, regardless of intensity). Four dichotomous indicators of PMH were examined: self-efficacy, self-confidence, life satisfaction, and psychological well-being. Covariates included grade, gender, cultural/racial background, and socioeconomic status. Unadjusted and adjusted mixed effects logistic regression models accounting for school-level clustering were run, with separate models for each PMH indicator and active SMU set as the referent. When compared to active SMU, **problematic SMU was associated with lower levels of all PMH indicators, and intense SMU was associated with lower life satisfaction**. In gender-stratified models, **intense SMU was associated with lower life satisfaction among girls**. In grade-stratified models, non-active SMU was associated with lower self-confidence for adolescents in grades 9 and 10. In all, **problematic SMU is generally associated with lower odds of reporting high PMH**. Longitudinal research is required to ascertain directionality of these findings, and to examine how these associations may have changed during the COVID-19 pandemic.

1.1.75 Klinger, Plener, Marboe, Karwautz, Kothgassner, & Dienlin (2024). Exploring the relationship between media use and depressive symptoms among gender diverse youth: findings of the Mental Health Days Study. *Child and Adolescent Psychiatry and Mental Health*.

ABSTRACT: BACKGROUND: Over the past decades, media use has become a key aspect of young people's daily lives, significantly shaping their social interactions,

learning processes, and recreational pursuits. At the same time, healthcare professionals and researchers are increasingly concerned about the impact of media use on young people's mental health. This concern is particularly relevant for gender diverse youth who may have distinct experiences with media that could impact their mental health uniquely compared to their peers, such as increased exposure to cyberbullying and negative content regarding their gender identity. This study aims to explore the associations between media use and depressive symptoms among youth and examine if gender moderates this association.
METHODS: This study utilized a cross-sectional design involving a school-based sample of 8158 participants (Mage = 14.05 years, SD = 2.45, Ndiverse = 144) from Austria. Participants completed a survey assessing their media use and depressive symptoms using the Patient Health Questionnaire-9 (PHQ-9). Media use was measured by asking participants to report their daily usage in hours and minutes across various categories, including smartphone use, streaming services, social networks, and other media types. Multiple regression analyses were conducted to examine relationships between different forms of media use and depressive symptoms. Moderation analyses were performed using the PROCESS macro for SPSS to explore the role of gender.
RESULTS: For gender diverse youth, multiple regression analysis identified **streaming services (β = 0.265, p = .005) and social networks (β = 0.189, p = .037) as significant predictors of depressive symptoms in gender diverse youth**. Moderation analyses conducted with the entire sample showed that **gender moderates the relationship between depressive symptoms and smartphone use (B = - 0.008, p = .014), with the effect being the most negative for gender diverse individuals**.
CONCLUSION: The findings underscore the complex relationship between media use and depressive symptoms among gender diverse youth, emphasizing the moderating role of gender. These results underline the need for gender-sensitive approaches in media literacy and mental health interventions. Stakeholders should be aware of risks and benefits of different media types to foster healthy media engagement.

1.1.76 Kennard, … & Trivedi (2025). Problematic social media use and relationship to mental health characteristics in youth from the Texas Youth Depression and Suicide Research Network (TX-YDSRN). *Journal of Affective Disorders*.

ABSTRACT: BACKGROUND: The relationship between social media and mental health, particularly in youth, is an area of concern for researchers, clinicians, and parents. Rising rates of screen time have coincided with an increase in youth mental health issues, emphasizing the need to investigate the prevalence and clinical correlates of problematic social media use.

METHODS: Our sample is a 489-participant sub-sample of the Texas Youth Depression and Suicide Research Network (TX-YDSRN) Registry, which is comprised of Texas youth receiving care for depression, suicidal ideation and/or suicidal behaviors. Prevalence of problematic social media use was identified, and indicators of mental and physical health were compared in those with or without problematic use.
RESULTS: In our sample, 40.3 % of participants reported problematic social media use, and those with problematic use were more likely to report higher amounts of screen time. Relative to non-problematic users, problematic users endorsed more and higher depressive symptoms, anxiety, and suicidal thoughts, as well as poorer wellness factors. Participants with high duration and problematic use had poorer outcomes than those with low duration and non-problematic use.
LIMITATIONS: The cross-sectional design does not allow for control comparisons and is limited by use of a single time point. Data are mainly derived from self-report measures, and generalizability of the findings may be impacted by overrepresentation of white females in the sample.
CONCLUSIONS: As use increases, these data contribute to the empirical literature on the complex relationship between social media and mental wellbeing, suggesting problematic use is associated with poor mental health outcomes.

1.1.77 Poulain, Meigen, Kiess, & Vogel (2025). Smartphone use, wellbeing, and their association in children. *Pediatric Research*.

ABSTRACT: BACKGROUND: This study assessed changes in the duration of smartphone use, problematic smartphone use (PSU), quality of life, and their association from 2018 to 2024 in children and adolescents. METHODS: Data were collected between 2018 and 2024 within the LIFE Child cohort study (Germany). We used a repeated cross-sectional dataset containing 2576 data points of 1113 10- to 17-year-old children and adolescents (51% male) who had reported on their quality of life, PSU, and their smartphone use duration. Hierarchical regression analyses were applied to assess associations of PSU, smartphone use duration, and quality of life with the year of assessment and associations of PSU and smartphone use duration with quality of life. RESULTS: From 2021 onwards, symptoms of PSU and smartphone use durations >3 h/day were significantly more frequent than in 2018. For PSU, these changes were significantly stronger in girls and younger children. Concurrently, quality of life was significantly poorer than in 2018. Both PSU and long smartphone usage durations were significantly associated with lower quality of life. CONCLUSIONS: This study shows the increasingly problematic use of smartphones and its negative association with the overall declining quality of life of children over the last seven years.

1.1.78 Sametoglu, Pelt, & Bartels (2025). The Association Between Frequency of Social Media Use, Wellbeing, and Depressive Symptoms: Disentangling Genetic and Environmental Factors. *Behavior Genetics*.

ABSTRACT: Meta-analyses report small to moderate effect sizes or inconsistent associations (usually around *r* = -0.10) between wellbeing (WB) and social media use (SMU) and between anxious-depressive symptoms (ADS) and SMU (also around *r* = 0.10). This study employs the classical twin design, utilizing data from 6492 individuals from the Netherlands Twin Register, including 3369 MZ twins (893 complete twin pairs, 1583 incomplete twin pairs) and 3123 DZ twins (445 complete, 2233 incomplete) to provide insights into the sources of overlap between WB/ADS and SMU. Both hedonic and eudaimonic WB scales were used. SMU was measured by (1) the time spent on different social media platforms (SMUt), (2) the frequency of posting on social media (SMUf), and (3) the number of social media accounts individuals have (SMUn). **Our results confirmed the low phenotypic correlations between WB and SMU (between *r* = -0.09 and 0.04) as well as between ADS and SMU (between *r* = 0.07 and 0.10).** For SMU, heritability estimates between 32 and 72% were obtained. The small but significant phenotypic correlations between WB/ADS and the SMU phenotypes were mainly determined by genetic factors (in the range of 80-90%). For WB and SMU, genetic correlations were between -0.10 and -0.0, and for ADS and SMU genetic correlations were between 0.10 and 0.23. Genetic correlations implied limited but statistically significant sets of genes that affect WB/ADS and SMU levels. **Overall, the results indicate that there is evidence that the small associations between WB/ADS and SMU are partly driven by overlapping genetic influences**. We encourage researchers and experts to consider more personalized approaches when considering the association between WB and SMU, as well as understanding the reasons for individuals' observed SMU levels.

1.1.79 May, Malouff, & Meynadier (2025). Reducing Social Media Use Decreases Depression Symptoms: A Meta-Analysis of Randomised Controlled Trials. *European Journal of Investigation in Health, Psychology and Education.*

ABSTRACT: The association between social media use and depression found in correlational research has prompted widespread concern regarding the consequences of social media use. In response to this evidence, experimental interventions have been used to evaluate whether lowering social media use affects depression. This meta-analysis synthesised results of 10 randomized controlled trials (*N* = 1491) to assess the effect of limiting or refraining from social media use on severity of depressive

symptoms. Studies were included if they were randomized control trials involving reducing or eliminating use of social media for a period of time. The results indicate that reducing social media use significantly decreases depressive symptoms, with an effect size of $g = 0.25$, 95% CI [0.10, 0.41], $p < 0.001$, after adjusting for publication bias. Significant heterogeneity was found between studies, with I2 indicating that 47% of the variability in effect sizes across studies was due to heterogeneity of true effect size rather than random error. Although interventions aimed at reducing use of social media had twice the depression effect size of interventions aimed at abstinence from social media, the difference was not significant. Two other potential moderators of effect size, intervention length and number of social networks included, were also nonsignificant. Overall, this meta-analysis suggests that limiting social media use is an effective way to reduce symptoms of depression. However, more studies with good research methods are needed to evaluate this conclusion. Also, further research is needed to evaluate long-term effects of limiting or refraining from social media use.

1.1.80 Hoertel et al. (2025). Impact of excessive social media use on adolescent depression and its consequences in France: An individual-based microsimulation model. *PLOS Medicine.*

ABSTRACT: Background: Social media (SM) platforms have become increasingly prevalent in adolescents' lives, and concerns have arisen regarding their potential contribution to depression. This study examined whether excessive SM use contributes to rising adolescent depression rates and evaluated potential mitigation strategies. Methods and findings: We developed an individual-based microsimulation model of 18.6 million French adolescents born 1990–2012, tracking depression outcomes from 2000–2022 (analyses conducted August 2024-July 2025). The model incorporated 95 parameters, including demographics, SM use patterns, and established depression risk factors (childhood adversities, chronic physical conditions, physical inactivity, obesity, substance use). The main outcome was cumulative depression cases, and secondary outcomes were suicide deaths, health-adjusted life expectancy (HALE) loss, and associated costs. The model was well-calibrated and validated adequately against US-specific data. **It showed that excessive SM use likely played an important role in the recent increase in rates of adolescent depression. Among French adolescents, simulations indicated that excessive SM use was associated with an additional cumulative lifetime 590,000 depression cases (95%CI [400,000, 760,000]), 799 suicide deaths (95%CI [547, 1,028]), 137,000 (95%CI [94,000, 176,000]) HALE loss years, and 3.94 (95%CI [2.70, 5.07]) billion euros, compared to scenarios without SM platforms.** Key limitations are that microsimulation modeling cannot establish causality from observational data and the reliance on duration-based

exposure measures without capturing content type or engagement quality. Conclusions: In this study, we estimated that limiting SM use to 1 h per day for all adolescents, replacing 30 min of SM use with 30 min of physical activity, or stopping its use for adolescents most at-risk for depression, would be associated with a reduction in cumulative lifetime prevalence of depression by 14.7%, 12.9%, and 12.0%, respectively, and diminished associated costs. Targeted SM interventions could potentially reduce adolescent depression burden, though real-world implementation and effectiveness require validation.

1.1.81 Nguyen et al. (2025). Feeds, Feelings and Focus: A Systematic Review and Meta-Analysis Examining the Cognitive and Mental Health Correlates of Short-Form Video Use. *Psychological Bulletin*.

ABSTRACT: The resurgence of short-form videos (SFVs), popularized by TikTok and Douyin, has transformed social media platforms, with features like Instagram Reels and YouTube Shorts fostering their widespread adoption. Although initially geared toward entertainment, SFVs are increasingly used in education, political campaigns, advertising, and consumerism, yet their design, characterized by endless scrolling interfaces, has raised concerns about addiction and negative health implications. Given the recent surge of studies on SFV apps, a comprehensive synthesis is needed to clarify how SFV use relates to different health indicators. This systematic review and meta-analytic investigation comprised data from 98,299 participants across 71 studies. **Increased SFV use was associated with poorer cognition (moderate mean effect size, r = -.34), with attention (4 = -.38) and inhibitory control (r = -.41) yielding the strongest associations. Similarly, increased SFV use was associated with poorer mental health (weak mean effect size, r = -.21), with stress (r = -.34) and anxiety (r = -.33) showing the strongest associations.** These findings were consistent across youth and adult samples and across different SFV platforms. Relatively few studies examined cognitive domains beyond attention and inhibitory control (e.g., memory, reasoning), highlighting critical directions for future research. Interestingly, SFV use was not associated with body image or self-esteem, which may reflect the diverse content and creators featured on those platforms. Further research is therefore needed to clarify how different types of content exposure may shape these associations. Overall, these findings highlight the importance of understanding the broader health implications of SFV use, given its pervasive role in daily life and potential to impact health, behavior, and well-being. By synthesizing current evidence, this study provides a critical foundation for future research to explore understudied health domains (e.g., cognitive health, physical health) and offers insights to guide public discourse and the

development of research-informed approaches for promoting more balanced engagement with SFVs.

1.1.82 Grund et al. (2025). Social Media Use and Adolescent Depressive Symptoms: The Moderating Roles of Gender and Parental Monitoring. *International Journal of Mental Health and Addiction*.

ABSTRACT: Social media use has significantly reshaped adolescents' social experiences, raising substantial concerns about its impact on mental health. This study examines the association between social media usage intensity and depressive symptoms among adoelscents, emphasizing the moderating roles of parental monitoring and gender. **Using logistic regression analysis of the 2023 US Youth Risk Behavior Survey (*N* = 10,334), results reveal that moderate and high schial media use significantly increases depressive symptoms.** Notably, higher parental monitoring mitigates these adverse effects. While females exhibit higher depressive symptoms overall, gender does not significantly moderate social media's impact. This study highlights the importance of nuanced parental engagement and offers critical insights for policymakers and educators to foster healthier digital environments for adolescents.

1.1.83 Azagba et al. (2024). Social media use and mental health indicators among US adolescents: A population-based study. *Journal of Psychiatric Research.*

ABSTRACT: Social media use among young people has raised concerns about its potential impact on mental health. However, research is limited regarding whether certain subgroups may be differently affected. This study uses data from the 2022 National Youth Tobacco Survey, a nationally representative sample of middle and high school students aged approximately 11-18 years (n = 23,366). Mental health conditions were assessed usring the Patient Health Questionnaire-4, and social media use was categorized by frequency levels. We employed multinomial logistic regression and a finite mixture Poisson model to explore the relationship between social media use, sexual identity, and mental health status. **The study found a consistent association between social media use and mental health conditions, particularly among frequent users.** The finite mixture model revealed two latent groups based on mental health status: a 'better' group with minimal or no poor mental health indicators and a 'worse' group with more indicators. For both groups, social media use was associated with mental health conditions, with a stronger association among frequent users.

Notably, sexual minorities, especially bisexual students, were more likely to report poor mental health indicators. This study suggests that frequent social media use may adversely affect young people's mental health and that different youth subgroups may respond differently to social media use and mental health conditions.

1.1.84 Mougharbel et al. (2023). Heavy social media use and psychological distress among adolescents: the moderating role of sex, age, and parental support. *Frontiers in Public Health*.

ABSTRACT: Background: Despite increasing evidence that social media use is associated with adolescents' mental well-being, little is known about the role of various factors in modifying the effect of this association during adolescence. This study examined the association between social media use and psychological distress among adolescents and explored whether sex, age, and parental support moderate this association. Methods: Data came from a representative sample of middle and high school students in Ontario, Canada. Cross-sectional analyses included 6,822 students derived from the 2019 Ontario Student Drug Use and Health Survey. Results: **Our results showed that 48% of adolescents used social media for 3 h or more per day, and 43.7% had moderate to severe psychological distress, with a higher prevalence among females (54%) than males (31%)**. After adjustment for relevant covariates, heavy social media use (≥3 h/day) was associated with increased odds of severe psychological distress [odds ratio (OR): 2.01; 95% confidence interval (CI):1.59-2.55]. The association of social media use with psychological distress was modified by age ($p < 0.05$) but not sex or parental support. The association was stronger among younger adolescents. Conclusion: Heavy social media use is associated with higher levels of psychological distress, with younger adolescents being the most vulnerable. Longitudinal studies are recommended for future research to examine in more depth the role of sex, age, and parental support in the association between social media use and psychological distress to better determine the strength and of the association.

1.1.85 Lamba et al. (2026). Social media and smartphone use are associated with blunted striatal reward response in early adolescence. [pre-print]

ABSTRACT: Adolescents spend unprecedented time on smartphones, raising concerns that screen time, and social media use in particular, may negatively impact developing reward circuitry in the brain—the very system critical for motivation and flexible learning.

We tested whether social media and overall smartphone use are associated with altered risk-taking, neural responsivity, and mental health outcomes in early adolescence. Twenty-nine participants (ages 13-15) completed a reinforcement learning gambling task while undergoing fMRI. We fit a computational model to estimate trial-wise reward prediction errors (RPEs) during a gambling task and quantified striatal RPE sensitivity, a canonical neural signature of dopaminergic reward learning. We also measured time spent on social media applications and total daily smartphone use. Adolescents averaged nearly 6 hours of screen time per day and exhibited strong preferences for the social media apps TikTok and Snapchat. Greater social media use predicted increased gambling behavior, indicating increased reward-seeking behavior. Increased screen time and social media use were associated with blunted striatal activity, suggesting a reduced neural responsiveness to rewards. App-specific analyses indicate that these diminished striatal responses were largely driven by TikTok use. Finally, **smartphone use was associated with greater anxiety, depression, and intolerance of uncertainty, which were also related to reduced striatal sensitivity. These findings provide evidence consistent with an emerging maladaptive profile that links technology exposure, mental health, and reward circuit function.**

1.1.86 Bird et al. (2026). Findings from the 2023 YRBSS: Examining the risk factors of social media use, alcohol use, bullying and adolescent suicide. *Journal of Affective Disorders*.

ABSTRACT: Background: Adolescent mental health concerns in the U.S. continue to rise, with suicide remaining the second leading cause of death among youth. Identifying factors associated with suicidal thoughts and behaviors is critical for prevention efforts. Methods: We analyzed data from the 2023 Youth Risk Behavior Surveillance Survey (YRBSS), a nationally representative survey of U.S. high school students. Multivariate logistic regression models assessed associations between self-reported frequency of social media use, school-based bullying, cyberbullying, and 30-day alcohol consumption with five risk markers of suicide risk, adjusting for sex, race/ethnicity, and grade level. Complete case analyses were conducted to address variable missingness, resulting in variation in sample size across models. Results: **School-based bullying, cyberbullying, and recent alcohol use were each significantly associated with four suicide risk markers. Social media use showed a modest associated with one marker: feelings of sadness or hopelessness.** Conclusion: This cross-sectional study identifies bullying, alcohol use, and social media exposure as important correlates of adolescent suicide risk markers; however causal or temporal relationships cannot be inferred. Longitudinal research is needed to clarify how these factors interact over time

and whether they contribute to or result from suicidal ideation. Future studies should also examine potential interaction effects among these risk factors. While schools may consider these associations when refining existing prevention efforts, comprehensive, evidence-based programs addressing bullying, online behaviors, and substance use should be informed by robust longitudinal evidence.

[Other studies? What have we missed?]

1.2: STUDIES INDICATING NO ASSOCIATION WITH BAD MENTAL HEALTH OUTCOMES

1.2.1a Orben & Przybylski (2019). The association between adolescent well-being and digital technology use. *Nature Human Behavior*.

ABSTRACT: The widespread use of digital technologies by young people has spurred speculation that their regular use negatively impacts psychological well-being. Current empirical evidence supporting this idea is largely based on secondary analyses of large-scale social datasets. Though these datasets provide a valuable resource for highly powered investigations, their many variables and observations are often explored with an analytical flexibility that marks small effects as statistically significant, thereby leading to potential false positives and conflicting results. Here we address these methodological challenges by applying specification curve analysis (SCA) across three large-scale social datasets (total n = 355,358) to rigorously examine correlational evidence for the effects of digital technology on adolescents. **The association we find between digital technology use and adolescent well-being is negative but small, explaining at most 0.4% of the variation in well-being. Taking the broader context of the data into account suggests that these effects are too small to warrant policy change.**

> See our published response:
> **1.2.1b** Twenge, Haidt, Joiner & Campbell (2020). Underestimating digital media harm. *Nature Human Behavior.*
>
> See their published response to our response:
> **1.2.1c** Orben & Przybylski (2020). Reply to: Underestimating digital media harm. Nature Human Behavior.

COMMENT: This study is impressive and important: the authors use a new and powerful statistical technique to conduct tens of thousands of analyses on three very large datasets. (The idea is to eliminate all the decisions researchers make, sometimes post-hoc, about which variables to examine and which covariates to include. Just run every possible combination.) They then report back that the average regression coefficient is negative but tiny, indicating a level of harmfulness so close to zero that it is roughly the same size as they find for “eating potatoes.” But a closer look, driven by our a priori hypothesis that it is heavy use (not light use) by girls (more than boys) of social media (more than any other screen-based activity) shows a larger effect size.

Here is Figure 2 from the paper, showing what happened in each of the 40,000 or so analyses they ran on the Monitoring The Future dataset. Whichever analysis showed the biggest negative effect is plotted on the left side; whichever showed the biggest positive relationship is plotted on the right side. The squiggly line emerges when the authors plot all of the regression coefficients found in all the analyses examining the relationship of a variety of variables related to tech use with a variety of variables related to “adolescent well being.” We have added the green boxes to show which part of the squiggly line reflects nearly all of the analyses done for “technology mean” -- the variable the authors created to capture each adolescent’s total time using technology.

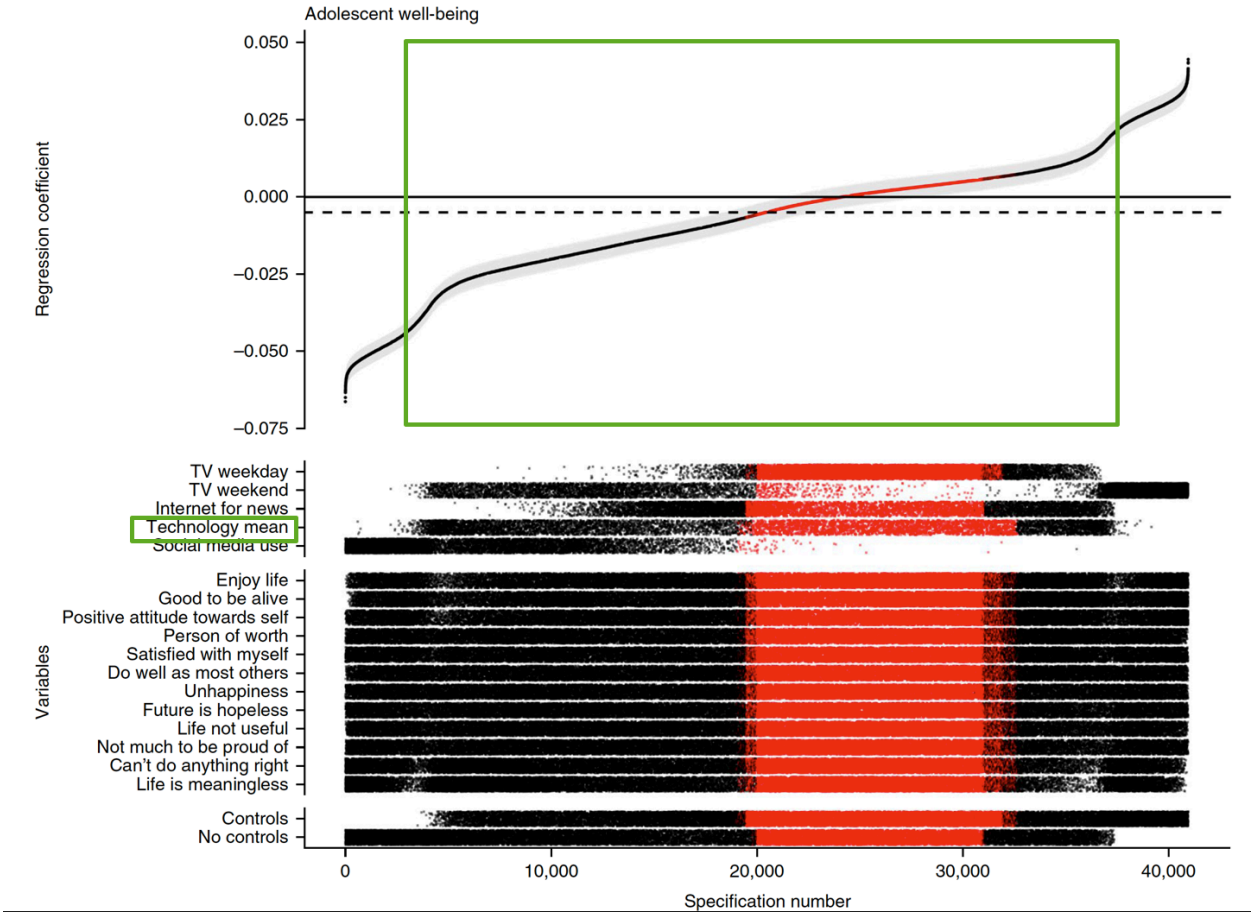
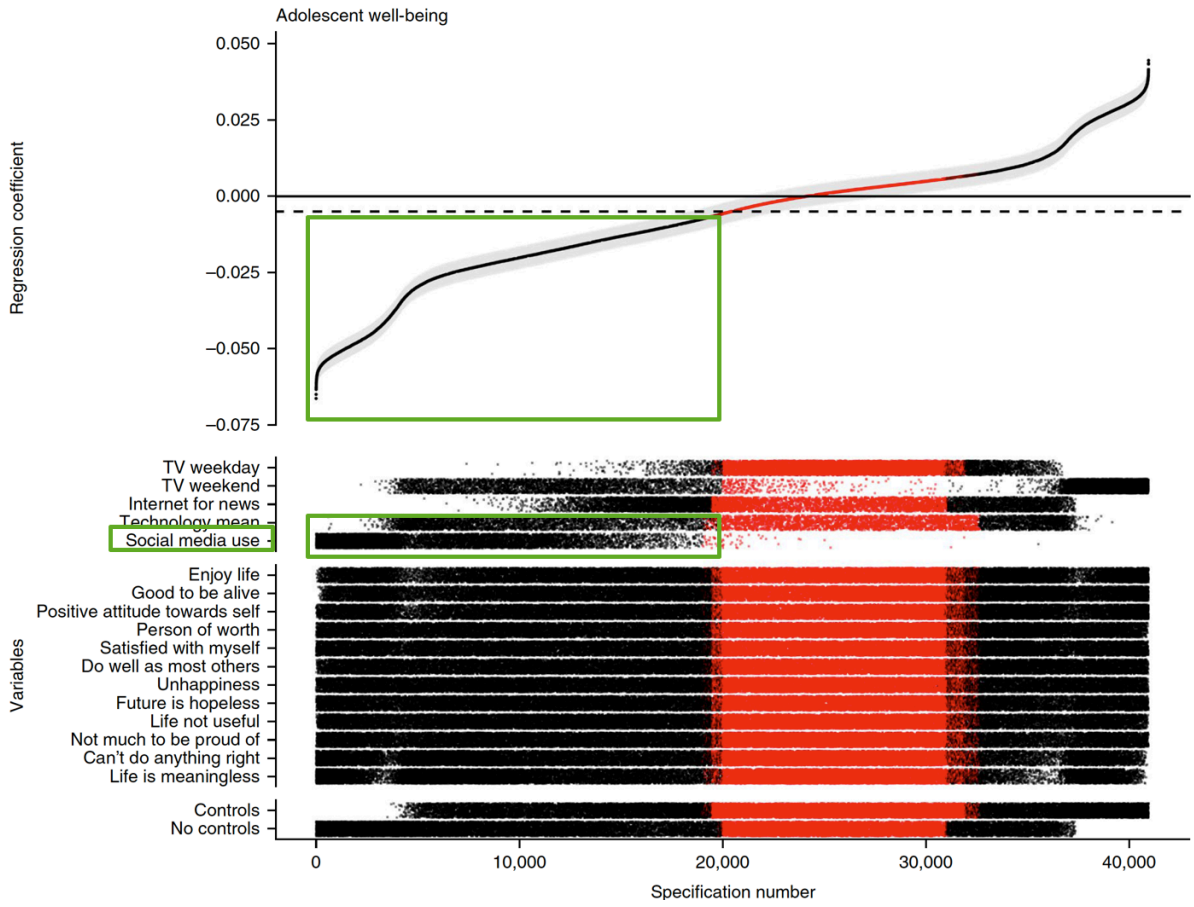


Figure 2 from Orben & Przybylski (2019), p. 5. Green boxes added.

As you can see, the squiggly line crosses the zero line, meaning that some analyses showed a negative correlation (indicating an association with harm), some a positive correlation (indicating an association with benefits), and many (shown in red) showed a zero correlation, so overall, it's a wash.

But in Figure 2, you can see a different story if you zoom in on social media:



In the thousands of analyses that used “social media” rather than watching TV, searching the internet, or the average of all tech activities, they nearly always found a statistically significant negative relationship with “adolescent well being”. So for our purposes in this lit review of the effects of social media, **the headline number for the MtF dataset should not be β = -.005, which is what is reported in Table 2 for the “complete SCA.” It should be β = -.031, which is what is reported in Table 2 for “social media use only.”** That is the average of the regression coefficients within the second green box. The other two datasets also show much larger effects for social media use (in the MCS) and for “electronic device use” (the closest usage category to social media in the YRBS). With these larger Betas, we are no longer looking at effects the size of “potatoes.” If we could re-run these analyses for girls only, we expect that the average β would increase substantially. If we could re-run the analyses looking for curvilinear effects rather than linear effects, we expect that the predictive power of social media use would increase again. It might well be above “binge drinking,” β = -.045. And if the MtF data on social media use in hours is used instead, and are considered in terms of number affected (as in 1.1.11), effects are larger still.

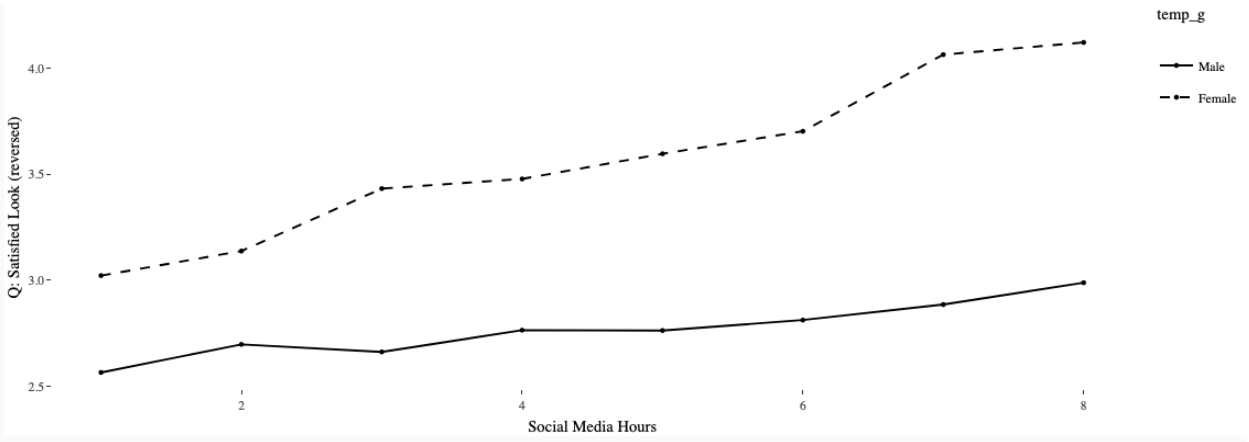
Update: 7/12/19, a new tool for exploring the MCS dataset:

One of Orben and Przybylski's arguments is that the size of the correlation obtained is heavily dependent upon how a researcher defines "technology usage" or "depression." They call this "researcher degrees of freedom." We agree that this is a problem. To allow anyone to explore the data themselves, to see how the correlation changes as you change variables, our research assistant Chris Vaccaro created an application that allows users to choose whatever criteria they desire:

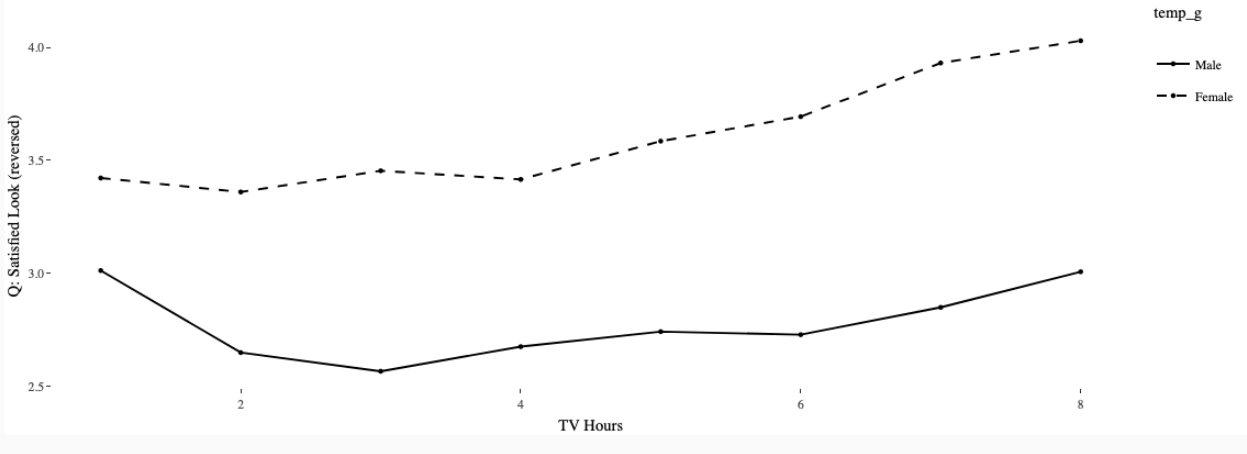
https://chrisvacc.shinyapps.io/spec-explorer/

The tool allows the user to choose how they define "Technology Use" and items of depressive symptoms. It allows users to choose which questions to include in the analysis, and allows the user to run tens of thousands of different combinations, but our tool allows users to see the distributions, which are often obscured by linear Rs and summary statistics.

To use the tool, select one kind of technology use to zoom in on. Then choose which questionnaire items you'd like to examine as the mental health outcome variables. A useful contrast is to switch back and forth between "TV hours" as the tech variable, and "social media hours" as the tech variable. Relationships of mental health outcomes to technology use are much clearer for social media use than for other tech variables. For example for social media, dissatisfaction with one's appearance rises for girls in a linear fashion: the more time a girl spends per day on social media, the less satisfied she is with how she looks, as you can see in the top line:



But if you select TV hours per day, the line is flat for girls out to 4 hours per day. It's only the very heavy users who are less satisfied with their appearance:



1.2.2 Berryman, Ferguson, & Negy (2018). Social Media Use and Mental Health among Young Adults. *Psychiatric Quarterly.*

ABSTRACT: In recent years many parents, advocates and policy makers have expressed concerns regarding the potential negative impact of social media use. Some studies have indicated that social media use may be tied to negative mental health outcomes, including suicidality, loneliness and decreased empathy. Other studies have not found evidence for harm, or have indicated that social media use may be beneficial for some individuals. The current correlational study examined 467 young adults for their time spent using social media, importance of social media in their lives and tendency to engage in vaguebooking (posting unclear but alarming sounding posts to get attention). Outcomes considered included general mental health symptoms, suicidal ideation, loneliness, social anxiety and decreased empathy. **Results indicated that social media use was not predictive of impaired mental health functioning.** However, vaguebooking was predictive of suicidal ideation, suggesting this particular behavior could be a warning sign for serious issues. Overall, **results from this study suggest that, with the exception of vaguebooking, concerns regarding social media use may be misplaced**.

1.2.3 Kardefelt-Winther (2017). How does the time children spend using digital technology impact their mental well-being, social relationships and physical activity? An evidence-focused literature review. Unicef office of research -- discussion paper.

ABSTRACT: Based on an evidence-focused literature review, the first part of this paper examines existing knowledge on how the time children spend using digital technology impacts their well-being across three dimensions; mental/psychological, social and physical. The evidence reviewed here is largely inconclusive with respect to impact on children's physical activity, but **indicates that digital technology seems to be beneficial for children's social relationships**. **In terms of impact on children's mental well-being, the most robust studies suggest that the relationship is U-shaped, where no use and excessive use can have a small negative impact on mental well-being, while moderate use can have a small positive impact.** In the second part of the paper, the hypothetical idea of addiction to technology is introduced and scrutinized. This is followed by an overview of the hypothetical idea that digital technology might re-wire or hijack children's brains; an assumption that is challenged by recent neuroscience evidence. In conclusion, considerable methodological limitations exist across the spectrum of research on the impact of digital technology on child well-being, including the majority of the studies on time use reviewed here, and those studies concerned with clinical or brain impacts. This prompts reconsideration of how research in this area is conducted. Finally, recommendations for strengthening research practices are offered.

1.2.4a Orben & Przybylski (2019). Screens, Teens, and Psychological Well-Being: Evidence From Three Time-Use-Diary Studies. *Psychological Science*.

ABSTRACT: The notion that digital-screen engagement decreases adolescent well-being has become a recurring feature in public, political, and scientific conversation. The current level of psychological evidence, however, is far removed from the certainty voiced by many commentators. There is little clear-cut evidence that screen time decreases adolescent well-being, and most psychological results are based on single-country, exploratory studies that rely on inaccurate but popular self-report measures of digital-screen engagement. In this study, which encompassed three nationally representative large-scale data sets from Ireland, the United States, and the United Kingdom (N = 17,247 after data exclusions) and included time-use-diary measures of digital-screen engagement, we used both exploratory and confirmatory study designs to introduce methodological and analytical improvements to a growing psychological research area. **We found little evidence for substantial negative associations between digital-screen engagement—measured throughout the day or particularly before bedtime—and adolescent well-being**.

[Comment, from Twenge and Haidt: See our published response to this paper here:]

1.2.4b Twenge, Blake, Haidt, & Campbell (2020). Commentary: Screens, Teens, and Psychological Well-Being: Evidence From Three Time-Use-Diary Studies. *Frontiers in Psychology.*

Our issues here are similar to those we discussed for 1.2.1, including focusing on "screen time" rather than social media use; relying solely on linear *r* for curvilinear data; analyzing boys and girls together when effects are usually larger for girls; including control variables that are potential mediators, In addition, 80% of the measures in this study gauged simple participation in the activity (mere use), when it is clear that *heavy* use is the primary issue, not mere use. As is found in many parts of this review: when you look at "screen time" for all teens, you find little. When you look at "social media" for girls, you find curvilinear relationships with double or triple rates of mental health problems for heavy users, compared to light users.

1.2.5 Sewall, Rosen, & Bear (2020). Examining the accuracy of estimated smartphone use: How well-being and usage level predict discrepancies between estimated and actual use. *Mobile Media and Communication*.

ABSTRACT: Using Apple's Screen Time application to obtain reported actual iPhone and social media (SM) use, we examined the accuracy of retrospective estimates of usage, how inaccuracies bias associations between use and psychosocial well-being (depression, loneliness, and life satisfaction), and the degree to which inaccuracies were predicted by levels of well-being. **Among a sample of 325 iPhone users, we found that (a) participants misestimated their weekly overall iPhone and SM use by 19.1 and 12.2 hours, respectively; (b) correlations between estimated use and well-being variables were consistently stronger than the correlations between reported actual use and well-being variables; and (c) the degree of inaccuracy in estimated use was associated with levels of participant well-being and amount of use.** These findings suggest that retrospective estimates of digital technology use may be systematically biased by factors that are fundamental to the associations under investigation. We propose that retrospective estimates of digital technology use may be capturing the construct of perceived use rather than actual use, and discuss how the antecedents, correlates, and consequences of perceived use may be distinct from

1.2.6 UK Dept. for Education (2019), State of the Nation 2019: Children and Young People's Wellbeing

ABSTRACT [from the executive summary]: **Social media use did not have a strong association with teenage girls' psychological health, after accounting for the range of factors we examined**. One possible explanation is that the link between social media use and psychological health is through factors such as experiences of online bullying, and once these are accounted for the unique, the direct association of social media with girls' psychological health is relatively small.

[Notes from later in the report:] Social media use was significantly related to psychological health, but the size of this effect was very small: 14-15 year olds who used social media regularly throughout the day had marginally worse psychological health than those who used it only daily or 2-3 times a day. However, **social media use had one of the smallest effects of all the factors we examined: getting enough sleep and seeing friends were about three times larger.** Being bullied, including online bullying, had an association with psychological health about eight times larger than social media use. This suggested that **when accounting for other factors such as the effect of bullying, physical health and sleep, and the frequency of seeing friends, social media use had only a minimal unique association with psychological health**. **One possible explanation is that the link between social media use and psychological health is through factors such as experiences of online bullying and sleep, and once these are accounted for the unique, the direct association of social media with girls' psychological health is relatively smal**l…. In contrast, the frequency of social media use was more strongly associated with psychological health in older girls, but this effect remained relatively small. … The sum of existing evidence suggests that a) social media use has a relatively small association with wellbeing across children and young people overall, b) there may be larger effects of social media use in specific groups, such as teenage girls, but c) these effects may be more strongly tied to mental ill-health than poor wellbeing, and d) there is limited causal evidence for social media use impacting wellbeing and mental health, although there are multiple pathways through which it could exert an influencexxxiii. … xxxiv Although social media had one of the smallest associations of all the effects we examined, this should not neglect that it may have a substantial impact on the wellbeing and mental health of a minority of girls, which is not reflected when capturing average effects across the population as a whole.

[Note from Haidt]: What was the raw correlation of social media use and psych health for girls? If it is substantial as in many other studies (like r = -.15), and then drops to

insignificance when you "control" for several of the main pathways by which social media is thought to harm mental health (e.g., online bullying, disrupted sleep, and seeing friends less IRL), then that does not mean that social media is harmless.

1.2.7 Orben, & Pryzbylski (2020). Teenage sleep and technology engagement across the week. *Peer J.*

ABSTRACT: BACKGROUND: Throughout the developed world, adolescents are growing up with increased access to and engagement with a range of screen-based technologies, allowing them to encounter ideas and people on a global scale from the intimacy of their bedroom. The concerns about digital technologies negatively influencing sleep are therefore especially noteworthy, as sleep has been proven to greatly affect both cognitive and emotional well-being. The associations between digital engagement and adolescent sleep should therefore be carefully investigated in research adhering to the highest methodological standards. This understood, studies published to date have not often done so and have instead focused mainly on data derived from general retrospective self-report questionnaires. The value of this work has been called into question by recent research showing that retrospective questionnaires might fail to accurately measure these variables of interest. Novel and diverse approaches to measurement are therefore necessary for academic study to progress.
METHODS: This study analyses data from 11,884 adolescents included in the UK Millennium Cohort Study to examine the association between digital engagement and adolescent sleep, comparing the relative effects of retrospective self-report vs. time-use diary measures of technology use. By doing so, it provides an empirical lens to understand the effects of digital engagement both throughout the day and before bedtime and adds nuance to a research area primarily relying on retrospective self-report.
RESULTS: The study finds that there is a small negative association relating digital engagement to adolescent sleep both on weekdays and weekend days (median standardized association βweekday = −0.06 and βweekend = −0.03). There is a more negative association between digital engagement and total sleep time on weekdays compared to weekend days (median standardized βweekday = −0.08, median standardized βweekend = −0.02), while there is no such difference when examining adolescents' bedtime. **Surprisingly, and contrary to our expectations, digital technology use before bedtime is not substantively associated with the amount of sleep and the tardiness of bedtime in adolescents.**
CONCLUSIONS: Results derived from the use of transparent Specification Curve Analysis methods show that the negative associations in evidence are mainly driven by

retrospective technology use measures and measures of total time spent on digital devices during the day. **The effects are overall very small: for example, an additional hour of digital screen time per day was only related to a 9 min decrease in total time spent sleeping on weekdays and a 3 min decrease on weekends.** Using digital screens 30 min before bed led to a 1 min decrease in total time spent sleeping on weekdays and weekends. The study shows that more work should be done examining how to measure digital screen time before interventions are designed.

[Note from Haidt: This study examines "screen time" or "digital engagement", which is a worthy construct to examine as a potential sleep disruptor. But it does not break out social media. A study that did look at social media specifically, in the same dataset (Millenium Cohort Study) found a much larger association with sleep disruption, see 1.1.21 Hisler, Twenge, & Krizan (2019).]

1.2.8 Davidson, Shaw, & Ellis (2020). Fuzzy Constructs in Assessment: The Overlap between Mental Health and Technology 'Use'. [Preprint…. Where is it in press?]

ABSTRACT: The mass adoption of digital technologies continues to generate psychological debate on how they impact people and society. For example, associations have regularly observed between technology use and a variety of negative outcomes including depression and anxiety. However, large, pre-registered studies have failed to replicate these findings. Regardless of direction, the majority of designs rely on self-reported 'usage' scales. Given their importance for research integrity, here we consider what these scales are measuring. **Across two studies, we observe that many scales align with a single, identical construct despite claims they capture something unique. We then demonstrate overlap between these scales and mental health by examining latent relationships. Our results suggest that psychologists need to critically consider how they proceed both methodologically and conceptually when developing psychometric scales in this domain** if research findings are to ever be drawn together into a coherent body of knowledge.

1.2.9 Rosgonjuk, Pruunsild, Jurimae, Schwartz, & Aru (2020). Instagram use frequency is associated with problematic smartphone use, but not with depression and anxiety symptom severity. *Mobile Media & Communication*.

ABSTRACT: Studies have demonstrated that social media use, as well as problematic smartphone use (PSU), are associated with psychopathology variables, such as depression and anxiety. However, it has not been studied how Instagram use frequency is associated with depression, anxiety, and PSU. The aim of this study was to investigate whether Instagram use frequency is related to these psychopathology variables. Three hundred and five active Instagram users (Mage = 23.61, SDage = 5.33; 82.2% female) comprised the effective sample in this study. They responded to an online survey that included questionnaires regarding their Instagram and smartphone use, as well as about experiencing depression and anxiety symptoms. We also retrieved objectively measured Instagram use data. **The results showed that although Instagram use frequency, depression, and anxiety were associated with PSU in bivariate analysis, Instagram use frequency did not have indirect effects in the relations between psychopathology variables and PSU.** Furthermore, while younger age and female sex predicted Instagram use frequency, these sociodemographic variables did not predict PSU. According to our findings Instagram use frequency contributes to PSU, but it is not related to depression and anxiety.

1.2.10 Kreski, Platt, Rutherford, Olfson, Odgers, Schulenberg, & Keyes (2020). Social media use and depressive symptoms among United States adolescents. *Journal of Adolescent Health*.

ABSTRACT: PURPOSE: Depression is increasingly common among US adolescents; the extent to which social media exposure contributes to this increase remains controversial.
METHODS: We used Monitoring the Future data from 8th and 10th grade students (n = 74,472), 2009–2017, to assess the relationship between daily social media use and depressive symptoms. Self-reported depressive symptom score (range: 4–20) was assessed continuously using a log-transformed outcome and at varying cut scores with logistic regression analyses. First, these outcomes were examined overall, comparing adolescents using social media daily to adolescents who were not. We then estimated predicted depressive symptom scores using 26 predictors in order to establish underlying depression risk. We partitioned students into depression risk quintiles to control for confounding due to underlying depression risk and examine heterogeneity in the association between social media use and depressive symptoms. Sensitivity analyses were used to test the robustness of results with different configurations of the predicted score model, and overall associations were examined in two-year groups to identify differences in effects.

RESULTS: **For girls, in adjusted risk-stratified analysis, daily social media use was not associated with high (vs. low) depressive symptoms. For boys, results were inconsistent, suggesting a protective effect of daily social media use at some cut scores.** Results were consistent across sensitivity analyses, and any potential harmful effects appear to be limited to 2009–2010, limiting the evidence supporting social media as a current risk factor for depressive symptoms. CONCLUSIONS: Among US adolescents, daily social media use is not a strong or consistent risk factor for depressive symptoms.

[NOTE, from Twenge: The effects are likely limited to 2009-2010 because in the years after that, nearly all adolescents began using social media every day. The measure of social media use they used asks if students use social media: never, a few times a year, once or twice a month, at least once a week, or almost every day. In recent years, upwards of 75% of students answered “almost every day,” which severely limits the variance of the item. Low variance = low correlations. And overall, whether social media use is “daily” doesn’t really matter -- they could be using it a few minutes a day. That’s unlikely to be harmful. Spending several hours a day is where the problems start to show up.
My conclusion: The conclusions that can be drawn from this study are severely limited due to the poor/uninteresting measure of social media use.]

1.2.11 Vuorre, Orben, & Przybylski (2021). There is no evidence that associations between adolescents’ digital technology engagement and mental health problems have increased. *Clinical Psychological Science*.

ABSTRACT: Digital technology is ubiquitous in modern adolescence, and researchers are concerned that it has negative impacts on mental health that, furthermore, increase over time. To investigate whether technology is becoming more harmful, we examined changes in associations between technology engagement and mental health in three nationally representative samples. Results were mixed across types of technology and mental health outcomes: **Technology engagement had become less strongly associated with depression in the past decade, but social-media use had become more strongly associated with emotional problems. We detected no changes in five other associations or differential associations by sex**. There is therefore little evidence for increases in the associations between adolescents’ technology engagement and mental health. Information about new digital media has been collected for a relatively short time; drawing firm conclusions about changes in their associations

with mental health may be premature. We urge transparent and credible collaborations between scientists and technology companies.

1.2.12 Di Cara, Winstone, Sloan, Davis, & Haworth (2022). The mental health and well-being profile of young adults using social media. *Npj Mental Health Research*.

ABSTRACT: The relationship between mental health and social media has received significant research and policy attention. However, there is little population-representative data about who social media users are which limits understanding of confounding factors between mental health and social media. Here we profile users of Facebook, Twitter, Instagram, Snapchat and YouTube from the Avon Longitudinal Study of Parents and Children population cohort (N = 4083). We provide estimates of demographics and mental health and well-being outcomes by platform. We find that users of different platforms and frequencies are not homogeneous. User groups differ primarily by sex and YouTube users are the most likely to have poorer mental health outcomes. Instagram and Snapchat users tend to have higher well-being than the other social media sites considered. Relationships between use-frequency and well-being differ depending on the specific well-being construct measured. The reproducibility of future research may be improved by stratifying by sex and being specific about the well-being constructs used.

EXCERPT: The patterns of mental health outcomes by use frequency displayed in Fig. showed some support for the so-called ‘Goldilocks theory’ of **social media use that hypothesises a quadratic, rather than linear, stimulus-response relationship between social media use and mental well-being.** This would mean that moderate use of social media, rather than very little or excessive use, is best for well-being. However, this pattern did not consistently apply. For instance, **there was an inverse relationship between social media use and percentage of women who self-harm, and in men only the group with the highest level of social media use had more severe depressive symptoms**. Previous research has found that in young women higher social media use was associated with increased risk of self-harm, which is in contrast to our results. Similarly, research using the Millennium Cohort Study also found an increasing relationship between objectively measured number of hours spent on social media and how many respondents had clinically relevant symptoms of depression, with a greater increase for girls than boys. Our findings roughly concur with those for the boys, but in women we found that those who used social media the least had the highest rates of depression.

1.2.13 Panayiotou, Black, Carmichael-Murphy, Qualter, & Humphrey (2023). Time spent on social media among the least influential factors in adolescent mental health: Preliminary results from a panel network analysis. *Nature Mental Health*.

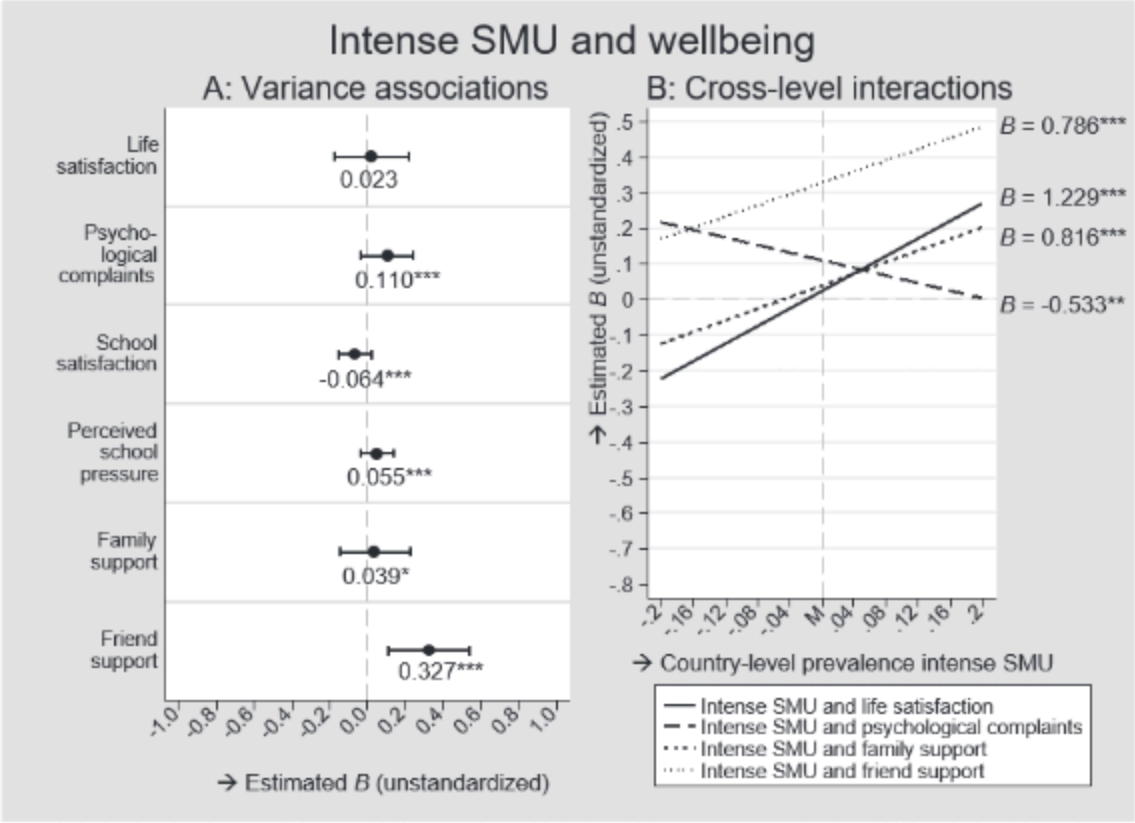
ABSTRACT: There is growing concern about the role of social media use in the documented increase of adolescent mental health difficulties. However, the current evidence remains complex and inconclusive. While increasing research on this area of work has allowed for notable progress, the impact of social media use within the complex systems of adolescent mental health and development is yet to be examined. The current study addresses this conceptual and methodological oversight by applying a panel network analysis to explore the role of social media on key interacting systems of mental health, wellbeing and social life of 12,041 UK adolescents. Here we find that, across time, estimated time spent interacting with social media predicts concentration problems in female participants. However, of the factors included in the current network, social media use is one of the least influential factors of adolescent mental health, with others (for example, bullying, lack of family support and school work dissatisfaction) exhibiting stronger associations. Our findings provide an important exploratory first step in mapping out complex relationships between social media use and key developmental systems and highlight the need for social policy initiatives that focus on the home and school environment to foster resilience.

1.2.14 Maartje Boer (2022) Dissertation. #ConnectedTeens: Social media use and adolescent wellbeing.

ABSTRACT: As there are great societal concerns about the consequences of adolescents' social media use, this dissertation investigated the relation between adolescents' social media use and wellbeing. We used longitudinal data from Dutch adolescents participating in the Digital Youth Project between 2015 and 2019, as well as (inter)nationally representative cross-sectional data from adolescents participating in the Health Behaviour in School-aged Children study in 2017/2018. In our research, we distinguished between the intensity of social media use and problematic social media use. The intensity of social media use was indicated by, for example, how many times per day someone views social network sites. Problematic social media use was characterized by symptoms of addiction to social media use, such as loss of control over social media use. Results indicated that this distinction is important. First, many adolescents engage in intensive social media use without developing problematic social media use. Second, problematic social media use seems to contribute to lower

wellbeing, such as decreased life satisfaction and increased attention problems, while higher intensity of social media use in general does not. Third, in contrast to problematic social media use, **we found indications that higher intensity of social media use is beneficial for adolescents' wellbeing**, as our results showed that intensive users of social media perceived more friend support than non-intensive users. These findings inform professionals concerned with the wellbeing of youth that mainly problematic social media use is harmful, while higher intensity of social media use is often not. Given the potential detrimental nature of problematic social media use, prevention and intervention programs on (reducing) problematic social media use are warranted.

Associations Between Intense SMU and Wellbeing



Notes. SMU = social media use; B = unstandardized coefficient; M = mean.
Left (A): dots denote average estimated associations between intense SMU and the wellbeing outcomes, horizontal lines through the dots denote their 95% prediction interval.
Right (B): diagonal lines represent the estimated associations of intense SMU and the wellbeing outcomes by the country-level prevalence of intense SMU. Cross-level interactions were reported when they improved model fit and when they were significant at $p < 0.05$. All estimates were derived from multilevel regression models (Appendix, Table A4.1).
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 4.3

Prevalence by Country

Country	*N*	Intense SMU	Problematic SMU
Spain	4,070	38.37%	14.17%
Wales	1,5456	37.26%	11.99%
Ireland	3,628	38.72%	11.99%
Italy	4,069	49.87%	10.56%
Finland	3,067	27.08%	10.16%
Greece	3,715	34.06%	9.93%
Scotland	4,916	39.31%	9.45%
Norway	3,053	39.46%	9.14%
Belgium (French)	3,695	38.32%	8.02%
Lithuania	3,685	40.90%	7.78%
England	3,306	33.91%	7.60%
Poland	5,055	43.25%	7.60%
France	8,621	36.82%	7.59%
Luxembourg	3,889	34.83%	7.37%
Canada	12,355	35.33%	6.71%
Belgium (Flanders)	4,117	43.29%	6.65%
Portugal	5,866	40.36%	5.92%
Estonia	4,622	31.42%	5.79%
Hungary	3,715	23.58%	5.39%
Latvia	4,143	25.95%	5.38%
Germany	4,126	26.15%	5.35%
Czech Republic	11,162	21.97%	5.33%
Slovenia	5,126	31.58%	5.31%
Sweden	4,006	43.10%	5.31%
Austria	4,011	33.18%	4.86%
Iceland	6,693	34.14%	4.83%
Switzerland	7,122	17.35%	4.47%
Denmark	3,113	35.04%	4.12%
Netherlands	4,579	27.53%	3.22%
Average	154,981	34.03%	7.38%

Notes. SMU = social media use; Countries were sorted on their problematic SMU prevalence.

1.2.15 Miller,, Mills, Vuorre, Orben, & Przybylski (2023). Impact of Digital Screen Media Activity on Functional Brain Organization in Late Childhood: Evidence from the ABCD Study. *Cortex*.

ABSTRACT: The idea that the increased ubiquity of digital devices negatively impacts neurodevelopment is as compelling as it is disturbing. This study investigated this concern by systematically evaluating how different profiles of screen-based engagement related to functional brain organization in late childhood. We studied participants from a large and representative sample of young people participating in the first two years of the ABCD study (ages 9-12 years) to investigate the relations between self-reported use of various digital screen media activity (SMA) and functional brain

organization. A series of generalized additive mixed models evaluated how these relationships related to functional outcomes associated with health and cognition. Of principal interest were two hypotheses: First, that functional brain organization (assessed through resting state functional connectivity MRI; rs-fcMRI) is related to digital screen engagement; and second, that children with higher rates of engagement will have functional brain organization profiles related to maladaptive functioning. **Results did not support either of these predictions for SMA. Further, exploratory analyses predicting how screen media activity impacted neural trajectories showed no significant impact of SMA on neural maturation over a two-year period.**

[Other studies? What have we missed?]

1.3: STUDIES SHOWING MIXED EVIDENCE

1.3.1 Keum, Wang, Callaway, Abebe, Cruz, & O'Connor (2022). Benefits and harms of social media use: A latent profile analysis of emerging adults. *Current Psychology*.

ABSTRACT: The rise in social media use among emerging adults in the United States has been well-documented, but researchers are still working on identifying how the type—not just the frequency—of use impacts psychological well-being. We identified "profiles" of social media use among young adults based on the frequency and purposes of use, and examined their associations with benefits and harms to psychosocial well-being, using data from 2828 incoming undergraduate students (Mage = 18.29 years; age range: 17 to 25 years). Using Latent Profile Analysis, we identified three unique profiles of individuals who used social media with varying levels of intensity across different purposes: Active Users (32.4%), Passive Users (25.3%), and Average Users (42.4%). Each profile was associated with varying levels of beneficial and harmful psychosocial outcomes. Compared to Average Users, (a) **Active Users reported significantly better psychosocial well-being, but also more harmful outcomes; and (b) Passive Users experienced significantly lower levels of perceived social media benefits and social connectedness, while also reporting less problematic social media use and social media stress.** Implications of these findings for research and practice are discussed.

1.3.2 Kim, Favotto, Halladay, Wang, Boyle, & Georgiades (2020). Differential associations between passive and active forms of screen time and adolescent mood and anxiety disorders. *Social Psychiatry and Psychiatric Epidemiology*.

ABSTRACT: OBJECTIVES: To quantify the strength of association between passive and active forms of screen time and adolescent major depressive episode and anxiety disorders.
METHODS: Data from the 2014 Ontario Child Health Study, a representative sample of 2,320 adolescents aged 12–17 years in Ontario (mean age = 14.58, male = 50.7%) were used. Screen time was measured using adolescent self-report on time spent on screen-based activities. Past 6-month occurrence of DSM-IV-TR defined major depressive episode, social phobia, generalized anxiety disorder, and specific phobia which were assessed using the Mini International Neuropsychiatric Interview for Children and Adolescents.
RESULTS: Adolescents reporting 4 or more hours of passive screen time per day, compared to those reporting less than 2 h, were three times more likely to meet the DSM-IV-TR criteria for major depressive episode [OR = 3.28(95% CI = 1.71–6.28)], social phobia [OR = 3.15 (95% CI = 1.57–6.30)] and generalized anxiety disorder [OR = 2.92 (95% CI = 1.64–5.20)]. **Passive screen time continued to be significantly associated with increased odds of disorders, after adjusting for age, sex, low income, active screen time use, sleep and physical activity. A small-to-moderate attenuation of the estimated ORs was observed in the fully adjusted model. In contrast, associations between active screen time use and depression and anxiety disorders were smaller in magnitude and failed to reach statistical significance.**
CONCLUSIONS: **Passive screen time use was associated with mood and anxiety disorders, whereas active screen time was not.** Further research is needed to better understand the underlying processes contributing to differential risk associated with passive versus active screen time use and adolescent mood and anxiety disorders.

1.3.3 Griffioen, Scholten, Lichtwarck-Aschoff, Maciejewski, & Granic (2022). Heterogeneity in some relationships between social media use and emerging adults' affective wellbeing. *Current Psychology*.

ABSTRACT: Group-level studies of the association between social media use and wellbeing in emerging adults have so far yielded mixed and inconsistent results. As a result, recent research has shifted focus towards assessing potential heterogeneity in social media use relationships in youth. In this preregistered study, we aimed to take

previous efforts further by incorporating both subjective and objective data, and by including more specific measures of social media use such as how active emerging adults were on social media, and with whom they interacted. While data resolution issues interfered with some of our analyses, our findings suggest that there is heterogeneity in some but not all of the relationships between social media use and emerging adults' affective wellbeing.

EXCERPT: In line with our preregistered expectations and previous work (Beyens et al., 2020), we found heterogeneity in the relationship between presence of social media use and positive affect. Furthermore, following recent research suggesting that the 'passive use hypothesis' does not hold for all young people (Valkenburg et al., 2021), we hypothesized that we too would find there to be heterogeneity in the relationship between activity of social media use and affective wellbeing. Our data however did not confirm this expectation, **as we did not find a group-level effect of social media activity on affective well being, nor potential heterogeneity.**

…Moving on to close versus distant social ties on social media, we found—as expected—a group-level relationship between a higher percentage of close-tie encounters on social media and higher positive affect. Additionally, our results indicated between-person heterogeneity in this relationship, which mean that there are likely emerging adults who exhibit this relationship (and for whom it may be either negative or positive) and emerging adults who do not display this relationship.

…Last, contrary to our expectations, we found **no moderating effects of psychological characteristics (i.e., self-compassion, rejection sensitivity, and FoMo) in any of the investigated associations.**

1.3.4 Beyens, Pouwels, van Driel, Keijsers, & Valkenburg (2020). The effect of social media on well-being differs from adolescent to adolescent. *Scientific Reports*.

ABSTRACT: The question whether social media use benefits or undermines adolescents' well-being is an important societal concern. Previous empirical studies have mostly established across-the-board effects among (sub)populations of adolescents. As a result, it is still an open question whether the effects are unique for each individual adolescent. We sampled adolescents' experiences six times per day for one week to quantify differences in their susceptibility to the effects of social media on their momentary affective well-being. Rigorous analyses of 2,155 real-time assessments **showed that the association between social media use and affective well-being**

differs strongly across adolescents: While 44% did not feel better or worse after passive social media use, 46% felt better, and 10% felt worse. Our results imply that person-specific effects can no longer be ignored in research, as well as in prevention and intervention programs.

1.3.5 Vuorre, & Przybylski (2023). Global Well-Being and Mental Health in the Internet Age. *Clinical Psychological Science*.

ABSTRACT: In the last 2 decades, the widespread adoption of Internet technologies has inspired concern that they have negatively affected mental health and psychological well-being. However, research on the topic is contested and hampered by methodological shortcomings, leaving the broader consequences of Internet adoption unknown. We show that the past 2 decades have seen only small and inconsistent changes in global well-being and mental health that are not suggestive of the idea that the adoption of Internet and mobile broadband is consistently linked to negative psychological outcomes. Further investigation of this topic requires transparent study of online behaviors where they occur (i.e., on online platforms). We call for increased collaborative efforts between independent scientists and the Internet-technology sector.

EXCERPT: "**We did find some evidence suggesting that Internet-technology adoption is more negatively associated with young individuals' mental health than older groups' (whose associations were, in some cases, positive).** Nevertheless, these associations, although sometimes credibly different from zero, appeared small in magnitude and were credibly in the null region when evaluated against a smallest **effect size of interest of 0.1 on the standardized scale.** Because of their apparently small magnitude and the fact that the data are not at the individual level, we highlight that these contrasts do not speak to whether the associations might be clinically relevant."

…We also examined the moderating roles of sex and age: Both depression and self-harm were more positively associated with per capita Internet users and mobile-broadband subscriptions in the younger age brackets—including the youngest studied here at 10 to 14 years—than they were for older age groups. However, evaluated against a smallest association of interest, all sex- and age-based associations provided evidence for null associations. Studies on the association between Internet-technology use and mental health across wide age ranges are scarce. **Nevertheless, although we found few gender differences, our results are in line with one study that reported that cross-sectional associations between social**

media use and life satisfaction are more negative at specific time windows in adolescence."

1.3.6 Minich & Moreno (2024). Real-world adolescent smartphone use is associated with improvements in mood: An ecological momentary assessment study. *PLOS ONE*, *19*(5).

ABSTRACT: OBJECTIVE: Rates of adolescent mood disorders and adolescent smartphone use have risen in parallel, leading some to suggest that smartphone use might have detrimental effects on adolescents' moods. Alternatively, it is possible that adolescents turn to smartphone use when experiencing negative mood. The purpose of this study was to explore the relationship between adolescent smartphone use and mood using a longitudinal methodology that measured both in real-time.
METHOD: This study used an Ecological Momentary Assessment (EMA) procedure completed by 253 12-17-year old participants from across the United States. Participants received short surveys delivered to their smartphones at random points throughout the day. Measures included real-time, in-situ assessments of smartphone use, current mood, and mood before smartphone use.
RESULTS: Based on tests of a multilevel regression model, **adolescent moods were positively associated with smartphone use (β = 0.261, F(1,259.49) = 19.120, p < 0.001), and that mood was positively associated with the length of phone use sessions (length of phone use β = 0.100, F(1, 112.88) = 5.616, p = 0.020). Participants also reported significant changes in mood during phone use, such that moods before phone use were significantly lower than moods during phone use (MChange = 0.539, t(2491) = 23.174, p < 0.001). Change in mood (mood before minus mood during phone use) was positively associated with the length of smartphone use sessions (β = 0.097, F(1,122.20) = 4.178, p = 0.043), such that participants who had a higher change in mood were more likely to report a longer length of smartphone use.**
CONCLUSIONS: Findings suggest that adolescent smartphone use is positively associated with mood. This finding may suggest that adolescents use smartphones for mood modification, which aligns with an understanding of smartphone use as potentially addictive behavior.

ADDITIONAL EXCEPRT: **This finding may suggest that adolescents use smartphones for mood modification, which aligns with an understanding of smartphone use as potentially addictive behavior.**

[Other studies? What have we missed?]

1.4 STUDIES SHOWING MEDIATORS AND MODERATORS OF THE ASSOCIATION BETWEEN SOCIAL MEDIA USE AND BAD MENTAL HEALTH OUTCOMES

[Note: many of the correlational studies in sections 1.1 through 1.3 cover mediators and moderators. This section was added in December 2022 to capture studies that may or may not show much of an overall association, but rather focus on the subtypes of people, or types of media, or contexts and limiting conditions in which harmful (or beneficial) effects are found. This section is curated by Raphaël Aubry]

1.4.1 STUDIES ON SOCIAL COMPARISON

1.4.1.1 Alberto, Antonios, Matteo Fabrizia & Massimo (2022). *Instagram Use and Mental Well-Being: The Mediating Role of Social Comparison.* The Journal of Nervous and Mental Disease.

ABSTRACT: Instagram has grown in popularity among young adults and adolescents and is currently the second-favorite social network in the world. Research on its relationship to mental well-being is still relatively small and has yielded contradictory results. This study explores the relationship between time spent on Instagram and depressive symptoms, self-esteem, and disordered eating attitudes in a nonclinical sample of female Instagram users aged 18–35 years. In addition, it explores the mediating role of social comparison. A total of 1172 subjects completed a one-time-only online survey. Three different mediation analyses were performed to test the hypotheses that social comparison on Instagram mediates the association time spent on Instagram with **depressive symptoms** (model 1), **self-esteem** (model 2), and **disordered eating attitudes** (model 3). **All three models showed that the relationship between intensity of Instagram use and the respective mental health indicator is completely mediated by the tendency for social comparison on Instagram**

1.4.1.2 Faelens, Hoorelbeke, Fried, De Raedt, & Koster (2019). Negative influences of Facebook use through the lens of network analysis. *Computers in Human Behavior.*

ABSTRACT: Various recent studies suggest a negative association between Facebook use and mental health. Yet, empirical evidence for this association is mixed, raising the question under which conditions Facebook use is related to negative outcomes, such as decreased well-being. Our study addresses this question by investigating the relationship between Facebook use, rumination, depressive, anxiety-, and stress-related symptoms, taking into account potential key variables such as social comparison, contingent self-esteem, and global self-esteem. In a first study, we explored the unique relations between these constructs using state-of-the-art network analysis. Subsequently, we conducted a preregistered replication study. In both studies, **social comparison and self-esteem held a central position in the network, connecting social media use with indicators of psychopathology**. These findings highlight the prominent role of social comparison and self-esteem in the context of social media use and well-being. Longitudinal and experimental studies will be required to further investigate these relationships.

1.4.1.3 Burnell, George, Vollet, Ehrenreich, & Underwood (2019). Passive social networking site use and well-being: The mediating roles of social comparison and the fear of missing out. *Cyberpsychology: Journal of Psychosocial Research on Cyberspace*.

ABSTRACT: Passively browsing social networking sites (SNSs) correlates with poorer well-being (Verduyn, Ybarra, Résibois, Jonides, & Kross, 2017). However, less research has been conducted that fully examines what factors may mediate this association. In particular, both online social comparison and the fear of missing out (FoMO) may play roles in how passive SNS browsing relates to depressive symptoms and self-perceptions. The current study adds to the literature by investigating how passive use relates to these outcomes through social comparison and FoMO. For an ethnically diverse sample of college students (N = 717, Mage = 21.47, SDage = 4.64, 69% female), passively using SNSs positively predicted social comparison, which was positively related to FoMO, which in turn positively predicted depressive symptoms, and negatively predicted global self-worth, self-perceived physical appearance, and self-perceived social acceptance. These findings suggest that social comparison and FoMO play a role in the link between passive SNS use, depressive symptoms, and self-perceptions, and that FoMO could result from online social comparison.

FIGURE:

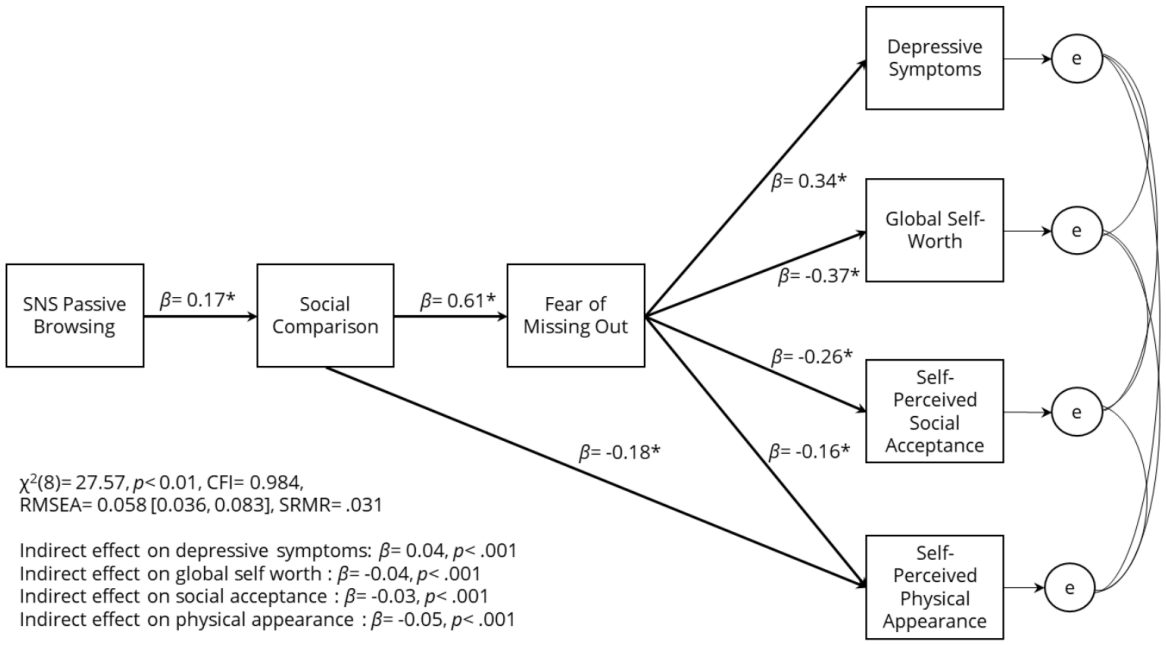


Figure 1. Mediation path model testing hypothesis 1A.
Note. *$p < .01$

1.4.1.4 Steers, Wickham, & Acitelli (2014). Seeing everyone else's highlight reels: How Facebook usage is linked to depressive symptoms. *Journal of Social and Clinical Psychology*.

ABSTRACT: Two studies investigated how social comparison to peers through computer-mediated interactions on Facebook might impact users' psychological health. Study 1 (N = 180) **revealed an association between time spent on Facebook and depressive symptoms for both genders.** However, results demonstrated that making **Facebook social comparisons mediated the link between time spent on Facebook and depressive symptoms for men only.** Using a 14-day diary design (N = 152), **Study 2 found that the relationship between the amount of time spent on Facebook and depressive symptoms was uniquely mediated by upward, nondirectional, and downward Facebook social comparisons.** Similarly, all three types of Facebook social comparisons mediated the relationship between the number of Facebook logins and depressive symptoms**. Unlike Study 1, gender did not moderate these associations.** Both studies provide evidence that people feel depressed after spending a great deal of time on Facebook because they feel badly when comparing themselves to others.

1.4.1.5 Hanna, Ward, Seabrook, Jerald, Reed, Giaccardi, & Lippman (2017). Contributions of Social Comparison and Self-Objectification in Mediating Associations Between Facebook Use and Emergent Adults' Psychological Well-Being. *Cyberpsychology, Behavior, and Social Networking*.

ABSTRACT: Although Facebook was created to help people feel connected with each other, data indicate that regular usage has both negative and positive connections to well-being. To explore these mixed results, we tested the role of social comparison and self-objectification as possible mediators of the link between Facebook use and three facets of psychological well-being: self-esteem, mental health, and body shame. Participants were 1,104 undergraduate women and men who completed surveys assessing their Facebook usage (minutes, passive use, and active use), social comparison, self-objectification, and well-being. Data were analyzed using structural equation modeling, testing separate models for women and men. Models for each gender fit the data well. **For women and men, Facebook use was associated with greater social comparison and greater self-objectification, which, in turn, was each related to lower self-esteem, poorer mental health, and greater body shame.** Mediated models provided better fits to the data than models testing direct pathways to the mediators and well-being variables. Implications are discussed for young people's social media use, and future directions are provided.

1.4.1.6 Fardouly, Magson, Rapee, Johnco, & Oar (2020). The use of social media by Australian preadolescents and its links with mental health. *Journal of Clinical Psychology*.

ABSTRACT: OBJECTIVES: Preadolescent social media use is normative and could influence mental health. This study investigated: (a) Differences between preadolescent users and non-users of various social media platforms on mental health, (b) unique links between time spent on those platforms, appearance-based activities on social media, and mental health, and (c) the moderating role of biological sex on those relationships. METHOD: Preadolescent youth (N = 528; 50.9% male) completed online surveys. RESULTS: **Users of YouTube, Instagram, and Snapchat reported more body image concerns and eating pathology than non-users, but did not differ on depressive symptoms or social anxiety. Appearance investment uniquely predicted depressive symptoms.** Appearance comparisons uniquely predicted all aspects of mental health, with some associations stronger for females than males.

CONCLUSIONS: Preadolescents could be encouraged to reduce their opportunities to make appearance comparisons and to invest less in their appearance on social media. Preadolescents may benefit from social media intervention programs.

1.4.1.7 Lee (2022). The effects of social comparison orientation on psychological well-being in social networking sites: Serial mediation of perceived social support and self-esteem. *Current Psychology.*

ABSTRACT: This study investigates the effects of the social comparison orientation in social networking sites on psychological well-being. In particular, it examines the mediation effect of perceived social support and self-esteem in the relationship between social comparison orientation and psychological well-being. Data were collected through an online survey with 236 participants in South Korea. The results showed that **social comparison orientation negatively influenced psychological well-being**. In the relationship between social comparison orientation and psychological well-being, perceived social support had no mediation effect, self-esteem had a significant negative mediation effect, and perceived social support and self-esteem had a **negative serial mediation effect. The social comparison orientation in social networking sites could elicit negative emotions, which decrease perceived social support, self-esteem, and psychological well-being.** Theoretical and practical implications as well as suggestions for future studies are discussed in detail.

1.4.1.8 Schettino, Fabbricatore & Caso (2022). “To Be Yourself or Your Selfies, That Is the Question”: The Moderation Role of Gender, Nationality, and Privacy Settings in the Relationship Between Selfie-Engagement and Body Shame. *Psychology of Popular Media.*

ABSTRACT: Since social networks have become an essential part of young people’s lives, the present study examined the relationship between sharing and manipulating selfies on Instagram and related outcomes on body image. A total of 350 young adults from Italy and Portugal participated in the study. They completed measures on selfie-sharing, selfie-manipulation, appearance-based comparison, internalization of beauty ideals, and shame for their bodies. Gender, nationality, and type of account (public/private) were hypothesized to moderate the examined relationships. The results partially confirmed the hypothesized model, **indicating that sharing selfies was positively associated with body shame through appearance based comparison, which was also positively associated with beauty-ideal internalization**. In contrast

with the hypotheses, **selfie manipulation was negatively associated with body shame.** Gender and type of social networks account moderated these relationships, whereas no moderation role was found with regard to nationality. Findings showed that there are specific behaviors on Instagram associated with the feeling of shame about one's own body. Limitations of the present study and implications for future research are discussed from a sociocultural perspective

1.4.1.9 Nguyen & Cheng (2022). A Moderated Mediation Model of the Relationship Between Passive Social Network Usages and Life Satisfaction. *Psychology of Popular Media.*

ABSTRACT: This study examined whether the adverse link between passive social network usage (PSNU) and life satisfaction was mediated by both envy and self-esteem (serial- and parallel-mediation models) based on social comparison theory (Festinger, 1954). In addition, according to social role theory (Eagly, 1987), sex was used as a moderator variable to moderate several recommended pathways related to envy. A total of 590 Vietnamese university students voluntarily participated in this survey study. The findings revealed that **envy and self-esteem both mediated the relationship between PSNU and life satisfaction**. The **moderating effect of sex was significant in envy-related pathways as well as in the association between PSNU and life satisfaction. Specially, most of these pathways worked for women but not for men, implying that envy is a relatively critical emotion for women in social network environment.** The results supported the hypothesized theories. The limitations and implications of these results are discussed.

1.4.1.10 Gomez, Klare, Ceballos, Dailey, Kaiser & Howard (2022). *Do you dare to compare? The key characteristics of social media users who frequently make online upward social comparisons.* International Journal of Human–Computer Interaction.

ABSTRACT: Social media platforms and social networking sites are heavily focused on self-presentation and impression management. The present study aimed to identify salient social media behaviors and psychosocial factors most associated with high levels of upward online social comparisons. An online survey was administered through Amazon's Mechanical Turk to assess demographics, psychosocial factors, and social media behaviors, including tendencies to make upward social comparisons online. Results revealed key factors related to **high upward social comparisons: those with low quality of life, low perceived social support, high in fear of missing out, high**

levels of social media addiction, frequent censorship to avoid judgment, and feelings of safety while using social media. The overall findings of this study suggest an association between negative well-being and making online upward social comparisons.

Note: Compared to low upward social comparison group (n=1004), **high upward social comparison group (N=310) have greater major depressive disorder (49% vs 12.9%), greater generalized anxiety disorder (11.3% vs 3.4%).**

1.4.1.11 Samra, A., Warburton, W. A., & Collins, A. M. (2022). Social comparisons: A potential mechanism linking problematic social media use with depression. *Journal of Behavioral Addictions*.

ABSTRACT: BACKGROUND: The majority of Australians are regular users of social media, especially young adults. Of concern, is that a minority of people appear to use social media in an addictive or problematic way which is associated with negative psychological outcomes such as depression. Social comparisons, where users compare themselves to others on social media, have also been linked with depression. Therefore, the key aim of the study was to determine whether social comparisons mediate the relationship between Problematic Social Media Use (PSMU) and depression.
METHOD: In a two-part study 144 participants (65 females) answered a series of selfreport questions assessing factors relating to PSMU and then came into the lab to view a series of social media images, (pre-tested to be upward or downward comparisons).
RESULTS: **Females used social media more problematically, liked more upward than downward comparison images and compared themselves more negatively to others on social media than did males. Higher PSMU scores were associated with depression and low self-esteem and comparing oneself more negatively to others on social media. Finally, focusing on upward comparisons and a tendency to make negative comparisons to others on social media partially mediated the association between PSMU and depression.**
DISCUSSION AND CONCLUSIONS: Social comparisons may function as a mechanism linking PSMU with negative psychological outcomes. Clinical interventions for individuals with PSMU which reduce the focus on upward social comparisons may also reduce negative psychological outcomes such as depression.

1.4.1.12 Spitzer, Crosby, & Witte (2022). Looking through a filtered lens: Negative social comparison on social media and suicidal ideation among young adults. *Psychology of Popular Media*.

ABSTRACT: The majority of young adults frequently use social networking sites such as Facebook and Instagram. Social networking sites are associated with increased negative social comparisons, and negative social comparison on social networking sites is related to suicidal ideation. Furthermore, young adults may have increased perceptions of thwarted belongingness due to frequent changes in important relationships that occur during this development period and may turn to social networking sites to increase social interactions. However, no study has examined whether negative social comparison on social networking sites exacerbates the relationship between thwarted belongingness and suicidal ideation and if this relationship varies depending on social networking site. We examined the relationship between social comparison on social networking sites (i.e., Instagram and Facebook) and suicidal ideation as well as if social comparison acts as a moderator in the established relationship between thwarted belongingness and suicidal ideation. We surveyed college students (N = 456) on measures of negative social comparison, suicidal ideation, and thwarted belongingness**. Results showed that there was a positive relationship between negative social comparison on social networking sites and suicidal ideation. Moreover, on Instagram, the relationship between thwarted belongingness and suicidal ideation was stronger among those with high levels of negative social comparison.** These findings suggest the importance of addressing negative social comparison on social networking sites, especially on Instagram.

1.4.1.13 González-Nuevo, C., Cuesta, M., Postigo, Á., Menéndez-Aller, Á., & Muñiz, J. (2021). Problematic Social Network Use: Structure and Assessment. *International journal of mental health and addiction*.

ABSTRACT: Using social networks (SNs) inappropriately can lead to psychological problems. The objective of this study was to develop a new measuring instrument of problematic use of SNs. The sample comprised 1003 participants over 18 years old (M = 42.33; SD = 14.32). Exploratory factor analysis was performed with a randomly selected 30% of the sample, and confirmatory factor analysis with the remaining 70%. The reliability of the instrument was estimated, and evidence of validity in relation to the variables—anxiety, depression and satisfaction with life—was obtained. The new scale demonstrated a two-dimensional structure (GFI =0.99; RMSEA= 0.06), with one factor

of negative social comparison (α = 0.94) and another of addictive consequences (α = 0.91). Clear evidence of validity related to other variables was found. The new scale demonstrated good psychometric properties. The advantage of this questionnaire is that it assesses not only excessive use but also social comparison through SNs.

Note: **The negative social comparison subscale (i.e "I feel inferior: I compare myself with other people who I think are better than me on social networks", "Most of my friends and people I know on social networks are happier than I am") had a correlation of .46** correlation with depression.**

1.4.1.14 Triệu, Ellison, Schoenebeck, & Brewer (2021). Implications of Facebook engagement types and feed's social content for self-esteem via social comparison processes. *Social Media+ Society*.

ABSTRACT: Self-esteem, generally understood as subjective appraisal of one's social worth and qualities, is related to how people use social media and the gratifications derived from their use—processes driven in part by social comparison. Two major components of the social media experience drive social comparison processes: (1) what content people engage with (feeds content) and (2) how they engage with such content (engagement type). **We conducted an eye-tracking study (N = 38), to measure viewing time spent on individual Facebook posts and paired this measurement with clicking behaviors. We found that spending more time looking at posts and clicking on more of them was associated with lower self-esteem for people with more social content on their feeds.** We discuss the importance of examining browsing behaviors as a combination of viewing time, clicking, and feed's content—especially given its potential impact on well-being outcomes such as self-esteem via social comparison processes.

1.4.1.15 Jarman, Marques, McLean, Slater, & Paxton (2021). Social media, body satisfaction and well-being among adolescents: A mediation model of appearance-ideal internalization and comparison. *Body Image*.

Abstract: Despite adolescents' prolific use of social media, relationships between social media and body satisfaction and well-being are not yet well understood, especially among boys. This study tested a sociocultural model of body image within the context of social media among adolescent boys and girls. Specifically, this study examined whether appearance-ideal internalization and social appearance comparisons mediated

relationships between social media engagement (intensity and appearance-focused use) and body satisfaction and subjective well-being. Australian adolescents between 11 and 17 years (N = 1,579, Mage = 13.45 years, SD = 1.15; 55.4 % boys) completed an online survey. Structural equational modelling indicated that only **higher appearance-focused social media use was directly associated with lower body satisfaction and well-being. Generally, higher appearance-ideal internalization and comparisons mediated the relationships between higher social media engagement and lower body satisfaction and well-being**. Multi-group analyses indicated these relationships were equivalent across gender. Findings supported the proposed model among boys and girls and extend existing theoretical knowledge to encompass male body image and well-being. Interventions which target internalization and comparisons in the context of social media are likely to be valuable in improving body satisfaction and subjective well-being in co-educational settings.

Note: **The correlation between social comparisons on social media and well-being is r=−.44**.**

1.4.1.15 Kingsbury et al. (2021). Differential associations between types of social media use and university students' non-suicidal self-injury and suicidal behavior. *Computers in human behavior*.

ABSTRACT: OBJECTIVE: To examine differential associations between types of social media use and non-suicidal self-injury (NSSI) and suicidal behaviors.
METHODS: Participants were N = 40,065 Norwegian college and university students, age 18–25, from the 2018 Students' Health and Wellbeing (SHoT) study. Students reported on their use of social media for seven specific activities, which we categorized into active and passive non-social use, passive social use, active public social, and active private social use. We also considered students' tendency for negative social comparisons on social media. Outcomes were past-year NSSI, NSSI ideation, suicidal ideation, and suicide attempt. Covariates were age, gender, total daily screen time and financial stress.
RESULTS: Results of multiple logistic regression revealed differential associations between types of social media use and outcomes. Notably, **active social private use (e.g., messaging friends) was associated with decreased odds of all outcomes, whereas active social public use (e.g., status updates) was associated with increased odds of NSSI ideation, NSSI, and suicide attempt. Social comparison was associated with increased odds of all outcomes.**

CONCLUSION: Our results suggest that specific types of social media use are differentially associated with NSSI and suicidal outcomes among university students.

[Comment from Raphael A.: Social comparison is measured with a single item (“I find that what others post (photos/status updates) make me feel less satisfied with myself and my own life”). It isn’t a measure of social comparison on social media in general, but rather a measure of threatening upward social comparison on life satisfaction. Odds-ratios range between 1.40 to 1.66.]

1.4.1.16 Irmer & Schmiedek (2023). Associations between youth’s daily social media use and well-being are mediated by upward comparisons. *Communications Psychology*.

ABSTRACT: Studies examining the associations between social media use and subjective well-being have revealed inconsistent results and mainly refer to the between-person level. We conducted a 14-day diary study among 200 youths ages 10 to 14 to examine within- and between-person associations of social media use (Instagram, TikTok, and YouTube), subjective well-being (positive/negative self-worth, positive/negative affect), and upward social comparisons (general impression of others being better off). Multilevel structural equation models showed that **social media use was linked to lower positive and higher negative self-worth on a daily basis, and that upward social comparisons were linked to diminished subjective well-being on all dimensions**. Furthermore, our findings were consistent with (partial) mediation of the effect of social media use on subjective well-being by upward social comparisons on the between- and within-person levels. Youths’ feelings that others are better off than themselves may help explain part of the heterogeneity of previous findings.

1.4.1.17 Locke (2025). Are there differences in the everyday social comparison experiences of youth in the 1990s versus 2020s? *Comprehensive Results in Social Psychology*.

ABSTRACT: Despite the widespread suggestion that decreases in psychological well-being among youth since 2010 are partly due to increases in distressing social comparisons with idealized portrayals of others on social media, this registered report is the first empirical test of whether social comparisons actually have changed since the advent of social media. Using event-contingent experience sampling, undergraduate participants from two comparable cohorts 27 years apart (N = 232participants in 1997–1998 and 234 participants in 2024–2025) each described 10 naturalistic social comparisons (4,660 comparisons total). The results revealed sizable cohort effects: Compared to their 1990s counterparts, students in the 2020s were more prone to

compare automatically, compare with distant rather than close others, compare upward with others' desirable attributes, and feel worse about themselves while making comparisons. The 2020s cohort also reported generally lower self-esteem and higher levels of depression. Examining the contexts in which the 2020s cohort made social comparisons revealed that comparisons made while using social media were more liable to be upward comparisons with distant targets that left people feeling insecure and disconnected. Collectively, these results suggest that social media comparisons could be one driver of the observed generational shifts in everyday social comparison experiences and psychological well-being.

[Other studies? What have we missed?]

1.4.2 STUDIES ON FOMO (FEAR OF MISSING OUT)

See Study 1.4.1.3

1.4.2.1 Elhai, Yang, Rozgonjuk, & Montag (2020). Using machine learning to model problematic smartphone use severity: The significant role of fear of missing out. *Addictive Behaviors*.

ABSTRACT: We examined a model of psychopathology variables, age and sex as correlates of problematic smartphone use (PSU) severity using supervised machine learning in a sample of Chinese undergraduate students. A sample of 1097 participants completed measures querying demographics, and psychological measures of PSU, depression and anxiety symptoms, fear of missing out (FOMO), and rumination. We used several different machine learning algorithms to train our statistical model of age, sex and the psychological variables in modeling PSU severity, trained using many simulated replications on a random subset of participants, and externally tested on the remaining subset of participants. Shrinkage algorithms (lasso, ridge, and elastic net regression) performing slightly but statistically better than other algorithms. **Results from the training subset generalized to the test subset, without substantial worsening of fit using traditional fit indices. FOMO had the largest relative contribution in modeling PSU severity when adjusting for other covariates in the model. Results emphasize the significance of FOMO to the construct of PSU.**

1.4.2.2 · Einstein, D. A., Dabb, C., & Fraser, M. (2023). FoMO, but not self-compassion, moderates the link between social media use and anxiety in adolescence. *Australian Journal of Psychology*

ABSTRACT OBJECTIVE: Social media use is ubiquitous during adolescence, and emerging research suggests an association with anxiety symptoms in some individuals. Two psychological constructs which may moderate this relationship are Fear of Missing Out (FoMO) and self-compassion. Higher FoMO tendencies may exacerbate the link between social media use and anxiety symptoms through greater fixation on social comparison, whereas higher self-compassion may weaken this link. The purpose of this study was to examine whether FoMO and self-compassion independently moderate the relationship between social media use and anxiety symptoms in adolescents.
METHOD: Participants included 951 adolescents (Mage = 13.69, SD = 0.72; 54% male). Online questionnaires assessed frequency of social media use, anxiety symptoms, FoMO, and self-compassion.
RESULTS: **FoMO moderated the relationship between social media use and anxiety, ΔR2 = .022, ΔF(1,945) = 26.26, p < .001. Increased social media use was associated with increased anxiety symptoms in adolescents high in FoMO and reduced anxiety for adolescents low in FoMO.** Self-compassion was not a significant moderator.
CONCLUSION: These findings have implications for social media use, public guidelines and clinical practice and support adoption of a discerning approach to adolescent's social media use.

[Other studies? What have we missed?]

1.4.3 STUDIES ON BODY OBJECTIFICATION

See Study 1.4.1.5

1.4.3.1 Tang, Xu, Tan, & Liu (2024). The impact of social network use on adolescent depression: the chain mediation between self-objectification and body satisfaction. *Frontiers in Psychology*.

ABSTRACT: INTRODUCTION: Adolescents are in the transitional stage from childhood to adulthood, a critical period for individual physical and mental development. With the

rapid development of the Internet, social networking has become an integral part of adolescents' daily lives. However, the information that adolescents are exposed to on social networks is often processed and embellished, which may cause them to become physically dissatisfied and lead to emotional problems, such as depression. We investigated the chain-mediating effects of self-objectification and body satisfaction on the relationship between social network use and depression.
METHODS: We utilized questionnaire data of 2025 adolescents from two secondary schools and one high school in China.
RESULTS: Our results demonstrated that (1) there are obvious sex differences in the intensity of social network use and active and passive social network use among adolescents, with usage higher among girls than for boys; (2) self-objectification and body satisfaction play a mediating role in the relationship between the intensity of social network use and adolescent depression, as well as the presence of chain-mediating roles; and (3) self-objectification and body satisfaction play an intermediary role in the relationship between active and passive social network use and adolescent depression; there is further a chain intermediary role. The findings suggest that **social network use affects adolescents' depression through self-objectification and body satisfaction, which is not only manifested in the general use intensity of social networks but also in their active and passive use modes of social networks**.
CONCLUSION: This study provides theoretical support for the causes and mechanisms behind the influence of social network use on adolescent depression and has practical implications for the prevention and intervention of adolescent emotional problems.

[Other studies? What have we missed?]

1.4.4 STUDIES ON PERFECTIONISM

1.4.4.1 Simon, Cu, De Jesus, Go, Lim, & Say (2022). Worried about being imperfect? The mediating effect of physical appearance perfectionism between Instagram addiction and body esteem. *Personality and Individual Differences*.

ABSTRACT: Physical appearance is an important domain wherein people tend to have perfectionistic tendencies. Physical appearance perfectionism is a domain-specific type of perfectionism that has a potential role to play in how addiction to popular social media platforms such as Instagram can negatively impact a person's body esteem. To test the hypothesis that physical appearance perfectionism mediates the relationship between

Instagram addiction and body esteem, data were collected from 902 undergraduate students from the Philippines. **While there were gender differences in the levels of the variables, analysis showed that physical appearance perfectionism (worry about imperfection) significantly mediates the relationship between Instagram addiction and body esteem even after controlling for the effects of sex.** This confirms the importance of studying how individual difference variables such as physical appearance perfectionism can explain why social media has a significant influence on how people perceive their physical bodies. Future research that tests the effects of Instagram addiction and physical appearance perfectionism on psychological outcomes other than body esteem is recommended to better inform the design of interventions for the prevention of addictive behaviors and potentially pathological traits.

1.4.5 STUDIES ON RELATIONSHIP WITH PARENTS

1.4.5.1 Rothwell (2023). Parenting Mitigates Social Media-Linked Mental Health Issues. *Gallup News*.

EXCERPT: As Gallup previously reported**, the strength of the parent relationship** -- in addition to parental supervision and regulation of screen time -- **predicts much less time spent on social media**. Across all categories of social media use, mental health outcomes are much worse for teens who report a weak parentl relationship than those who report a strong one. The comprehensive mental health index shows a high of -23 and a low of -59 for teens with a weak parental relationship. By contrast, the index varies from 26 to 39 for those with a strong parental relationship. **Looking only within the group of teens with a strong parenting relationship, the comprehensive mental health index is not significantly different for those who use social media for five or more hours compared with those who use it for less than two hours**. The same is true when the analysis is done for those with a *weak* parenting relationship.

Consistent with the research literature on the topic, the Gallup survey confirms that mental health problems are more severe among heavy adolescent users of social media. Yet, these **data also suggest that the strength of the parenting relationship shows a more fundamental connection to mental health and that teens who benefit from a strong, loving relationship with their caretaker are much less likely to be harmed by intensive social media use than those who do not.**

1.4.5.2 Rothwell (2023). Teens Spend Average of 4.8 Hours on Social Media Per Day. *Gallup News*.

On average, adolescents report 1.8 hours less time on social media apps if their parents strongly agree that they restrict screen time, compared with parents who strongly disagree. Using the larger sample of parents with children aged 3 to 19, one in four parents (25%) strongly agree that they restrict screen time for their children, which does not vary between mothers and fathers. **Parental education is weakly related to screen time restrictions**, with graduate degree holders slightly more likely than parents with less education to strongly agree that they restrict screen time.

The **political ideology of the parent is more closely related to restrictions**. Forty-one percent of very conservative parents strongly agree that they restrict screen time, compared with 26% of conservative parents and 23% among moderate, liberal or very liberal parents. **Very liberal parents are more than twice as likely as conservative or very conservative parents to strongly disagree that they restrict screen time**

1.4.5.3 Raphaely (2024). Association Between Parental Problematic Internet Use and Adolescent Depression

Abstract

We examined the association between parental problematic internet use (PIU) and adolescent depression and whether this association varied based on internet-related rules. We recruited adolescents ages 13-18 and their parent using national Qualtrics panels (N = 4592 dyads). Measures included the Problematic and Risky Internet Use Screening Scale (PRIUSS-3), the Patient Health Questionnaire (PHQ-9), and the internet specific parenting practice scale (ISPPS). Parental PIU was associated with symptoms of adolescent depression, including suicidal ideation, even when controlling for adolescent PIU (β = 0.35, 95% CI [0.32, 0.38]). Time-related rules moderated this association in a non-linear way where the association was strongest when time-related rules were unclear / mid-range. The moderation effect was linear for content-related rules, where stricter rules were associated with a weaker association between parent PIU and adolescent depression. Results support clinicians assessing parent PIU when treating depressed adolescents and engaging parents in monitoring their adolescents' internet use content.

1.4.5.4 Rothwell (2023). How Parenting and Self-control Mediate the Link Between Social Media Use and Youth Mental Health. *Institute for Family Studies*.

EXCERPT:

- The mental health of U.S. teenagers has declined over the past 10 to 15 years. Symptoms of mental illness have increased, as suicide rates have doubled for girls and increased by 50% for boys.
- New Gallup survey data show that U.S. teenagers spend an average of 4.8 hours per day using social media—far more time than they spend watching television, doing homework, perusing hobbies, and playing video games. There are strong theoretical reasons to believe that teenagers both overuse social media and that it is harmful psychologically; moreover, the timing of greater use coincides with declining mental health. YouTube and TikTok account for most of teens' time on social media, among the platforms included in this study.
- Time spent on social media predicts significantly lower mental health and higher discomfort with one's body in simple models adjusting only for child sex and age.1 Teens who spend more than 5 hours a day on social media were 2.5 times more likely to express suicidal thoughts or harm themselves, 2.4 times more likely to hold a negative view of their body, and 40% more likely to report a lot of sadness the day before. In our study, these mental health problems were only associated with YouTube and TikTok, with no effects found for Instagram, Twitter, Facebook, or other platforms, perhaps because teens use these platforms less and/or use them for different reasons. Body image problems show significant effects associated with time spent on YouTube, TikTok, Instagram, and WhatsApp, but not the other platforms included in this study.
- Children who exhibit greater self-control and/or live with parents who restrict screen time, supervise them, and sustain a strong relationship are far less likely to spend 4 hours or more per day on social media. **The negative effects of high social media use on mental health are no longer observed when matching youth on these personality and parental characteristics, and the negative effects on body image problems are cut in half, though they remain significant**. In other words, screen time has no association with an index of mental health problems for teens who demonstrate high levels of self-control and enjoy a strong relationship with parents who supervise them—a minority of American teens. Yet even teens with these characteristics show greater risk of body image issues if they are heavy users of social media.

1.4.6 STUDIES ON QUALITY OF SOCIAL CONNECTIONS

1.4.6.1 Hu, Ballow, Meng, Ellithorpe, & Meshi (2024). Social Network Density Mediates the Association Between Problematic Social Media Use and Depressive Symptoms. *International Journal of Human-Computer Interaction*.

ABSTRACT: Previous studies have indicated that problematic social media use (PSMU) is positively related to depressive symptoms. However, the potential mechanisms underlying this relationship are not well understood. For example, prior research found that depressive symptoms are related to one's social network structure, such as network size and density. Therefore, we examined whether one's social network size and density mediate the relationship between PSMU and depressive symptoms. We conducted an in-person survey to collect measures of PSMU, social network size and density, and depressive symptoms. Our analysis showed that **there was a positive relationship between PSMU and depressive symptoms, which was mediated by social network density but not size. Specifically, the greater one's PSMU, the less dense their social network, and the greater their depressive symptoms.** Our research suggests that **PSMU may affect how individuals maintain their social connections with others, which may affect mental health**. Implications were discussed.

1.4.7 STUDIES ON OTHER MEDIATORS

1.4.7.1 Lee, & Hancock (2023). Social media mindsets: A new approach to understanding social media use & psychological well-being. In *Europe PMC*.

ABSTRACT: We report the first investigation of social media mindsets and examine how these mindsets play a role in the relationship between social media use and well-being. We investigate this question across five studies (total N = 1,364). First, we demonstrate that people hold distinct mindsets about the amount of agency they have over their social media use ("in control" vs. "out of control") and the valence of its effects in their lives ("enhancing" vs. "harmful") (Studies 1-2). We develop and validate a 12-item instrument, the Social Media Mindsets scale (SMMS) to assess these mindsets systematically. We show that social media mindsets differentially relate to diverse indicators of psychological well-being, explaining more variance in psychological distress and perceived social support than time spent on social media (Studies 2-3). People who hold more agentic, positive mindsets (i.e., that social media can be leveraged to fulfill needs) consistently experience greater well-being than those with a

low-agency, negative mindset (i.e., that social media is addictive). This effect operates through two routes: appraisal effects and behavioral change. **Holding a more agentic mindset not only changes how people use social media, but also how they remember and understand its role in their lives (Study 4). Finally, we experimentally manipulate social media mindsets through a targeted intervention, which reduced depression and increased social connection among the treatment group** (Study 5). We discuss implications for social media effects on well-being, the study of mindsets in relation to technology, and for practical interventions for improving experiences with social media.

1.4.7.2 Wang, Wang, Liu, & Deng (2025). Exploring the relationship between physical activity and social media addiction among adolescents through a moderated mediation model. *Scientific Reports*.

ABSTRACT: Physical activity is highly correlated with social media dependence in adolescence, but the underlying mechanisms between these variables require further investigation. This study suggests two potential psychological pathways linking physical activity and social media dependence in adolescence, with depression potentially serving as a mediating factor and difficulty describing feelings acting as a moderating factor. A self-reported survey was conducted with 3,247 Chinese adolescents, including measures of physical activity, social media dependence, depression, and difficulty describing feelings. Descriptive statistics and correlation analyses were performed on these variables, and a mediation-moderation model was developed. Physical activity showed a significant negative correlation with social media dependence, depression, and difficulty describing feelings. Additionally, depression was positively correlated with both social media dependence and difficulty describing feelings, and difficulty describing feelings was positively correlated with social media dependence. Furthermore, difficulty describing feelings moderated the relationship between depression and social media dependence in adolescence. This study provides further insights into the psychological mechanisms underlying the relationship between physical activity and social media dependence in adolescence. Depression serves as a mediating factor, while difficulty describing feelings acts as a moderating factor in the relationship between depression and social media dependence. These findings enhance our understanding of the role of depression and difficulty describing feelings in the relationship between physical activity and social media dependence, offering valuable implications for more comprehensive and targeted interventions aimed at reducing social media dependence among adolescents.

1.4.7.3 Saha, Yoo, Swain, & Choudhury (2025). Mental wellbeing effects of disclosing life events on social media. *Scientific Reports.*

ABSTRACT: Life events are noteworthy moments that we often share on social media. However, how such online disclosures of life events impact our mental wellbeing is largely unknown. This study examines the effects of these disclosures using data from 236 participants. Regression models reveal that individual differences and event attributes significantly influence wellbeing. Through a quasi-experimental design, we find that sharing life events on Facebook positively impacts wellbeing by increasing positive affect and sleep quality while reducing negative affect, stress, and anxiety. Notably, disclosing negative events shows the strongest improvement in wellbeing, suggesting a protective effect of social media. Additionally, life event disclosures elicit more reactions and comments than other Facebook posts, with negative events receiving more comments but fewer reactions than non-negative life event disclosures. These findings offer insights into the complex relationship between online disclosures and wellbeing, contributing to theoretical understanding and practical strategies for enhancing online experiences and supporting mental health.

[Other studies? What have we missed?]

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QUESTION 2: DOES SOCIAL MEDIA USE AT TIME 1 PREDICT BAD MENTAL HEALTH OUTCOMES AT TIME 2?

NOTE: It is not clear what time interval is appropriate for examining changes between measurements (T1, T2, T3…). Most studies take advantage of whatever interval happens to be used by a larger study, which is often annual. But it's not clear when the effects of an increase in a variable at T1 (e.g. time on social media) should show up in another variable at T2 (e.g., depression). Is it the next day, or a month later, or a year later? Few studies address this question directly, and we would not expect to find effects at all time intervals. Of the 26 studies in this section (on 12/8/21), 13 found a significant

effect (section 2.1), and 13 did not (section 2.2). When we cross that dichotomy with the time interval (a week or less, vs. a month or more) we find that 6 studies used a week or less (4 of them were daily), and only 1 of the 6 found an effect. But 19 studies used a month or more (12 were annual) and of these, 12 found a significant effect. So a simple dose response model, where consuming more social media on Monday makes you more depressed on Tuesday, does not seem to be supported. But increasing your average weekly usage in January, and continuing for an unknown amount of time, might make you more depressed at some unknown amount of time later. We simply don't know what the optimal interval is, but it seems to be more than a day or a week.

2.1: STUDIES INDICATING HARM AT T2

2.1.1 Shakya & Christakis (2017). Association of Facebook Use With Compromised Well-Being: A Longitudinal Study. *American Journal of Epidemiology*.

ABSTRACT: Face-to-face social interactions enhance well-being. With the ubiquity of social media, important questions have arisen about the impact of online social interactions. In the present study, we assessed the associations of both online and offline social networks with several subjective measures of well-being. We used 3 waves (2013, 2014, and 2015) of data from 5,208 subjects in the nationally representative Gallup Panel Social Network Study survey, including social network measures, in combination with objective measures of Facebook use. We investigated the associations of Facebook activity and real-world social network activity with self-reported physical health, self-reported mental health, self-reported life satisfaction, and body mass index. Our results showed that **overall, the use of Facebook was negatively associated with well-being. For example, a 1-standard-deviation increase in "likes clicked" (clicking "like" on someone else's content), "links clicked" (clicking a link to another site or article), or "status updates" (updating one's own Facebook status) was associated with a decrease of 5%–8% of a standard deviation in self-reported mental health. These associations were robust to multivariate cross-sectional analyses, as well as to 2-wave prospective analyses.** The negative associations of Facebook use were comparable to or greater in magnitude than the positive impact of offline interactions, which suggests a possible tradeoff between offline and online relationships.

EXCERPT: The associations between Facebook use and compromised well-being may stem from the simple fact that those with compromised well-being may be more likely to seek solace or attempt to alleviate loneliness by excessively using Facebook in the first

place. However, the longitudinal models accounted for well-being measures in wave t when including Facebook use to predict the well-being outcomes in wave t + 1. Also, in our final models, we included degree (or real-world friendship counts) to adjust for this possibility, and the results remained intact.

[Time period between waves: one year]
[age group: Adults 18+]
[Direction: Forward]

2.1.2 Hökby, Hadlaczky, Westerlund et al. (2016). Are Mental Health Effects of Internet Use Attributable to the Web-Based Content or Perceived Consequences of Usage? A Longitudinal Study of European Adolescents. *JMIR Mental Health*.

ABSTRACT: BACKGROUND: Adolescents and young adults are among the most frequent Internet users, and accumulating evidence suggests that their Internet behaviors might affect their mental health. Internet use may impact mental health because certain Web-based content could be distressing. It is also possible that excessive use, regardless of content, produces negative consequences, such as neglect of protective offline activities.
OBJECTIVE: The objective of this study was to assess how mental health is associated with (1) the time spent on the Internet, (2) the time spent on different Web-based activities (social media use, gaming, gambling, pornography use, school work, newsreading, and targeted information searches), and (3) the perceived consequences of engaging in those activities.
METHODS: A random sample of 2286 adolescents was recruited from state schools in Estonia, Hungary, Italy, Lithuania, Spain, Sweden, and the United Kingdom. Questionnaire data comprising Internet behaviors and mental health variables were collected and analyzed cross-sectionally and were followed up after 4 months.
RESULTS: **Cross-sectionally, both the time spent on the Internet and the relative time spent on various activities predicted mental health (P<.001), explaining 1.4% and 2.8% variance, respectively**. **However, the consequences of engaging in those activities were more important predictors, explaining 11.1% variance**. Only Web-based gaming, gambling, and targeted searches had mental health effects that were not fully accounted for by perceived consequences. **The longitudinal analyses showed that sleep loss due to Internet use (ß=.12, 95% CI=0.05-0.19, P=.001) and withdrawal (negative mood) when Internet could not be accessed (ß=.09, 95% CI=0.03-0.16, P<.01) were the only consequences that had a direct effect on mental health in the long term**. Perceived positive consequences of Internet use did

not seem to be associated with mental health at all.
CONCLUSIONS: **The magnitude of Internet use is negatively associated with mental health in general**, but specific Web-based activities differ in how consistently, how much, and in what direction they affect mental health. Consequences of Internet use (especially sleep loss and withdrawal when Internet cannot be accessed) seem to predict mental health outcomes to a greater extent than the specific activities themselves. Interventions aimed at reducing the negative mental health effects of Internet use could target its negative consequences instead of the Internet use itself.

COMMENT: this large study (n=2286) found both correlational and time-lagged effects of heavy internet use. They looked beyond total time spent in various categories and asked subjects to rate the consequences of time spent in each category. Not surprisingly, these self-ratings are much more predictive of mental health outcomes than are the subjects' estimates of total time spent, so including these ratings in the regression analyses washed out the predictive power of total time. Nonetheless, total time spent online at T1 (other than for schoolwork) predicted bad mental health outcomes at T1, and predicted increased problems at T2. Consistent with other studies, the **pathway through disrupted sleep** was found to be an important part of the story.
[Time period between waves: 4 months]
[age group: 14-16]
[Direction: Unknown]

2.1.3 Booker, Kelly, & Sacker (2018). Gender differences in the associations between age trends of social media interaction and well-being among 10-15 year olds in the UK. *BMC Public Health*

ABSTRACT: BACKGROUND: Adolescents are among the highest consumers of social media while research has shown that their well-being decreases with age. The temporal relationship between social media interaction and well-being is not well established. The aim of this study was to examine whether the changes in social media interaction and two well-being measures are related across ages using parallel growth models.
METHODS: Data come from five waves of the youth questionnaire, 10-15 years, of the Understanding Society, the UK Household Longitudinal Study (pooled n = 9859). Social media interaction was assessed through daily frequency of chatting on social websites. Well-being was measured by happiness with six domains of life and the Strengths and Difficulties Questionnaire.
RESULTS: **Findings suggest gender differences in the relationship between interacting on social media and well-being. There were significant correlations between interacting on social media and well-being intercepts and between social**

media interaction and well-being slopes among females. Additionally higher social media interaction at age 10 was associated with declines in well-being thereafter for females, but not for males. Results were similar for both measures of well-being.
CONCLUSIONS: **High levels of social media interaction in early adolescence have implications for well-being in later adolescence, particularly for females**. The lack of an association among males suggests other factors might be associated with their reduction in well-being with age. These findings contribute to the debate on causality and may inform future policy and interventions.
[Time period between waves: one year]
[age group: 10-15]
[Direction: unknown, they looked at effects of different people at the two time points, so cannot determine direction]

2.1.4 Schmiedeberg & Schroder (2017). Leisure Activities and Life Satisfaction: an Analysis with German Panel Data. *Applied Research in Quality of Life.*

ABSTRACT: Given the nature of leisure as largely uncoerced and not necessary for survival it seems obvious at a first glance that leisure activities should contribute to happiness. Indeed, recent research has found positive effects of leisure activities on subjective well-being. In this article, we analyze the association between leisure activities and life satisfaction based on longitudinal data from Germany. By applying fixed-effects regression models we are able to rule out potential bias due to unobserved heterogeneity in time-constant variables. We use data from three waves of the German Family Panel (pairfam), a large, randomly sampled longitudinal study of adolescents and adults (aged 15–41 across the observation period), to test the effects of five leisure activities (sports; vacation; meeting with friends; internet use; and TV viewing) on respondents' life satisfaction. **Our results indicate that meeting with friends, doing sports, and going on vacation contributes positively to life satisfaction whereas internet use for personal purposes and TV consumption are negatively related to life satisfaction.**
[Time period between waves: yearly]
[age group: 15-41]
[Direction: unknown]

COMMENT: The study does not allow us to look at social media use specifically. The dependent variable is life satisfaction, measured by the question "All in all, how satisfied are you with your life at the moment?" "Personal internet use" was broken down into 3

categories: 0 hours per day, between 0 and 3 hours, and 3 or more hours. The authors report that the effects were similar across all age groups, so they did not break down the analysis into age groups. We take this to mean that these effects were found for adolescents, as well as for older participants.

2.1.5 Babic, Smith, Morgan, et al. (2017). Longitudinal associations between changes in screen-time and mental health outcomes in adolescents. *Mental Health and Physical Activity.*

ABSTRACT: INTRODUCTION: The primary aim was to examine **longitudinal associations between changes in screen-time and mental health outcomes among adolescents.**
METHODS: Adolescents (N = 322, 65.5% females, mean age = 14.4 ± 0.6 years) reported screen-time and mental health at two time points over a school year. Multi-level linear regression analyses were conducted after adjusting for covariates.
RESULTS: Changes in total recreational screen-time (β = −0.09 p = 0.048) and tablet/mobile phone use (β = −0.18, p < 0.001) were negatively associated with physical self-concept. Changes in total recreational screen-time (β = −0.20, p = 0.001) and computer use (β = −0.23, p = 0.003) were negatively associated with psychological well-being. A positive association was found with television/DVD use and psychological difficulties (β = 0.16, p = 0.015). No associations were found for non-recreational screen-time.
CONCLUSION: Changes in recreational screen-time were associated with changes in a range of mental health outcomes.

[NOTE: this study is about “screen time” in general; it does not tell us about social media effects specifically]
[Time period between waves: 6 months]
[age group: mean age is 14]
[Directionality: Unknown]

2.1.6 Stevic & Matthes (2021). A vicious circle between children’s non-communicative smartphone use and loneliness: Parents cannot do anything about it. *Telematics & Informatics.*

ABSTRACT: Children are increasingly using their own smartphones for communicative and non-communicative purposes. In fact, studies showed that different ways of using

the smartphone might influence loneliness, and as a consequence, loneliness might also enhance further engagement with the smartphone. In this context, parents play an important role because they can regulate children's smartphone use. The present study **tested the moderating role of active and restrictive parental mediation on the relations between different types of smartphone use and children's loneliness.** We conducted a two-wave panel survey among 10- to 14-year-old children and their parents, resulting in total of 384 parent-child pairs at Time 2. Our results revealed that **non-communicative use at Time 1 increased loneliness at Time 2. We also found a reciprocal influence, that is, loneliness at Time 1 increased children's non-communicative use at Time 2. We found no moderating influence of active and restrictive parental mediation on the relations between children's smartphone use and loneliness.** Our findings are discussed against the background of the poor-get-poorer effect regarding smartphone use.
[Time period between waves: 4 months]
[age group: 10-14]
{Directionality: Bi-directional]

2.1.7 Verduyn, Lee, Park, Shablack, Orvell, Bayer, … Kross (2015). Passive Facebook usage undermines affective well-being: Experimental and longitudinal evidence. *Journal of Experimental Psychology. [h/t Kai Lukoff]*

ABSTRACT: Prior research indicates that Facebook usage predicts declines in subjective well-being over time. How does this come about? We examined this issue in 2 studies using experimental and field methods. In Study 1, **cueing people in the laboratory to use Facebook passively (rather than actively) led to declines in affective well-being over time.** Study 2 replicated these findings in the field using experience-sampling techniques. It also demonstrated how passive Facebook usage leads to declines in affective well-being: by increasing envy. Critically, the relationship between passive Facebook usage and changes in affective well-being remained significant when controlling for active Facebook use, non-Facebook online social network usage, and direct social interactions, highlighting the specificity of this result. These findings demonstrate that passive Facebook usage undermines affective well-being.
[Time period between waves: Study 2 = 6 days]
[Age group: Study 1: Undergraduates, Study 2: Adults, *M = 20*]
[Direction: Forward]

COMMENT (from Kai Lukoff): Study 2 finds that passive use of Facebook at T1 predicts declines in affective wellbeing at T2, but not for active Facebook use. Since people used Facebook passively significantly more than they used it actively, I decided to tentatively include it here under “indicating effects.” Study 1 is an experimental study in a similar vein.

2.1.8 Boers, Afzali, Newton et al. (2019). Association of Screen Time and Depression in Adolescence. *JAMA Pediatrics*. [h/t Ian Goddard]

ABSTRACT: DESIGN, SETTING, AND PARTICIPANTS: This secondary analysis used data from a randomized clinical trial assessing the 4-year efficacy of a personality-targeted drug and alcohol prevention intervention. This study assessed screen time and depression throughout 4 years, using an annual survey in a sample of adolescents who entered the seventh grade in 31 schools in the Greater Montreal area. Data were collected from September 2012 to September 2018. Analysis began and ended in December 2018.
MAIN OUTCOMES AND MEASURES: Independent variables were social media, television, video gaming, and computer use. Symptoms of depression was the outcome, measured using the Brief Symptoms Inventory. Exercise and self-esteem were assessed to test displacement and upward social comparison hypothesis.
RESULTS: A total of 3826 adolescents (1798 girls [47%]; mean [SD] age, 12.7 [0.5] years) were included. In general, depression symptoms increased yearly (year 1 mean [SD], 4.29 [5.10] points; year 4 mean [SD], 5.45 [5.93] points). Multilevel models, which included random intercepts at the school and individual level estimated between-person and within-person associations between screen time and depression. Significant between-person associations showed that **for every increased hour spent using social media, adolescents showed a 0.64-unit increase in depressive symptoms (95% CI, 0.32-0.51). Similar between-level associations were reported for computer use (0.69; 95% CI, 0.47-0.91). Significant within-person associations revealed that a further 1-hour increase in social media use in a given year was associated with a further 0.41-unit increase in depressive symptoms in that same year. A similar within-person association was found for television (0.18; 95% CI, 0.09-0.27).** Significant between-person and within-person associations between screen time and exercise and self-esteem **supported upward social comparison and not displacement hypothesis**. Furthermore, a significant interaction between the between-person and within-person associations concerning social media and self-esteem supported reinforcing spirals hypothesis.

CONCLUSIONS AND RELEVANCE: **Time-varying associations between social media, television, and depression were found, which appeared to be more explained by upward social comparison and reinforcing spirals hypotheses than by the displacement hypothesis. Both screen time modes should be taken into account when developing preventive measures and when advising parents**.
[Time period between waves: one year]
[age group: 12-16?]
[Direction: Bi-directional]

2.1.9 Viner, Aswathikutty-Gireesh, et al. (2019) Roles of cyberbullying, sleep, and physical activity in mediating the effects of social media use on mental health and wellbeing among young people in England: A secondary analysis of longitudinal data. *The Lancet Child and Adolescent Health*. [thanks to Ian Goddard]

ABSTRACT: There is growing concern about the potential associations between social media use and mental health and wellbeing in young people. We explored associations between the frequency of social media use and later mental health and wellbeing in adolescents, and how these effects might be mediated.
METHODS: We did secondary analyses of publicly available data from the Our Futures study, a nationally representative, longitudinal study of 12 866 young people from age 13 years to 16 years in England. The exposure considered was the frequency of social media use (from weekly or less to very frequent [multiple times daily]) at wave 1 (participants aged 13–14 years) through wave 3 of the study (participants aged 15–16 years). Outcomes were mental health at wave 2 (with high 12-item General Health Questionnaire [GHQ12] scores [≥3] indicating psychological distress), and wellbeing at wave 3 (life satisfaction, feeling life is worthwhile, happiness, and anxiety, rated from 1 to 10 by participants). Analyses were adjusted for a minimal sufficient confounding structure, and were done separately for boys and girls. Cyberbullying, sleep adequacy, and physical activity were assessed as potential mediators of the effects.
FINDINGS: **Very frequent use of social media increased from wave 1 to wave 3: from 34·4% (95% CI 32·4–36·4) to 61·9% (60·3–63·6) in boys, and 51·4% (49·5–53·3) to 75·4% (73·8–76·9) in girls. Very frequent social media use in wave 1 predicted a high GHQ12 score at wave 2 among girls (adjusted odds ratio [OR] 1·31 [95% CI 1·06–1·63], p=0·014; N=4429) and boys (1·67 [1·24–2·26], p=0·0009; N=4379). Persistent very frequent social media use across waves 1 and 2 predicted lower wellbeing among girls only** (adjusted ORs 0·86 [0·74–0·99], N=3753, p=0·039 for life satisfaction; 0·80 [0·70–0·92], N=3831, p=0·0013 for happiness; 1·28 [1·11–1·48], N=3745, p=0·0007 for anxiety). Adjustment for

cyberbullying, sleep, and physical activity attenuated the associations of social media use with GHQ12 high score (proportion mediated 58·2%), life satisfaction (80·1%), happiness (47·7%), and anxiety (32·4%) in girls, such that these associations (except for anxiety) were no longer significant; however, the association with GHQ12 high score among boys remained significant, being mediated only 12·1% by these factors. **Interpretation: Mental health harms related to very frequent social media use in girls might be due to a combination of exposure to cyberbullying or displacement of sleep or physical activity, whereas other mechanisms appear to be operative in boys.** Interventions to promote mental health should include efforts to prevent or increase resilience to cyberbullying and ensure adequate sleep and physical activity in young people.

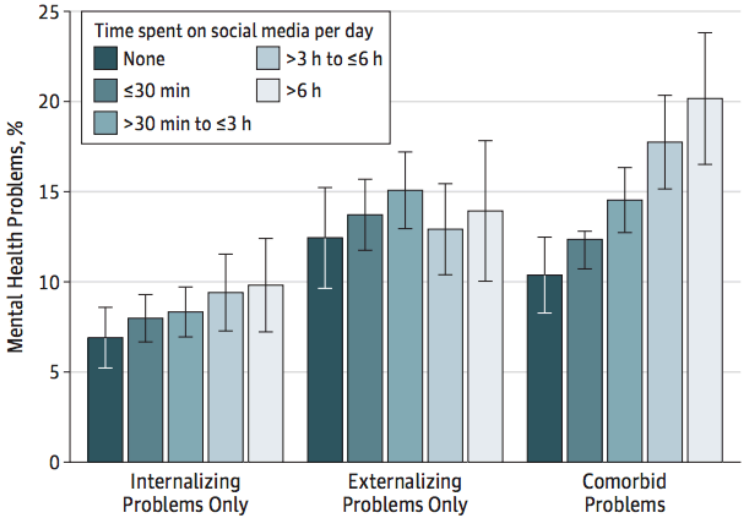
NOTE [from Twenge]: Effects were found for both boys and girls, with T1 social media use predicting T2 wellbeing and mental health. But the mediational model including cyberbullying, sleep, and exercise only worked well for girls. That suggests other forces may be at work for boys -- future research should try to figure out what those are. One notable limitation: Social media use was measured from “never” to “more than three times a day,” a measurement that often lacks variance as most teens who use social media do so multiple times a day. Low variance = low effects. Thus, if social media use had been measured in hours per day, effects might have been larger.
[Time period between waves: 2 years]
[age group: 13-16]
[Direction: Forward]

2.1.10 Riehm, Feder, Tormohlen et al. (2019). Associations Between Time Spent Using Social Media and Internalizing and Externalizing Problems Among US Youth. JAMA Psychiatry. [h/t Ian Goddard]

ABSTRACT**:** OBJECTIVE: To assess whether time spent using social media per day is prospectively associated with internalizing and externalizing problems among adolescents.
DESIGN, SETTING, AND PARTICIPANTS: This longitudinal cohort study of 6595 participants from waves 1 (September 12, 2013, to December 14, 2014), 2 (October 23, 2014, to October 30, 2015), and 3 (October 18, 2015, to October 23, 2016) of the Population Assessment of Tobacco and Health study, a nationally representative cohort study of **US adolescents**, assessed US adolescents via household interviews using audio computer-assisted self-interviewing. Data analysis was performed from January 14, 2019, to May 22, 2019.

EXPOSURES: Self-reported time spent on social media during a typical day (none, ≤30 minutes, >30 minutes to ≤3 hours, >3 hours to ≤6 hours, and >6 hours) during wave 2.
Main Outcomes and Measure: Self-reported past-year internalizing problems alone, externalizing problems alone, and comorbid internalizing and externalizing problems during wave 3 using the Global Appraisal of Individual Needs–Short Screener.
RESULTS: A total of 6595 adolescents (aged 12-15 years during wave 1; 3400 [51.3%] male) were studied. In unadjusted analyses, spending more than 30 minutes of time on social media, compared with no use, was associated with increased risk of internalizing problems alone (≤30 minutes: relative risk ratio [RRR], 1.30; 95% CI, 0.94-1.78; >30 minutes to ≤3 hours: RRR, 1.89; 95% CI, 1.36-2.64; >3 to ≤6 hours: RRR, 2.47; 95% CI, 1.74-3.49; >6 hours: RRR, 2.83; 95% CI, 1.88-4.26) and comorbid internalizing and externalizing problems (≤30 minutes: RRR, 1.39; 95% CI, 1.06-1.82; >30 minutes to ≤3 hours: RRR, 2.34; 95% CI, 1.83-3.00; >3 to ≤6 hours: RRR, 3.15; 95% CI, 2.43-4.09; >6 hours: RRR, 4.29; 95% CI, 3.22-5.73); associations with externalizing problems were inconsistent. **In adjusted analyses, use of social media for more than 3 hours per day compared with no use remained significantly associated with internalizing problems alone** (>3 to ≤6 hours: RRR, 1.60; 95% CI, 1.11-2.31; >6 hours: RRR, 1.78; 95% CI, 1.15-2.77) **and comorbid internalizing and externalizing problems** (>3 to ≤6 hours: RRR, 2.01; 95% CI, 1.51-2.66; >6 hours: RRR, 2.44; 95% CI, 1.73-3.43) but not externalizing problems alone.
CONCLUSIONS AND RELEVANCE: Adolescents who spend more than 3 hours per day using social media may be at heightened risk for mental health problems, particularly internalizing problems. Future research should determine whether setting limits on daily social media use, increasing media literacy, and redesigning social media platforms are effective means of reducing the burden of mental health problems in this population.
[Time period between waves: one year]
[age group: adolescents]
[Direction: Forward]

Figure 2. Adjusted Proportion of Internalizing Problems, Externalizing Problems, and Comorbid Internalizing and Externalizing Problems Stratified by Category of Time Spent on Social Media per Day Among US Adolescents in the Population Assessment of Tobacco and Health Study, 2013-2016

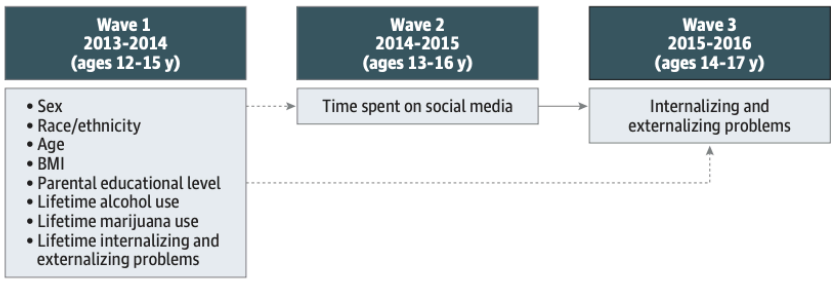


Error bars indicate 95% CIs.

[NOTE from Haidt: this abstract shows that the study found correlations between social media use in a given wave and internalizing disorders (depression/anxiety) in that same wave, but the abstract and the main text don't make clear how well social media use at one time predicted changes in internalizing disorders at a later time. But the discussion does begin: **"we found that adolescent social media use was prospectively associated with increased risk of comorbid internalizing and externalizing problems as well as internalizing problems alone.** This association remained significant after adjusting for demographics, past alcohol and marijuana use, and, most importantly, a history of mental health problems, which mitigates the possibility that reverse causality explains these findings."]

[NOTE from Twenge: By my reading of the main text, the unadjusted RR's are social media at Wave 2 predicting mental health problems at Wave 3 (see Figure 1, below).

Figure 1. Directed Acyclic Graph of the Hypothesized Associations Between Study Variables and Waves of Measurement for the Exposure, Outcome, and Potential Confounders



The dashed lines represent potential confounding. The solid line represents the main association of interest. BMI indicates body mass index.

In addition, the adjusted analyses control for mental health problems reported at Wave 1. Thus, **this study shows that social media use at one time predicts mental health problems a year later, even when controlled for previous mental health problems.** Thus, it's good evidence that social media use is associated with future mental health issues apart from past issues.]

2.1.11 Mundy, Canterford et al. (2020). Social networking and symptoms of depression and anxiety in early adolescence. *Depression and Anxiety*.

ABSTRACT: METHODS: Using data from the Childhood to Adolescence Transition Study (n = 1,156), duration of social networking use was measured annually at four time points from 11.9 to 14.8 years of age (≥1 h/day indicating high use). Cross-sectional and prospective relationships between social networking use and depressive and anxiety symptoms were examined.
RESULTS: In adjusted (age, socioeconomic status, prior mental health history) cross-sectional analyses, **females with high social networking use had greater odds of depressive (odds ratio [OR]: 2.15; 95% confidence interval [CI]: 1.58–2.91) and anxiety symptoms (OR: 1.99; 95% CI: 1.32–3.00) than those that used a few minutes at most, while males with high social networking use had 1.60 greater odds of reporting depressive symptoms (95% CI: 1.09–2.35). For females, an increased odds of depressive symptoms at age 14.8 was observed for high social networking use at one previous wave and at two or three previous waves, even after adjustment (OR: 1.76; 95% CI: 1.11–2.78; OR: 2.06, 95% CI: 1.27–3.37, respectively) compared to no wave of high use.**
CONCLUSIONS: **Our results suggest weak to moderate increased odds of depression and anxiety in girls and boys with high social networking use versus**

low/normal use. These findings indicate that prevention programs for early mental health problems might benefit from targeting social networking use in early adolescence.
[Time period between waves: one year]
[age group: 12-15]
[Direction: Forward]

2.1.12 Primack, Shensa et al. (2020). Temporal Associations Between Social Media Use and Depression. *American Journal of Preventive Medicine*.

ABSTRACT: INTRODUCTION: Previous studies have demonstrated cross-sectional associations between social media use and depression, but their temporal and directional associations have not been reported.
METHODS: In 2018, participants aged 18−30 years were recruited in proportion to U.S. Census characteristics, including age, sex, race, education, household income, and geographic region. Participants self-reported social media use on the basis of a list of the top 10 social media networks, which represent >95% of social media use. Depression was assessed using the 9-Item Patient Health Questionnaire. A total of 9 relevant sociodemographic covariates were assessed. All measures were assessed at both baseline and 6-month follow-up.
RESULTS: Among 990 participants who were not depressed at baseline, 95 (9.6%) developed depression by follow-up. In multivariable analyses conducted in 2020 that controlled for all covariates and included survey weights, there was a significant linear association ($p<0.001$) between baseline social media use and the development of depression for each level of social media use. Compared with those in the lowest quartile, participants in the highest quartile of baseline social media use had significantly increased odds of developing depression (AOR=2.77, 95% CI=1.38, 5.56). However, there was no association between the presence of baseline depression and increasing social media use at follow-up (OR=1.04, 95% CI=0.78, 1.38). Results were robust to all sensitivity analyses.
CONCLUSIONS: **In a national sample of young adults, baseline social media use was independently associated with the development of depression by follow-up, but baseline depression was not associated with an increase in social media use at follow-up.** This pattern suggests temporal associations between social media use and depression, an important criterion for causality.
[Time period between waves: 6 months]
[age group: 18-30 in 2018]
[Direction: Forward]

[NOTE: most of the participants were millennials; the youngest third were Gen Z]

2.1.13 Nesi, Rothenberg, Bettis, Massing-Schaffer, Fox, Telzer, Lindquist, & Prinstein (2021). Emotional responses to social media experiences among adolescents: Longitudinal associations with depressive symptoms, *Journal of Clinical Child and Adolescent Psychology.*

ABSTRACT: OBJECTIVE: The degree to which adolescent social media use is associated with depressive symptoms has been the source of considerable debate. Prior studies have been limited by a reliance on cross-sectional data and measures of overall "screen time." This study examines prospective associations between adolescents' emotional responses to social media experiences and depressive symptoms, and examines gender differences in these processes.
METHOD: A school-based sample of 687 adolescents (48.6% girls; Mage = 14.3; 38.1% White, 29.4% Hispanic, 23.0% Black) completed measures of positive and negative emotional responses to social media experiences and depressive symptoms at two time points, one year apart.
RESULTS: **Higher levels of depressive symptoms were associated with more frequent negative emotional responses to social media experiences one year later, whereas greater positive emotional responses to social media were associated with later depressive symptoms. Girls reported overall greater emotional responses to social media experiences, but gender did not moderate associations between these emotional responses and depressive symptoms.**
CONCLUSION: Findings highlight the importance of examining adolescents' positive and negative emotional experiences in the context of social media use, and the ways in which these experiences intersect with depressive symptoms, so as to identify youth who may be most vulnerable to negative effects of social media use.
[Time period between waves: one year]
[age group: mean age 14.3]
[Direction: Unknown]

2.1.14 Frison, & Eggermont (2017). Browsing, posting, and liking on Instagram: The reciprocal relationships between different types of Instagram use and adolescents' depressed mood. Cyberpsychology, Behavior and Social Networking.

ABSTRACT: Although studies have shown that Instagram use and young adults' mental health are cross-sectionally associated, longitudinal evidence is lacking. In addition, no

study thus far examined this association, or the reverse, among adolescents. To address these gaps, we set up a longitudinal panel study among 12- to 19-year-old Flemish adolescents to investigate the reciprocal relationships between different types of Instagram use and depressed mood. Self-report data from 671 adolescent Instagram users (61% girls; MAge = 14.96; SD = 1.29) were used to examine our research question and test our hypotheses. Structural equation modeling showed that **Instagram browsing at Time 1 was related to increases in adolescents' depressed mood at Time 2. In addition, adolescents' depressed mood at Time 1 was related to increases in Instagram posting at Time 2.** These relationships were similar among boys and girls. Potential explanations for the study findings and suggestions for future research are discussed.
[Time period between waves: 6 months]
[age group: mean age is 15]
[Direction: Bi-directional]

2.1.15 Davison, Bunting, Connolly, Lloyd, Dunne, & Stewart-Knox (2022). Less Screen Time, More Frequent Fruit and Vegetable Intake and Physical Activity are Associated with Greater Mental Wellbeing in Adolescents. *Child Indicators Research*.

ABSTRACT: Wellbeing declines during adolescence, for which the reasons are unclear. This analysis explored associations between wellbeing and multiple lifestyle, socioeconomic and school-level factors in young people. Data were collected as part of the Wellbeing in School (WiSe) survey of adolescent school children in Northern Ireland at age 13–14 years (N = 1618; 49% female) and 15–16 years (N = 1558; 50.5% female). Wellbeing was assessed using the short-form Warwick-Edinburgh Mental Wellbeing Scale (sWEMWBS), where scores declined between time one (13–14 years) and time two (15–16 years) in both sexes and were significantly lower in females at both timepoints. Multilevel, multivariate modelling was therefore undertaken separately for males and females with sWEMWBS scores as the dependent variable. Physical activity, family affluence, fruit and vegetable intake, social media use, sleep duration, school factors (size and type) and religion were independent variables. More frequent physical activity in both sexes at both timepoints was associated with higher sWEMWBS scores. In females, **higher sWEMWBS scores were associated with less social media use at time one (and marginally at time two),** greater family affluence at time two, and being Catholic at both timepoints. In males, higher sWEMWBS scores were associated with more frequent fruit and vegetable intake at time one. Mental wellbeing was unrelated to sleep duration or school factors in either sex, at both time points. Efforts to

maximize mental wellbeing in adolescents should promote engagement in physical activity and implement sex-specific interventions.
[Time period between waves: 2 years]
[Age group: 13-16]
[Direction: Unkown]

2.1.16 Miljeteig, & von Soest (2022). An experience sampling study on the association between social media use and self-esteem. *Journal of Media Psychology*.

ABSTRACT: We know little about longitudinal associations between social media use and important psychological variables such as self-esteem. Using experience sampling methodology, this study examined the relationship between social media use and self-esteem in a new and ecologically valid way. Participants (*N* = 200) responded to notifications sent to their smartphones **several times a day for 2 weeks** and reported social media use as well as current self-esteem. Multilevel analyses revealed distinct gendered patterns: Low initial self-esteem among women predicted more frequent social media use, whereas low initial self-esteem among men was related to less frequent social media use. Moreover, recent social media use predicted lower current self-esteem for women, but not for men. Low stability of self-esteem was related to more social media use, independent of gender. **The findings support the notion of a reciprocal relationship between social media use and self-esteem for women, where self-esteem level may motivate women to use social media more frequently and social media may be a source of lower self-esteem. Social media use seems to have a less detrimental effect on men.**
[Time period: daily for 2 weeks]
[Age group: young adults?? Zach please check]
[Direction: Bi-directional]

2.1.17 Coyne, Hurst, Dyer, Hunt, Schvanaveldt, Brown, & Jones (2021). Suicide risk in emerging adulthood: Associations with screen time over 10 years. *Journal of Youth and Adolescence.*

ABSTRACT: Suicide rates have increased over the past decade, and screen media (and social media in particular) are often blamed for this marked increase. However, there is little longitudinal research on this topic. The current study examined the link between various types of screen media use over a 10-year period (from adolescence to emerging adulthood) to suicide risk in emerging adulthood. Participants included 500

adolescents (51% female) who were first surveyed in 2009, when they were an average of 13.82 years old (range 12-15 years). For girls, **a high level of social media or television use in early adolescence followed by a marked increase over time was most predictive of suicide risk in emerging adulthood.** Additionally, video game use that increased over time was also associated with a higher risk for developing suicide risk for girls. A passive sensing measurement was also included at the final wave of data collection to obtain a more accurate and complete picture of phone use in particular. The use of entertainment apps was risky for girls while reading apps were risky for boys. Additionally, video game use (for boys) was associated with suicide risk when cyberbullying was also high. Identifying nonnormative patterns of media during adolescence may be instructive in terms of suicide prevention efforts.
[Time period between waves: annual, Over 10 years]
[Age group: 13-16]
Sex difference
[Direction: bi-directional]

2.1.18 Orben, Przybylski, Blakemore, & Kievit (2022). Windows of developmental sensitivity to social media. *Nature Communications*.

ABSTRACT: The relationship between social media use and life satisfaction changes across adolescent development. Our analyses of two UK datasets comprising 84,011 participants (10–80 years old) **find that the cross-sectional relationship between self-reported estimates of social media use and life satisfaction ratings is most negative in younger adolescents.** Furthermore, sex differences in this relationship are only present during this time. Longitudinal analyses of 17,409 participants (10–21 years old) suggest **distinct developmental windows of sensitivity to social media in adolescence, when higher estimated social media use predicts a decrease in life satisfaction ratings one year later** (and vice-versa: lower estimated social media use predicts an increase in life satisfaction ratings). These windows occur at different ages for males (14–15 and 19 years old) and females (11–13 and 19 years old). Decreases in life satisfaction ratings also predicted subsequent increases in estimated social media use, however, these were not associated with age or sex.
[Time period between waves: annual]
[Age group: 10-80, and 10-21]
Sex differences
[Direction: Bi-directional]

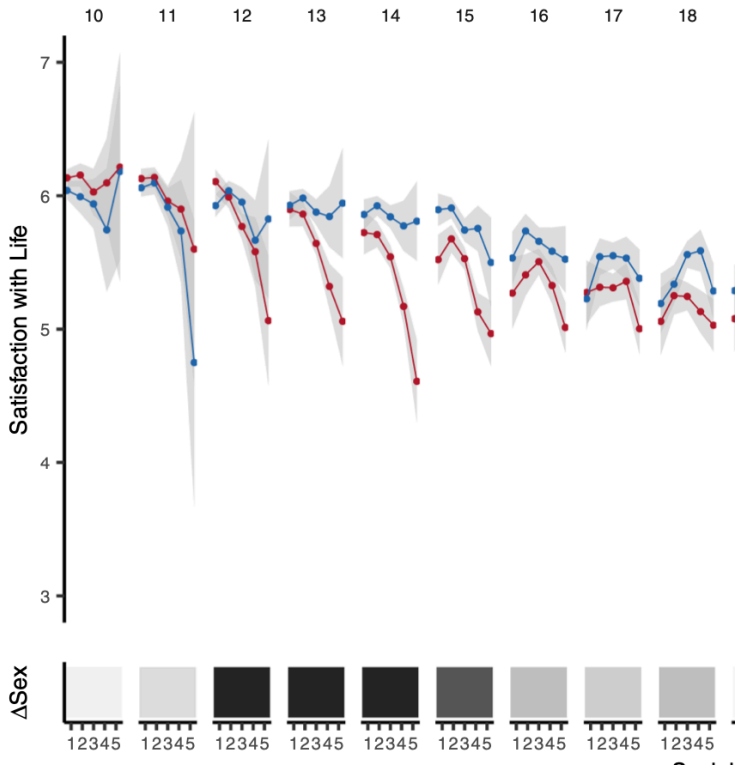
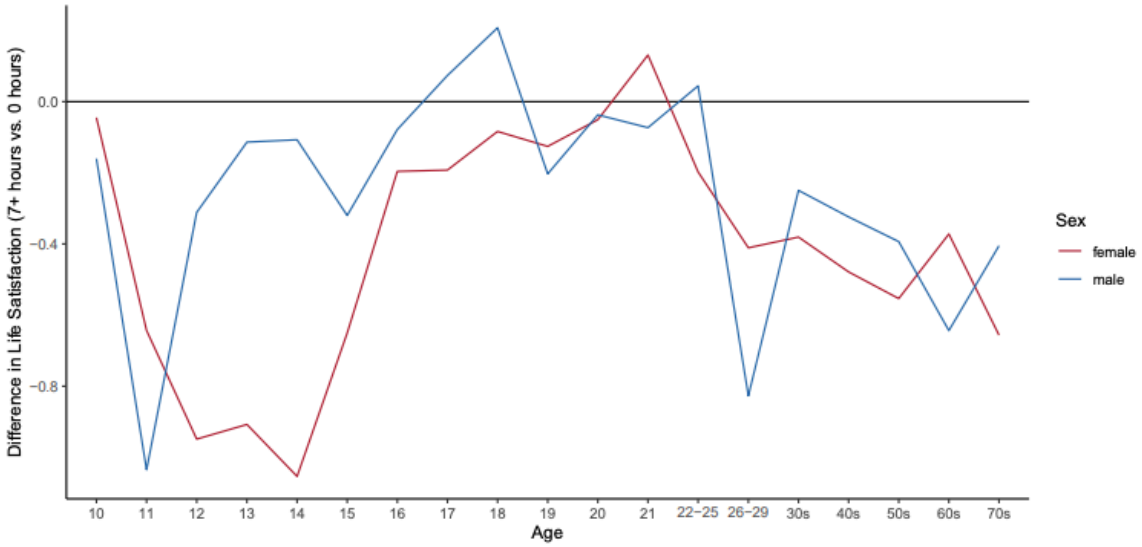


Figure 1 (thru age 18): Red lines are girls, blue lines are boys. The 5 dots for each line are the five levels of self reported daily social media use, plotted against “satisfaction with life” on an x point scale on the Y axis.
[**Note from Haidt**: For 16-18 year olds, the differences in life satisfaction are not large, across levels of use, and it is the moderate users who are highest. This is called the “goldilocks” effect. But for younger users, and especially girls, the heavy users are much less satisfied with life, and there is no goldilocks effect. Young teen girls who are moderate or heavy users of social media are much less happy than light or non-users.]



Supplementary Figure 2: Difference between the predicted life satisfaction of those participants who report using 7 or more hours of social media vs those who report using no social media

[**Note from Haidt**: It seems to be in girls ages 12-14 that the most damage is being done from heavy social media use. This corresponds to our finding in the companion Google Doc on mental health that it is younger teen girls whose rates of self-harm and sucide that have increased the most.]

2.1.19 Brannigan, Gil-Hernández, McEvoy, Cronin, Stanistreet, & Layte (2022). Digital engagement and its association with adverse psychiatric symptoms: A longitudinal cohort study utilizing latent class analysis. *Computers in Human Behavior*.

ABSTRACT: OBJECTIVES:To assess the impact of digital media usage on psychiatric symptoms in an adolescent population utilizing a longitudinal cohort design. METHODS: Using two waves of the GUI child cohort, age 13 (N = 7527) and age 17/18 (N = 6126), we used latent class analysis (LCA) to create latent groups centred around self-reported time spent online, and the self-reported behaviours children engaged with online. At both waves, the 4 class latent model suited best. We used the different symptoms scales of the Strengths and Difficulties Questionnaires (SDQ), self-reported, at age 17 as our outcome variable. Using linear regression analysis, we then examined the associations between our latent class model and psychiatric symptoms, using moderate usage as our reference group, with adjustments being made for baseline psychiatric symptoms, maternal education and pre-diagnosed mental disorder. RESULTS: **For females, placement in the high usage group at 13 was associated with increased internalizing symptoms, whereas placement in the high usage**

group at 17 was associated with an increase in all symptoms. For males, placement in the high usage group at 17 was associated with increased emotional symptoms, and placement in the “low usage & behaviour engagement” group, a group showing low reported time online and low engagement in our measured online behaviours at 17, was associated with an increase in all symptoms. Finally for both sexes, placement in the “moderate usage, entertainment only” group at age 13, (a group reporting no school-based online engagement), was associated with increases in all symptoms except emotional symptoms.
CONCLUSIONS: **High digital media usage is associated with increased psychiatric symptoms in both males and females, with moderate usage associated with positive effects on symptoms compared to both our high usage, and low usage groups.**
[Time period between waves: ??]
[Age group: 13 and 17]
Sex differences
Age differences
[Directionality: Unkown]

2.1.20 Merrill, Cao, & Primack (2022). Associations between social media use, personality structure, and development of depression. *Journal of Affective Disorders Reports*.

ABSTRACT: BACKGROUND: While longitudinal studies demonstrate associations between social media use and development of depression, it is not clear whether these associations differ among people with various personality characteristics.
METHODS: Data were obtained from a national sample of 978 individuals ages 18-30. Measures used included the Patient Health Questionnaire assessing depression, the 10-item Big Five Inventory assessing personality, and self-reported use of the top 10 social media platforms. Logistic regression determined associations between each personality characteristic (openness, conscientiousness, extraversion, agreeableness, and neuroticism), social media use, and development of depression over 6 months.
RESULTS: In multivariable analyses that adjusted for all covariates, compared to people with low agreeableness, those with high agreeableness had 49% lower odds for developing depression (OR=0.51, 95% CI=0.33, 0.80). Compared to people with low neuroticism, those with high neuroticism had more than double the odds for developing depression (OR=2.46, 95% CI=1.57, 3.87). **For each personality characteristic, increased social media use was significantly associated with developing**

depression. Interaction terms showed that associations between social media use and developing depression did not vary according to any of the personality characteristics. LIMITATIONS: Because we assessed young adults ages 18-30, inferences cannot be made to other age groups.
CONCLUSIONS: The fact that agreeableness and neuroticism were associated with different risks for developing depression may help practitioners target high-risk populations. Because social media use was strongly associated with development of depression for all personality characteristics, it may be useful for interventions to target reduction of social media use overall regardless of personality type.
[Age group: 18-30]
Time period between waves: 6 months]
[Direction: Unkown]

2.1.21 Bohnert & Gracia (under review). Digital engagement, Social inequalities and adolescent well-being. *SocArxiv.*

ABSTRACT: This study uses high-quality longitudinal data from the Growing Up in Ireland (GUI) study to examine how digital engagement shapes socioemotional and educational outcomes from middle childhood to late adolescence across family socioeconomic status (SES). Results from fixed-effects regressions show that digital screen-time increases markedly from mid-childhood to late adolescence, but to a higher extent among low-SES versus high-SES groups. **Heavy levels of digital screen time (i.e., 3 daily hours or more) leads to declines in well-being, particularly for external and prosocial functioning.** By contrast, engaging in learning-oriented digital activities and gaming, not in social media, is associated with improvements in adolescent outcomes. **Low-SES adolescents are generally more harmed by digital engagement, while high-SES adolescents benefit more from moderate levels of digital use and learning-oriented digital engagement.** Overall, we observe how divides in online worlds reflect socioeconomic divisions in offline worlds by creating and perpetuating inequalities in adolescents' well-being.
[Age group: 9 - 18]
[Time period between waves: 4 years]
[Direction: Unkown]

2.1.22 Winstone, Mars, Haworth,Heron, J., Kidger (2022). Adolescent social media user types and their mental health and well-being: Results from a longitudinal survey of 13–14-year-olds in the United Kingdom. *JCPP Advances*.

ABSTRACT: BACKGROUND: There is mixed evidence as to the effects of different types of social media use on mental health, but previous research has been platform-specific and has focused on an oversimplified distinction between active and passive use. This study aimed to identify different underlying subgroups of adolescent social media user based on their pattern of social media activities and test associations between user type and future mental health.
METHODS: Students from 19 schools (N = 2456) in south-west England completed an online survey measuring 13 social media activities and four psychosocial outcomes (past year self-harm, depression, anxiety and poor well-being) at age 13 years (October 2019) and repeated a year later (October 2020; aged 14 years). Latent class analysis using Mplus identified distinct classes of social media user and stability of these classes was examined using latent transition analysis. A bias-adjusted three-step model was used to test associations between class membership at baseline and mental health at follow-up. Analyses were adjusted for gender, ethnicity, sexual orientation, socioeconomic status, disability, social media screen-time and baseline mental health.
RESULTS: A four-class model of social media user at baseline was selected based on fit statistics and interpretability. **User types were labelled High Communicators; Moderate Communicators; Broadcasters; and Minimal users. Users became more active over time. Broadcasters at age 13 had the poorest mental health outcomes at age 14, with mental health and well-being generally better among the High and Moderate Communicators.**
CONCLUSIONS: Findings suggest that broadcasters—adolescents with high levels of content sharing in addition to messaging and browsing online—are most likely to be experiencing poor mental health a year later. Recommendations regarding social media use should expand to consider different user types, and mental health implications of their engagement with different online activities in addition to screen-time.
[Age group: 13 - 14]
[Time period between waves: 1 year]
[Direction: unkown]

2.1.22 Twigg, Duncan, & Weich (2020). Is social media use associated with children's well-being? Results from the UK Household Longitudinal Study. *Journal of Adolescence*.

ABSTRACT: INTRODUCTION: There are concerns about young people's increasing use of social media and the effects this has on overall life satisfaction. Establishing the significance of social media use requires researchers to take simultaneous account of

other factors that might be influential and it is essential to adopt a longitudinal perspective to investigate temporal patterns.
METHOD: Measures of happiness for children aged 10–15 from 7 waves of the UK Household Longitudinal Study were examined (n = 7596). Multilevel models were used to assess the relative association between these measures, children's social media use and individual, household and community characteristics.
RESULTS: **High use of social media was found to be significantly associated with change in happiness scores but was not associated with worsening life satisfaction trajectories. The most consistent factor was gender, with girls experiencing the largest decline in happiness between two time points (0.18 points) and being more likely to have a worsening trajectory over time (OR 1.77, 95% CI 1.36–2.32).** Parental mental health, household support and household income were also important.
CONCLUSION: Moderate use of social media does not play an important role in shaping children's life satisfaction. **Higher levels of use is associated with lower levels of happiness, especially for girls but more research is needed to understand how this technology is being used.** As well as focusing on high levels of social media use, policy makers should also concentrate on particular demographic groupings and factors affecting the social fabric of the households in which children grow up.
[Age group: 10 - 15]
[Time period between waves: 1 year]
[Direction: Unkown]

2.1.23 Leggett-James, & Laursen (2022). The Consequences of Social Media Use Across the Transition Into Adolescence: Body Image and Physical Activity. *Journal of Early Adolescence.*

ABSTRACT: Children and adolescents spend considerable time online. The current study investigated moderators of short-term longitudinal associations from social media use to changes in body satisfaction and physical activity. Participants (144 girls, 152 boys) were third–sixth grade students (ages 8–13) attending public schools in Florida (USA). Self-reports of social media use, body satisfaction, physical activity, and susceptibility to peer influence were completed twice, approximately 13.5 weeks apart. The results indicated that higher initial social media use was associated with greater subsequent decreases in body satisfaction and physical activity, but only for children high on susceptibility to peer influence. The findings suggest that peer conformity amplifies the risks of social media use. The fact that meaningful change can be

identified across a relatively short period of time is noteworthy and demonstrates the need for careful monitoring of those who participate in social media at an early age.
[Age group: 8 - 13]
[Time period between waves: 3 months, 13.5 weeks]
[Direction: Unkown]

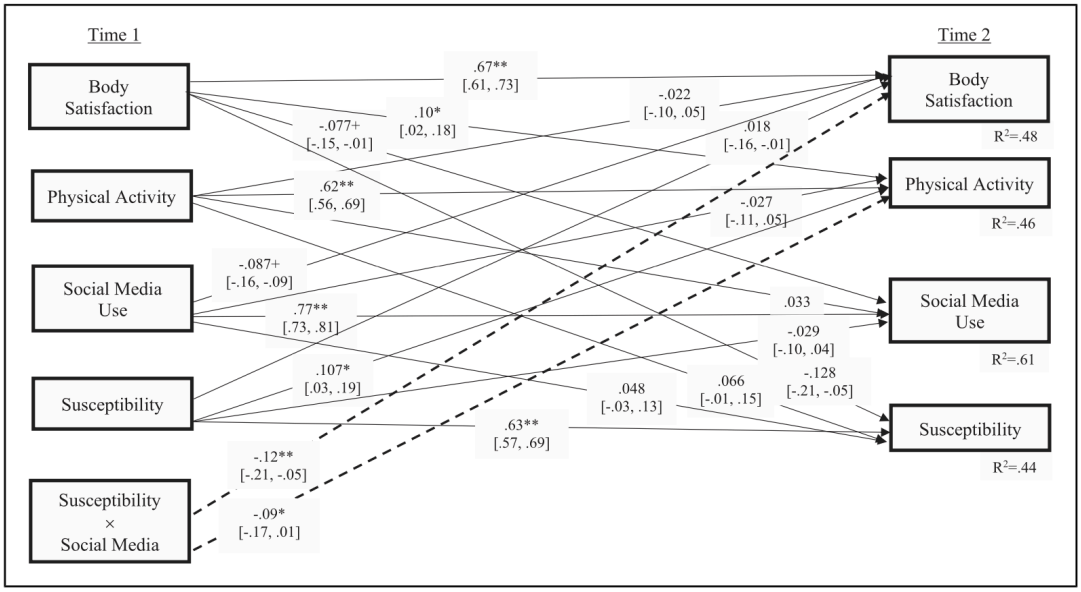


Figure 1. Short-Term Longitudinal Associations from Time 1 Social Media Use and Susceptibility to Peer Influence to Time 2 Body Satisfaction and Physical Activity. *Note.* $N = 296$. $+p < .06$, $*p < .05$, $**p < .01$. Standardized beta weights presented. Concurrent correlations are presented in Table 1. Grade was included in the model as a Time 1 covariate but is not depicted in the figure.

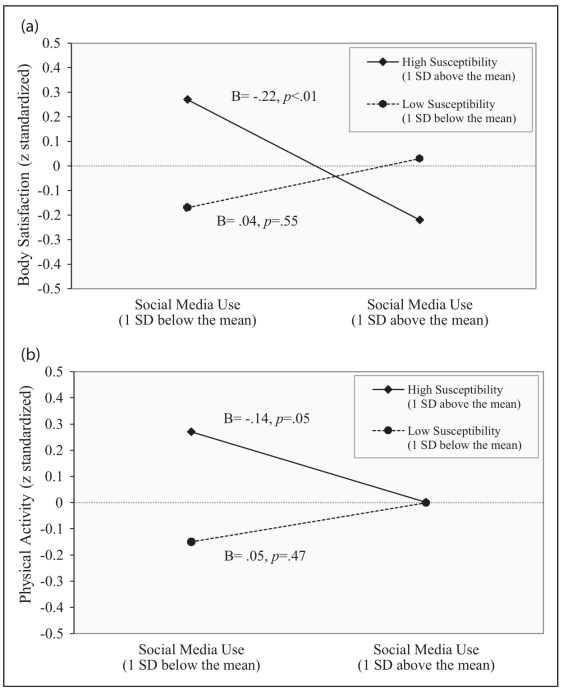


Figure 2. (a) Social Media Use Predicts Declining Body Satisfaction for Adolescents High but Not Low on Susceptibility to Peer Influence. (b) Social Media Use Predicts Declining Physical Activity for Adolescents High but Not Low on Susceptibility to Peer Influence. Note. *N* = 296. Standardized beta weights reported.

2.1.24 Rapee et al. (2022). Risk for social anxiety in early adolescence: Longitudinal impact of pubertal development, appearance comparisons, and peer connections. *Behavior Research and Therapy.* (h/t Raphael Aubry)

ABSTRACT: OBJECTIVES: The aims of this study were to determine the impact of adolescent-relevant risk factors on changes in social anxiety symptoms from pre-to early-adolescence.
METHODS: From 2016 to 2018, 528 youth (51% boys) were tested in three annual waves across grades 6, 7, and 8 (M ages 11.2, 12.7, 13.7 years).Through online surveys youth reported on peer relationships that were combined into two latent factors: 1) appearance comparisons, comprising youth reports of appearance comparisons relative to others in general and while using social media, along with perceived attractiveness; and 2) positive peer connections, comprising youth reports of group affiliation, school belonging, and peer victimization. Youth and their parents also reported on the youth ’s level of pubertal development as well as the youth ’s level of social anxiety using previously validated questionnaires. Social anxiety was also assessed with structured diagnostic interview.

RESULTS: Separate cross-lagged panel models were used to model longitudinal associations between all risk factors and youth, parent, and interviewer-reported measures of social anxiety. Of the associations tested, **only appearance comparisons directly predicted increases in social anxiety symptoms 12 months later across all models. More advanced pubertal development was associated with increased appearance comparisons the following year. On the other hand, higher levels of social anxiety predicted subsequent reductions in positive peer connections in parent and interviewer models**.
CONCLUSIONS: These results highlight the important and interconnected impact of pubertal development and appearance comparisons on both the developmEnt of social anxiety symptoms during early adolescence, as well as the social consequences of social anxiety.
[Age group: 11 - 14]
[Time period between waves: 1 year]

2.1.25 Jeong, Kim, Ryu, & Lee (2022). A Longitudinal Relationship Between Mother's Smartphone Addiction to Child's Smartphone Addiction. *International Journal of Mental Health and Addiction*.

ABSTRACT: Children are more likely to become addicted as they become accustomed to using smartphones, and as they observe and imitate their parents using smartphones. This study aims to confirm longitudinally the effect of mother's smartphone addiction on children's smartphone addiction. Latent growth modeling was used to analyze longitudinal relationships between 3615 pairs of children and their mothers from the Korean Children and Youth Panel Survey (KCYPS) (2018–2020). **As a result, both the mothers and children's smartphone addiction significantly increased over time. The initial value of the mother's smartphone addiction was found to have a significant effect on the child's initial value and the change rate. Moreover, children's smartphone addiction change rate was significantly affected by the change rate of the mother's smartphone addiction.** To intervene in children's smartphone addiction, a family-level approach, as well as parental addiction, must also be addressed, and a preventive approach should focus on those with a low risk of addiction.
[Age group: 1st - 6th graders]
[Time period between waves: 1 year]

2.1.26 Chu, Ganson, Baker, Testa, Jackson, Murray, & Nagata (2023). Screen time and suicidal behaviors among U.S. children 9–11 years old: A prospective cohort study. *Preventive Medicine*.

ABSTRACT: Suicide is a leading cause of death among adolescents. Emerging literature has described relationships between excessive screen time and suicidal behaviors, though findings have been mixed. The objective of this study is to determine the prospective associations between screen time and suicidal behaviors two-years later in a national (U.S.) cohort of 9-11-year-old-children. We analyzed prospective cohort data from the Adolescent Brain Cognitive Development (ABCD) Study (N=11,633). Logistic regression analyses were estimated to determine the associations between baseline self-reported screen time (exposure) and suicidal behaviors (outcome) based on the Kiddie Schedule for Affective Disorders and Schizophrenia (KSADS-5) at two-year-follow-up. Participants reported an average of 4.0 hours of total screen time per day at baseline. At two-year-follow-up, 1.38% of the sample reported at least one suicidal behavior. **Each additional hour of total screen time was prospectively associated with 1.09 higher odds of suicidal behaviors at 2-year-follow-up (95% CI 1.03-1.14), after adjusting for covariates. For specific screen time modalities, each additional hour of texting (aOR 1.36, 95% CI 1.06-1.74), video chatting (aOR 1.30, 95% CI 1.03-1.65), watching videos (aOR 1.21, 95% CI 1.04-1.39), and playing video games (aOR 1.18, 95% CI 1.01-1.38) was associated with higher odds of subsequent suicidal behaviors.** Higher screen time is associated with higher odds of reporting suicidal behaviors at two-year-follow-up. Future research should seek to identify how specific screen time experiences may influence suicidal behaviors.
[Age group: 9-11]
[Time period between waves: 2 years]
[Direction: Unkown]

2.1.27 Nesi, & Prinstein (2019). In Search of Likes: Longitudinal Associations Between Adolescents' Digital Status Seeking and Health-Risk Behaviors. *Journal of Clinical Child & Adolescent Psychology*.

ABSTRACT: This study introduces a new construct—digital status seeking—which reflects a set of behaviors made possible by the social media environment. Digital status seeking is defined as the investment of significant effort into the accumulation of online indicators of peer status and approval. The concurrent validity of this construct was examined, as well as the longitudinal implications of digital status seeking for

adolescents' engagement in health-risk behaviors. A school-based sample of 716 participants (Mage = 16.01 at Time 1; 54.2% female) participated at 2 time points, 1 year apart. Sociometric nomination procedures were used to assess digital status seeking and peer status. Participants self-reported indices of social media use, peer importance, and risky behavior engagement (substance use, sexual risk behavior). For a subset of participants, social media pages were observationally coded for status indicators (i.e., likes, followers) and status-seeking behaviors. Adolescents with greater reputations of digital status seeking reported more frequent social media use, desire for popularity, belief in the importance of online status indicators, and use of strategies to obtain these indicators. **Multiple group path analyses indicated that for both genders, digital status seekers engaged in higher levels of substance use and sexual risk behavior 1 year later.** Moderation of this effect by race/ethnicity and socioeconomic status was explored. This novel, multimethod investigation reveals digital status seeking as an important construct for future study and offers preliminary evidence for the unique role of social media experiences in contributing to adolescent adjustment.
[Age group: *M* = 16]
[Time period between waves: 1 year]

2.1.28 Wang, Gaskin, Rost, & Gentile (2018). The Reciprocal Relationship Between Passive Social Networking Site (SNS) Usage and Users' Subjective Well-Being. *Social Science Computer Review.*

ABSTRACT: Prior studies have found an inconclusive relationship between social networking site (SNS) usage and users' subjective well-being. Passive SNS usage may be detrimental to subjective well-being, because it cannot provide social support and may evoke envy and jealousy. Conversely, it is also possible that lower subjective well-being may predict higher passive SNS usage, which can be used as a means to relieve stress. To examine this reciprocal process, a two-wave study among a sample of Chinese college students was conducted (N = 350 at Time 1, 265 at Time 2). Data were analyzed with structural modeling. **Cross-lagged analysis indicated that passive SNS usage at Time 1 predicted a decrease in subjective well-being at Time 2. Lower subjective well-being at Time 1 also predicted an increase in passive SNS usage at Time 2.** These findings deepen our understanding of the complicated association between SNS usage and well-being and has implications for how to help individuals use SNS healthily.
[Age group: *M = 20*]
[Time period between waves: 1 year]

[Direction: Bi-directional]

2.1.29 Fitzpatrick, Lemieux, Smith, West, Bohbot, & Asbridge (2023). Is adolescent internet use a risk factor for the development of depression symptoms or vice-versa? *Psychological Medicine.*

ABSTRACT: BACKGROUND: The extent to which digital media use by adolescents contributes to poor mental health, or vice-versa, remains unclear. The purpose of the present study is to clarify the strength and direction of associations between adolescent internet use and the development of depression symptoms using a longitudinal modeling approach. We also examine whether associations differ for boys and girls. METHODS: Data are drawn from (N = 1547) participants followed for the Quebec longitudinal Study of Child Development (QLSCD 1998–2020). **Youth self-reported internet use in terms of the average hours of use per week at the ages of 13, 15, and 17. Youth also self-reported depression symptoms at the same ages.** RESULTS" After testing sex-invariance, random intercepts cross-lagged panel models stratified by sex, revealed that internet use by girls was associated with significant within-person (time-varying) change in depression symptoms. **Girl's internet use at age 13 was associated with increased depression symptoms at age 15 (ß = 0.12) and internet use at age 15 increased depression at age 17 (ß = 0.10). For boys, internet use was not associated with significant time varying change in depression symptoms.** CONCLUSIONS: The present findings support the hypothesis that internet use by adolescents can represent a significant risk factor for the development of depressive symptoms, particularly in girls.

2.1.30 Thorisdottir, Sigurvinsdottir, Kristjansson, Allegrante, Lilly, & Sigfusdottir (2020). Longitudinal association between social media use and psychological distress among adolescents. *Preventive Medicine.* (h/t Eric Osika).

ABSTRACT: This study aimed to examine in a longitudinal cohort design whether social media use among adolescents is related to symptoms of social anxiety, depressed mood, and physical symptoms of anxiety over time. As part of the LIFECOURSE study of risk and protective factors for healthy adolescent development, three waves of school-based surveys of adolescents born in Iceland in 2004 were analyzed. Of the 3914 eligible adolescents, 2378 gave informed consent. Complete responses for this study were collected from 2211 students at the first wave, with 2052 responding roughly 12 months later, and 2097 responding in year 3. Linear mixed-effects models were used

to analyze time spent on social media in relation to psychological distress over time. **More time spent on social media was weakly but significantly associated with increased symptoms of depressed mood, social anxiety and symptoms of physical anxiety over time. However, the effect size of these relationships suggest they may not be of clinical relevance. The relationship between time spent on social media and symptoms of depressed mood and physical symptoms of anxiety grew stronger over time, although it is not known if this relationship is causal.** The relationship between time spent on social media and all outcomes of psychological distress were stronger for girls than boys and increased social media use had a positive relationship with symptoms of depressed mood over time. The relationships found in this study were relatively small and future studies need to focus on the clinical and public health significance of these effects.
[Age group: 12-14]
[Time period between waves: yearly]

[NOTE: The effect sizes are small]

2.1.31 Arendt, Scherr, & Romer (2019). Effects of exposure to self-harm on social media: Evidence from a two-wave panel study among young adults. *New Media & Society*.

ABSTRACT: Suicide is a leading cause of death among youth, and media depictions of suicidal behavior can be a contributing risk factor. Of interest, Instagram recently received more scholarly attention due to its large number of publicly available, explicit, and graphic depictions of self-harm. Importantly, researchers have hypothesized that exposure to this content could be a risk for self-harm and suicide in vulnerable audiences. We tested this hypothesis using a two-wave US panel survey among young adults (N = 729). **Analyses indicated that exposure to self-harm on Instagram was associated with suicidal ideation, self-harm, and emotional disturbance even controlling for exposure to other sources with similar content. As hypothesized, exposure to self-harm on Instagram at the first wave prospectively predicted self-harm and suicidality-related outcomes at the second wave 1 month later.** These findings provide evidence that such exposure can lead to contagion in vulnerable users. Implications are discussed.
[Age group: 18-29]
[Time period between waves: one month]
[Direction: Unclear]

2.1.32 Lapierre, Zhao, & Custer (2019). Short-Term Longitudinal Relationships Between Smartphone Use/Dependency and Psychological Well-Being Among Late Adolescents. *Journal of Adolescent Health*.

ABSTRACT: PURPOSE: The aim of the study was to determine the short-term longitudinal pathways between smartphone use, smartphone dependency, depressive symptoms, and loneliness among late adolescents.
METHODS: A two-wave longitudinal survey was used using adolescents between the ages of 17 and 20 years. The interval between wave 1 and wave 2 was between 2.5 and 3 months. Using convenience sampling, the total number of participants who completed both waves of data collection was 346. Validated measures assessed smartphone dependency, smartphone use, depressive symptoms, and loneliness. The longitudinal model was tested using path modeling techniques.
RESULTS: Among the 346 participants (33.6% male, mean [standard deviation] age at wave 1, 19.11 [.75] years, 56.9% response rate), **longitudinal path models revealed that wave 1 smartphone dependency predicted loneliness (β = .08, standard error [SE] = .05, p = .043) and depressive symptoms (β = .11, SE = .05, p = .010) at wave 2, loneliness at wave 1 predicted depressive symptoms at wave 2 (β = .21, SE = .05, p < .001), and smartphone use at wave 1 predicted smartphone dependency at wave 2 (β = .08, SE = .05, p = .011).**
CONCLUSIONS: Considering the rates of smartphone ownership/use among late adolescents (95%), the association between smartphone use and smartphone dependency, and the deleterious effects of loneliness and depression within this population, health practitioners should communicate with patients and parents about the links between smartphone engagement and psychological well-being.
[Time period between waves: 3 months]
[Directionality; Forward]

2.1.33 Layte, Brannigan, & Stanistreet (2023). Digital engagement and adolescent depression: A longitudinal mediation analysis adjusting for selection. *Computers in Human Behavior Reports*.

ABSTRACT: OBJECTIVES: To quantify the association between high digital engagement at age 17/8 and subsequent depressive symptoms at age 20 adjusting for selection into high digital engagement. To examine the role of social comparison, displacement and online harassment in mediating the relationship between digital engagement and depressive symptoms.

METHODS: Using four waves of longitudinal data on the same individuals from the Growing Up in Ireland Cohort at ages 9, 13, 17/18 and 20, we apply propensity score methods (PSM) with matching to estimate selection into high digital engagement at age 17/8. Poisson regression is applied to individuals matched according to their propensity to high digital engagement to quantify the role of self-esteem, body weight satisfaction, quality and duration of sleep and online harassment in mediating the association between high digital engagement at 17/8 and depression risk at age 20.
RESULTS: **Estimates within matched strata suggest a 9.7% increase in depressive symptoms for high digital engagement, over moderate engagement for females. No significant association with high engagement was found for males.** Adjustment for self-esteem at 17/8 reduces the association by 26%; adjustment for sleep duration and quality leads to a 23% reduction. Online harassment and body weight satisfaction reduce the association by <2% individually. Our fully adjusted model reduced the association by 41% overall.
CONCLUSIONS: **High digital engagement is associated with an increase in depressive symptoms compared to moderate engagement, but only among young women.** Reductions in self-esteem and sleep duration and quality appear to be more important mediators of the association of high engagement with depressive symptoms than online harassment or body weight satisfaction, but more research is needed on the precise mediating processes.
[Time period between waves: 4 years]
[Directionality; Forward]

2.1.34 Zhao, Paulus, & Potenza (2023). Brain structural co-development is associated with internalizing symptoms two years later in the ABCD cohort. *Journal of Behavioral Addictions*.

ABSTRACT: BACKGROUND: About 1/3 of youth spend more than four hours/day engaged in screen media activity (SMA). This investigation utilized longitudinal brain imaging and mediation analyses to examine relationships among SMA, brain patterns, and internalizing problems.
METHODS: Data from Adolescent Brain Cognitive Development (ABCD) participants with baseline and two-year follow-up structural imaging data that passed quality control (N = 5,166; 2,385 girls) were analyzed. Joint and Individual Variation Explained (JIVE) identified a brain co-development pattern among 221 brain features (i.e., differences in surface area, thickness, or cortical and subcortical gray-matter volume between baseline and two-year-follow-up data). Generalized linear mixed-effect models investigated associations between baseline SMA, structural co-development and internalizing and externalizing psychopathology at two-year follow-up.

RESULTS: **SMA at baseline was related to internalizing psychopathology at year 2 (β=0.020, SE = 0.008, P = 0.014) and a structural co-development pattern (β = 0.015, SE = 0.007, P=0.029), where the co-development pattern suggested that rates of change in gray-matter volumes of the brainstem, gray-matter volumes and/or cortical thickness measures of bilateral superior frontal, rostral middle frontal, inferior parietal, and inferior temporal regions were more similar than those in other regions. This component partially mediated the relationship between baseline SMA and future internalizing problems (indirect effect = 0.020, P-value = 0.043, proportion mediated: 2.24%).**
DISCUSSION: Greater youth engagement in SMA at ages 9–10 years statistically predicted higher levels of internalizing two years later. This association was mediated by cortical-brainstem circuitry, albeit with relatively small effect sizes. The findings may help delineate processes contributing to internalizing behaviors and assist in identifying individuals at greater risk for such problems.
[Time period between waves: 2 years]

2.1.35 Fruehwirth, Weng, & Perreira (2024). The effect of social media use on mental health of college students during the pandemic. *Health economics*.

ABSTRACT: Social media is viewed to be a key contributor to worsening mental health in adolescents, as most recently reflected in a public health advisory by the US Surgeon General. We provide new evidence on the causal effects of social media on mental health of college students during the Covid-19 pandemic, exploiting unique, longitudinal data collected before the Covid-19 pandemic began and at two points during the pandemic. We find **small insignificant effects of social media 4 months into the pandemic** during a period of social distancing, but **large statistically significant negative effects 18 months into the pandemic when colleges were mostly back to normal operations**. Using rich data on substance use, exercise, sleep, stress, and social support, we find some evidence of substitution away from activities that better support mental health at later stages of the pandemic but not at early stages. We find that the negative effects of social media are mostly concentrated among socially-isolated students. Both social support and resilience protect students from the negative effects of social media use. Policy implications include regulating social media while also bolstering social support and resilience as important protective factors.

2.1.36 Carter, Ahmed, Cassidy, Pearson, Calcia, Mackie, & Kalk (2024). ‘There’s more to life than staring at a small screen’: a mixed methods cohort study of problematic

smartphone use and the relationship to anxiety, depression and sleep in students aged 13–16 years old in the UK. *BMJ Mental Health*.

ABSTRACT: BACKGROUND: Depression and anxiety are common in adolescents and have increased over the last decade. During that period, smartphone usage has become ubiquitous.
OBJECTIVES: The study aim was to assess the association between problematic smartphone usage (PSU) and anxiety.
METHODS: Using a prospective mixed methods cohort study design, students aged 13–16 year old from two schools were enrolled regarding their smartphone use, mood and sleep via a semistructured questionnaire at baseline and week 4. The primary outcome was symptoms of anxiety (Generalised Anxiety Disorder Questionnaire, GAD-7) and exposure was PSU (Smartphone Addiction Scale Short Version). A linear regression was fitted to assess the change in anxiety. Thematic analysis of free-text responses was conducted.
FINDINGS: The sample included 69 participants that were enrolled and followed up between 28 March and 3 June 2022. Of those with **PSU, 44.4% exhibited symptoms of moderate to severe anxiety compared with 26.4% of those without PSU**. There was a linear association between change in symptoms of anxiety and PSU β=0.18 (95% CI 0.04 to 0.32, p=0.013). Several themes were found: both positive and negative effects of smartphones on relationships; negative effects on school performance and productivity; mixed effects on mood; a desire to reduce the amount of time spent on smartphones.
CONCLUSIONS: **Increased anxiety, depression and inability to sleep were seen in participants as their PSU score increased over time. Participants reported both positive and negative effects of smartphones and almost all used strategies to reduce use**.
CLINICAL IMPLICATIONS: Interventions need to be developed and evaluated for those seeking support.
[Age group: 13-16]
[Time period between waves: 4 weeks]

2.1.37 Chu … & Nagata (2024). Screen time, problematic screen use, and eating disorder symptoms among early adolescents: findings from the Adolescent Brain Cognitive Development (ABCD) Study. *Eating and Weight Disorders*.

ABSTRACT: PURPOSE: Emerging research evidence suggests positive relationships between higher screen time and eating disorders. However, few studies have examined

the prospective associations between screen use and eating disorder symptoms in early adolescents and how problematic screen use may contribute to symptom development.
METHODS: We analyzed prospective cohort data from the Adolescent Brain Cognitive Development (ABCD) Study (N = 10,246, 2016–2020, ages 9–14). Logistic regression analyses were used to estimate the longitudinal associations between baseline self-reported screen time and eating disorder symptoms in year two. Logistic regression analyses were also used to estimate cross-sectional associations between problematic screen use in year two (either problematic social media or mobile phone use) and eating disorder symptoms in year two. Eating disorder symptoms based on the Kiddie Schedule for Affective Disorders and Schizophrenia (KSADS-5) included fear of weight gain, self-worth tied to weight, engaging in compensatory behaviors, binge eating, and distress with binge eating.
RESULTS: Each additional hour of total screen time and social media use was associated with higher odds of fear of weight gain, self-worth tied to weight, compensatory behaviors to prevent weight gain, binge eating, and distress with binge eating two years later (odds ratio [OR] 1.05–1.55). Both problematic social media and mobile phone use were associated with higher odds of all eating disorder symptoms (OR 1.26–1.82).
CONCLUSIONS: Findings suggest greater total screen time, social media use, and problematic screen use are associated with more eating disorder symptoms in early adolescence. Clinicians should consider assessing for problem screen use and, when high, screen for disordered eating.

[Age group: 9-14]
[Time period between waves: 1 year]
[Direction: forward]

2.1.38 Nagata et al. (2026). Prospective associations between early adolescent problematic screen use, mental health, sleep, and substance use. American *Journal of Preventative Medicine*.

ABSTRACT: Introduction: There are limited large-scale, prospective analyses examining problematic (addiction-like) screen use and mental and behavioral health outcomes in early adolescents. This study aimed to determine the associations between problematic screen use and mental and behavioral health outcomes—such as depressive symptoms, suicidal behaviors, sleep disturbance, and substance use initiation—1 year later in a national cohort of children aged 11–12 years in the U.S. Methods: Prospective cohort data from Adolescent Brain Cognitive Development Study participants who

reported their screen use at ages 11–12 (Year 2, 2018–2020; N=8,119; 47.5% female; 43.8% racial/ethnic minority) were analyzed in 2025. Associations between problematic screen use (Social Media Addiction Questionnaire, Video Game Addiction Questionnaire, Mobile Phone Involvement Questionnaire, Year 2) and mental and behavioral health outcomes (Year 3) were determined using either linear or logistic regression analyses on the basis of the outcome, adjusting for potential confounders (Year 2). Results: **Problematic mobile phone use and social media use were prospectively associated with higher depressive, somatic, attention/deficit, oppositional defiant, and conduct problems scores; suicidal behaviors; sleep disturbance; and substance initiation**. Problematic video game use was associated with higher depressive, attention/deficit, and oppositional defiant scores; suicidal behaviors; and sleep disturbance. Conclusions: **Early adolescent problematic screen use is prospectively associated with poor mental and behavioral health outcomes 1 year later**, extending prior cross-sectional findings. Clinicians can assess not only screen time but also problematic screen use and provide guidance to adolescents and parents, including the development of a family media plan.

[Other studies? What have we missed?]

2.2: STUDIES INDICATING NO HARM AT T2

2.2.1 Heffer, Good, Daly, McDonnell, & Willoughby (2019). The Longitudinal Association Between Social-Media Use and Depressive Symptoms Among Adolescents and Young Adults: An Empirical Reply to Twenge et al. (2018). *Clinical Psychological Science*

ABSTRACT: Research by Twenge, Joiner, Rogers, and Martin has indicated that there may be an association between social-media use and depressive symptoms among adolescents. However, because of the cross-sectional nature of this work, the

relationship among these variables over time remains unclear. Thus, in this longitudinal study we examined the associations between social-media use and depressive symptoms over time using two samples: 594 adolescents (M age = 12.21) who were surveyed annually for 2 years, and 1,132 undergraduate students (M age = 19.06) who were surveyed annually for 6 years. Results indicate that among both samples, **social-media use did not predict depressive symptoms over time for males or females. However, greater depressive symptoms predicted more frequent social-media use only among adolescent girls**. **Thus, while it is often assumed that social-media use may lead to depressive symptoms, our results indicate that this assumption may be unwarranted.**
[Direction: Reverse]

FIGURE FROM THE PAPER:

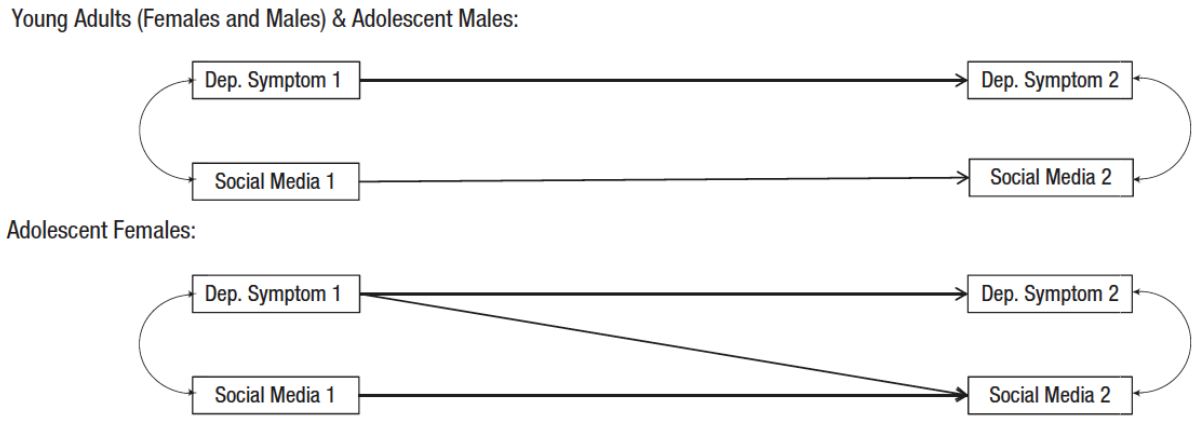


Fig. 1. Significant results from the full model. Dep. Symptom = depressive symptoms. Numbers 1 and 2 represent Times 1 and 2, respectively. Results from female and male young adults and male adolescents are depicted in the same model because they had the same findings (no significant cross-lag associations). Given that the results for the young-adult sample were invariant across time, only the paths from Time 1 to Time 2 are shown. Results from the covariates can be obtained from Tables 2 and 3.

[Time period between waves: one year]

2.2.2 Albers, McNally, Heeren et al. (2018). Social media and depression symptoms: A network perspective. *Journal of Experimental Psychology: General*

ABSTRACT: Passive social media use (PSMU)—for example, scrolling through social media news feeds—has been associated with depression symptoms. It is unclear, however, if PSMU causes depression symptoms or vice versa. In this study, 125 students reported PSMU, depression symptoms, and stress 7 times daily for 14 days. We used multilevel vector autoregressive time-series models to estimate (a) contemporaneous, (b) temporal, and (c) between-subjects associations among these

variables. (a) More time spent on PSMU was associated with higher levels of interest loss, concentration problems, fatigue, and loneliness. (b) **Fatigue and loneliness predicted PSMU across time, but PSMU predicted neither depression symptoms nor stress.** (c) **Mean PSMU levels were positively correlated with several depression symptoms (e.g., depressed mood and feeling inferior), but these associations disappeared when controlling for all other variables.** Altogether, we identified complex relations between PSMU and specific depression symptoms that warrant further research into potentially causal relationships.
[Time period between waves: 1 day]
[Direction: Reverse]

2.2.3 Mitev, Weinstein, Karabeliova, Nguyen, Law & Przybylski (2021). Social media use only helps, and does not harm, daily interactions and well-being. *Technology, Mind, and Behavior.*

ABSTRACT: In two studies we explore how different levels of social networking sites (SNSs) use affect the psychological constructs of well-being, social connection, and social capital. Conducting two studies and using a multiday experimental design in both an individualistic (United Kingdom [U.K.]) and a collectivistic (Bulgaria [BG]) society, we investigated differences in the effects of abstaining from SNS use, overuse, and normal use. Participants (U.K. *n* = 116; BG. *n* = 120) in the two within-subject studies reported on connectedness and two types of social capital (bridging; bonding), and their well-being, on days in which they had lower use of social media, used it as normal, or overused it. **Results revealed no significant differences on well-being scores across the three conditions for the U.K. and Bulgaria. Social connection and bonding social capital significantly decreased on lower use days in the U.K. sample. These effects were not replicated in the Bulgarian sample. Findings did not indicate significant differences on the scores for bridging social capital across the three levels of SNS use for the participants from the U.K. and from Bulgaria.** For the U.K. sample, social connection, in particular, served as an independent mediator linking lower use days to lower well-being, in contrast with normal use days. Suddenly lowering one's social media use might lead to people experiencing less connected to others, thus impacting their well-being. However, overuse of SNS platforms is still underexplored, thus people should regulate their SNS use in an optimal way which best supports their daily lives.
[Time period between waves: daily]
[Direction: none]

2.2.4 Burke, & Kraut (2016). The relationship between facebook use and well-being depends on communication type and tie strength. *Journal of Computer-Mediated Communication*.

ABSTRACT: An extensive literature shows that social relationships influence psychological well-being, but the underlying mechanisms remain unclear. We test predictions about online interactions and well-being made by theories of belongingness, relationship maintenance, relational investment, social support, and social comparison. An opt-in panel study of 1,910 Facebook users linked self-reported measures of well-being to counts of respondents' Facebook activities from server logs. Specific uses of the site were associated with improvements in well-being: Receiving targeted, composed communication from strong ties was associated with improvements in well-being while viewing friends' wide-audience broadcasts and receiving one-click feedback were not. These results suggest that people derive benefits from online communication, as long it comes from people they care about and has been tailored for them. [Thanks to Kai Lukoff]
[Time period between waves: monthly]

COMMENT (from Kai Lukoff): The key result for the purposes of this review is likely this: The coefficient for lagged well-being (beta = .850) shows that well-being was very stable month-to-month. Aggregating over all the communication activities from Table 2, Model A shows that **receiving more Facebook communication in general was not associated with changes in well-being (beta = .010, p = .493).** Other results: communication from strong ties was associated with improvements in well-being, whereas communication from weak ties had no effect. Note of caution: the lead author works at Facebook.

2.2.5 Orben, Dienlin, & Przybylski (2019). Social media's enduring effect on adolescent life satisfaction. *PNAS*.

ABSTRACT: In this study, we used large-scale representative panel data to disentangle the between-person and within-person relations linking adolescent social media use and well-being. **We found that social media use is not, in and of itself, a strong predictor of life satisfaction across the adolescent population**. Instead, social media effects are nuanced, small at best, reciprocal over time, gender specific, and contingent on analytic methods.
[Time period between waves: one year]

[Direction: Bi-drectional]

COMMENT [from Twenge and Haidt]: This study focuses on social media and separates boys and girls -- both praiseworthy choices. Yet, it still uses linear r to examine data that is curvilinear and would be better understood by examining the number of people affected. And because only a minority are in the highest category of use, most comparisons focus on movements that don't matter much for well-being (say, from no use to light use, or light use to moderate use). Even so, the study finds a path from greater social media use to lower well-being that is stronger than the path from lower well-being to greater social media use. That suggests that more of the causation moves from social media use to low well-being rather than the reverse causation argument of low well-being leading to more social media use.

2.2.6 Jensen, George, Russell, & Odgers (2019). Young adolescents' digital technology use and adolescents' mental health symptoms: Little evidence of longitudinal or daily linkages. *Clinical Psychological Science.*

ABSTRACT: This study examines whether 388 adolescents' digital technology use is associated with mental-health symptoms during early adolescence to midadolescence. Adolescents completed an initial Time 1 (T1) assessment in 2015, followed by a 14-day ecological momentary assessment (EMA) via mobile phone in 2016–2017 that yielded 13,017 total observations over 5,270 study days. **Adolescents' T1 technology use did not predict later mental-health symptoms. Adolescents' reported mental health was also not worse on days when they reported spending more versus less time on technology.** Little was found to support daily quadratic associations (whereby adolescent mental health was worse on days with little or excessive use). Adolescents at higher risk for mental-health problems also exhibited no signs of increased risk for mental-health problems on higher technology use days. **Findings from this EMA study do not support the narrative that young adolescents' digital technology usage is associated with elevated mental-health symptoms.**

COMMENT [From Haidt]: This is a large well-done longitudinal study on "digital technology use" among 388 adolescents in North Carolina, using "ecological momentary assessments --three short text surveys a day for two weeks--rather than relying on recall. The general failure to find time-lagged effects makes this study a point in favor of those who say that "**screen time**" is not necessarily bad for teenagers. However, **this study has little to say about the effects of *social media.*** All four of the research questions listed on p. 3 are about "technology use," which includes watching

TV and playing video games, among other activities. The study did include one question on social media use, given only once, at T1 (the longer survey done before the 2 week period began): “How often do you use social networking sites like Facebook or Instagram?,” answered on a seven point scale from 0=”I do not have social media” through 6=”several times a day.”
[Time period between waves: For the EMA: daily]

[NOTE from Twenge: Items like these are problematic because they severely lack variance -- almost all teens who use social media use the sites several times a day, and low variance means you can find only small effects. Measurement in hours per day is often necessary for sufficient variance.] But social media use was not assessed in the three “daily technology use” surveys, so this study does not tell us how variations in social media use at any one time (within a person’s own range) are related to subsequent variations in mental health, as assessed by the K6 (Kessler scale) and other measures. The authors do report that social media use self-rated at T1 did not predict mental health problems during the two week assessment period, so that does qualify the study to be in this section of our lit review -- it is a null finding. But the real power of this study was its ability to examine how fluctuations in technology use during the two weeks influenced concurrent and subsequent mental health reports, and that power was not applied to the study of social media use.

2.2.7 Coyne, Rogers, Zurcher, Stockdale, & Booth (2019). Does time spent using social media impact mental health?: An eight year longitudinal study. *Computers in Human Behavior.*

ABSTRACT: Many studies have found a link between time spent using social media and mental health issues, such as depression and anxiety. However, the existing research is plagued by cross-sectional research and lacks analytic techniques examining individual change over time. The current research involves an **8-year longitudinal study examining the association between time spent using social media and depression and anxiety at the intra-individual level**. Participants included 500 adolescents who completed once-yearly questionnaires between the ages of 13 and 20. Results revealed that **increased time spent on social media was not associated with increased mental health issues across development when examined at the individual level.** Hopefully these results can move the field of research beyond its past focus on screen time.
[Time period between waves: yearly]

2.2.8 George, Russell, Piontak, & Odgers (2018). Concurrent and subsequent associations between daily digital technology use and high-risk adolescents' mental health symptoms. *Child Development.*

ABSTRACT: Adolescents are spending an unprecedented amount of time using digital technologies (especially mobile technologies), and there are concerns that adolescents' constant connectivity is associated with poor mental health, particularly among at-risk adolescents. Participants included 151 adolescents at risk for mental health problems (Mage = 13.1) who completed a baseline assessment, 30-day ecological momentary assessment, and 18 month follow-up assessment. **Results from multilevel regression models showed that daily reports of both time spent using digital technologies and the number of text messages sent were associated with increased same-day attention deficit hyperactivity disorder (ADHD) and conduct disorder (CD) symptoms.** Adolescents' reported digital technology usage and text messaging across the ecological momentary assessment (EMA) period was also associated with poorer self-regulation and increases in conduct problem symptoms between the baseline and follow-up assessments.
[Time period between waves: daily, and then 18 month followup]

2.2.9 Erevik, Pallesen, Vedaa, Andreassen, Dhir, & Torsheim (2020). General and alcohol-related social media use and mental health: A large-sample longitudinal study. *International Journal of Mental Health and Addiction*.

ABSTRACT: The current study aimed to investigate if general and alcohol-related social media use predicts symptoms of depression and anxiety. Students in Bergen, Norway, participated in a Web-based survey during fall 2015 (T1) and a follow-up survey during fall 2016 (T2). A total of 5217 participated in both surveys. Crude and adjusted linear regression analyses were conducted to investigate if social media use at T1 predicted depression and anxiety at T2. **Several social media use variables (e.g., using Instagram) were positively associated with depression and anxiety over time, but these associations became non-significant when covariates were controlled for. Number of online friends was inversely related to depression whereas using Twitter was positively related to anxiety at T2, when covariates were controlled for. The effect sizes of the observed associations were all very small.** The current study found little support for a relationship between social media use and mental health.
[Time period between waves: one year]

2.2.10 Hamilton et al. (2021). Social media use and prospective suicidal thoughts and behaviors among adolescents at high risk for suicide. *Suicide and Life-Threatening Behavior*.

ABSTRACT: OBJECTIVE: To examine the relationship between social media use and suicidal thoughts and behaviors among adolescents in the first 30 days of an intensive outpatient program (IOP) for depression and suicidality.

METHOD: Participants included 100 adolescents who enrolled in an IOP for depression and suicidality and completed baseline measures of social media and weekly measures of depression and suicidal thoughts and behaviors at clinical visits over the next month.

RESULTS: **Lower levels of social media use (overall and messaging) were associated with a greater likelihood of having suicidal ideation with plan over the next 30 days. There was no effect on suicidal behavior. Multilevel modeling indicated no main effects of social media use on depression or average days of suicidal thoughts. However, individuals with lower levels of social media use maintained more depression symptoms and days with passive death wish across the first month of treatment.**

CONCLUSIONS: Among adolescents at high risk for suicide, less engagement in social media may reflect social anhedonia or withdrawal, which may heighten risk for more severe suicidal ideation or impede initial treatment. Findings highlight the importance of considering social media as an additional context when assessing social dysfunction in treatment for depression and suicidality.

[Time period between waves: daily]
[Direction: Reverse]

2.2.11 Beeres, Andersson, Vossen, & Galanti (2020). Social media and mental health among early adolescents in Sweden: A longitudinal study with 2-year follow-up (KUPOL Study). *Journal of Adolescent Health.*

ABSTRACT: PURPOSE: The aim of this study is to assess the longitudinal associations between the frequency of social media use and symptoms of mental ill-health among Swedish adolescents.
METHODS: Data came from KUPOL, a Swedish school-based longitudinal cohort accrued in 101 participating schools in 8 regions of Sweden. The study sample

consisted of 3,501 adolescents in grade 8 (14–15 years, 51.5%, n = 1,765 girls) followed for 2 consecutive years. Daily social media use was measured as weighted average of self-reported use in weekdays and weekend days. Mental health was measured with the Strength and Difficulties Questionnaire (SDQ). A Random-Intercept Cross-Lagged Panel Model was applied to distinguish between-person from within-person associations between social media use and symptoms of mental ill-health.

RESULTS: Median SDQ score at baseline was 9 (interquartile range [IQR] 6–14). Median social media use was 1.7 hours at baseline (interquartile range .6–3.0) and increased over the 3-year period. **Adolescents with more social media use also reported higher SDQ scores, *B* (95% confidence interval [CI]) = 2.40 (2.03–2.77). On a within-person level, no cross-lagged associations were found between changes in social media use and subsequent changes in symptoms of mental ill-health after 1 year, *B* (95% CI) = .02 (−12 to .16) or vice versa *B* (95% CI) = .00 (−.02 to .02). Weak cross-sectional associations were found between changes in social media use and concurrent changes in symptoms of mental ill-health, *B* (95% CI) = .24 (.00–.48).**

CONCLUSIONS: **Adolescents with higher use of social media report more symptoms of mental health problems, but there is no evidence for a longitudinal association between increased use and mental health problems.** This suggests that social media may be rather an indicator than a risk factor for symptoms of mental ill-health.

[Time period between waves: yearly]
[Direction: positive

NOTE from Twenge: The results section says “adolescents reporting higher social media use than expected based on their previous scores also reported higher than expected SDQ-(sub)-scores at the same time point, and vice versa.” That means this study does show a longitudinal association between more social media use and more psychological difficulties, though not by much (standardized B = .06).

2.2.12 Schemer, Masur, Geiss et al. (2020). The Impact of Internet and Social Media Use on Well-Being: A Longitudinal Analysis of Adolescents Across Nine Years. *Journal of Computer-Mediated Communication*.

ABSTRACT: The present research examines the longitudinal average impact of frequency of use of Internet and social networking sites (SNS) on subjective well-being of adolescents in Germany. Based on five-wave panel data that cover a period of nine years, we disentangle between-person and within-person effects of media use on depressive symptomatology and life satisfaction as indicators of subjective well-being.

Additionally, we control for confounders such as TV use, self-esteem, and satisfaction with friends. **We found that frequency of Internet use in general and use of SNS in particular is not substantially related subjective well-being. The explanatory power of general Internet use or SNS use to predict between-person differences or within-person change in subjective well-being is close to zero.** TV use, a potentially confounding variable, is negatively related to satisfaction with life, but it does not affect depressive symptomatology. However, this effect is too small to be of practical relevance.

[COMMENT from Haidt: used random sample of German adolescents born from 1991-1993, so these are late millennials, not Gen Z. They used 5 of the 9 waves of data collection, from 2008-2016, so this does cover the period when social media changed (2009-2011) and when depression rates rose in the USA. But the **spacing between waves was 2 years**. I see little reason to think that an increased report of social media use in 2014 would predict higher depression scores in 2016]
[Time period between waves: 2 years]

2.2.13 Bradley, & Howard (2021). Stress, mood, and smartphone use in university students: A 12-week longitudinal study. *OSF Preprints.*

ABSTRACT: The current study used device-logged screen time records to measure week-to-week within-person associations between stress and smartphone use in undergraduate students (N = 187, Mage = 20.1) during Fall 2020, focusing on differences across types of app used and whether accumulated screen use each week predicted end-of-week mood states. Participants uploaded weekly screenshots from their “Screen Time” settings display and completed surveys measuring stress, mood, and COVID-19 experiences. Results of multilevel models showed no week-to-week change in smartphone hours of use or device pickups. **Higher stress levels were not concurrently associated with heavier smartphone use, either overall or by type of app. Heavier smartphone use in a given week did not predict end-of-week mood states, but students who tended to spend more time on their phones in general reported slightly worse moods—a between-person effect potentially reflecting deficits in well-being that are present in students’ offline lives as well.** Our findings contribute to a growing scholarly consensus that time spent on smartphones tells us little about young people’s well-being.
[Time period between waves: Weekly]

2.2.14 Sewall, Goldstein, Wright, & Rosen (2022). Does objectively-measured social media or smartphone use predict depression, anxiety, or social isolation among young adults? *Clinical Psychological Science.*

ABSTRACT: Despite a plethora of research, the link between digital technology use and psychological distress among young adults remains inconclusive. Findings in this area are typically undermined by methodological limitations related to measurement, study design, and statistical analysis. Addressing these limitations, we examined the prospective, within-person associations between three aspects of objectively-measured digital technology use (smartphone use duration and frequency; social media use duration) and three aspects of psychological distress (depression, anxiety, and social isolation) among a sample of young adults (N = 384). Across 81 different model specifications, we found that **most within-person prospective effects between digital technology use and psychological distress were statistically non-significant and all were very small—even the largest effects were unlikely to register a meaningful impact on a person's psychological distress. In post hoc subgroup analyses, we found scant evidence for the claim that digital technology use is more harmful for women and/or younger people.**
[Time period between waves: Monthly]

2.2.15 Boer, Stevens, Finkenauer, & van den Eijnden (2022). The complex association between social media use intensity and adolescent wellbeing: A longitudinal investigation of five factors that may affect the association. *Computers in Human Behavior*.

ABSTRACT The present study examined five possible explanations for the mixed findings on the association between adolescents' social media use (SMU) intensity and wellbeing. Particularly, it investigated whether the association between SMU intensity and life satisfaction depended on (1) the type of SMU activity the adolescent engaged in, (2) the (non)linearity of the association, (3) individual differences, (4) inclusion of SMU problems, and (5) the level of analysis. Data from four waves of longitudinal data among 1419 adolescents were used (Mage(T1) = 12.51 (0.60), 45.95% girl). Multilevel analyses showed that at the within-person level, on average, **changes in different types of SMU activities were not associated with changes in life satisfaction. Within individuals, the associations ranged from negative to positive across adolescents. In general, this variation could not be explained by adolescents' engagement in upward social comparisons. At the between-person level, the higher adolescents' average intensity of certain SMU activities, the lower their**

average level of life satisfaction. However, these associations were confounded by adolescents' SMU problems. No curvilinear associations were found. Overall, the findings underline that to enhance our understanding of the association between SMU and wellbeing in adolescence, it is important to acknowledge the heterogeneity of effects, distinguish between SMU intensity and SMU problems, and disentangle within-from between-person effects.
[Time period between waves: 1 year

2.2.16 Steinsbekk, Nesi, & Wichstrom (2023). Social media behaviors and symptoms of anxiety and depression. A four-wave cohort study from age 10–16 years. *Computers in Human Behavior.*

ABSTRACT: BACKGROUND: Concerns have been raised that social media use causes mental health problems in adolescents, but findings are mixed, and effects are typically small. The present inquiry is the first to measure diagnostically-defined symptoms of depression and anxiety, examining whether changes in social media behavior predict changes in levels of symptoms from age 10 to 16, and vice versa. We differentiate between activity related to one's own vs. others' social media content or pages (i.e., self-oriented: posting updates, photos vs other-oriented: liking, commenting).
METHODS: A birth-cohort of Norwegian children was interviewed about their social media at ages 10, 12, 14 and 16 years (n = 810). Symptoms of depression, social anxiety and generalized anxiety were captured by psychiatric interviews and data was analyzed using Random Intercept Cross-lagged Panel Modeling.
RESULTS: **Within-person changes in self- and other oriented social media behavior were unrelated to within-person changes in symptoms of depression or anxiety two years later, and vice versa.** This null finding was evident across all timepoints and for both sexes.
CONCLUSIONS: The frequency of posting, liking, and commenting is unrelated to future symptoms of depression and anxiety. This is true also when gold standard measures of depression and anxiety are applied.
[Time period between waves: 2 years

NOTE from Twenge: This study does not use a measure of social media use in hours per day. Instead, it asks Ps how often they post photos and written material and how often they liked or commented on others' posts. Thus it does not capture a good chunk of social media use, including scrolling through others' content.

2.2.17 Plackett, Sheringham, & Dykxhoorn (2023). The Longitudinal Impact of Social Media Use on UK Adolescents' Mental Health: Longitudinal Observational Study. *Journal of Medical Internet Research*.

ABSTRACT: BACKGROUND: Cross-sectional studies have found a relationship between social media use and depression and anxiety in young people. However, few longitudinal studies using representative data and mediation analysis have been conducted to understand the causal pathways of this relationship.
OBJECTIVE: This study aims to examine the longitudinal relationship between social media use and young people's mental health and the role of self-esteem and social connectedness as potential mediators.
METHODS: The sample included 3228 participants who were 10- to 15-year-olds from Understanding Society (2009-2019), a UK longitudinal household survey. The number of hours spent on social media was measured on a 5-point scale from "none" to "7 or more hours" at the ages of 12-13 years. Self-esteem and social connectedness (number of friends and happiness with friendships) were measured at the ages of 13-14 years. Mental health problems measured by the Strengths and Difficulties Questionnaire were assessed at the ages of 14-15 years. Covariates included demographic and household variables. Unadjusted and adjusted multilevel linear regression models were used to estimate the association between social media use and mental health. We used path analysis with structural equation modeling to investigate the mediation pathways.
RESULTS: **In adjusted analysis, there was a nonsignificant linear trend showing that more time spent on social media was related to poorer mental health 2 years later (n=2603, β=.21, 95% CI −0.43 to 0.84; P=.52).** In an unadjusted path analysis, 68% of the effect of social media use on mental health was mediated by self-esteem (indirect effect, n=2569, β=.70, 95% CI 0.15-1.30; P=.02). This effect was attenuated in the adjusted analysis, and it was found that self-esteem was no longer a significant mediator (indirect effect, n=2316, β=.24, 95% CI −0.12 to 0.66; P=.22). We did not find evidence that the association between social media and mental health was mediated by social connectedness. Similar results were found in imputed data.
CONCLUSIONS: There was little evidence to suggest that more time spent on social media was associated with later mental health problems in UK adolescents. This study shows the importance of longitudinal studies to examine this relationship and suggests that prevention strategies and interventions to improve mental health associated with social media use could consider the role of factors like self-esteem.
[Time period between waves: 2 year

2.2.18 Puukko, Hietajärvi, Maksniemi, Alho and Salmela-Aro (2020).Social Media Use and

Depressive Symptoms—A Longitudinal Study from Early to Late Adolescence. *International Journal of Environmental Research and Public Health*.

ABSTRACT: An increasing number of studies have addressed how adolescents' social media use is associated with depressive symptoms. However, few studies have examined whether these links occur longitudinally across adolescence when examined at the individual level of development. This study investigated the within-person effects between active social media use and depressive symptoms using a five-wave longitudinal dataset gathered from 2891 Finnish adolescents (42.7% male, age range 13–19 years). Sensitivity analysis was conducted, adjusting for gender and family financial status. The **results indicate that depressive symptoms predicted small increases in active social media use during both early and late adolescence, whereas no evidence of the reverse relationship was found. Yet, the associations were very small, statistically weak, and somewhat inconsistent over time**. The results provide support for the growing notion that the **previously reported direct links between social media use and depressive symptoms might be exaggerated**. Based on these findings, we suggest that the impact of social media on adolescents' well-being should be approached through methodological assumptions that focus on individual-level development.

2.2.19 Beeres, Andersson, Vossen, & Galanti (2021). Social Media and Mental Health Among Early Adolescents in Sweden: A Longitudinal Study With 2-Year Follow-Up (KUPOL Study). *The Journal of Adolescent Health: Official Publication of the Society for Adolescent Medicine*.

ABSTRACT: PURPOSE: The aim of this study is to assess the longitudinal associations between the frequency of social media use and symptoms of mental ill-health among Swedish adolescents.
METHODS: Data came from KUPOL, a Swedish school-based longitudinal cohort accrued in 101 participating schools in 8 regions of Sweden. The study sample consisted of 3,501 adolescents in grade 8 (14-15 years, 51.5%, n = 1,765 girls) followed for 2 consecutive years. Daily social media use was measured as weighted average of self-reported use in weekdays and weekend days. Mental health was measured with the Strength and Difficulties Questionnaire (SDQ). A Random-Intercept Cross-Lagged Panel Model was applied to distinguish between-person from within-person associations between social media use and symptoms of mental ill-health.
RESULTS: Median SDQ score at baseline was 9 (interquartile range [IQR] 6-14). Median social media use was 1.7 hours at baseline (interquartile range .6-3.0) and

increased over the 3-year period. Adolescents with more social media use also reported higher SDQ scores, B (95% confidence interval [CI]) = 2.40 (2.03-2.77). On a within-person level, **no cross-lagged associations were found between changes in social media use and subsequent changes in symptoms of mental ill-health after 1 year, B (95% CI) = .02 (-.12 to .16) or vice versa B (95% CI) = .00 (-.02 to .02). Weak cross-sectional associations were found between changes in social media use and concurrent changes in symptoms of mental ill-health, B (95% CI) = .24 (.00-.48).**
CONCLUSIONS: Adolescents with higher use of social media report more symptoms of mental health problems, but there is no evidence for a longitudinal association between increased use and mental health problems. This suggests that social media may be rather an indicator than a risk factor for symptoms of mental ill-health.

2.2.20 Schreurs, Lee, Liu and Hancock (2024). When Adolescents' Self-Worth Depends on Their Social Media Feedback: A Longitudinal Investigation With Depressive Symptoms. *Communication Research*.

ABSTRACT: The current three-wave longitudinal panel study examines the within- and between-person relations between adolescents' self-worth dependency on social media feedback and depressive symptoms. About 1,607 adolescents participated in two of the three waves, yet a third had to be excluded due to failing an attention check.

METHOD: Through 24 schools in Flanders, the Dutch speaking region in Belgium, we recruited 1,895 adolescents to participate in a three-wave panel study about their social media use and daily life experiences. The first, second, and third waves of the study took place in September to October 2019, January to February 2020, and May to June 2020 respectively. There were approximately 4 months between each measurement occasion, at each school
DISCUSSION: **A strong correlation was found at the between-person level, indicating that adolescents who perceive their self-worth to be more dependent on social media feedback also have higher trait like symptoms of depression. However, there was no evidence for within-person relations.** (...) As there were no effects at the within-person level, third variables likely account for this between-person association (Coyne et al., 2020). (...) Finally, we conducted an exploratory investigation into the between- and within-person associations between time spent and depressive symptoms. Here, a positive significant correlation was found at the between-person level, indicating that **adolescents who spent more time on Instagram, Snapchat, TikTok, and Facebook reported more depressive symptoms. However**, as the within-person associations were not significant, **there was no evidence for an effect**

of time spent on depressive symptoms, nor of depressive symptoms on time spent.
CONCLUSION: While these between-person effects were significant, we did not observe evidence of within-person effects in our study - counter to conventional claims that social media use can exacerbate depressive symptoms.

[Time period between waves: 4 months

[NOTE for ND: This study was based on a sample size of Belgian students; results may differ when applied to American or British adolescents. Although this study is put in section 2.2, note that that the between subjects effect was significant.]

2.2.21 Cheng et al. (2025). How do social media use, gaming frequency, and internalizing symptoms predict each other over time in early-to-middle adolescence? *Journal of Public Health*.

ABSTRACT: Background: The effects of adolescent digital technology use (e.g. social media, gaming) on their mental health are a major public health concern, but existing evidence is of mixed quality and findings have been inconclusive. Methods: Separating within-person effects from between-person effects, a random-intercept cross-lagged panel model was applied to three annual waves of data (T1, T2, T3) on social media use, gaming, and internalizing symptoms among N = 25 629 adolescents (51% girls, average age 12 years, 7 months (SD = 3.58 months) at baseline) in Greater Manchester, England. Results: Longitudinal relationships varied by gender, such that more frequent gaming at T2 predicted less time spent on social media use at T3 in girls (but not boys), and more frequent internalizing symptoms at T2 predicted reductions in gaming frequency at T3 in boys (but not girls). **There was no evidence that time spent on social media or gaming frequency predicted later internalizing symptoms among girls or boys.** Sensitivity analyses that distinguished active versus passive social media use replicated these findings. Conclusions: **The findings of this study do not support the widely held view that adolescent technology use is a major causal factor in their mental health difficulties.**

2.3 STUDIES SHOWING MEDIATORS AND MODERATORS OF THE ASSOCIATION

2.3.1 Choi, & Kim (2021). Between Instagram browsing and subjective well-being: Social comparison or emotional contagion?. *Media Psychology*.

RELEVANT RESULT OF STUDY 2: Participants were asked to fill out a diary form for 7 consecutive days. A total of 120 participants were recruited (47 men, 73 women; age M = 23.02, SD = 2.90, range = 19–31). The average exposure to **upward social comparison information over a 7-day period was negatively related to the follow-up measure of life satisfaction,** β = −.31, t = −3.26, p = .002 (controlled for life satisfaction at baseline).

2.3.1.2 McComb, & Mills (2021). Young women's body image following upwards comparison to Instagram models: The role of physical appearance perfectionism and cognitive emotion regulation. *Body Image*.

ABSTRACT: The present study examined whether trait physical appearance perfectionism moderates young women's body image following upwards appearance comparison to idealized body images on social media, and whether cognitive coping mediates the relationship between physical appearance perfectionism and resulting body image from social comparison processes. Female undergraduate students (N = 142) were randomly assigned to either 1) compare the size of their body parts to the body parts of attractive Instagram models, or 2) an appearance-neutral control condition. All participants completed measures of trait physical appearance perfectionism, pre and post measures of state body image, and state cognitive coping processes. **Appearance comparison to the models resulted in lowered confidence and increased appearance and weight dissatisfaction. High trait physical appearance perfectionism predicted lower confidence and higher weight dissatisfaction and appearance dissatisfaction, and these relationships were mediated by engagement in rumination and catastrophizing.** Clinical implications of the findings are discussed.

FIGURE:

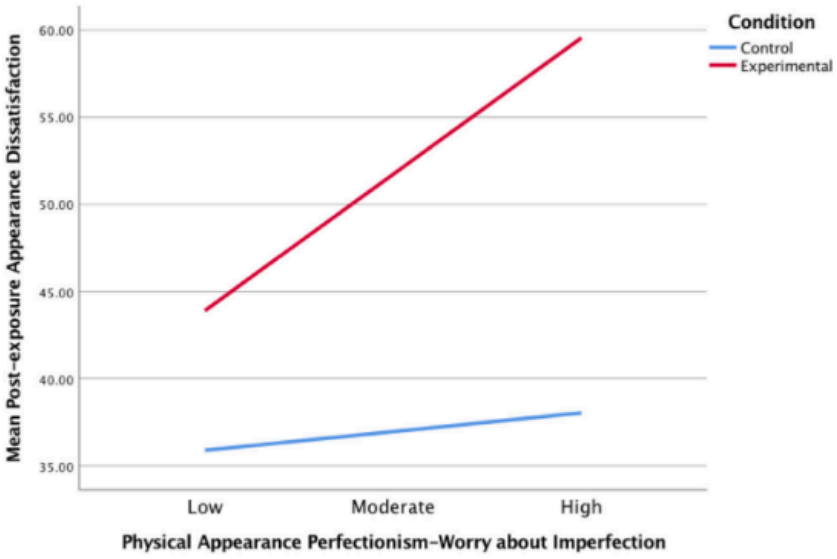


Fig. 3. Appearance dissatisfaction as a function of condition and level of physical appearance perfectionism.

2.3.1.3 Aubry, Quiamzade, & Meier (2024). Depressive symptoms and upward social comparisons during Instagram use: A vicious circle. *Personality and Individual Differences*.

ABSTRACT: On the one hand, social comparisons on social media use lead to more depressive symptoms. On the other hand, more depressive symptoms lead to more social comparison on social media. We propose an articulation of both effects. As users are primarily exposed to positive information leading to upward comparisons on Instagram and depressive individuals engage more in comparisons, they would be more vulnerable to negative impacts of comparisons on the self. Furthermore, at least two interindividual differences might explain this vicious circle, i.e. Instagram type of use and self-assessment motivation. The research tested it with correlation (N = 482), experimental (N = 185), and experimental diary design (N = 168). Two groups were asked to use Instagram actively or passively in the experimental studies. Structural equation modeling analysis showed that while the type of use didn't explain the effects, depressive symptoms, and self-assessment motivation did. Indeed, one with more depressive symptoms indicated perceives others being better off than oneself, which worsened the self-esteem (Cohen's d range for the three studies = 0.01 to 0.10), felt emotions (d = 0.03 to 0.06), and depressive mood (d = 0.02 to 0.06), and this process appears to be mediated by the motivation to self-assess.

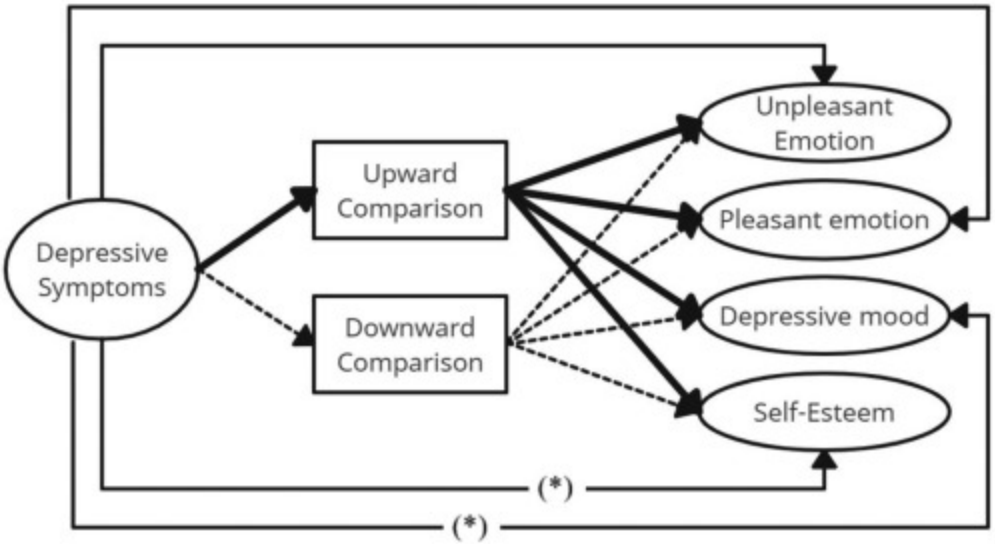


Fig. 3. Depiction of the moderated mediation model testing the effect of depressive symptoms on unpleasant emotions, pleasant emotions, depressive mood and self-esteem via upward and downward comparison. Continuous lines represent significant paths, bold lines represent indirect effects via upward comparison, arrows between depressive symptoms and outcomes represent total effect, and parentheses indicate direct effects (* at least $p < .05$). Note that the covariate and the experimental condition - however integrated into the model - is not represented here.

[Comment Raphael Aubry: In supplementary material - Time spent on Instagram the last 7 days did not predict unpleasant emotion, depressive mood, self-esteem nore depressive symptoms. For study 3, it is worth noting that the motivation to self-assess (through social comparison in social media) at baseline predict depressive symptoms two weeks afterword controlloing for depressive symptoms at baseline. The linear model (not motivated at all to self asses versus very motivated to self-assess) predicts an 25% increase of depressive symptoms at followup compared to baseline]

[Other studies? What have we missed?]

* * * * * * * * * * * * * * *

QUESTION 3: DO EXPERIMENTS SHOW HARMFUL EFFECTS OF SOCIAL MEDIA USE ON MENTAL HEALTH OUTCOMES?

True experiments are the gold standard for establishing causality. Many studies split participants randomly between a ‘control’ group and a ‘treatment’ group where treatment may be the reduction of social media use for a specified period of time. Other studies expose participants to social media, typically for a short time in a ‘laboratory’ environment.

We include retrospective quasi-experiments (which examine past events as a natural experiment) in sections 3.3 and 3.4.

A few of the studies examine data preceding 2012, and since some have argued that social media has changed dramatically between 2009 and 2012, we will add a note indicating the historical period involved.

3.1: REDUCTION EXPERIMENTS SUGGESTING THAT SOCIAL MEDIA IS HARMFUL

In social media reduction studies, participants are asked to reduce or eliminate their usage of social media for a specific amount of time (days, weeks, or months), and changes in their mental health outcomes are measured and compared against a control group who were not asked to modify their social media use. Studies in this section show an improvement in the mental health of those who reduced their social media use, suggesting that social media reduction is beneficial and social media itself is harmful.

3.1.1 Hunt, Marx, Lipson & Young (2018). No more FOMO: Limiting social media decreases loneliness and depression. *Journal of Social and Clinical Psychology*.

ABSTRACT: Introduction: Given the breadth of correlational research linking social media use to worse well-being, we undertook an experimental study to investigate the potential causal role that social media plays in this relationship.
METHODS: After a week of baseline monitoring, 143 undergraduates at the University of Pennsylvania were randomly assigned to either limit Facebook, Instagram and Snapchat use to 10 minutes, per platform, per day, or to use social media as usual for three weeks.
RESULTS: **The limited use group showed significant reductions in loneliness and depression over three weeks compared to the control group.** Both groups showed significant decreases in anxiety and fear of missing out over baseline, suggesting a benefit of increased self-monitoring.
DISCUSSION: **Our findings strongly suggest that limiting social media use to approximately 30 minutes per day may lead to significant improvement in well-being.**
[age group: college students]
[Time period between waves: 3 weeks]

FIGURE FROM THE ARTICLE:

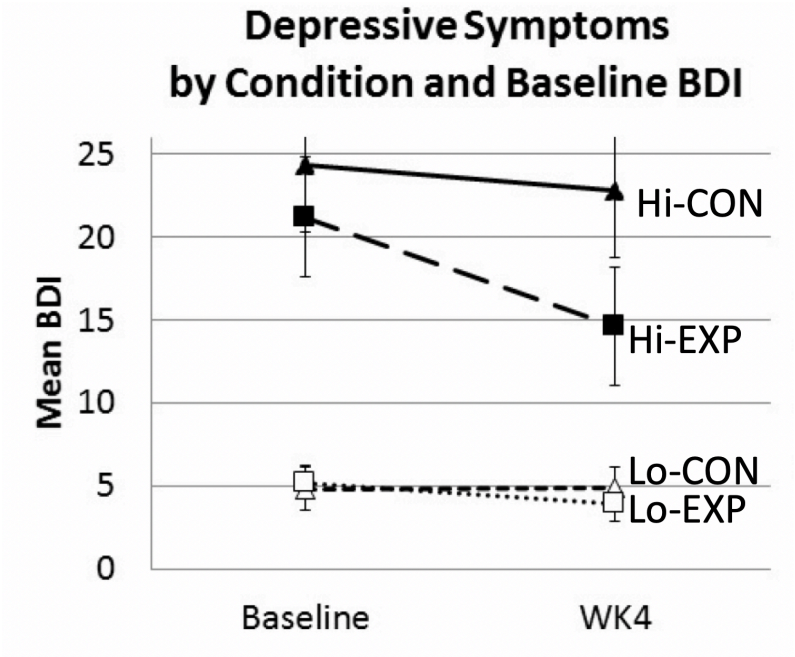


Figure 3, from Hunt et al. (2018), p. 762. “Hi” vs. “Lo” refers to participants’ scores on the BDI (Beck Depression Inventory) at the start of the study. CON = control group, EXP = experimental group, assigned to reduce social media use.

COMMENT: This is a well-controlled experimental study. Participants were required to submit screenshots of the battery usage screen on an iPhone that gives the breakdown of time used per app. The experimental group cut its social media use roughly in half. Participants who had high scores on the Beck Depression Inventory at the start of the study experienced large declines in their BDI scores. Those who scored low on the BDI experienced a small but statistically significant drop on their BDI scores.

COUNTERPOINT (from Patrick Markey, Villanova, via Twitter): “This experimental study found that reductions in social media only affected 2 of 7 outcomes examined. The authors fail to correct for any type-1 error in the study and once that is done only 1 outcome remains significant.” also: “Related to this study, the author failed to find any relation between social media use and any of the SEVEN outcomes at time 1 (before the intervention). NOTE: this study is BOTH correlation and experimental (probably need to include both in a review)”

ABSTRACT: Facebook is the world’s most popular online social network and used by more than one billion people. In three studies, we explored the hypothesis that Facebook activity negatively affects people’s emotional state. A first study shows that the longer people are active on Facebook, the more negative is their mood afterwards. **The second study provides causal evidence for this effect by showing that Facebook activity leads to a deterioration of mood compared to two different control conditions.** Furthermore, it was demonstrated that this effect is mediated by a feeling of not having done anything meaningful. With such negative outcomes for its users, the question arises as to why so many people continue to use Facebook on a daily basis. A third study suggests that this may be because people commit an affective forecasting error in that they expect to feel better after using Facebook, whereas, in fact, they feel worse.
[age group: adults]

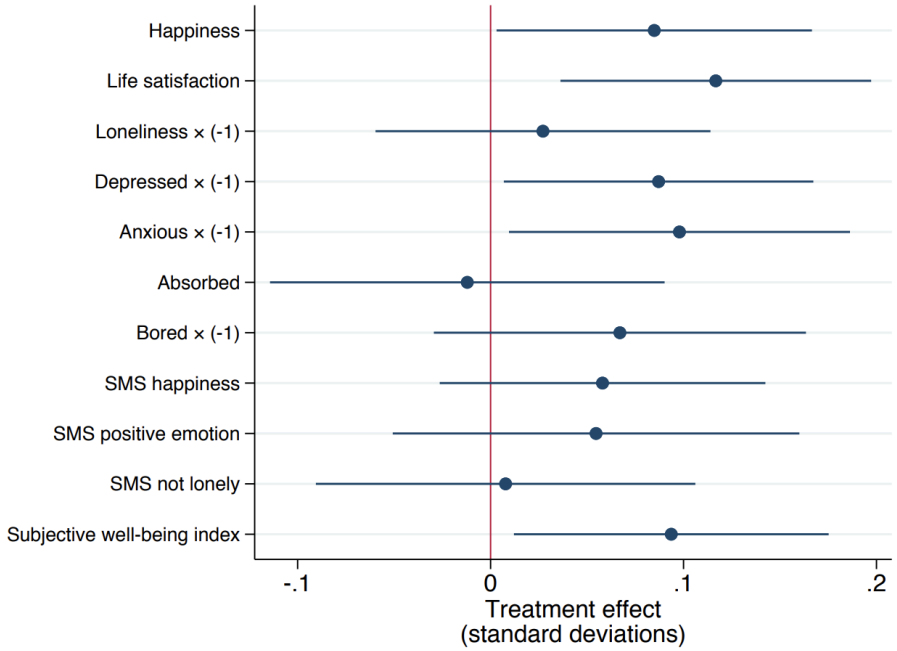
COMMENT: Study 1 is not impressive, n=123 German speaking Facebook users surveyed after using Facebook. But study 2, the experimental study, is stronger: n=263 Americans, randomly assigned to one of 3 conditions. Note: Kai Lukoff points out that this was done using mTurk, not with teens.

3.1.2 Allcott, Braghieri, Eichmeyer, & Gentzkow (2020). The welfare effects of social media. *American Economic Review*.

ABSTRACT: The rise of social media has provoked both optimism about potential societal benefits and concern about harms such as addiction, depression, and political polarization. We present a randomized evaluation of the welfare effects of Facebook, focusing on US users in the run-up to the 2018 midterm election. We measured the willingness-to-accept of 2,743 Facebook users to deactivate their Facebook accounts for four weeks, then randomly assigned a subset to actually do so in a way that we verified. Using a suite of outcomes from both surveys and direct measurement, we show that **Facebook deactivation** **(i) reduced online activity, including other social media, while increasing offline activities such as watching TV alone and socializing with family and friends; (ii) reduced both factual news knowledge and political polarization;(iii) increased subjective well-being**; and (iv) caused a large persistent reduction in Facebook use after the experiment. Deactivation reduced post-experiment valuations of Facebook, but valuations still imply that Facebook generates substantial consumer surplus.
[age group: adults]
[Time period between waves: 4 weeks]
##

COMMENT: This paper appears to be the largest experimental study yet done. It does not target teens specifically. The authors say that they will conduct a subsequent study with teens. Here is an interview with Gentzkow, about the study, at Recode.

Figure 5: **Effects on Subjective Well-Being**



Notes: This figure presents local average treatment effects of Facebook deactivation estimated using Equation (1). All variables are normalized so that the Control group endline distribution has a standard deviation of one. Error bars reflect 95 percent confidence intervals. See Section 2.3 for variable definitions.

3.1.3 Mosquera, Odunowo, McNamara et al (2019). The economic effects of Facebook. *Experimental Economics*. [H/T Ian Goddard]

ABSTRACT: Social media permeates many aspects of our lives, including how we connect with others, where we get our news and how we spend our time. Yet, we know little about the economic effects for users. In 2017, we ran a large field experiment with over 1765 individuals to document the value of Facebook to users and its causal effect on news, well-being and daily activities. Participants reveal how much they value one week of Facebook usage and are then randomly assigned to a validated Facebook restriction or normal use. One week of Facebook is worth $67. **Those who are off Facebook for one week reduce news consumption, are less likely to recognize politically-skewed news stories, report being less depressed and engage in healthier activities.** These results are strongest for men. Our results further suggest

that, after the restriction, Facebook's value increases, consistent with information loss or that using Facebook may be addictive.
[Age group: Undergraduates]
[Time period between waves: 1 week]

[NOTE: Here is a brief accessible writeup of the study: College students who go off Facebook for a week consume less news and report being less depressed]

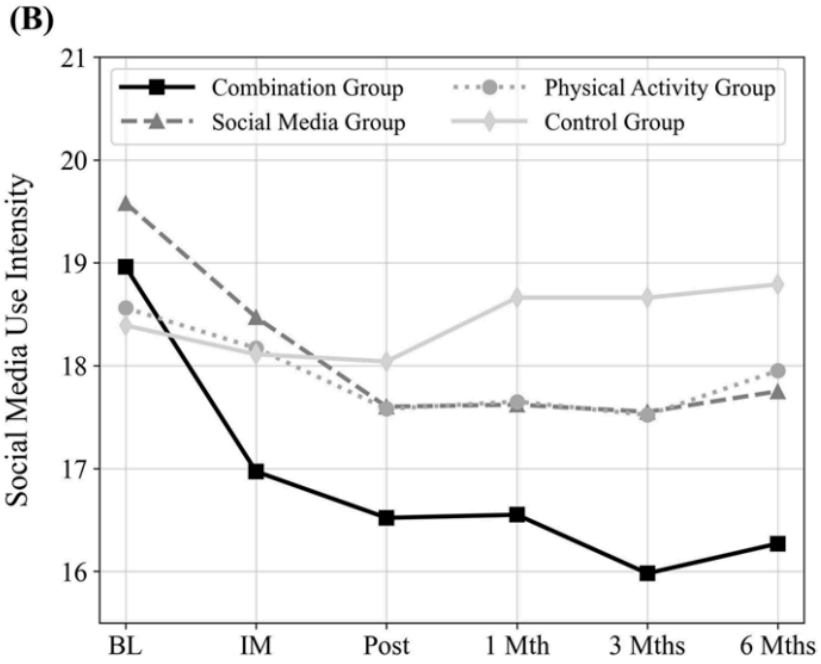
3.1.4 Lambert, Barnstable, Minter, Cooper, & McEwan (2022). Taking a One-Week Break from Social Media Improves Well-Being, Depression, and Anxiety: A Randomized Controlled Trial. *Cyberpsychology, Behavior, and Social Networking*.

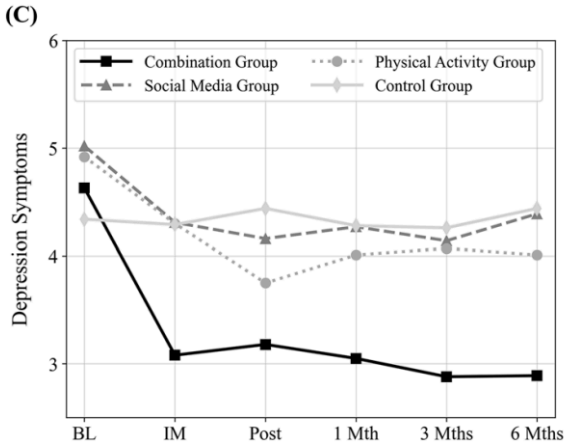
ABSTRACT: The present study aimed to understand the effects of a 1-week break from social media (SM) (Facebook, Instagram, Twitter, and TikTok) on well-being, depression, and anxiety compared with using SM as usual. We also aimed to understand whether time spent on different SM platforms mediates the relationship between SM cessation and well-being, depression, and anxiety. We randomly allocated 154 participants (mean age of 29.6 years) to either stop using SM (Facebook, Twitter, Instagram, and TikTok) for 1 week or continue to use SM as usual. At a 1-week follow-up, significant between-group differences in well-being (mean difference [MD] 4.9, 95% confidence interval [CI] 3.0–6.8), depression (MD −2.2, 95% CI −3.3 to −1.1), and anxiety (MD −1.7, 95% CI −2.8 to −0.6) in favor of the intervention group were observed, after controlling for baseline scores, age, and gender. The intervention effect on well-being was partially mediated by a reduction in total weekly self-reported minutes on SM. The intervention effect on depression and anxiety was partially mediated by a reduction in total weekly self-reported minutes on Twitter and TikTok, and TikTok alone, respectively. **The present study shows that asking people to stop using SM for 1 week leads to significant improvements in well-being, depression, and anxiety.** Future research should extend this to clinical populations and examine effects over the longer term.
[Age group: *M* = 29.6]
[Time period between waves: 1 week]
[screen shots of screen-time usage, sent in to researchers]

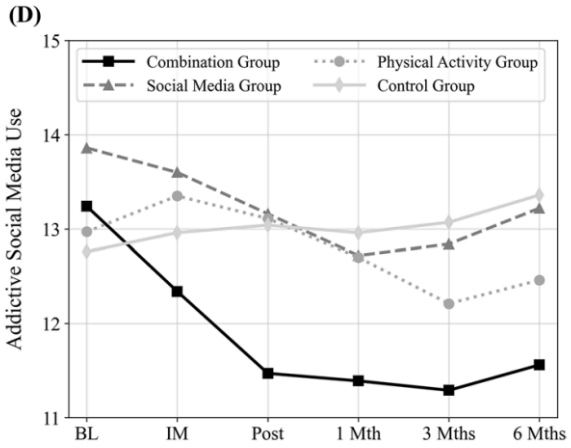
[NOTE: This study uses a sample of adults, *M* = *29.6* years old]

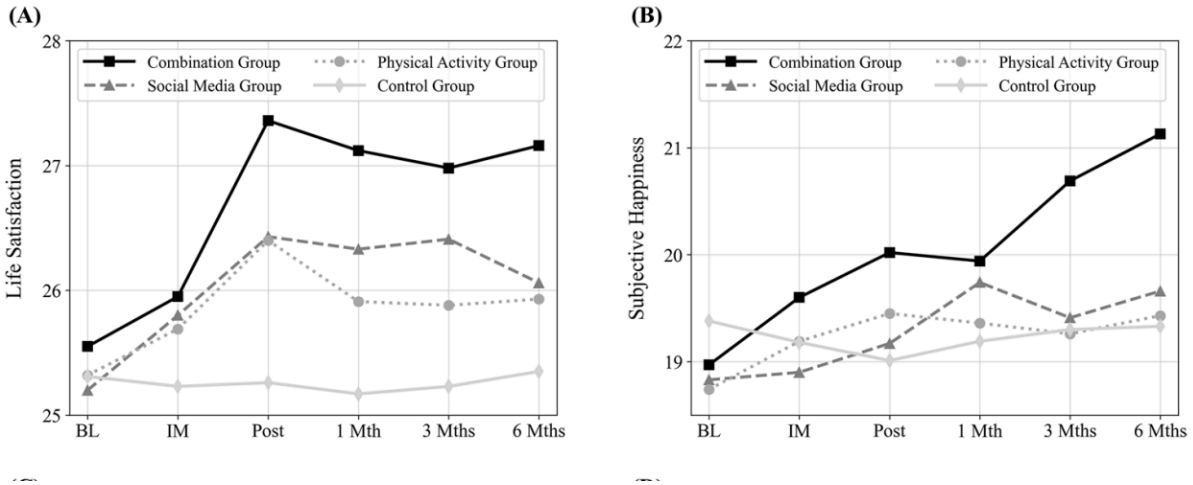
3.1.5 Brailovskaia, Swarlik, Grethe, Schillack, & Margraf (2022). Experimental longitudinal evidence for causal role of social media use and physical activity in COVID-19 burden and mental health. *Journal of Public Health*.

ABSTRACT: AIM: The COVID-19 outbreak has severely impacted people's mental health. The present experimental study investigated how to reduce this negative effect by a combination of two interventions.
SUBJECTS: Participants (Ntotal = 642) were users of social media in Germany. For two weeks, the social media group (N = 162) reduced its social media use (SMU) by 30 minutes daily, the physical activity group (N = 161) increased its physical activity by 30 minutes daily, the combination group (N = 159) followed both instructions, and the control group (N = 160) did not get specific instructions. Online surveys assessed variables of SMU, physical activity, mental health, COVID-19 burden, and lifestyle at six measurement time points up to six months after the intervention.
RESULTS: **In the experimental groups, (addictive) SMU, depression symptoms, and COVID-19 burden decreased, while physical activity, life satisfaction, and subjective happiness increased.** All effects were stronger and more stable in the combination group in the longer-term. Smoking behavior decreased in the social media group only.
CONCLUSION: Thus, the conscious combination of less SMU and more physical activity leads causally to more psychological resilience against negative pandemic impacts and to higher levels of mental health over six months. Prevention programs could improve their effectiveness by integrating the time- and cost-efficient interventions – separately or in combination.
[Age group: Adults, *M* = 26]
[Time period between waves: 2 weeks]
###[combined more real world with less online]


(B)
Combination Group
Physical Activity Group
Social Media Group
Control Group
Social Media Use Intensity
21
20
19
18
17
16
BL
IM
Post
1 Mth
3 Mths
6 Mths


(C)
Combination Group
Physical Activity Group
Social Media Group
Control Group
Depression Symptoms
6
5
4
3
BL
IM
Post
1 Mth
3 Mths
6 Mths


(D)
Combination Group
Physical Activity Group
Social Media Group
Control Group
Addictive Social Media Use
15
14
13
12
11
BL
IM
Post
1 Mth
3 Mths
6 Mths



3.1.6 Thai, Davis, Mahboob, Perry, Adams, & Gold (2023). Reducing Social Media Use Improves Appearance and Weight Esteem in Youth With Emotional Distress. *Psychology of Popular Media.*

ABSTRACT: Adolescence and young adulthood are vulnerable periods in which mental health challenges often emerge. Cross-sectional research has shown that high social media use (SMU) is associated with poor body image in youth, a known predictor of eating disorders; however, high-quality experimental evidence is scarce, limiting the ability to make causal inferences. **The present study experimentally examined the effects of reducing smartphone SMU on appearances and weight esteem in youth with emotional distress.** A randomized controlled trial was conducted where 220 participants (17–25 years; 76% female, 23% male, and 1% other) were assigned to either an intervention (SMU limited to 1 hr/day) or control (unrestricted access to SMU) group. SMU was monitored via screen time trackers and submitted daily during 1-week baseline and 3-week intervention periods. Baseline and post-intervention measurements were taken to assess changes in appearance and weight esteem. **Compared to the controls, the intervention group yielded significant increases in both appearance (p , .022) and weight esteem (p , .026). The intervention group significantly increased in appearance esteem (from M = 2.95 to 3.15, p , .001, dz = 0.33) and weight esteem (from M = 3.16 to 3.32, p , .001, dz = 0.27), whereas the control group did not significantly change (appearance: M = 2.72 to 2.76, p = .992, dz = 0.13; weight: M = 3.01 to 3.02, p = .654, dz = 0.06) from baseline to post-intervention. No effects of gender were detected**. Findings suggest that

reducing SMU on smartphones may be a feasible and effective method of improving body image in a vulnerable population of youth.

[Age group: 17-25]

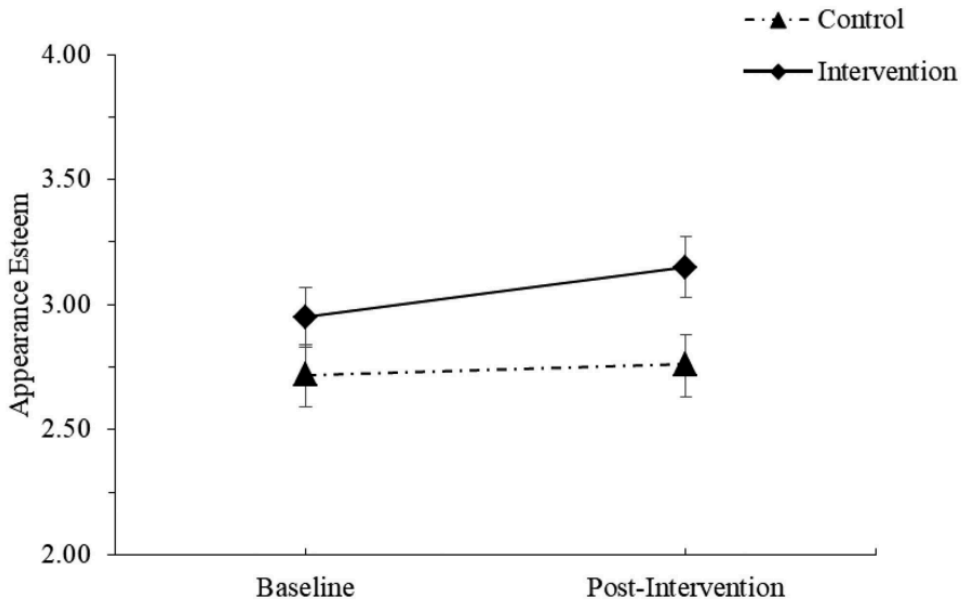
[Time period between waves: 1 week baseline + 3 weeks intervention]

##

FIGURES:

Figure 2

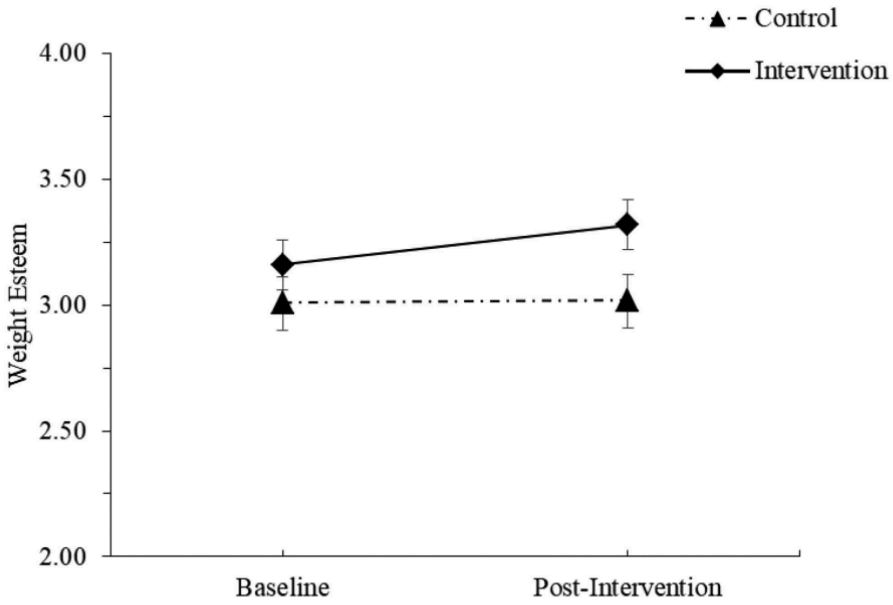
Effect of Reducing Social Media Use on Levels of Appearance Esteem by Condition



Note. Error bars represent standard errors.

Figure 3

Effect of Reducing Social Media Use on Levels of Weight Esteem by Condition.



3.1.7 Brailovskaia, Ströse, Schillack, & Margraf (2020). Less Facebook use – More well-being and a healthier lifestyle? An experimental intervention study. *Computers in Human Behavior.*

ABSTRACT: Use of the social platform Facebook belongs to daily life, but may impair subjective well-being. The present experimental study investigated the potential beneficial impact of reduction of daily Facebook use. Participants were Facebook users from Germany. While the experimental group (N = 140; Mage(SDage) = 24.15 (5.06)) reduced its Facebook use for 20 min daily for two weeks, the control group (N = 146; Mage(SDage) = 25.39 (6.69)) used Facebook as usual. Variables of Facebook use, life satisfaction, depressive symptoms, physical activity and smoking behavior were assessed via online surveys at five measurement time points (pre-measurement, day 0 = T1; between-measurement, day 7 = T2; post-measurement, day 15 = T3; follow-up 1, one month after post-measurement = T4; follow-up 2, three months after post-measurement = T5). **The intervention reduced active and passive Facebook use, Facebook use intensity, and the level of Facebook Addiction Disorder. Life satisfaction significantly increased, and depressive symptoms significantly decreased. Moreover, frequency of physical activity such as jogging or cycling**

significantly increased, and number of daily smoked cigarettes decreased. Effects **remained stable during follow-up (three months).** Thus, less time spent on Facebook leads to more well-being and a healthier lifestyle.

[Age group: *M*=24]

[Time period between waves: 2 weeks]

###

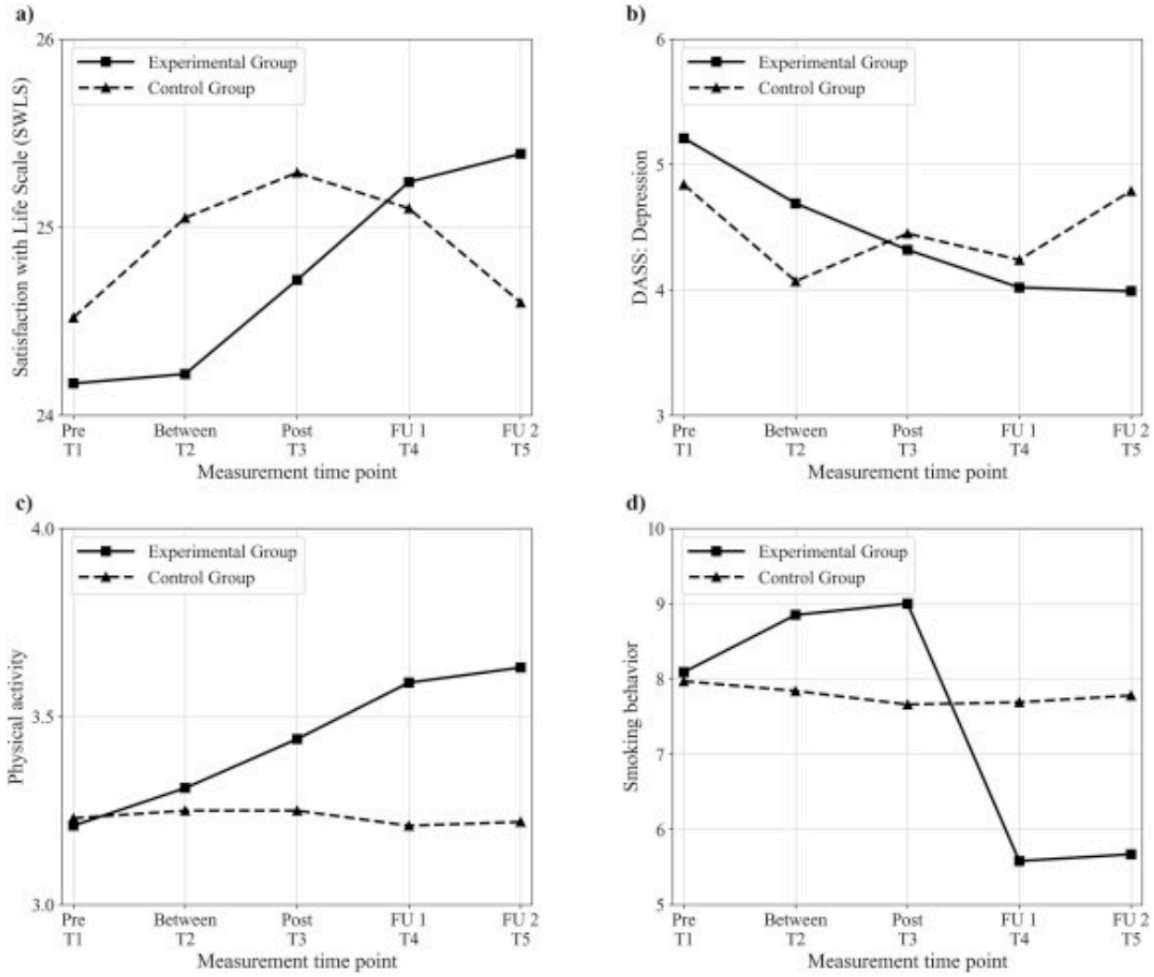


Fig. Results of repeated measure analyses of variance (ANOVAs; pre-measurement, day 0 = T1; between-measurement, day 7 = T2; post-measurement, day 15 = T3; follow-up 1, one month after post-measurement = T4; follow-up 2, three months after post-measurement = T5) for variables of well-being and lifestyle: (a) life satisfaction, (b) depressive symptoms, (c) physical activity, (d) smoking behavior (Experimental Group: N = 140, Control Group: N = 146; exception: smoking behavior: Experimental Group: n = 33, Control Group: n = 32).

3.1.8 Faulhaber, Lee, & Gentile (2023). The Effect of Self-Monitoring Limited Social Media Use on Psychological Well-Being. *Technology, Mind, and Behavior.*

ABSTRACT: An experimental study was conducted to investigate the effect of self-monitoring limited social media usage on psychological well-being. After completing pretest measures, 230 undergraduate students from a large Midwestern university were randomly assigned to one of two experimental conditions: either limit their social media usage to 30 min a day or to use social media as usual. **After 2 weeks of limiting, the self-monitored group showed significant improvements in their psychological well-being. Anxiety, depression, loneliness, fear of missing out, and negative affect decreased while positive affect increased.** These results suggest that limiting social media usage may improve psychological well-being on multiple dimensions. This study is one of the first to experimentally investigate feasible alternatives to social media use abstinence or experimenter-managed limitation. Future studies could investigate motivations and mechanisms of social media use through qualitative explorations.
[Age group: Undergraduate students]
[Time period between waves: 2 weeks]

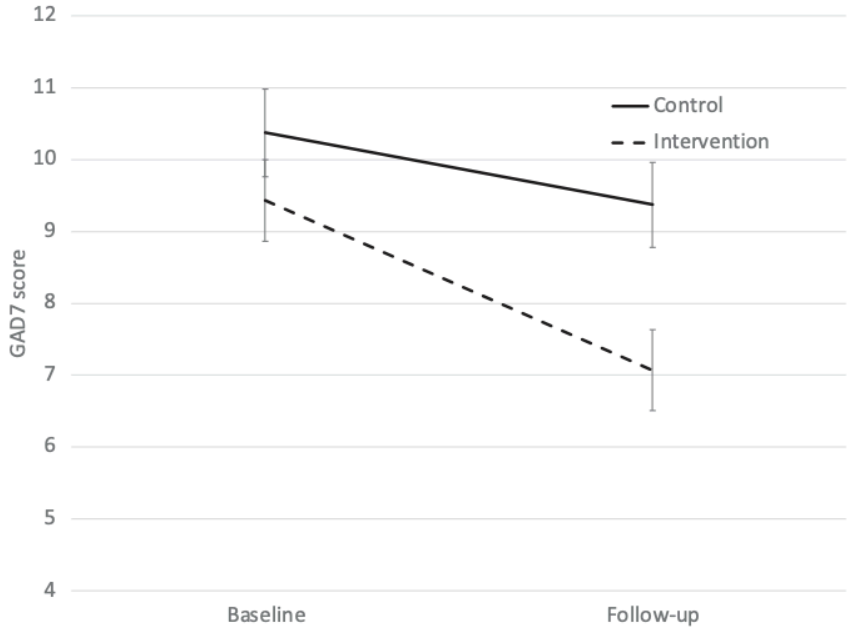
3.1.9 Davis & Goldfield (2024). Limiting social media use decreases depression, anxiety, and fear of missing out in youth with emotional distress: A randomized controlled trial. *Psychology of Popular Media.*

ABSTRACT: Reports demonstrating modest but significant correlations between heavy social media use (SMU) and poorer mental health in youth have led many to suggest that heavy SMU is culpable. Although many youth may not be harmed by heavy SMU, distressed youth may be particularly vulnerable. The aim of this study was to experimentally examine the effects of reducing SMU on smartphones on symptoms of depression, anxiety, fear of missing out (FoMO), and sleep in youth with emotional distress. A randomized controlled trial was used to assign **220 youth aged 17–25 years to either an intervention or control group.** The intervention group was asked to **reduce smartphone-based SMU to 1 hr/day for 3 weeks while the control group had no SMU restrictions**. SMU was objectively measured daily via tracking systems in smartphones. Mental health and sleep were subjectively assessed at baseline and following the 3-week intervention period. **Compared to the control group, the intervention group showed significantly greater reductions in symptoms of**

depression, anxiety, and FoMO, and greater increases in sleep. No effects of gender were detected. Reducing SMU on smartphones to approximately 1 hr/day may be a feasible, inexpensive, and effective method of increasing sleep and reducing symptoms of depression, anxiety, and FoMO among distressed youth.
[Age group: *M*=17-25]
[Time period between waves: 3 weeks]

Figure

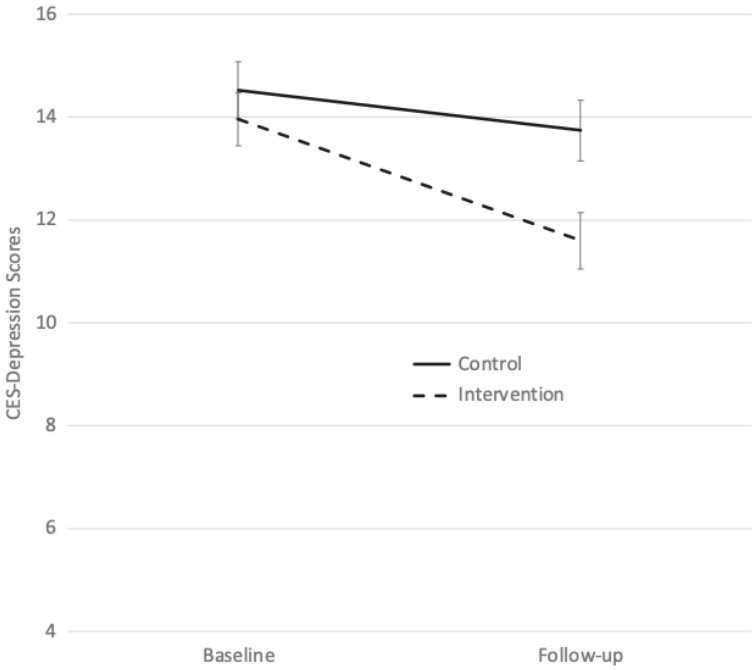
Figure 4
Effect of Reducing SMU on Symptoms of Generalized Anxiety



Note. Error bars represent standard errors. SMU = social media use; GAD-7 = generalized anxiety disorder 7.

Figure 3

Effect of Reducing SMU on Symptoms of Depression



Note. Error bars represent standard errors. SMU = social media use; CES = Center for Epidemiological Studies.

3.1.10 Tromholt (2016). The Facebook experiment: Quitting Facebook leads to higher levels of well-being. *Cyberpsychology, Behavior, and Social Networking*.

ABSTRACT. Most people use Facebook on a daily basis; few are aware of the consequences. Based on a 1-week experiment with 1,095 participants in late 2015 in Denmark, this study provides causal evidence that Facebook use affects our well-being negatively. By comparing the treatment group (participants who took a break from Facebook) with the control group (participants who kept using Facebook), it was demonstrated that taking a break from Facebook has positive effects on the two dimensions of well-being: our life satisfaction increases and our emotions become more positive. Furthermore, it was demonstrated that these effects were significantly greater for heavy Facebook users, passive Facebook users, and users who tend to envy others on Facebook.

COMMENT [from Haidt]: This is a relatively low quality experiment: There were no

checks to be sure users complied with instructions, and the experiment ran for just one week. Also, as Sonia Livingston points out, the avg age of participants in the study was 34.
[Age group: Adults]
[Time period between waves: 1 week]

3.1.11 Hunt, All, Burns, & Li (2021). Too much of a good thing: Who we follow, what we do, and how much time we spend on social media affects well-being. *Journal of Social and Clinical Psychology.*

ABSTRACT: INTRODUCTION: Given previous experimental research on the benefits of limiting time spent on social media and correlational research linking active use to better well-being, we designed an experimental study to investigate the effects of limiting time and increasing active use on social media on well-being.
METHOD: After completing a survey on who they followed on social media and undergoing a week of baseline monitoring, 88 undergraduates at a private university were randomly assigned to either **limit Facebook, Instagram, Twitter, and Snapchat use to 30 minutes in total per day and increase their active use, just limit their use to 30 minutes per day, or continue to use social media as usual for three weeks.**
RESULTS: The initial survey revealed that following more friends was negatively correlated with loneliness whereas following more strangers was positively correlated with depression. **Highly depressed participants in the limited-use group showed significant reductions in depression compared to the control group**, but the active group did not show similar benefits. **Highly active participants in the active group reported greater loneliness and anxiety and lower self-esteem at week 4 compared to less active participants in the active group,** whereas the most passive participants in the control group showed the worst depression overall.
DISCUSSION: Our findings suggest that following friends rather than strangers and limiting time spent on social media may lead to significant improvements in well-being, and that moderately active engagement may be the most adaptive.
[Age group: Undergraduate students]
[Time period between waves: 3 weeks]

3.1.12 Thai, Davis, Stewart, Gunnell, & Goldfield (2021). The Effects of Reducing Social Media Use on Body Esteem Among Transitional-Aged Youth. *Journal of Social and Clinical Psychology*.

ABSTRACT: INTRODUCTION: Social media use (SMU) and body image concerns are highly prevalent in youth. Although several studies have shown that high SMU is crosssectionally associated with lower body esteem, experimental evidence is lacking. This pilot study experimentally evaluated the effects of reducing SMU on body esteem among transitional aged youth (TAY) with emotional distress.
METHODS: **Thirty-eight undergraduate students** presenting with elevated symptoms of anxiety/depression were randomly assigned to the intervention (n = 16), where SMU was restricted to 60 minutes/day, or to the control group (n = 22), where SMU was not restricted. SMU was monitored via screen-time trackers in participants' smartphone submitted daily during **baseline (1-week) and intervention (3-week)** periods. Baseline and post-intervention measurements were taken to assess appearance and weight esteem as well as symptoms of anxiety and depression as secondary outcomes.
RESULTS: A significant group × time interaction emerged indicating that the intervention participants showed a significantly greater increase in appearance esteem over the 4 weeks compared to controls. There was no significant between-group difference on change in weight esteem. A significant group × time interaction emerge on **anxiety indicating that intervention participants showed a significantly greater improvement in anxiety over the study period compared to controls. There was no significant between-group difference on change in depressive symptoms.**
DISCUSSION: Reducing SMU may be a feasible and effective method of improving **appearance esteem and reducing anxiety in a high-risk population of TAY with emotional distress;** however, more high-quality randomized controlled trials are needed to confirm findings.
[Age group: Undergraduate students]
[Time period between waves: 3 weeks]

3.1.13 Reed, Fowkes, Khela (2023) Reduction in Social Media Usage Produces Improvements in Physical Health and Wellbeing: An RCT. *Journal of Technology in Behavioral Science.*

ABSTRACT: Social media usage has increased over recent years and has been associated with negative effects on health and wellbeing. This study explored whether reducing smartphone screentime would improve health and wellbeing. Fifty students completed a battery of questionnaires regarding their health, immune function, loneliness, sleep, anxiety, and depression. They were allocated randomly to groups either using smartphones as normal (No Change), reducing usage by 15 min per day (Reduce), or reducing use by 15 min and substituting another activity during this time

(Reduce + Activity). After 3 months, they completed the same questionnaires again. There was unexpectedly low compliance with the Reduce + Activity (leisure substitution) intervention. In contrast, there was a significant reduction in screentime for the Reduce group compared to the other two groups. There was a significant improvement in the Reduce group in general health, immune function, loneliness, and depression compared to the other groups. These findings extend previous results from similar studies and suggest limiting screentime may be beneficial to health and wellbeing.

[Age group: Students aged 18-30]
[Time period between waves: 3 months]

[Note: this is truly SM time reduction, not screen time reduction.]

3.1.14 Schwartz, Steinau, Kraus, & In-Albon (2022). The Effect of a 1-Week Abstinence From Instagram on Mental Health in Youth and Young Adults. *Kindheit und Entwicklung: Zeitschrift für Klinische Kinderpsychologie*.

ABSTRACT: THEORETICAL BACKGROUND*:* Results concerning the association between the use of social networking sites and mental health are so far inconsistent. OBJECTIVE*:* To investigate the effects of a 1-week abstinence from Instagram on depressive symptoms, self-esteem, and the role of social comparison orientation in youth.
METHODS*:* Participants were *N* = 298 youth (76.2 % f; mean age 22.28, *SD* = 2.25). Three groups were assigned: non-Instagram users (*n* = 113), Instagram users randomly assigned to a control group (CG, *n* = 106) with no change in their Instagram use, and an experimental group (EG, *n* = 79) that agreed to a 1-week abstinence. Participants completed questionnaires on depressive symptoms, self-esteem, social comparison orientation, and general mental state.
RESULTS*:* The EG and CG revealed a **reduction in depressive symptoms, an increase in self-esteem, and an improvement in general mental state**.
DISCUSSION AND CONCLUSION*:* The short-term positive effects of Instagram abstinence on mental health.
[Age group: M=16-27]
[Time period between waves: 1 week]

3.1.15 Brown & Kuss (2020). Fear of Missing Out, Mental Wellbeing, and Social Connectedness: A Seven-Day Social Media Abstinence Trial. *International Journal of Environmental Research and Public Health*.

ABSTRACT: Smartphones aid the constant accessibility of social media (SM) applications, and these devices and platforms have become a key part of our everyday lives and needs. Previous research has focused on the psychological impact of social media use (SMU) and SM abstinence has only received limited attention. Therefore, employing a combination of an experimental within-subjects mixed methodology using surveys to obtain both quantitative and qualitative data, this study aimed to compare psychosocial factors of fear of missing out (FoMO), mental wellbeing (MWB), and social connectedness (SC) before and after seven days of SM abstinence. Results revealed that participants (N = 61) experienced a **significant increase in MWB and SC, and a significant decrease in FoMO and smartphone use following SM abstinence**. There was a significant positive relationship between MWB and SC change scores and a significant negative relationship between SC and FoMO change scores. There were no significant differences in levels of SMU before abstinence or across genders in FoMO, MWB, and SC change scores. Thematic analysis revealed coping, habit, and boredom as motivations for SMU, and notification distractions presenting a challenge for successful abstinence from SM. Participants indicated that abstinence resulted in the perceived need to fill their time with non-SM applications. Finally, thematic analysis revealed mixed experiences of perceived connectivity in the absence of SMU. Findings present implications for the importance of unplugging from SM for temporary periods because scrolling through SM to fill time is a key motivator of SMU, and notifications encourage SMU and trigger FoMO.
[Age group: M=20-49]
[Time period between waves: 1 week]

3.1.16 Hesselle & Montag (2024). Effects of a 14-day social media abstinence on mental health and well-being: results from an experimental study. *BMC Psychology*.

ABSTRACT: BACKGROUND AND AIM: The study investigated the effects of a 14-day social media abstinence on various mental health factors using an experimental design with follow-up assessment. Hypotheses included positive associations between problematic smartphone use (PSU) and depression, anxiety, fear of missing out (FoMO), and screentime. Decreases in screentime, PSU, depression and anxiety, and

increases in body image were assumed for the abstinence group. Additionally, daily changes in FoMO and loneliness were explored.
METHODS: Participants completed different questionnaires assessing PSU, FoMO, depression and anxiety, loneliness and body image and were randomized into control and social media abstinence groups. Daily questionnaires over 14 days assessed FoMO, loneliness, screentime, and depression and anxiety. 14 days after the abstinence, a follow-up questionnaire was administered. Multilevel models were used to assess changes over time.
RESULTS: **PSU was positively associated with symptoms of depression, anxiety and FoMO, but not with screentime**. Spline models identified decreased screentime and body image dissatisfaction for the intervention group. **Depression and anxiety symptoms, PSU, trait and state FoMO, and loneliness, showed a decrease during the overall intervention time but no difference between the investigated groups could be observed (hence this was an overall trend).** For appearance evaluation and body area satisfaction, an increase in both groups was seen. Daily changes in both loneliness and FoMO were best modelled using cubic trends, but no group differences were significant.
DISCUSSION: Results provide insights into effects of not using social media for 14 days and show that screentime and body image dissatisfaction decrease. The study also suggests areas for future studies to better understand how and why interventions show better results for some individuals.
[Age group: M=23.66]
[Time period between waves: 2 weeks]

3.1.17 Hunt, Xu, & Fogelson (2023). Follow Friends One Hour a Day: Limiting Time on Social Media and Muting Strangers Improves Well-Being. *Journal of Social and Clinical Psychology*.

ABSTRACT: INTRODUCTION: Social media use is ubiquitous among young adults, and empirical research is increasingly suggesting that how it is used and how much time is spent using it have significant implications for psychological well-being and mental health. Most recent studies find that limiting but not eliminating social media has beneficial effects. Correlational findings suggest that following actual friends is beneficial, while following strangers can be harmful.
METHOD: This study sought to test the impact of limiting time spent on social media as well as “muting” strangers on Instagram and eliminating TikTok use in an experimental paradigm.

RESULTS: Replicating prior studies, **we found that limiting social media use to 60 minutes per day (versus unlimited use) led to reductions in depression**, F(1,96) = 5.84, p = .018, for the most depressed participants. Moreover, limiting stranger content (by muting strangers on Instagram and eliminating TikTok use), in addition to limiting time, led to **significant reductions in fear of missing out**, F(2,138) = 4.806, p = .01, for the most depressed participants and to significant reductions in social comparison, F(2,138) = 4.367, p = .015.
DiSCUSSION: In conclusion, it is not just how much time one spends on social media that matters to well-being, but how one uses that time and who one is interacting with.
[Age group: ?]
[Time period between waves: ?]

3.1.18 Wolgast, Lundberg, Palmqvist, & Wolgast (2023). Effects of Reduced and Altered Use of Social Networking Sites— A Randomized Controlled Study. *Journal of Social and Clinical Psychology*.

ABSTRACT: INTRODUCTION: The purpose of this study was to experimentally investigate the effects of changes in both quantity and quality of use of social networking sites (SNS) on measures of anxiety, depression, stress, self-esteem, loneliness, problematic social media use, and present focused awareness.
METHOD: Participants were randomly assigned to three different conditions: reducing SNS time to 30 minutes per day, using SNS passively; and a control condition.
RESULTS: The results indicated that both **reduced and altered SNS use had significant positive effects on present focused awareness and reductions in problematic social media use**. In addition, **reduced SNS use led to reductions in symptoms of stress and depression, as well as increases in self-esteem**.
DISCUSSION: The study provides experimental support for the hypothesis that reduced use of social networking sites leads to positive effects on measures of psychological well-being in young adults.
[Age group: ?]
[Time period between waves: ?]

3.1.19 Graham, Mason, Riordan, Winter, & Scarf (2021). Taking a Break from Social Media Improves Wellbeing Through Sleep Quality. *Cyberpsychology, Behavior, and Social Networking*.

ABSTRACT: As social media use has increased in prevalence, so have concerns that social media may be detrimental to mental health and wellbeing. The primary aim of the current study was to investigate whether limiting social media use leads to increases in wellbeing. A secondary aim was to assess whether sleep quality contributed to the hypothesized relationship between social media use and wellbeing. One hundred and thirty-two individuals participated in the current study, with half the participants limiting their use of Facebook, Instagram, and Snapchat for 1 week. Social media use was monitored by having participants email screen shots of their battery usage, which included information on the level of usage for Facebook, Instagram, and Snapchat. **Relative to a control group that did not limit social media use, taking a break from social media led to a small improvement in wellbeing. This improvement, at least in part, appears to be due to changes in sleep quality**.

[Age group: ?]
[Time period between waves: 1 week]

3.1.20 Fioravanti, Prostamo, & Casale (2020). Taking a Short Break from Instagram: The Effects on Subjective Well-Being. *Cyberpsychology, Behavior, and Social Networking*.

ABSTRACT: This study investigated whether abstaining from Instagram (Ig) affects subjective well-being among young men and women. By comparing an intervention group (40 participants who take a break from Ig for a week) with a control group (40 participants who kept using Ig), we found that **women who quitted Ig reported significantly higher levels of life satisfaction and positive affect than women who kept using it.** Whereas positive affect increment depended on social appearance comparison, life satisfaction rose independent of the tendency to compare one's own appearance with others. It is possible that users who are no longer exposed to direct evaluative feedback about their images on Ig—be it related to their appearance, habits, or opinions—can witness an increase in their global satisfaction levels. No significant effects were found among men.

[Age group: M=25.05]
[Time period between waves: 1 week]

3.1.21 Turel, Cavagnaro, & Meshi (2018). Short abstinence from online social networking sites reduces perceived stress, especially in excessive users. *Psychiatry Research*.

ABSTRACT: Online social networking sites (SNSs), such as Facebook, provide frequent and copious social reinforcers (e.g., “likes”) delivered at variable time intervals. As a result, some SNS users display excessive, maladaptive behaviors on these platforms. Excessive SNS users, and typical users alike, are often aware of their intense use and psychological dependence on these sites, which may lead to elevated stress. In fact, research has demonstrated that use of SNSs alone induces elevated stress. Other research has begun to investigate the effects of short periods of SNS abstinence, revealing beneficial effects on subjective wellbeing. We aligned these two lines of research and hypothesized that a short period of SNS abstinence would induce a reduction in perceived stress, especially in excessive users. The results confirmed our hypothesis and revealed that both **typical and excessive SNS users experienced reduction in perceived stress following SNS abstinence of several days**. The effects were particularly pronounced in excessive SNS users. The reduction in stress was not associated with academic performance increases. These results indicate a benefit—at least temporarily—of abstinence from SNSs and provide important information for therapists treating patients who struggle with excessive SNS use.

[Age group: M=24.01]
[Time period between waves: 1 week]

3.1.22 Brailovskaia (2023) Less social media use – more satisfied, work-engaged and mentally healthy employees: an experimental intervention study. *Behaviour and Information Technology*.

ABSTRACT
Intensive Social Media Use (SMU) can negatively impact employees’ work performance and mental health. The present experimental study investigated how a reduction of daily SMU time influences employees from different professional sectors in Germany. The experimental group (N = 84; age: M = 29.38, SD = 5.84) reduced its non-work-related SMU by 30 min daily for seven days; the control group (N = 82; age: M = 30.06, SD =

8.39) used Social Media (SM) as usual. Work-related variables and mental health-related variables were assessed via online surveys at three measurement time points (baseline; post-intervention; one-week follow-up). The intervention significantly **reduced the experience of work overload, stress symptoms, fear of missing out and addictive SMU. Work satisfaction, work engagement and positive mental health increased significantly**. The present findings reveal that less time spent on SMU leads to increased work motivation and higher levels of mental health. Employers and employees should take the present findings into account. Business coaching programmes, mental health promotion programmes and clinical interventions could benefit from the integration of a controlled reduction of SMU time.

[Age group: mature adults]
[Time period of experiment: 1 week]

3.1.23 Arceneaux, Foucault, Giannelos, Ladd, & Zengin (2024). Facebook increases political knowledge, reduces well-being and informational treatments do little to help. *Royal Society Open Science*.

ABSTRACT: Nearly three billion people actively use Facebook, making it the largest social media platform in the world. Previous research shows that the social media platform reduces users' happiness, while increasing political knowledge. It also may increase partisan polarization. Working to build a scientific consensus, we test whether the potential negative effects of Facebook use can be overcome with the help of minimalist informational interventions that a parallel line of research has shown to be effective at inducing people to be more accurate and civil. We conducted a pre-registered well-powered Facebook deactivation experiment during the 2022 French presidential election. In line with previous research, we find that **deactivating Facebook increases subjective well-being and reduces political knowledge**. However, deactivating Facebook had no overall effect on the level of political or social polarization during the election. Moreover, we find little evidence that minimalist informational interventions in a field setting helped individuals who deactivated Facebook to become better informed.

[Age group: adults, 18+]
[Time period of experiment: 24 days]

3.1.24 Allcott, … & Tucker (working paper). The Effect of Deactivating Facebook and Instagram on Users' Emotional State.

ABSTRACT: We estimate the effect of social media deactivation on users' emotional state in two large randomized experiments before the 2020 U.S. election. People who deactivated Facebook for the six weeks before the election reported a 0.060 standard deviation improvement in an index of happiness, depression, and anxiety, relative to controls who deactivated for just the first of those six weeks. People who deactivated Instagram for those six weeks reported a 0.041 standard deviation improvement relative to controls. Exploratory analysis suggests the Facebook effect is driven by people over 35, while the Instagram effect is driven by women under 25.

[Age group: adults, 18+]
[Time period of experiment: 6 weeks]

3.1.25 Thimm-Kaiser & Keyes (2025). Small effects, big questions: the unfinished business of social media restriction science. SSM Mental Health.

EXCERPT: A large and growing body of research has sought to examine the relationship between social media use and indicators of mental wellbeing and distress, but the largely observational nature of this work has raised concerns regarding firm conclusions on causality. Randomized controlled trials (RCTs) evaluating effects of interventions to restrict (i.e., reduce or pause) social media use compared against control conditions with as-usual use hold the potential for more definitive answers. In this issue, Burnell et al. (2025) meta-analyzed thirty-two such RCTs, summarizing the state of the evidence regarding the effects social media restriction interventions on several domains of wellbeing, including but not limited to depressive and anxiety symptoms. The authors advance the field by presenting convincing evidence that reducing or pausing social media use improves, to a relatively small degree, some domains of wellbeing for some people. However, as Burnell *et al.* carefully note, much about the effects of social media use and of social media use restriction on mental wellbeing and distress remains incompletely understood.

3.1.26 Goldfield et al. (2026). Reducing social media use decreases loneliness regardless of gender or level of social comparisons in youth with anxiety and depression: A randomized controlled trial. *Journal of Affective Disorders*.

ABSTRACT: Loneliness and feeling socially isolated is especially problematic in youth experiencing anxiety and depressive symptoms. Social media use (SMU) was designed to promote social connection, but correlational studies suggest it is often associated with greater loneliness and mental health problems, with girls and those who engage in more frequent upward social comparisons being more negatively impacted by SMU. However, experimental studies are needed to gain insights into causality, especially in a vulnerable population of youth with affective distress. The present study experimentally investigated the effects of voluntarily reducing SMU to 1 h/day on loneliness, and whether intervention effects were moderated by gender and/or baseline levels of social comparisons in youth with pre-existing symptoms of anxiety and/or depression. After completing a baseline survey and providing daily screenshots of SMU for one week, 260 participants were randomly assigned to an intervention (reduce SMU to 1 h/day) or control group (no SMU restriction) for the next three weeks. A total of 219 participants completed the study and were included for analysis. **Mixed models indicated a significant group x time interaction whereby the intervention group showed significantly greater reductions in loneliness compared to controls** (β = -0.11, 95% CI [-0.21, -0.005]). However, neither gender (β = 0.23, 95% CI [-0.16, 0.63]) nor baseline social comparison (β = -0.04, 95% CI [-0.24, 0.15]) moderated these intervention effects. These findings suggest that reducing SMU may represent an important intervention component in a comprehensive approach to combating loneliness among a vulnerable population of youth presenting with affective distress.

3.1.27 Sullivan et al. (2026). Innovations in practice: A pilot randomized trial on smartphone and social media abstinence: Effects on sleep quality and psychological well-being in adolescents. [pre-print]

ABSTRACT: There is growing concern that smartphones and social media (S/SM) disrupt adolescent sleep, wellbeing and cognition, yet causal evidence from robust interventions is limited. To assess the acceptability of a total 21-day S/SM detox we conducted a preregistered (https://osf.io/79zd2) pilot randomised control trial with eighty-two adolescents aged 13-18 years from UK schools. Participants were randomly assigned to a total S/SM detox (N=26), total S/SM detox with access to a basic “brick” phone (N=26) or a business-as-usual control (N=30). Pre-and postintervention measures of sleep, wellbeing, and cognition were collected using surveys, wearables, and cognitive tasks. Retention was high, with 13% attrition across groups. **At 21- days, one or both detox groups showed tentative improvements in sleep duration, daytime sleepiness, depressive symptoms, perceived stress, and working**

memory relative to the controls, however these changes were not maintained at a two-month follow-up. Open-ended post-detox reflections reflected a range of both positive and negative experiences, with reported challenges including boredom, functional reliance on smartphones, and fear of missing out. Nevertheless, 83% endorsed the need for government action. Digital detoxes appear feasible for generating causal evidence; however, they can also pose functional challenges to young people. Fully powered trials should address these challenges, potentially via more targeted intervention approaches (e.g. switching off the internet on smartphones, particularly at bedtime).

[Other studies? What have we missed?]

3.2: REDUCTION EXPERIMENTS SUGGESTING THAT SOCIAL MEDIA IS BENEFICIAL OR NOT HARMFUL

Studies in this section show a deterioration in the mental health of those who reduced their social media use. This might suggest that social media reduction is harmful and social media itself is beneficial. However, many of the experiments in this section were conducted over the course of a short period of time (less than a week), so their results might suggest that social media is actually addictive and abstinence or reduction causes withdrawal symptoms (such as worsened mood or subjective well-being) in the short term.

3.2.1 Hall, Xing, Ross, & Johnson (2019). Experimentally manipulating social media abstinence: results of a four-week diary study. *Media Psychology.*

ABSTRACT: Social media use has a weak, negative association with well-being in cross-sectional and longitudinal research, but this association in experimental studies is mixed. This investigation explores whether social media abstinence leads to improved daily well-being **over four weeks of time**. Community and undergraduate participants (N = 130) were randomly assigned to five experimental conditions: no change in social media use, and one week, two weeks, three weeks, and four weeks abstinence from social media (i.e., Facebook, Twitter, Instagram, Snapchat). All participants completed a daily diary measuring loneliness, well-being, and quality of day. **Results showed no**

main effect of social media abstinence. The duration of abstinence was not associated with change in outcomes and order of abstinence did not explain variance in outcomes. Results are consistent with trivial effects detected in large cross-sectional research, and call into question the causal relationship between social media and well-being on the daily level.
[age group: undergrauate students]
[Time period of experiment: 4 weeks]
[Note from Haidt: with n=130 divided into 5 groups, that is just 26 participants per cell, which is very underpowered]

3.2.2 Collis & Eggers (2022). Effects of restricting social media usage on wellbeing and performance: A randomized control trial among students. *PLoS One.*

ABSTRACT: Recent research has shown that social media services create large consumer surplus. Despite their positive impact on economic welfare, concerns are raised about the negative association between social media usage and performance or well-being. However, causal empirical evidence is still scarce. To address this research gap, we conduct a randomized controlled trial among students in which we track participants' digital activities over the course of three quarters of an academic year. In the experiment, we randomly allocate half of the sample to a treatment condition in which social media usage is restricted to a maximum of 10 minutes per day. **We find that participants in the treatment group substitute social media for instant messaging and do not decrease their total time spent on digital devices. Contrary to findings from previous correlational studies, we do not find any impact of social media usage on well-being and academic success.** Our results also suggest that antitrust authorities should consider instant messaging and social media services as direct competitors before approving acquisitions.
[age group: undergrauate students]
[Time period of experiment: 7 weeks]

[NOTE: 7 week reduction to 10 minutes per day. This study is notable for using an objective measure of social media activity by installing special software on all of each participants' devices, and also for tracking participants for a long period of time -- three academic quarters. The key intervention lasted for about 7 weeks, which is a good long time]

3.2.3 van Wezel, Abrahamse, & Vanden Abeele (2021). Does a 7-day restriction on the use of social media improve cognitive functioning and emotional well-being? Results from a randomized control trial. *Addictive Behaviors Reports.*

ABSTRACT: INTRODUCTION: Screen time apps that allow smartphone users to manage their screen time are assumed to combat negative effects of smartphone use. This study explores whether a social media restriction, implemented via screen time apps, has a positive effect on emotional well-being and sustained attention performance.

METHODS: A randomized controlled trial (N = 76) was performed**, exploring whether a week-long 50% reduction in time spent on mobile Facebook, Instagram, Snapchat and YouTube is beneficial to attentional performance and well-being as compared to a 10% reduction.**

RESULTS: Unexpectedly, several participants in the control group pro-actively reduced their screen time significantly beyond the intended 10%, dismantling our intended screen time manipulation. Hence, we analyzed both the effect of the original manipulation (i.e. treatment-as-intended), and the effect of participants' relative reduction in screen time irrespective of their condition (i.e. treatment-as-is). **Neither analyses revealed an effect on the outcome measures. We also found no support for a moderating role of self-control, impulsivity or Fear of Missing Out. Interestingly, across all participants behavioral performance on sustained attention tasks remained stable over time, while perceived attentional performance improved. Participants also self-reported a decrease in negative emotions, but no increase in positive emotions.**

CONCLUSION: We discuss the implications of our findings in light of recent debates about the impact of screen time and formulate suggestions for future research based on important limitations of the current study, revolving among others around appropriate control groups as well as the combined use of both subjective and objective (i.e., behavioral) measures.

[age group: undergrauate students]
[Time period of experiment: 1 week]
[note:small sample size, compromised manipulation]

3.2.4 Przybylski, Nguyen, Law & Weinstein (2021). Does Taking a Short Break from Social Media Have a Positive Effect on Well-being? Evidence from Three Preregistered Field Experiments. *J. of Technology in Behavioral Science.*

Concerns about the consequences of social media use on well-being has led to the practice of taking a brief hiatus from social media platforms, a practice known as "digital

detoxing." These brief "digital detoxes" are becoming increasingly popular in the hope that the newly found time, previously spent on social media, would be used for other, theoretically more rewarding, activities. In this paper, we test this proposition. Participants in three preregistered field experiments (ntot = 600) were **randomly assigned to receiving each of two conditions on each of two different days: a normal-use day or an abstinence day.** Outcomes (social relatedness, positive and negative affect, day satisfaction) were measured on each of the two evenings of the study. Results did not show that abstaining from social media has positive effects on daily well-being (in terms of social relatedness, positive and negative affect, day satisfaction) as suggested by the extant literature. **Participants reported similar well-being on days when they used social media and days when they did not. Evidence indicated that abstinence from social media had no measurable positive effect on well-being, and some models showed significant deficits in social relatedness and satisfaction with one's day**. We discuss implications of the study of social media hiatus and the value of programmatic research grounded in preregistered experimental designs.
[age group: undergrauate students]
[Time period of experiment: 1 day]

[COMMENT FROM HAIDT: If social media is addictive, then short breaks, such as one day in this study, could make users feel worse. Experiments that involve a week or more of abstinence are most valuable]
@@

3.2.5 Mahalingham, Howell, & Clarke (2023). Assessing the effects of acute reductions in mobile device social media use on anxiety and sleep. *Journal of Behavior Therapy and Experimental Psychiatry*.

ABSTRACT: BACKGROUND: Research has consistently suggested social media exerts negative effects on sleep and anxiety. Researchers have however, relied heavily on self-report measures of social media use and correlational designs. The present study employed an experimental manipulation to examine the effects of an acute reduction of social media use over a one-week period to assess the potential causal role of social media use in anxiety and sleep quality.
METHODS: Baseline social media use across one week was captured via smartphones, in addition to questionnaire measures of anxiety and sleep quality in a group of 93 unselected participants (female = 48, male = 43, did not specify = 2). Participants were then **randomly assigned to suspend social media use for one**

week, whilst the other half used social media as normal. At the end of this week participants returned for a second data collection session where the same measures were re-administered.
RESULTS: **No evidence of a causal effect of social media use on anxiety or sleep quality was observed.**
LIMITATIONS: While capturing objective mobile social media data, future research could also benefit from incorporating usage data from computers and other devices.
CONCLUSIONS: The discussion considers the possibility that the findings may represent the genuine absence of such a relationship versus the failure to detect an extant relationship and the importance of including objective measures of social media use.
[age group: undergrauate students]
[Time period of experiment: 1 week]

[NOTE from Haidt: This study had a relatively small sample size (n = 93) in which half reduced social media use for a short time (1 week). The first days of reduced use sometimes cause increased anxiety, and it may take people a while to adapt to the new rhythms. It would be good to see a much larger sample reducing usage for at least a month, or simply banning it within 2 hours of bedtime.]

3.2.6 Vanman EJ, Baker R, Tobin SJ (2018). The burden of online friends: the effects of giving up Facebook on stress and well-being. *J Soc Psychol.*

ABSTRACT: People occasionally choose to cut themselves off from their online social network by taking extended breaks from Facebook. This study investigated whether abstaining from Facebook reduces stress but also reduces subjective well-being because of the resulting social disconnection. Participants (138 active Facebook users) were assigned to either a condition in which they were instructed to give up Facebook for 5 days or continue to use Facebook as normal. Perceived stress and well-being, as well as salivary cortisol, were measu**red before and after the test period. Relative to those in the Facebook Normal condition, those in the No Facebook condition experienced lower levels of cortisol and life satisfaction. Our results suggest that the typical Facebook user may occasionally find the large amount of social information available to be taxing, and Facebook vacations could ameliorate this stress—at least in the short term.**
[age group: 18-40 Median 23]
[Time period of experiment: 5 days]

[NOTE: **The results of this study are mixed:** lower cortisol/stress, but also lower subjective well being. Also note that this study uses a very short duration: 5 days of cold-turkey should lead to withdrawal symptoms for those with problematic use, according to Anna Lembke, not to happiness]

3.2.7 Vally & D'Souza (2019). Abstinence from social media use, subjective well-being, stress, and loneliness. *Perspectives in Psychiatric Care*.

ABSTRACT: PURPOSE: Studies with experimental designs in which the association between participants' subjective well-being and their use of social media is studied remain rare. This study tested the effect of abstaining from social media use on participants' well-being, affect, perceived stress, and sense of perceived loneliness.
DESIGN AND METHODS: Randomized, controlled design. Sixty-eight participants were randomized to one of two conditions.
FINDINGS: Those who abstained from social media use, compared with those in the control group, evidenced a decline in life satisfaction, an increase in negative affect, and an increase in loneliness.
PRACTICE IMPLICATIONS: Excessive social media use poses deleterious consequences for users, but abstinence may not necessarily exact positive changes; this outcome is dependent on the functions for which social media are used.

3.2.8 Hanley, Watt, & Coventry (2019). Taking a break: The effect of taking a vacation from Facebook and Instagram on subjective well-being. *PLOS One*.

ABSTRACT: Social Networking Sites (SNS) such as Facebook and Instagram have relocated a large portion of people's social lives online, but can be intrusive and create social disturbances. Many people therefore consider taking an "SNS vacation." We investigated the effects of a one-week vacation from both Facebook and Instagram on subjective well-being, and whether this would vary for passive or active SNS users. Usage amount was measured objectively, using RescueTime software, to circumvent issues of self-report. Usage style was identified at pre-test, and SNS users with a more active or more passive usage style were assigned in equal numbers to the conditions of one-week SNS vacation (n = 40) or no SNS vacation (n = 38). Subjective well-being (life satisfaction, positive affect, and negative affect) was measured before and after the vacation period. At pre-test, more active SNS use was found to correlate positively with life satisfaction and positive affect, whereas more passive SNS use correlated positively with life satisfaction, but not positive affect. **Surprisingly, at post-test the SNS vacation resulted in lower positive affect for active users and had no significant**

effects for passive users. This result is contrary to popular expectation, and indicates that SNS usage can be beneficial for active users. We suggest that SNS users should be educated in the benefits of an active usage style and that future research should consider the possibility of SNS addiction among more active users.

[Age group: M=18-48]
[Time period between waves: 1 week]

3.2.9 Walsh, Regan, Okabe-Miyamoto, & Lyubomirsky (2024). Does putting down your smartphone make you happier? the effects of restricting digital media on well-being. *PLOS One*.

ABSTRACT: Both scientists and laypeople have become increasingly concerned about smartphones, especially their associated digital media (e.g., email, news, gaming, and dating apps) and social media (e.g., Facebook, Instagram, Snapchat). Recent correlational research links substantial declines in Gen Z well-being to digital and social media use, yet other work suggests the effects are small and unnoteworthy. To help further disentangle correlation from causation, we conducted a preregistered 8-day experimental deprivation study with Gen Z individuals (N = 338). Participants were randomly assigned to one of four conditions: (1) restrict digital media (i.e., smartphone) use, (2) restrict social media use, (3) restrict water use (active control), or (4) restrict nothing (measurement-only control). Relative to controls, participants restricting digital media reported a variety of benefits, including higher life satisfaction, mindfulness, autonomy, competence, and self-esteem, and reduced loneliness and stress. In contrast, **those assigned to restrict social media reported relatively few benefits (increased mindfulness) and even some potential costs (increased negative emotion).**

[Other studies? What have we missed?]

3.3: EXPOSURE EXPERIMENTS INDICATING THAT SOCIAL MEDIA IS HARMFUL

In social media exposure studies, participants are asked to use a type of social media in a controlled setting, typically for a number of minutes. Outcome variables related to mental health, such as loneliness, mood, or body image, are measured before and after and compared to those in a control group.

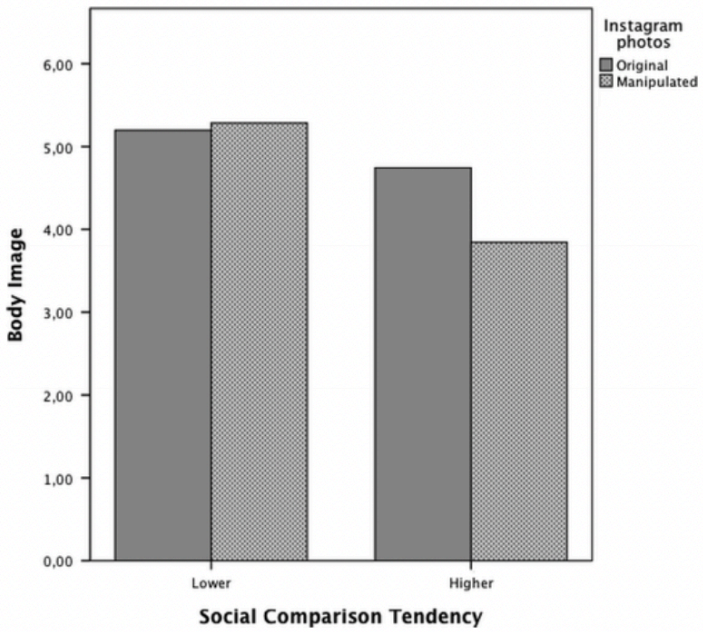
3.3.1 Sagioglou & Greitemeyer (2014). Facebook's emotional consequences: Why Facebook causes a decrease in mood and why people still use it. *Computers in Human Behavior.*

3.3.2 Kleemans, Daalmans, Carbaat, & Anschütz (2018). Picture Perfect: The Direct Effect of Manipulated Instagram Photos on Body Image in Adolescent Girls. *Media Psychology*.

ABSTRACT: This study investigates the effect of manipulated Instagram photos on adolescent girls' body image, and whether social comparison tendency moderates this relation. A between-subject experiment was conducted in which 144 girls (14–18 years old) were randomly exposed to either original or manipulated (retouched and reshaped) Instagram selfies. **Results showed that exposure to manipulated Instagram photos directly led to lower body image. Especially, girls with higher social comparison tendencies were negatively affected by exposure to the manipulated photos. Interestingly, the manipulated photos were rated more positively than the original photos.** Although the use of filters and effects was detected, **reshaping of the bodies was not noticed very well.** Girls in both conditions reported to find the pictures realistic. Results of this study implied that the recent societal concern about the effects of manipulated photos in social media might be justified, especially for adolescent girls with a higher social comparison tendency.
[age group: 14-18]
##

FIGURE:

Figure 2. Effect of manipulated versus original Instagram photos on body image among girls with a lower and higher social comparison tendency.



3.3.3 Yuen, Koterba, Stasio, et al. (2019). The effects of Facebook on mood in emerging adults. *Psychology of Popular Media Culture.*

ABSTRACT: Social media usage is on the rise, with the majority of American adults using Facebook. The present study examined how Facebook activity affects mood in a subset of emerging adults, specifically undergraduates attending a private 4-year university. Participants (N = 312) were randomly assigned to one of the following 20-min activities: browse the Internet, passively browse others' Facebook profiles, actively communicate with others on Facebook via messages/posts, or update their own personal profile on Facebook. Participants also completed questionnaires assessing mood, feelings of envy, and perceived meaningfulness of their time online. The results demonstrated that **using Facebook led to significantly worsened mood compared with browsing the Internet, especially when participants passively browsed Facebook.** Furthermore, perceptions of meaningfulness, but not feelings of envy, mediated the relationship between online activity and mood. Overall, these findings add to the mounting evidence that social media use may, at times, adversely affect psychological well-being.
[age group: college students]

##

Figure:

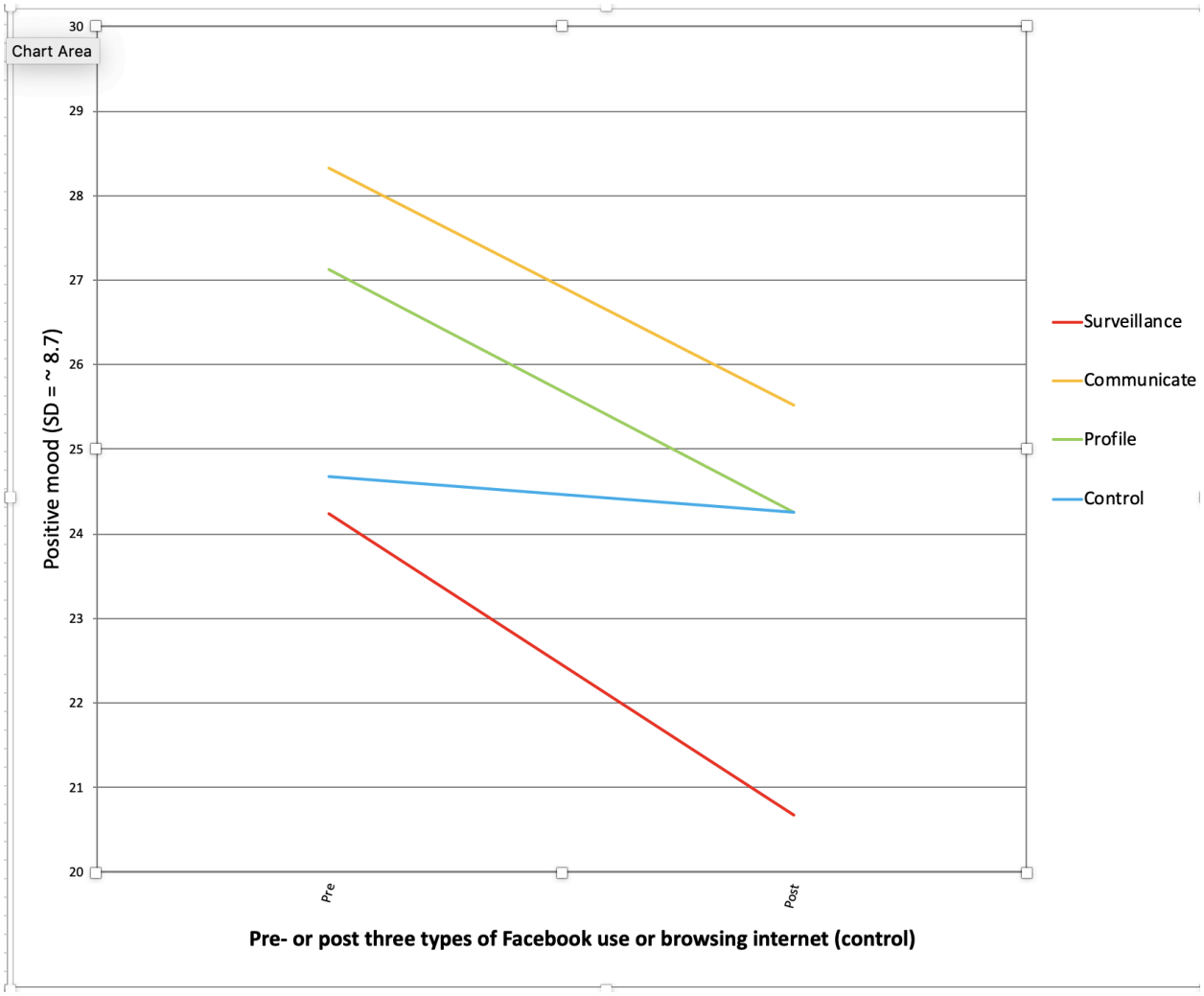


Figure: Mean for PANAS positive mood pre- and post three types of Facebook use (surveillance: browse and view but do not post messages; communicate: post on others' timelines, comment on posts, send messages; profile: view, edit, or add content to "about me" or respond to others' comments on their profile pages) vs. control task (browse the web but do not visit e-mail, SNS, chatrooms, message boards, or dating sites). [graphed by Jean Twenge]

COMMENTS [by Twenge]: It's impressive that these effects appear after only 20 minutes of use. The effects are moderate in size, about d = .42 for surveillance, d = .31 for communicate, and d = .34 for profile. (Though I'd love to see the variation in the effect -- say, the shift in the % who were very low in positive mood). In addition, those in the Facebook conditions felt less meaning than those who browsed the web doing other

things, and this effect was large (d = .71). However, there were no significant effects for negative mood or envy. The mediation by meaningfulness is interesting: Perhaps social media lowers positive mood partially because people feel empty afterward? Or because they realize they have wasted their time and should have been doing something else?

3.3.4 Ozimek & Bierhoff (2019). All my online-friends are better than me – three studies about ability-based comparative social media use, self-esteem, and depressive tendencies. *Behaviour & Information Technology*.

ABSTRACT: We conducted three studies to assess short-term and long-term effects of social comparative SNS use on self-esteem and depressive tendencies. In Study 1 (N = 75) we found in an exposure experiment including two experimental groups and one control group that social comparative internet use decreased participants' performance-oriented state self-esteem as a short-term effect. In Study 2 and 3(Ns = 809, 145) results of the serial multiple mediator model indicated that passive Facebook use is associated with higher depressive tendencies mediated by a higher ability-related social comparison orientation and lower self-esteem as long-term effect. To obtain more generalisable findings, we transferred the serial multiple mediator model successfully from private to professional SNS use (Study 3).
[Age group: Adults]

3.3.5 Engeln, Loach, Imundo, & Zola (2020). Compared to Facebook, Instagram use causes more appearance comparison and lower body satisfaction in college women. *Body Image*.

ABSTRACT: The current experiment tested the effect of social media use on college women's appearance comparisons, mood, and body satisfaction. We randomly assigned 308 undergraduate women (aged 18–26) to use Facebook, use Instagram, or play a matching game (the control condition) on an iPad for seven minutes. Compared to the Facebook condition, Instagram users retrospectively reported spending more time viewing images or videos containing people. Participants in both the Facebook and Instagram conditions also retrospectively reported engaging in more appearance comparisons relative to those in the control condition, but Instagram users reported significantly more appearance comparisons than those in the Facebook condition. **Those who used Instagram, but not Facebook, showed decreased body satisfaction, decreased positive affect, and increased negative affect.** Results are consistent with previous research suggesting social media use influences body

satisfaction and social comparison, and that Instagram may be a particularly harmful platform when it comes to body image because of its focus on photos over text.
[Age group: 18-26]
##

3.3.6 Sherlock, & Wagstaff (2019). Exploring the relationship between frequency of Instagram use, exposure to idealized images, and psychological well-being in women. *Psychology of Popular Media Culture.*

ABSTRACT: Research on the mental health effects of social networking have predominantly focused on Facebook, with limited research investigating the effects of Instagram on psychological well-being. This study aimed to address the link between Instagram use and a range of psychological variables in two parts. Participants were 129 women aged between 18 and 35 years. In Part 1, women completed a series of questionnaires related to mental health outcomes and self-perceptions. Results showed that the **frequency of Instagram use is correlated with depressive symptoms, self-esteem, general and physical appearance anxiety, and body dissatisfaction and that the relationship between Instagram use and each of these variables is mediated by social comparison orientation.** In Part 2, participants were exposed to a range of either beauty, fitness, or travel Instagram images (or a control condition with no images). **Beauty and fitness images significantly decreased self-rated attractiveness, and the magnitude of this decrease correlated with anxiety, depressive symptoms, self-esteem, and body dissatisfaction.** Therefore, excessive Instagram use may contribute to negative psychological outcomes and poor appearance-related self-perception, in line with prior research. The research has implications for interventions and education about chronic Instagram use.
[Age group: 18-35]
##

3.3.7 Lowe-Calverley, E., & Grieve, R. (2021). Do the metrics matter? An experimental investigation of Instagram influencer effects on mood and body dissatisfaction. *Body image*.

Instagram is saturated with content from ‘influencers’, users who create high-quality idealised content, attain celebrity-level following, and often leverage their popularity to earn money through brand partnership/promotion. Although existing literature generally indicates the negative impact of idealised Instagram imagery on female psychological wellbeing, influencer imagery has yet to receive thorough attention. We investigated the impact of high versus low popularity influencer images on mood and body

dissatisfaction. Adult women (N = 111, aged 17–40) were randomly allocated to one of three groups: either (1) the influencer-high group (idealised imagery alongside high 'like'/follow metrics); (2) the influencer-low group (the same idealised imagery adjusted for low popularity metrics); or (3) a nature control group with matched low-popularity metrics. **Results revealed significantly higher negative mood and body dissatisfaction within the two influencer imagery groups compared with the control group.** Interestingly, comparisons revealed no significant differences between the influencer-high and influencer-low groups on mood and body dissatisfaction. The findings suggest that users should be aware of the potentially negative impacts of viewing idealised influencer imagery, regardless of whether the content is high or low in popularity.

[Age group: 17-40]
[NOTE: this experiment is with women aged 17-40, so mostly not teens, but still relatively young.]

3.3.8 Pritchard & Button (2023). #Instabod versus #BoPo: An experimental study of the effects of viewing idealized versus body-positive content on collegiate males' and females' body satisfaction. *Psychology of Popular Media*.

ABSTRACT: Multiple studies have reported the harmful effects of appearance-related social media content on women's body image; however, few studies have examined gender differences in the impact of Instagram images on body satisfaction and body appreciation. In addition, no studies have examined the influence of body-positive images on males' body image and body appreciation. Thus, the purpose of the present study was to examine the influence of three different types of Instagram posts (idealized, body-positive, and nature images) on males' and females' body satisfaction and appreciation. Three hundred seventy-one emerging adults (18–29 years old) viewed one of three sets of Instagram posts based on gender and completed body image measures before and after viewing those images. **While the experimental condition only impacted overall posttest body satisfaction in females, when the salience of the images was highlighted by asking about how viewing these Instagram posts made them feel about specific body parts, both males' and females' feelings about their bodies seemed to be negatively affected by idealized Instagram images and positively affected by viewing body-positive posts. However, while females' body image may benefit more from viewing body-positive images than idealized or nature images, males seem to benefit from viewing nonidealized images (either body-positive or nature images).**

[Age group: *M*=18-29]

3.3.9 Lepp, & Barkley (2022). The experimental effect of social media use, treadmill walking, studying, and a control condition on positive and negative affect in college students. *Current Psychology: A Journal for Diverse Perspectives on Diverse Psychological Issues.*

ABSTRACT: Using a within-subjects design, this study assessed the experimental effect of common activities upon positive and negative affect scores in a college student sample. All participants completed the following 30-minute activity conditions: treadmill walking, self-selected schoolwork (i.e., studying), social media use, and a control condition where participants sat in a quiet room (i.e., do nothing). Positive and negative affect scores were assessed at baseline, mid-, and post-condition. Positive affect scores increased by 26% and 10% during the treadmill and studying conditions, respectively. **Conversely, positive affect decreased by 20% and 24% during the social media and "do nothing" conditions, respectively.** Furthermore, negative affect was decreased by 8% in the studying condition. These changes were statistically significant ($p \leq 0.04$). This suggests that college students' everyday activities can significantly impact affect, for better and for worse. As demonstrated, studying and walking may improve affect, whereas social media use may negatively impact affect.
[Age group: College students]
[Time period between waves: 1 day]

[The sample size in this study was very small: N = 40]

3.3.10 Tartaglia & Bergagna (2022). Social networking sites passive use and its effects on sad-happy mood. *Psihologija.*

ABSTRACT: The social comparison theory explains some negative effect of social networking sites (SNSs) use. These Internet applications have made easier the online social comparison that in turn predicts depression and lower life satisfaction. Individuals prone to depression engage in greater levels of social comparison, particularly with others who are thought to be slightly better off, and experience a decrease in mood or self-esteem in the light of others' perceived happiness. The present study aimed at investigating the impact of the use of SNSs on the mood in an experimental design. In total, **120 university students** were randomly assigned to one of two groups. In the experimental groups, the participants were instructed to **access their Facebook and browse personal profiles for 20 minutes; while in the control, they read articles.**

For the participants with initial **low mood using Facebook further lowered their mood whereas for the other participants did not have any effect.** Furthermore, using **Facebook lowered the mood of the participants not accustomed to use it frequently.**
[Age group: Undergraduate students]

3.3.11 Mills, Musto, Williams, & Tiggemann (2018). "Selfie" harm: Effects on mood and body image in young women. *Body Image*.

ABSTRACT: "Selfies" (self-taken photos) are a common self-presentation strategy on social media. This study experimentally tested whether taking and posting selfies, with and without photo-retouching, elicits changes to mood and body image among young women. Female undergraduate students (N = 110) were randomly assigned to one of three experimental conditions: taking and uploading either an untouched selfie, taking and posting a preferred and retouched selfie to social media, or a control group. State mood and body image were measured pre- and post-manipulation. As predicted, there was a main effect of experimental condition on changes to mood and feelings of physical attractiveness. **Women who took and posted selfies to social media reported feeling more anxious, less confident, and less physically attractive afterwards compared to those in the control group. Harmful effects of selfies were found even when participants could retake and retouch their selfies**. This is the first experimental study showing that taking and posting selfies on social media causes adverse psychological effects for women.
[Age group: Undergraduate Students]

3.3.12 Hogue & Mills (2018). The effects of active social media engagement with peers on body image in young women. *Body Image*.

ABSTRACT: This experimental study examined the effects of engaging on social media with attractive female peers on young adult women's body image. Participants were 118 female undergraduate students randomly assigned to one of two experimental conditions. Participants first completed a visual analogue scale measure of state body image and then either browsed and left a comment on the social media site of an attractive female peer (n = 56) or did the same with a family member (n = 62) and then completed a post-manipulation visual analogue scale measure of state body image. A 2 × 2 mixed analysis of variance showed a significant interaction between condition and time. Follow-up t-tests revealed that young adult women who engaged with an attractive

peer on social media subsequently experienced an increase in negative body image (dependence-corrected d = 0.13), whereas those who engaged with a family member did not (dependence-corrected d = 0.02). The findings suggest that upward appearance comparisons on social media may promote increased body image concerns in young adult women.
[Age group: Undergraduate Students]

[Other studies? What have we missed?]

3.4: EXPOSURE EXPERIMENTS INDICATING THAT SOCIAL MEDIA IS BENEFICIAL OR NOT HARMFUL

[Other studies? What have we missed?]

3.5: QUASI-EXPERIMENTS THAT DO INDICATE HARMFUL EFFECT OF TECHNOLOGIES RELATED TO SOCIAL MEDIA USE

Although broadband internet access is not a direct measurement of social media usage, it is a useful proxy for teen girls because one of the main things that they do online is social media. The arrival of broadband makes possible the "almost constantly" response that many teens give on Pew surveys about social media use.

3.5.1 Guo (working paper). Social media and mental health: Quasi experimental evidence.

ABSTRACT: Teenage mental health has been a source of growing concern over the past decade, with recent whistleblower testimony pointing to the mental health risks of spending time on social media platforms, especially for girls. This paper investigates the extent to which social media are harmful for teenagers, leveraging rich administrative

data from the Canadian province of British Columbia and quasi-experimental variation related to the rollout of wireless internet there. I show neighbourhoods covered by high-speed wireless internet have significantly higher social media use, based on Google search volumes. In the main analysis, I link federally-collected broadband data with 20 years of student records that provide detailed information about individual student health. I then estimate a triple-difference model using this novel data linkage, comparing teen girls to teen boys in terms of school-reported mental health diagnoses, before and after major social media launches, and across neighbourhoods with and without access to high-speed wireless internet. **Estimates suggest high-speed wireless internet significantly increased teen girls' mental health diagnoses -- by 90% -- relative to teen boys over the period when visual social media became dominant among teenagers. I find similar effects across all subgroups, indicating they are not driven by differences in confounding characteristics.** When applying the same strategy, I find null effects for placebo health conditions -- ones for which there is no clear channel for social media to operate. The evidence points to adverse effects of visual social media, in light of large gender gaps in visual social media use and documented risks. In turn, the analysis calls attention to policy interventions that could mitigate the harm to young people due to their online activities.

3.5.2 Arenas-Arroyo, Fernandez-Kranz, & Nollenberger (2025). High Speed Internet and the Widening Gender Gap in Adolescent Mental Health: Evidence from Hospital Records. *Journal of Health Economics*.

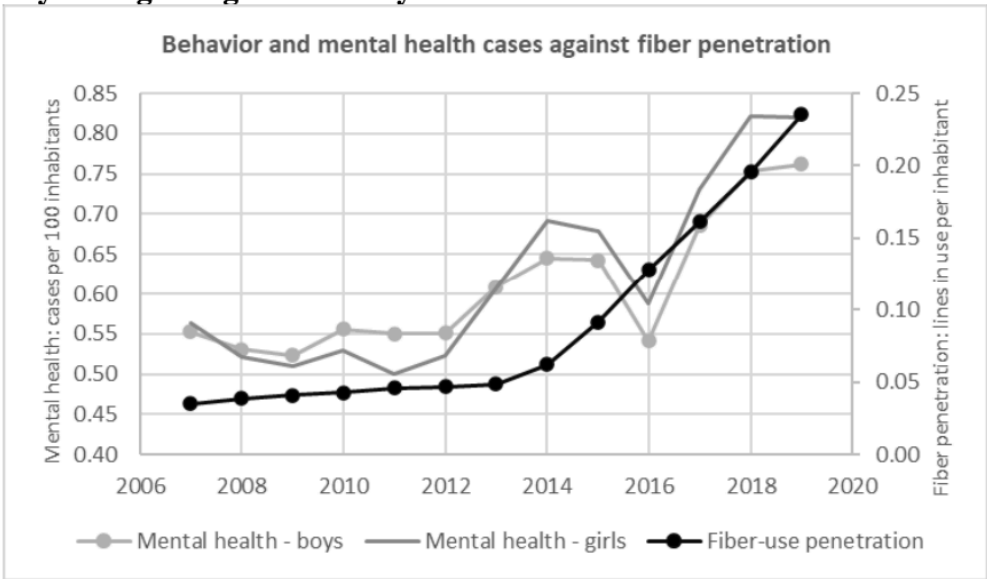
[NOTE: the independent variable here is not social media specifically; it is high speed internet access, which enables the transition to the “almost constant” use of social media that began to affect many girls in the 2010s]

ABSTRACT: Increases in mental health problems among adolescents have been concurrent with increased use of digital media, with bigger changes among girls after the mid-2010s. This study exploits exogenous variation in the deployment of optic fiber across Spanish provinces between 2007 and 2019 to analyze the effect of access to high-speed Internet (HSI) on hospital discharge diagnoses of behavioral and mental health cases among adolescents. **We find a positive and significant impact on girls but not on boys. Exploring the mechanism behind these effects, we show that HSI increases addictive Internet use and significantly decreases time spent sleeping, doing homework, and socializing with family and friends. Girls again power all these effects. We find no evidence of an increase in online bullying.** Finally, we show that **fiber expansion harms the quality of the relationship between fathers**

and daughters, especially when that relationship suffers from a previous conflict. Our results help explain the observed widening gender gap in mental health among adolescents and are robust to various sensitivity tests.

FIGURE:

Figure 2. Fiber penetration and behavioral and mental health (BMH) cases among boys and girls aged 15 to 19 years – Raw Data: 2007-2019.



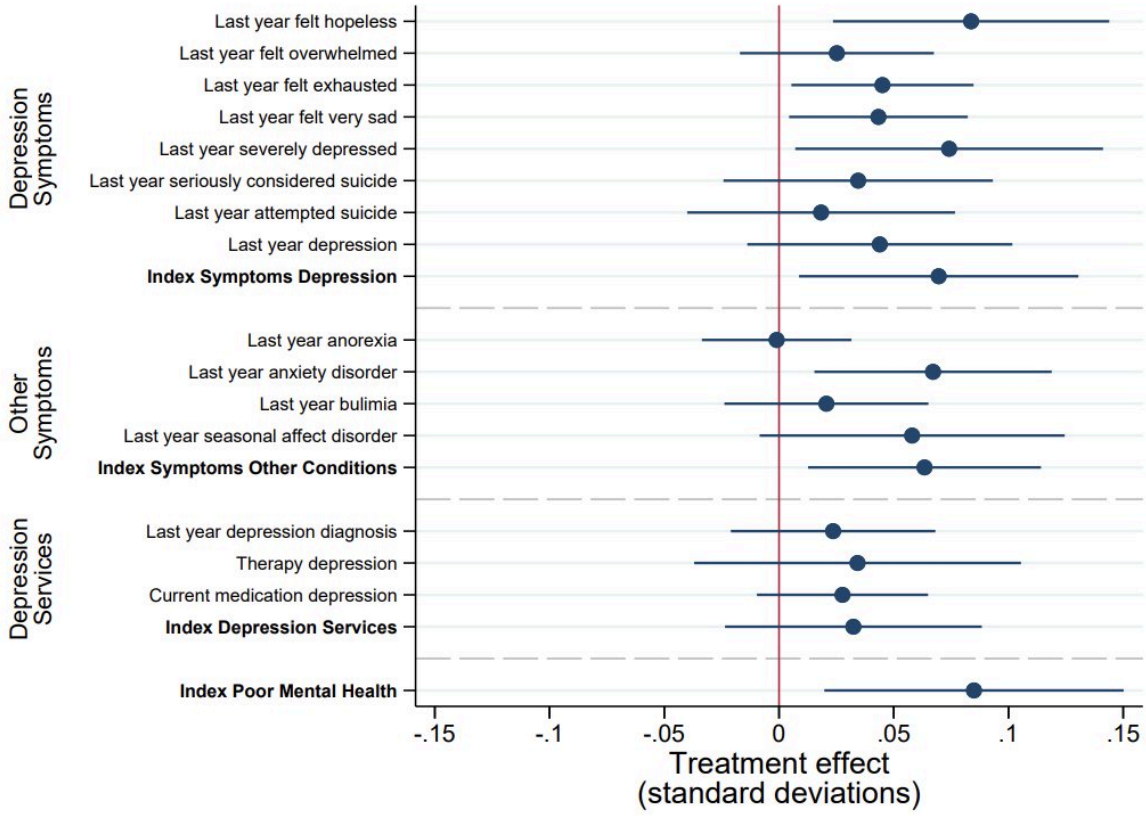
Notes: Elaborated by the authors based on administrative data from Spanish public and private hospital discharge diagnoses of behavioral and mental health cases and data from of fiber use from the National Commission of Markets and Competition.

3.5.3 Braghieri, Levy, & Makarin (2022). Social media and mental health. *American Economic Review* [See summary from Sinan Aral] [see draft at SSRN]

ABSTRACT: The diffusion of social media coincided with a worsening of mental health conditions among adolescents and young adults in the United States, giving rise to speculation that social media might be detrimental to mental health. In this paper, we provide the first quasi-experimental estimates of the impact of social media on mental health by leveraging a unique natural experiment: the staggered introduction of Facebook across U.S. colleges. Our analysis couples data on student mental health around the years of Facebook's expansion with a generalized difference-in-differences empirical strategy. **We find that the roll-out of Facebook at a college increased symptoms of poor mental health, especially depression, and led to increased utilization of mental healthcare services.** We also find that, according to the students' reports, the decline in mental health translated into worse academic performance.

Additional evidence on mechanisms suggests the results are due to Facebook fostering unfavorable social comparisons.

Figure 1: Effects of the Introduction of Facebook on Student Mental Health



3.5.4 Kyung, Lim, & Lee (2021). Digital self-harm: An empirical analysis of the effects of broadband adoption on suicide. *Internet Research*.

ABSTRACT: PURPOSE: Past literature offered competing predictions of the effect of broadband Internet on suicide. The Internet facilitates suicide by providing suicide-related information and ruining mental health. In contrast, Internet prevents suicide by offering social interaction and online mental treatment. This study aims to solve this tension by empirically examining the effect of broadband Internet on suicide with large-scale panel set.
DESIGN: This study takes instrument approach with the US county-level panel set for the period 2013–17. This study uses the number of household broadband Internet

subscriptions as the measure of broadband and leverages the number of telecommunication carriers as an instrument to address concern for endogenous relationship.
FINDINGS: **There exists a positive and significant association between broadband Internet adoption and suicide on average. This study provides empirical evidence that this association is attributable to the Internet's role in leading to a general decline in the mental well-being and in providing suicide-relevant information.** This association is more evident in areas with high poverty and low social capital.
ORIGINALITY: This study contributes to literatures that address the dark side of information systems in general and that address how Internet adoption can influence public health and well-being in particular. Results of underlying mechanisms why Internet affects suicide, and heterogeneous effect of Internet by poverty and social capital provide insight for governments to enact proactive regulations to address continuing rise of suicide.

3.5.5 Donati, Durante, Sobbrio, & Zejcirovic (2022). *Lost in the Net? Broadband Internet and Youth Mental Health* (SSRN Scholarly Paper No. 4121345).

ABSTRACT: How does the internet affect young people's mental health? We study this question in the context of Italy using administrative data on the universe of cases of mental disorders diagnosed in Italian hospitals between 2001 and 2013, which we combine with information on the availability of high-speed internet at the municipal level. Our identification strategy exploits differences in the proximity of municipalities to the pre-existing voice telecommunication infrastructure, which was previously irrelevant but became salient after the advent of the internet. **We find that access to high-speed internet has a significant positive effect on the incidence of mental disorders for young cohorts but not for older ones. In particular, internet access leads to an increase in diagnoses of depression, anxiety, drug abuse, and personality disorders - for both males and females - and of eating and sleep disorders - for females only. We find similar results for urgent and compulsory hospitalizations and self-harm episodes.** These results suggest that the effect of broadband is driven by a rise in the underlying prevalence of mental disorders and not merely by increased awareness about these pathologies.

3.5.6 Golin (2022). The effect of broadband Internet on the gender gap in mental health: Evidence from Germany. *Health Economics*.

ABSTRACT: Mental health disorders are among the leading causes of disease burden worldwide. Recently, attention has been drawn to the Internet and social media as determinants of the increase in mental health conditions in recent years. In this paper, I analyze the causal effect of broadband Internet access on the mental health of adults. I leverage confidential information on the coordinates of respondents to the German Socio-Economic Panel (GSOEP) and exploit technological features of the German telecommunication network to instrument for broadband Internet access. **The results are suggestive that broadband Internet leads to worse mental health for women (primarily those aged 17–30) but not for men, thus widening the gender gap in mental disorders. Looking at sub-facets of mental health, broadband access leads to a worsening of socializing behavior and ability to cope with emotional problems.** The fact that the results are concentrated among the younger cohorts of women is suggestive that high Internet usage intensity amplifies the negative effect of broadband internet access on mental health.

3.5.7 McDool, Powell, Roberts, & Taylor (2020). The internet and children's psychological wellbeing. *Journal of Health Economics*.

ABSTRACT: Late childhood and adolescence is a critical time for social and emotional development. Over the past two decades, this life stage has been hugely affected by the almost universal adoption of the internet as a source of information, communication, and entertainment. **We use a large representative sample of over 6300 children in England over the period 2012–2017, to estimate the effect of neighbourhood broadband speed, as a proxy for internet use, on a number of wellbeing outcomes, which reflect how these children feel about different aspects of their life. We find that internet use is negatively associated with wellbeing across a number of domains. The strongest effect is for how children feel about their appearance, and the effects are worse for girls than boys.** We test a number of potential causal mechanisms, and find support both for the **'crowding out' hypothesis, whereby internet use reduces the time spent on other beneficial activities, and for the adverse effect of social media use.** Our evidence adds weight to the already strident calls for interventions that can reduce the adverse effects of internet use on children's emotional health.

EXCERPT: We employ a FE framework where, based upon the quasi-random allocation of BB speed, we recover the ITT effect, which shows that even in the most stringent specifications estimated there is evidence of a negative causal relationship between faster BB speed and domains of children's wellbeing. The largest effect from a 1 %

increase in BB speed is for how children feel about their appearance, decreasing the score by approximately 0.6 per cent on average. A number of potential channels are investigated as possible mechanisms capable of explaining this phenomenon. The empirical analysis provides support for both the 'crowding out' hypothesis (whereby beneficial activities are sacrificed for more time spent on the internet) and also for the adverse effect of increased social media use.

3.5.8 Gerosa & Gui (2023). Earlier smartphone acquisition negatively impacts language proficiency, but only for heavy media users. Results from a longitudinal quasi-experimental study. *Social Science Research*.

ABSTRACT: There is a growing debate about the proper age at which teens should be given permission to own a personal smartphone. While experts in different disciplines provide parents and educators with conflicting guidelines, the age of first smartphone acquisition is constantly decreasing and there is still limited evidence on the impact of anticipating the age of access on learning outcomes. Drawing on two-wave longitudinal data collected on **a sample of 1672 students in 2013 (at grade 5) and 2016 (at grade 8), this study evaluates whether obtaining the first personal smartphone at 10 or 11 years old, during the transition to lower secondary school (early owning), affected their language proficiency trends compared to receiving it from the age of 12 onwards (late owning). Results indicate an overall null effect of smartphone early owning on adolescents' language proficiency trajectories, while a negative effect is found on those who were already heavy screen media users before receiving the device.**

3.5.9 Fernandez-Guerrico & Tojerow (2025). The Effect of Broadband Internet on Mental Health-Related Disability Insurance Claims. *IZA Institute of Labor Economics*.

ABSTRACT: We examine the causal impact of high-speed internet on adult mental health using administrative data from Belgium. We exploit predetermined telecommunications infrastructure and broadband technology's distance-sensitive nature for identification. **Our difference-in-differences estimates show internet increased mental health-related disability insurance claims by 0.054 percentage points—a 31% increase relative to the control group.** These findings are supported by increased antidepressant use at the municipality level. **Results point to a work-related mechanism: effects are concentrated among knowledge workers**

and those in high work-from-home potential jobs. Time-use data show a substitution from leisure to work and less social interaction on weekends.

[Other studies? What have we missed?]

NOTE: Stuart Ritchie provided a review and critique of the quasi-experimental studies:

"There are four broadband studies that included kids and young teens. They all claim that the rollout of the internet harmed people's mental well-being. And all four, in my view, have big problems.

The first study is from the UK. This was a difficult paper to read: it includes a lot of eye-strainingly complex tables. The researchers looked at other outcomes as well as mental health; in one of those tables, we find that, according to the statistical model, faster broadband speed strongly improves children's performance on their age 10-11 Sat exams – but strongly reduces their performance on their age 16 GCSE exams. This, along with some other strange results in the tables, seems rather implausible to me – and makes me doubt the results relating to mental health.

Next there's a study from Italy. In this case the data came from hospital reports, so we're talking about serious psychiatric disorders. They had people born from to 1974-95 in their dataset, and the hospitalisations were from 2001-13.

When they ran the analysis over the entire sample, there weren't any effects. But then, when they split the data into a younger and older group (people born from 1974-84 and 1985-95, respectively), and then split them again by sex, they started to see some effects. Since I can't find any plan the researchers posted online before the study started, it's not clear whether they always intended to make this split (unplanned analyses can lead to yet more false-positives) – but let's assume they did.

The first thing to note is that there's no effect on depression or anxiety for females. That's despite the fact they claim these effects were "for both males and females" in the study's abstract summary. If you just read that summary, you get the impression that this result fits with Haidt's "teen girls" thesis, when in fact it doesn't.

You might have noticed another big problem, too: the period of the hospitalisations (2001-13) hardly covers any of the "smartphone era" from 2010 onwards that people are

worried about, and contains a lot of data from before modern social media was even a glint in Mark Zuckerberg's eye.

Then, there's a study from the fibre broadband rollout in Spain. This one was over a more appropriate period of time, when sites like Instagram were becoming popular (2007-19), and looks like it provides good evidence for Haidt's thesis, because it's only girls who seem to suffer the mental health effects of the internet rollout.

But the study suffers from our old friend "multiple comparisons": when the authors ran a more conservative correction to the numbers, none of the results for mental health were statistically significant at the normally-accepted level. Again, the results were very fragile, only appearing when you look at the data in a certain way.

Finally, there's a study from Canada, which purports to show an effect on severe (but, interestingly, not moderate) mental health problems in girls. The study contains lots of graphs that apparently show this – but it provides so few numerical details that I found it impossible to properly evaluate it.

I don't see how anyone can look at these studies and think they provide a coherent, convincing line of evidence for the damaging effects of social media (and remember, they're inherently quite removed from social media itself, because the main thing they're measuring is broadband speed).

The broadband studies aren't the only causal research done in children and teens. For example, there's an experiment where teens were shown Instagram selfies and asked about their immediate feelings about body image. But it's not clear how much this translates to the real-world use of social media. There's even at least one randomised trial – albeit a small one – where teens' well-being was reduced when they took a short break from Facebook."

3.5.10 Churchill & Johnson (n.d.). *Broadband Internet Access and Adolescent Mental Health in the U.S*. NBER.

ABSTRACT: Broadband internet has become a critical component of U.S. infrastructure, but policymakers are increasingly concerned that the widespread adoption of this technology has adversely affected adolescent mental health. To test this hypothesis, we use 2009–2019 National and State Youth Risk Behavior Survey data and leverage the nationwide rollout of broadband internet. **First, we show that adolescents in states with greater broadband internet access reported spending more time online.**

Next, we find that a one-standard-deviation increase in broadband internet access was associated with a 9.3–16.5-percent increase in adolescent suicide ideation. While we document increases in suicide ideation for both girls and boys, the results are most pronounced for adolescent girls. Exploring potential mechanisms, we show that greater broadband internet access was associated with increases in cyberbullying and body dissatisfaction among adolescent girls and a reduction in the likelihood that adolescent boys reported getting an adequate amount of sleep.

3.6: QUASI-EXPERIMENTS THAT DO NOT INDICATE HARMFUL EFFECT OF TECHNOLOGIES RELATED TO SOCIAL MEDIA USE

3.6.1 Johnson & Persico (2024). Broadband internet access, economic growth, and wellbeing. *National Bureau of Economic Research.*

ABSTRACT: Between 2000 and 2008, access to high-speed, broadband internet grew significantly in the United States, but there is debate on whether access to high-speed internet improves or harms wellbeing. We find that a ten percent increase in the proportion of county residents with access to broadband internet leads to a 1.01 percent reduction in the number of suicides in a county, as well as improvements in self-reported mental and physical health. We further find that this reduction in suicide deaths is likely due to economic improvements in counties that have access to broadband internet. Counties with increased access to broadband internet see reductions in poverty rate and unemployment rate. In addition, zip codes that gain access to broadband internet see increases in the numbers of employees and establishments. In addition, heterogeneity analysis indicates that the positive effects are concentrated in the working age population, those between 25 and 64 years old. This pattern is precisely what is predicted by the literature linking economic conditions to suicide risk.

ADDITIONAL EXCEPRTS: "We next address whether the roll out of social media might affect suicide outcomes, especially in the later time period. Using the same data on the roll out of Facebook from Braghieri, Levy and Makarin (2022), we produce population-weighted estimates at the county-month level of the percentage of college students who would have access to Facebook in each county in each month. We repeat this for suicide decedents of all ages (which would encompass the spillover effects of

Facebook) in Column 1 of Table 5, as well as just college-age students between the ages of 18-22 in Column 2 of Table 5. The coefficients on deaths by suicide in Panel A are small and not statistically significant. In Panel B, we do an exploratory mediation analysis

In Panel B, we do an exploratory mediation analysis to see whether the roll out of Facebook mediates the effect of access to broadband internet on suicide. **The coefficients are nearly identical, suggesting that the rollout of Facebook did not have a significant effect on suicides, and that the roll out of social media is unlikely to have caused the negative effect on suicides we observe with the rollout of broadband internet.** However, it is important to note that social media might affect mental health without increasing suicides over this period since suicide is a relatively rare outcome for this age group."

…"Panel B reports results by decedent age. Here results are strongly clustered in working age adults. The coefficients for adults aged 25 to 64 are large and statistically significant, while the age groups before and just after working age show no statistically significant results. This is suggestive evidence that the employment effects of broadband internet are driving our observed mental health effects."

[NOTES from ZR:

- Regarding social media, this looked at Facebook rollout from 2003 to 2005, which was a period before smartphones and when FB was not very toxic.
- They did not look at teens.
- They are looking at suicides by county, and in most counties the vast majority of the 18-22 population would *not* have been students at the colleges where Facebook was available at the time. Maybe in some rural counties with a larger college, but not in suburbs or cities.]

[Other studies? What have we missed?]

3.7 STUDIES SHOWING MEDIATORS AND MODERATORS OF THE CAUSAL RELATIONSHIP

This short section includes experiments that did not find a simple main effect of an experimental manipulation, but did find a significant causal effect on a theoretically relevant sub-group.

3.7.1 Zerhouni, Flaudias, Barré & Rodgers (2022). The effects of exposure to social media images of thin and average size women on body satisfaction among young women: Emotion regulation and self-efficacy as modulating factors. *Body Image*.

ABSTRACT: Although appearance comparison has emerged as an important mechanism underlying the detrimental effects of exposure to idealized social media images on body image among young women, little is known regarding the role of the direction of these comparisons. In addition, to date, little attention has been paid to the role of self-regulation processes in these effects. A sample of 260 female students (Mage = 19.6) from a University in Paris completed an online survey where they were randomly assigned to view thin-ideal or average size social media images of women. Participants reported on state body satisfaction before and after exposure, as well as state appearance comparison and direction of appearance comparison, and trait emotion regulation difficulties and self-efficacy . **Findings revealed no main effect of condition**. However, **among participants who engaged in upwards appearance comparison the thin-ideal condition was associated with greater decreases in body satisfaction**. In addition, three-way interactions revealed that emotional regulation difficulties and self-efficacy both further moderated these effects.

3.7.2 Prydea & Prichard (2022). TikTok on the clock but the #fitspo don't stop: The impact of TikTok fitspiration videos on women's body image concerns. *Body Image.*

ABSTRACT: Fitspiration is a popular social media trend that aims to inspire individuals to improv e their health and fitness through diet and exercise. However, viewing fitspiration content on Instagram has been identified as a contributor to negative body image, especially for young women. With the growing popularity of the video sharing platform TikTok and concerns over its content, the present study aimed to experimentally examine the effect of exposure to fitspiration TikTok videos on young women's body dissatisfaction, appearance comparison and mood. The roles of state appearance comparison as a mediator and trait fit ideal internalisation as a moderator were also considered. Young women (18–25, N = 120) from Australia were randomly allocated to view a set of fitspiration videos or a set of art control videos from TikTok. Results indicated that **exposure to fitspiration TikTok videos increased state appearance comparison and state negative mood relative to art TikTok videos but did not directly increase state body dissatisfaction. State appearance comparison significantly mediated the effect of TikTok videos on body dissatisfaction and mood,** however, there was no moderating effect of trait fit ideal internalisation.

3.7.3 Joseph, Ios Santos & Amaro (2022). Naturalistic social cognitive and emotional reactions to technology-mediated social exposures and cortisol in daily life. *Biological Psychology.*

ABSTRACT: The emotional and social evaluative aspects of social interactions influence cortisol. The interactions that mothers have on social networking sites and via other technology involve heightened social comparison and emotion. We examined the associations between technology-mediated social engagement, social comparisons and emotion during technology-mediated social exposures (TMSEs), and cortisol during daily life. Forty-seven mothers (mean age = 34.38) completed a 4-day monitoring period involving four saliva collections and questionnaires daily at awakening, 4 h post-awakening, 9 h post-awakening, and bedtime. **Higher social comparison during TMSE was associated with lower momentary cortisol, whereas higher negative emotions during TMSE and more time spent in TMSE were associated with higher momentary cortisol. Higher average social comparison during TMSE was associated with lower average daily cortisol output (area under the curve with respect to ground; AUCg), and more time spent on TMSE was associated with higher average AUCg**. This study presents the first evidence that naturalistic social-cognitive and emotional reactions to TMSE are associated with cortisol in daily life.

3.7.4 Weber, Messingschlager, & Stein (2022). This is an insta-vention! Exploring cognitive countermeasures to reduce negative consequences of social comparisons on Instagram. *Media Psychology.*

ABSTRACT: Social networking sites such as Instagram provide users with numerous social comparison cues, potentially leading to envy and lower self-esteem. We conducted two experiments, examining whether such negative consequences could be mitigated by brief cognitive interventions. In Experiment 1 (N = 391), we reminded users of the unrealistic nature of most Instagram posts in a 2 (intervention: disclaimer vs. control) × 2 (Instagram profile: upward vs. downward comparison standard) between-subjects design. Positive and negative affect, envy, self-esteem, and well-being served as dependent variables. Experiment 2 (N = 184) explored whether slightly longer cognitive interventions (“cognitive bias” vs. “growth mindset” vs. control) could improve participants’ experience of upward comparisons, shielding them against envy or the loss of self-esteem. Both experiments included social comparison orientation (SCO) as a potential moderator. Results show that **eliciting upward**

comparisons indeed evoked more envy, with SCO moderating the effect. We further observed indirect effects of the shown Instagram profiles on positive affect, envy, self-esteem, and well-being via participants' social comparison experience. Concerning the cognitive interventions, however, we report that neither an authoritative disclaimer, nor educating users about cognitive biases or mindsets significantly reduced the negative consequences of social comparisons.

Note about the indirect effect**: the manipulation of Instagram profil (downward vs upward comparison) led to self-devaluation through social comparison which decreased positive affect, self-esteem, well-being and increased envy.**

3.7.5 Zhang, Zhu, Sun, & Chen (2021). Does influencers popularity actually matter? An experimental investigation of the effect of influencers on body satisfaction and mood among young Chinese females: the case of RED (Xiaohongshu). *Frontiers in Psychology*.

ABSTRACT: Many studies have linked idealized body image on social media to negative psychological well-being among young females. However, social media influencers' imagery has not attracted much research attention in either the Western or the Asian context. This study aimed to experimentally investigate the impact of high versus low popular social media influencer images on young Chinese females' body satisfaction and mood. The participants were 420 female RED users (aged 18–35) who were randomly assigned to three groups: (1) the influencer-high group (idealized imagery alongside high engagement metrics); (2) the influencer-low group (the same idealized imagery adjusted for low engagement metrics); or (3) a control set of nature images. The results revealed that **the groups exposed to influencer imagery had lower body satisfaction and more negative mood than the control group (nature images). Notably, this comparison showed no significant difference between the low-influencer and high influencer groups in body satisfaction and mood.** Additionally, this effect was moderated by individuals' self-discrepancy between personal ideals and their own bodies. That is, **exposure to idealized body images does not always produce harmful effects. For those with lower self-discrepancy, idealized body posts somewhat positively affected their body satisfaction**. The current research contributes to the media effect literature by providing critical new insights into the study of body image in the context of China.

3.7.6 McComb, Vanman & Tobin (2023). A Meta-Analysis of the Effects of Social Media Exposure to Upward Comparison Targets on Self-Evaluations and Emotions. *Media Psychology*.

ABSTRACT: Social media have become a pervasive part of contemporary culture and are an essential part of the daily lives of an increasing number of people. Its popularity has brought unlimited opportunities to compare oneself with other people. This meta-analysis combined and summarized the findings of previous experimental research, with the aim of generating causal conclusions regarding the effects of exposure to upward comparison targets on self-evaluations and emotions in a social media context. We identified **48 articles** involving **7679 participants** through a systematic search and entered **118 effect sizes** into a multilevel, random-effects meta-analysis. **Analyses revealed an overall negative effect of upward social comparison relative to downward comparison and controls on social media users' self-evaluations and emotions (g = −0.24, p < .001)**. Specifically, there were significant negative effects of upward comparison on each outcome variable: **body image (g = −0.31, p < .001), subjective well-being (g = −0.19, p < .001), mental health (g = −0.21, p < .001) and self-esteem (g = −0.21, p < .001)**. This meta-analysis indicates that contrast is the dominant response to upward comparison on social media, which results in negative self-evaluations and emotions.

Note: Age and sex does not moderate the effects.

3.7.7 Cha, Mayers & Stutts (2022). The impact of curvy fitspiration and fitspiration on body dissatisfaction, negative mood, and weight bias in women. *Stigma and Health, 7*(2), 226–233.

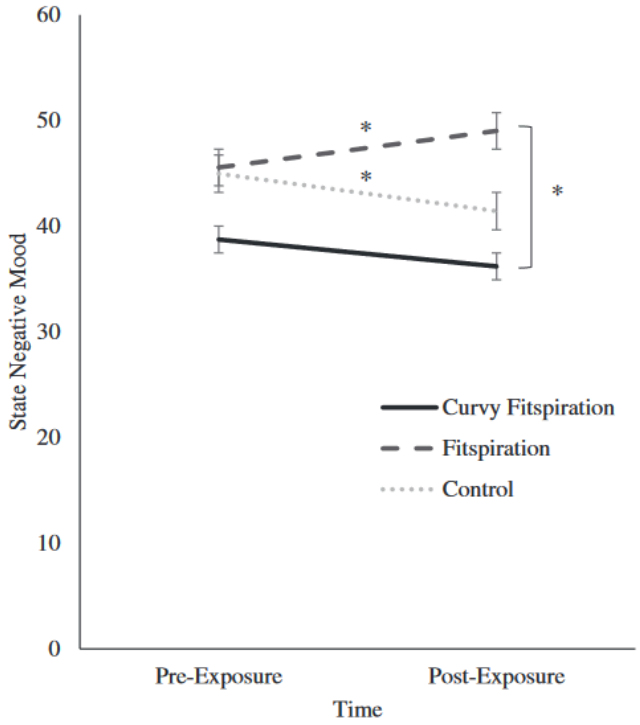
ABSTRACT: Exposure to fitspiration (images of thin, active women) on Instagram has been shown to be associated with body dissatisfaction, but fitspiration's effect on weight bias has not been studied. The impact of curvy fitspiration (images of higher weight, active women) also has not been explored. The present study aim was to investigate the impact of curvy fitspiration and fitspiration on body dissatisfaction, negative mood, and weight bias. Participants included 17**8 women from the general population who were randomly assigned to three groups: curvy fitspiration, fitspiration, or control (travel).** Participants completed measures of body dissatisfaction, negative mood, and weight bias before and after exposure to the images. Body dissatisfaction and weight bias decreased in the curvy fitspiration group, and the curvy fitspiration group had lower negative mood and weight bias than the fitspiration group postexposure. Body dissatisfaction and weight bias did not change **in the fitspiration group, but negative**

mood increased. Body dissatisfaction and negative mood decreased in the control group, and the control group had lower body dissatisfaction and weight bias than the fitspiration group postexposure. These results suggest that increasing representations of diverse body types on Instagram could be beneficial in reducing body dissatisfaction and weight bias in women.

Note: item exemple for the ‘’state negative mood’’ (‘’i feel depressed’’)

Figure 2

State Negative Mood by Group and Time



Note. All error bars represent standard error.
* $p < .05$.

[Other studies? What have we missed?]

3.8 OTHER UNCATEGORIZED EXPERIMENTS

3.8.1 Vaghefi (2021). Sustaining Abstinence from Social Media: Results from a Seven-Day Facebook Break: Social Media Abstinence. *Academic Mindtrek '21: Proceedings of the 24th International Academic Mindtrek Conference*.

ABSTRACT: The increasing use of social media has created adverse outcomes for individuals, and society, which prompted many to take actions to reduce it back to healthy levels of use. However, little is known about how individuals may take a break (i.e., abstain) from use and how such behaviors can be sustained. In this study, we report the results of a study, in which participants took up to seven days of voluntary break from Facebook use. Drawing from the stimulus-organism-response model, we propose a research model to formulate the relationships between social media addiction, cognitive dissonance, attitude toward use, positive and negative affect during abstinence, and sustaining of social media abstinence, as measured by its duration. Analysis of data collected from 533 participants provides support for the model and hypotheses.

[Age group: ?]
[Time period between waves: ?]

3.8.2 Schmidt-Persson … & Grøntved (2024). Screen Media Use and Mental Health of Children and Adolescents: A Secondary Analysis of a Randomized Clinical Trial. *Jama Network*.

ABSTRACT: IMPORTANCE: Excessive screen media use has been associated with poorer mental health among children and adolescents in several observational studies. However, experimental evidence supporting this hypothesis is lacking.
OBJECTIVE: To investigate the effects of a 2-week screen media reduction intervention on children's and adolescents' mental health.
DESIGN, SETTINGS, and PARTICIPANTS: This prespecified secondary analysis of a cluster randomized clinical trial with a 2-week follow-up included 89 families (with 181 children and adolescents) from 10 Danish municipalities in the region of Southern Denmark. All study procedures were carried out in the home of the participants. Enrollment began on June 6, 2019, and ended on March 30, 2021. This analysis was conducted between January 1 and November 30, 2023.
INTERVENTION: Families were randomly allocated to a screen media reduction group or a control group. The 2-week screen media reduction intervention was designed to ensure a high level of compliance to the reduction in leisure-time screen media use.

Participants allocated to the intervention group had to reduce their leisure-time screen media use to 3 hours per week or less per person and hand over smartphones and tablets.
MAIN OUTCOMES AND MEASURES: The main outcome was the between-group mean difference in change in total behavioral difficulties, measured by the Strengths and Difficulties Questionnaire at 2-week follow-up. Results were estimated using mixed-effects tobit regression models. Analyses were carried out as both intention to treat and complete case.
RESULTS: In the sample of 89 families including 181 children and adolescents (intervention group [45 families]: 86 children; mean [SD] age, 8.6 [2.7] years; 42 girls [49%]; control group [44 families]: 95 children; mean [SD] age, 9.5 [2.5] years; 57 girls [60%]), **there was a statistically significant between-group mean difference in the total difficulties score, favoring the screen media reduction intervention** (−1.67; 95% CI, −2.68 to −0.67; Cohen d, 0.53). **The greatest improvements were observed for internalizing symptoms** (emotional symptoms and peer problems; between-group mean difference, −1.03; 95% CI, −1.76 to −0.29) **and prosocial behavior** (between-group mean difference, 0.84; 95% CI, 0.39-1.30).
CONCLUSIONS AND RELEVANCE: This secondary analysis of a randomized clinical trial found that a short-term reduction in leisure-time screen media use within families positively affected psychological symptoms of children and adolescents, particularly by mitigating internalizing behavioral issues and enhancing prosocial behavior. More research is needed to confirm whether these effects are sustainable in the long term.

[Age group: entire families, children M=9.07]
[Time period between waves: 2 weeks]

[Other studies? What have we missed?]

QUESTION 4: WHAT DO TEENS SAY ABOUT SOCIAL MEDIA AND MENTAL HEALTH?

[This section includes both qualitative and quantitative data. We are trying to answer two related questions: A) do teens generally see social media as a net positive for their own mental health, or as a net negative? And B) Do teens think that social media is, or is not, a major contributor to mental illness in their generation?]

Below includes a few major studies on these questions. For more, see our new Google Document, "Gen Z on the Effects of a Phone-Based Childhood."

4.1: STUDIES SHOWING THAT TEENS BLAME SOCIAL MEDIA

4.1.1. Headspace National Youth Mental Health Survey (2018). *Headspace.*

Insight 34

Young people think social media is the main reason youth mental health is getting worse.

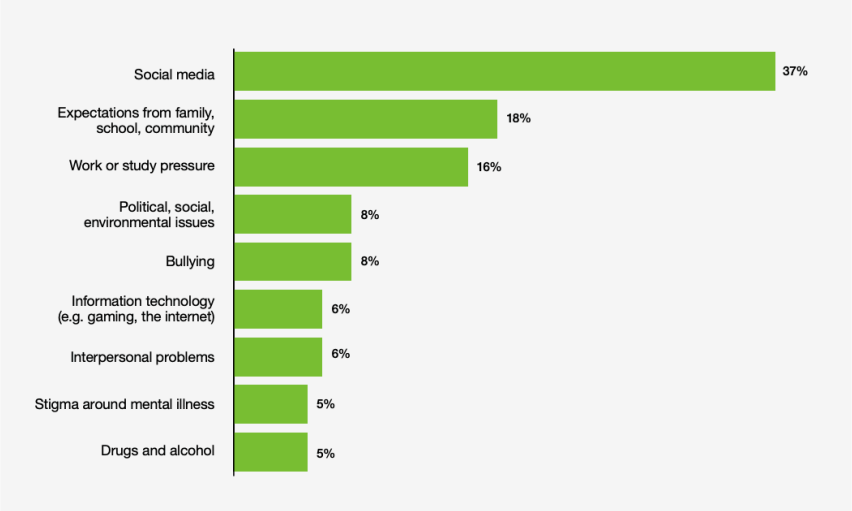


Figure 55.
Reasons for the opinion that the mental health of young people is getting worse

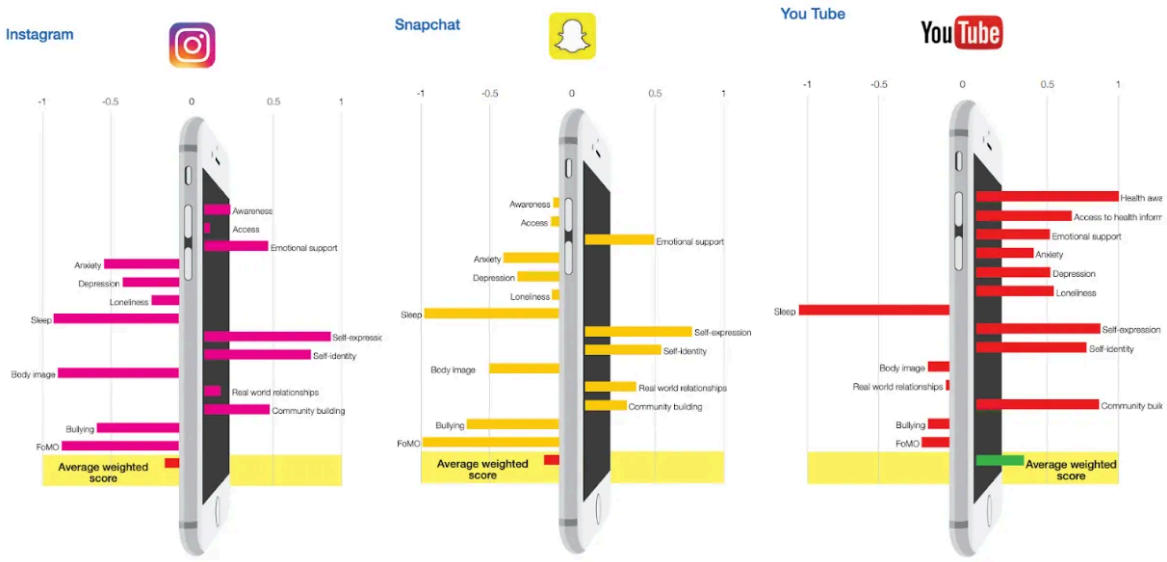
From p. 52 of the report

4.1.2 Royal Society for Public Health (2017). Instagram ranked worst for young people's mental health.

OVERVIEW: In 2017, British researchers asked 1,500 teens to rate how each of the major social-media platforms affected them on certain well-being measures, including anxiety, loneliness, body image, and sleep. Instagram scored as the most harmful, followed by Snapchat and then Facebook.

FIGURE:

Effects of Social Media Apps on British Teenagers' Mental Health



4.1.3 Facebook's Internal Research: [The Facebook Files (2021).](#) *Wall Street Journal.*

RELEVANT DOC: [Facebook knows Instagram is toxic for many teen girls](#)

ABSTRACT: Researchers inside Instagram, which is owned by Facebook, have been studying for years how its photo-sharing app affects millions of young users. Repeatedly, the company found that Instagram is harmful for a sizable percentage of them, most notably teenage girls, more so than other social-media platforms. In public, Facebook has consistently played down the app's negative effects, including in comments to Congress, and hasn't made its research public or available to academics or lawmakers who have asked for it. In response, Facebook says the negative effects aren't widespread, that the mental-health research is valuable and that some of the harmful aspects aren't easy to address.

EXCERPT: **"Teens blame Instagram for increases in the rate of anxiety and depression … This reaction was unprompted and consistent across all groups."**

NOTE FROM JH: The researchers also noted that "social comparison is worse" on Instagram than on rival apps. Snapchat's filters "keep the focus on the face," whereas Instagram "focuses heavily on the body and lifestyle."

4.1.4 Papageorgiou, Fisher & Cross (2022). “Why don’t I look like her?” How adolescent girls view social media and its connection to body image. (h/t Rapael Aubry)

Background: Adolescent girls appear more vulnerable to experiencing mental health difficulties from social media use than boys. The presence of sexualized images online is thought to contribute, through increasing body dissatisfaction among adolescent girls. Sexual objectification through images may reinforce to adolescent girls that their value is based on their appearance. This study explored how sexualized images typically found on social media might influence adolescent girls’ mental health, in positive and/or negative ways. Methods: In-depth interviews were conducted with girls aged 14–17 years (n = 24) in Perth, Western Australia. Data were analyzed using thematic analysis. Results: **Participants identified body image as a major concern, reporting negative appearance comparisons when viewing images on social media.** Appearance comparisons were perceived to exacerbate adolescent girls’ appearance-based concerns. Comparisons also influenced adolescent girls’ efforts to change their appearance and seek validation on social media. The importance of awareness and education from a younger age about social media and its influence on body image was emphasized, as was the need for strategies to promote positive body image and counteract negative body image. Conclusion: The findings of this study have important implications for professionals working with adolescent girls and for the development of health promotion programs addressing social media use and body image concerns. Keywords: Adolescence, Instagram, Body image, Sexualization, Appearance comparisons, Self-objectification

4.1.5 Popat, & Tarrant (2022). Exploring adolescents’ perspectives on social media and mental health and well-being–A qualitative literature review. *Clinical Child Psychology and Psychiatry.*

ABSTACT: Many quantitative studies have supported the association between social media use and poorer mental health, with less known about adolescents’ perspectives on social media’s impact on their mental health and wellbeing. This narrative literature review aimed to explore their perspectives, focusing on adolescents aged between 13 and 17. It reviewed qualitative studies published between January 2014 and December 2020, retrieved from four databases: APA Psychinfo, Web of Science, PubMed and Google Scholar. The literature search obtained 24 research papers**. Five main themes were identified: 1) Self-expression and validation, 2) Appearance comparison and body ideals, 3) Pressure to stay connected, 4) Social engagement and peer**

support and 5) Exposure to bullying and harmful content. This review has highlighted how social media use can contribute to poor mental health – through validation-seeking practices, fear of judgement, body comparison, addiction and cyberbullying. It also demonstrates social media's positive impact on adolescent wellbeing - through connection, support and discussion forums for those with similar diagnoses. Future research should consider adolescent views on improvements to social media, studying younger participants, and the impact of COVID-19 on social media use and its associated mental health implications.

4.1.6 Harness, Fitzgerald, Sullivan, & Selkie (2022). Youth Insight About Social Media Effects on Well/Ill-Being and Self-Modulating Efforts. *Journal of Adolescent Health*.

ABSTRACT: PURPOSE: We aim to investigate youth insight about how their social media use affects them. We hope to understand if and how they self-modulate their use.
METHODS: Using a text message-based platform, codable survey responses were returned by a minimum of 871 of 1,144 youth aged 14-24 in November, 2020. Youth were asked the following three questions: (1) What advice would you give to young people who are new to social media? (2) Have you ever felt like you need to change your social media use (what you view, time spent, etc.)? Why? (3) Have you ever deleted or thought about deleting your social media account(s)? Why? A codebook was created from the data and two coders independently coded the entirety of the data set using the 18-code codebook. Coders resolved discrepancies in coding patterns together and the frequency of each code was recorded.
RESULTS: **Youth showed insight about negative impacts of social media and were especially concerned about safety on social media. A majority of respondents deleted or thought about deleting their social media account or app. Youth were more likely to report wanting to change the amount of time spent on their social media compared to the content they view.**
DISCUSSION: Youth are aware of ways in which social media could be negatively impacting them and they have employed methods to modulate their use because of this awareness.

4.1.7 Coe, Doy, Enomoto, & Healy (2023). Social media and mental health: The impact on Gen Z. *McKinsey*.

EXCERPT: Gen Zers and millennials are more likely than other generations to say social media affects their mental health.

Studies of young adults and their social media use have shown an inverse relationship between screen time and psychological well-being, with higher utilization associated with poorer well-being. Other research indicates the nature of the relationship individuals have with social media can have a greater impact on their mental health than time spent.

Our findings show a nuanced relationship between social media use and mental health. While around one-third of respondents across cohorts report positive impacts of social media on mental health, generations differ in reported negative impacts.

Negative effects seem to be greatest for younger generations, with particularly pronounced impacts for Gen Zers who spend more than two hours a day on social media and Gen Zers with poor mental health. Gen Z respondents from Europe and Oceania were most likely to report negative impacts from social media, and respondents from Asia were least likely (32 percent and 19 percent, respectively).

All generational cohorts in the survey said that social media use had the most positive impact on self-expression and social connectivity. Self-reported refugees and asylum seekers cite higher levels of positive impact than others across all aspects.

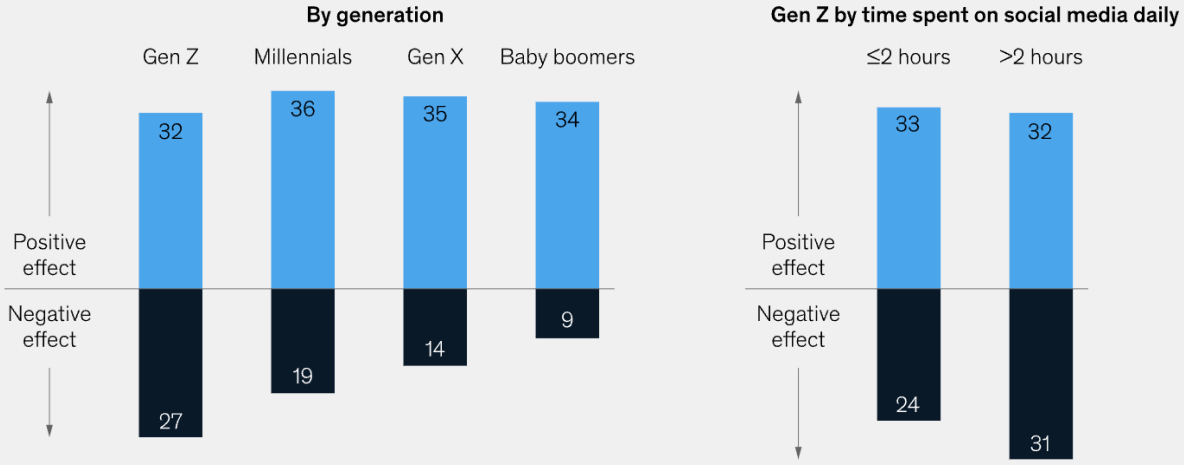
Across generations, there are more positive than negative impacts reported by respondents; however, the reported negative impact is higher for Gen Z. **Respondents from high-income countries (as defined by World Bank) were twice as likely to report a negative impact of social media on their lives than respondents from lower-middle-income countries (13 percent compared with 7 percent).**

When compared with their male counterparts, a higher proportion of female Gen Zers said social media had a negative impact on FOMO (32 percent versus 22 percent), body image (32 percent versus 16 percent), and self-confidence (24 percent versus 13 percent).

FIGURES:

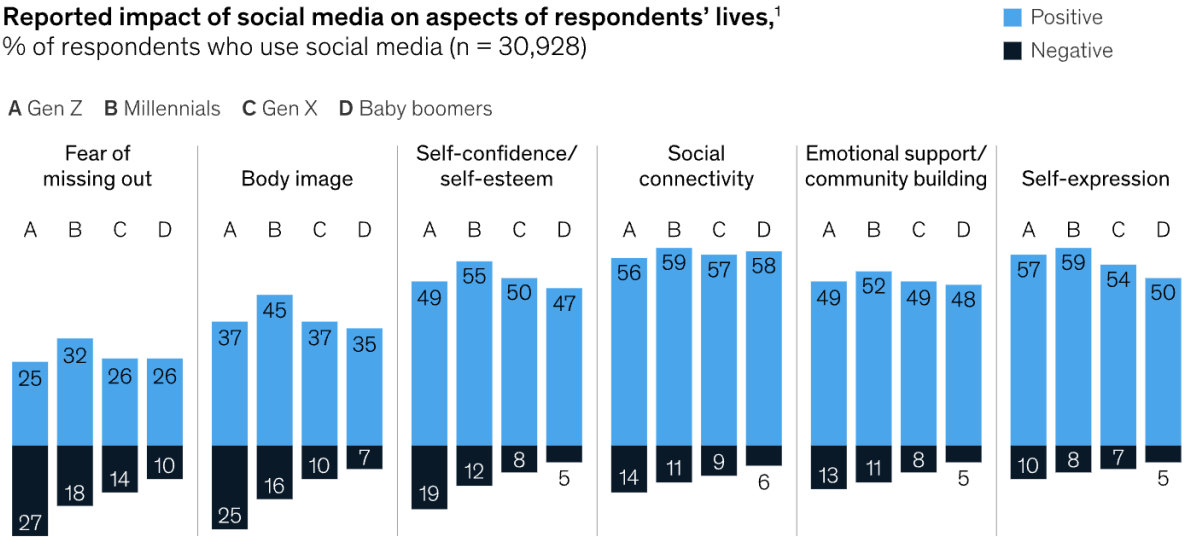
While social media and tech have a consistent positive impact across all age cohorts, the negative impact increases substantially for younger ages.

Reported impact of technology and social media on mental health,[1] % of respondents



[1]Question: How strongly do the following factors affect your mental health? Shown are the answers for "Technology and social media"; respondents who answered "does not affect my mental health" or "don't know/not applicable" are not shown.
Source: McKinsey Health Institute Global Gen Z Survey (2022) (n = 41,960)

Reported impact of social media on aspects of respondents' lives,[1]
% of respondents who use social media (n = 30,928)



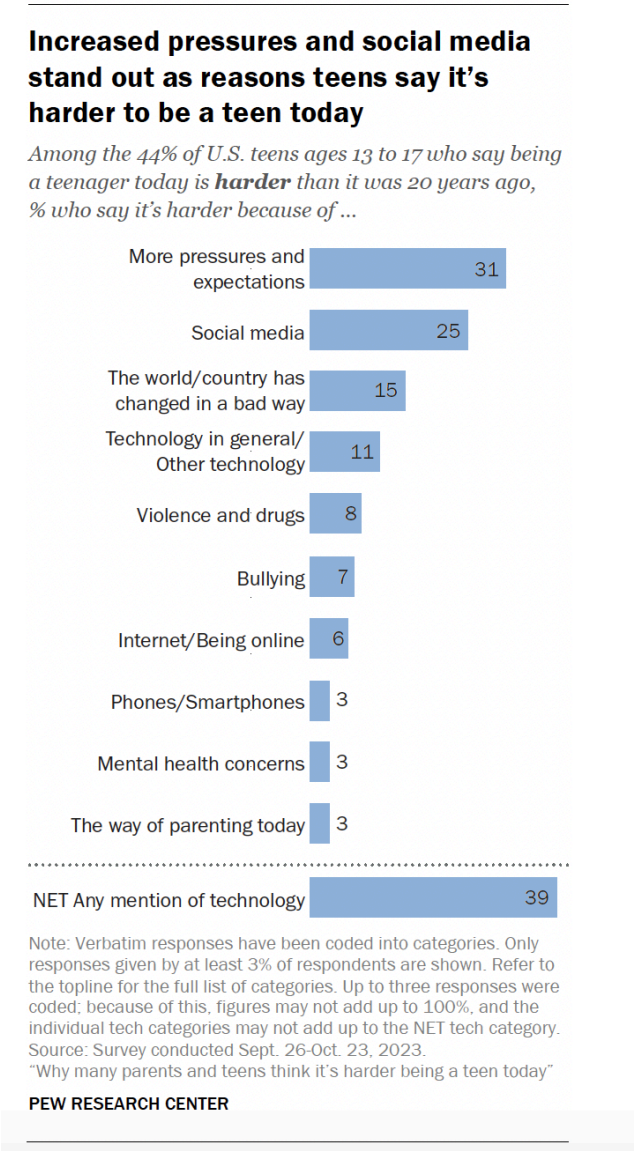
Note: Gen Z oversample (covers ages 13–24); weighted by gender, age, and socioeconomics; dates fielded: Aug 26–Nov 2, 2022, for Argentina, Australia, Brazil, China, Egypt, India, Indonesia, Ireland, Japan, Mexico, Nigeria, Saudi Arabia, South Africa, UAE, US, and Vietnam.
[1]Respondents who answered "no effect" are not shown.
Source: McKinsey Health Institute Global Gen Z Survey (2022)

4.1.8 Pew (2024). Why Many Parents and Teens Think It's Harder Being a Teen Today.

ABSTRACT: Is it harder these days to be a teen? Or do today's teenagers have it easier than those of past generations?

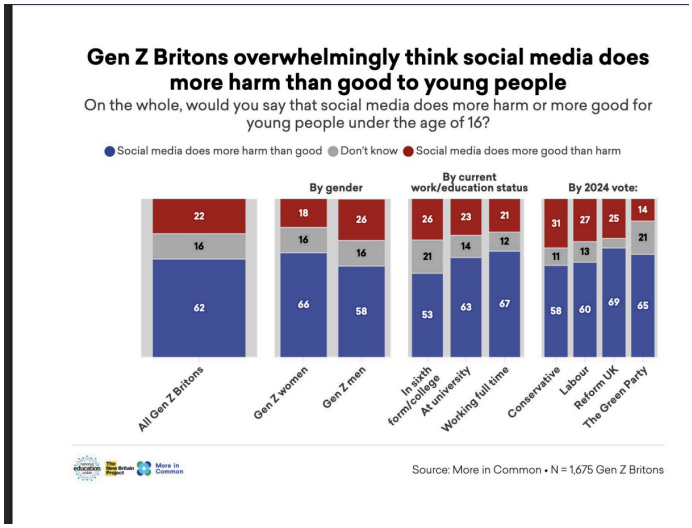
We asked the following question of 1,453 U.S. parents and teens: **Compared with 20 years ago, do you think being a teenager today is harder, easier or about the same?**

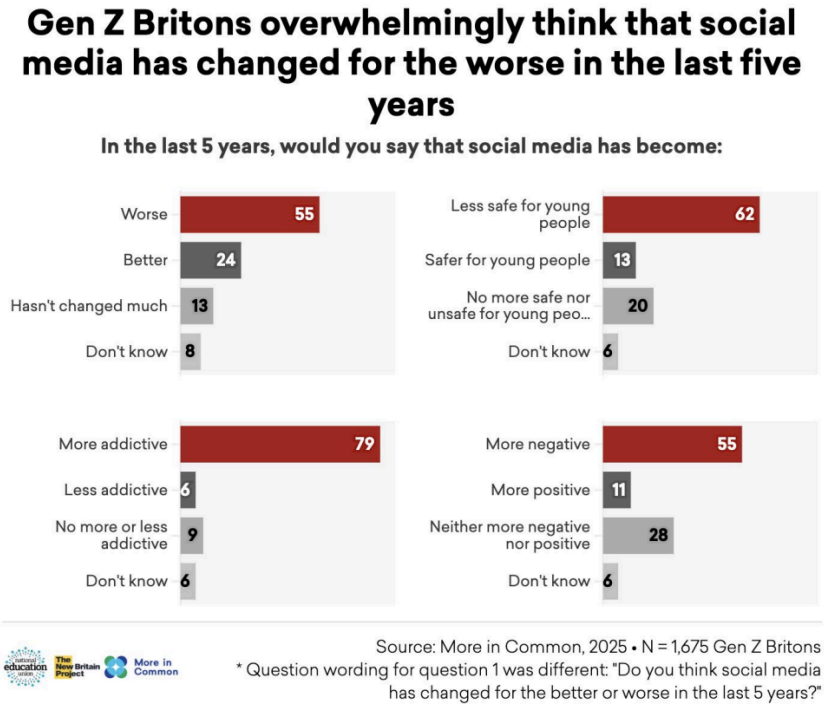
FIGURE:



4.1.9 More in Common (2025). Public attitudes to smartphones, social media, and online safety.

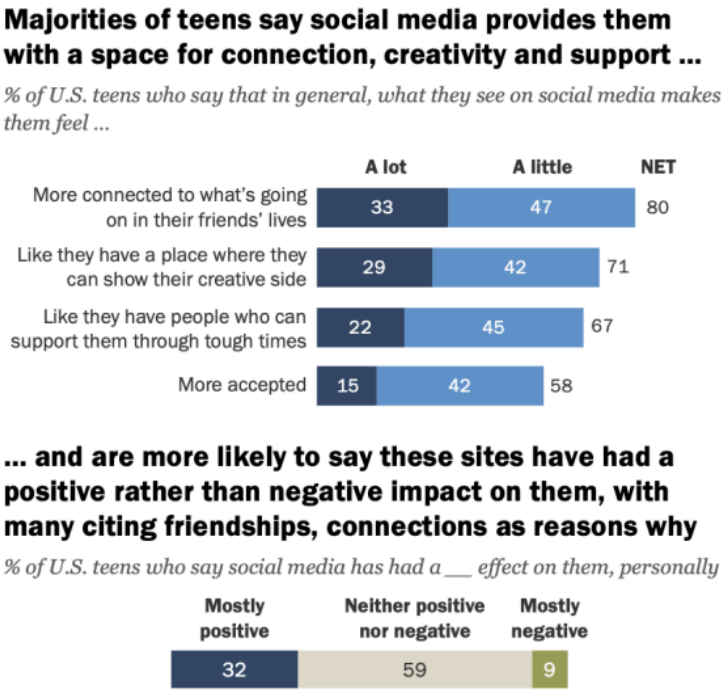
FIGURES:





4.2: STUDIES SHOWING THAT TEENS CREDIT SOCIAL MEDIA WITH IMPROVING MENTAL HEALTH

4.2.1 Pew (2022). Connection, Creativity and Drama: Teen Life on Social Media in 2022



[None found that show clear evidence of positive appraisals. What are we missing?]

4.3: STUDIES SHOWING MIXED EVIDENCE

4.3.1 Weinstein (2018). The social media see-saw: Positive and negative influences on adolescents' affective well-being. *New Media & Society*.

ABSTRACT: Social media use is nearly universal among US-based teens. How do daily interactions with social apps influence adolescents' affective well-being? Survey self-reports ($n = 568$) portray social media use as predominantly positive. Exploratory principal component analysis further indicates that positive and negative emotions form orthogonal response components. In-depth interviews with a sub-sample of youth ($n = 26$), selected for maximum variation, reveal that affect experiences can be organized across four functional dimensions. *Relational interactions* contribute to both closeness and disconnection; *self-expression* facilitates affirmation alongside concern about others' judgments; interest-driven *exploration* confers inspiration and distress; and *browsing* leads to entertainment and boredom, as well as admiration and envy. All interviewees describe positive and negative affect experiences across multiple dimensions. **Analyses suggest the relationship between social technology usage and well-being—whether enhanced or degraded—is not confined to an "either/or"**

framework: the emotional see-saw of social media use is weighted by both positive and negative influences.

4.3.2 Van der Wal, Valkenburg, & van Driel (pre-print). How Adolescents Differ in Their Social Media Use and How it Affects Them. *PsyArXiv.*

ABSTRACT: Despite a burgeoning literature into the relationship between social media use (SMU) and adolescent well-being, clear conclusions about this relationship remain elusive as the literature has yielded a mixed bag of results. The aim of this study is to take a qualitative approach to improve our understanding of individual differences in (a) adolescents' motives for using SMU, (b) their social media-related mood management, and (c) the effects they experience due to SMU. **Based on eight focus groups among 55 adolescents ranging in age from 14 to 17 years, we found considerable homogeneity in adolescents' motives to turn to social media. But we also found substantial heterogeneity in the moods that predict their SMU, their affective responses to SMU, and the effects they experienced due to SMU.** Such sizeable individual differences may, in part, explain the inconsistent results in earlier quantitative work. We end with three lessons for future self-report studies.

4.3.3 Anderson, Vogels, Perrin, & Rainie (2022). Connection, Creativity and Drama: Teen Life on Social Media in 2022. *Pew Research Center.*

EXCERPT: **Eight-in-ten teens say that what they see on social media makes them feel more connected to what's going on in their friends' lives, while 71% say it makes them feel like they have a place where they can show their creative side. And 67% say these platforms make them feel as if they have people who can support them through tough times.** A smaller share – though still a majority – say the same for feeling more accepted. These positive sentiments are **expressed by teens across demographic groups.**

…When asked about the overall impact of social media on them personally, more teens say its effect has been mostly positive (32%) than say it has been mostly negative (9%). The largest share describes its impact in neutral terms: 59% believe social media has had neither a positive nor a negative effect on them. For teens who view social media's effect on them as mostly positive, many describe maintaining friendships, building connections, or accessing information as main reasons they feel this way, with one teen saying:

…While these youth describe the benefits they get from social media, this positivity is not unanimous. Indeed, 38% of teens say they feel overwhelmed by all the drama they see on social media, while about three-in-ten say these platforms have made them feel like their friends are leaving them out of things (31%) or have felt pressure to post content that will get lots of likes or comments (29%). Another 23% say these platforms make them feel worse about their own life.

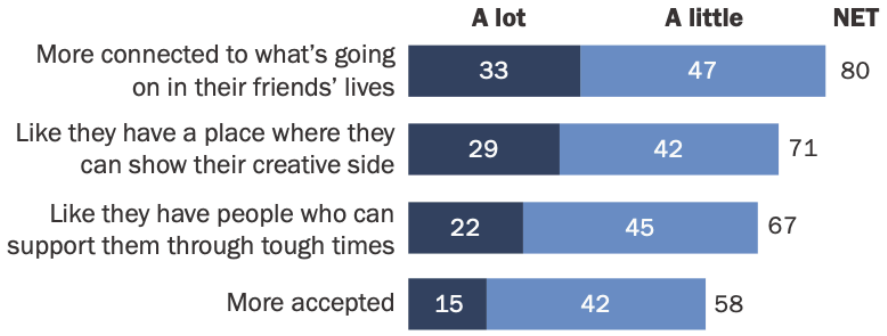
Teen girls report encountering some of these pressures at higher rates. Some 45% of girls say they feel overwhelmed because of all the drama on social media, compared with 32% of boys. Girls are also more likely than boys to say social media has made them feel like their friends are leaving them out of things (37% vs. 24%) or worse about their own lives (28% vs. 18%).

> *"I think it would be a little bit [messed up if social media disappeared]. I spend 99% of my time indoors in front of my computer, if I'm not playing games, I'm watching pirated videos. If I'm not watching videos, maybe I'm reading an article. I'm always online. And I hardly step out of my room. I have had issues with my dad. He said my room is too creepy. I should come outside and play with people but I'm not really good at making friends. So, it's a bit hard on me." – Teen boy*

> *"[When] we were younger, [social media] didn't have an effect on us and social media wasn't as big as it is now. I feel like we were more free and more happy, and no stress or overthinking or insecure." – Teen girl*

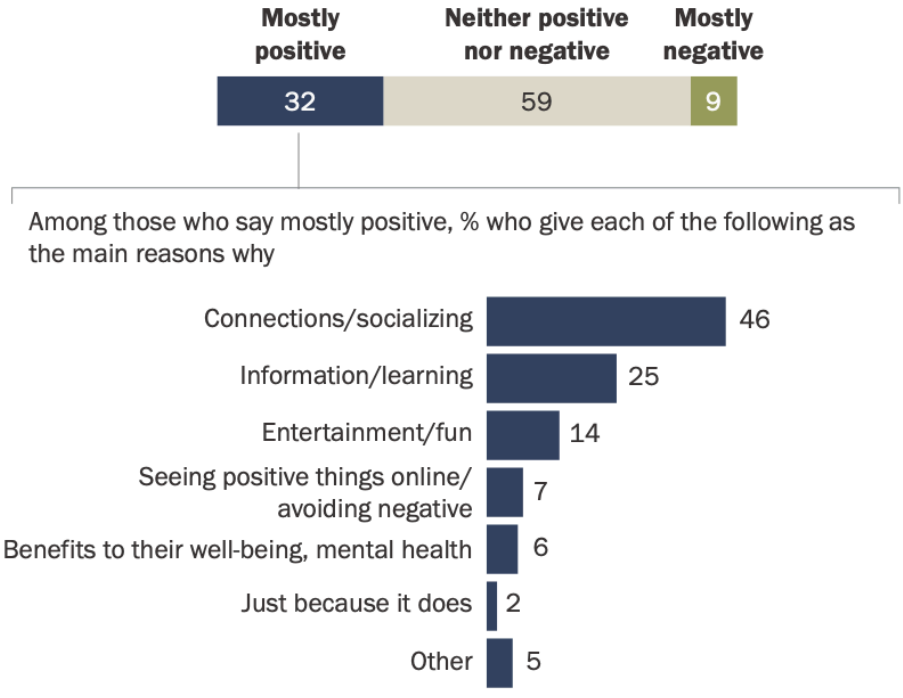
Majorities of teens say social media provides them with a space for connection, creativity and support ...

% of U.S. teens who say that in general, what they see on social media makes them feel ...



... and are more likely to say these sites have had a positive rather than negative impact on them, with many citing friendships, connections as reasons why

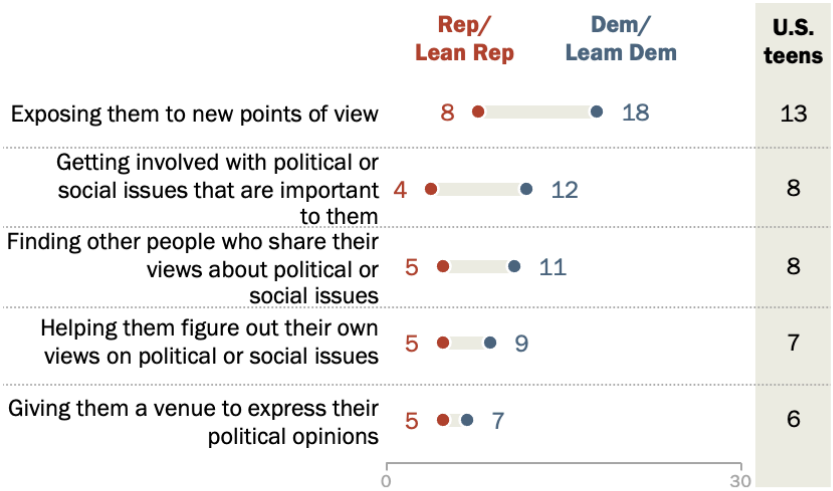
% of U.S. teens who say social media has had a ___ effect on them, personally



Note: Teens are those ages 13 to 17. Verbatim responses have been coded into categories. The 13% who received this question but did not give an answer are not shown. Including this group, figures may add up to more than 100% because multiple responses were allowed.
Source: Survey conducted April 14-May 4, 2022.
"Connection, Creativity and Drama: Teen Life on Social Media in 2022"

Among teens, Democrats more likely than Republicans to see social media as extremely or very important for finding new viewpoints

*% of U.S. teens who say social media is **extremely or very important** to them personally when it comes to each of the following*

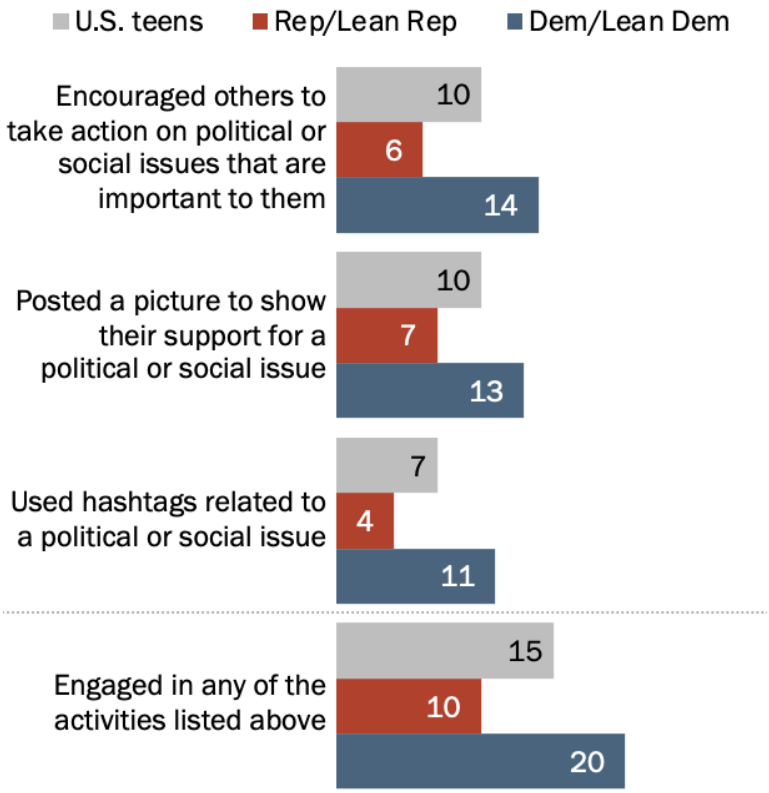


Note: Teens are those ages 13 to 17. Those who did not give an answer or who gave other responses are not shown.
Source: Survey conducted April 14-May 4, 2022.
"Connection, Creativity and Drama: Teen Life on Social Media in 2022"

PEW RESEARCH CENTER

Few teens engaged in online activism in past year; Democratic teens are more likely to have done so than Republicans

% of U.S. teens who say they have ___ on social media in the past 12 months

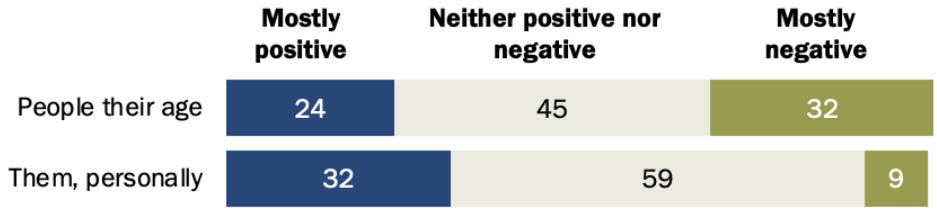


Note: Teens are those ages 13 to 17. Those who did not give a response are not shown.
Source: Survey conducted April 14-May 4, 2022.
"Connection, Creativity and Drama: Teen Life on Social Media in 2022"

PEW RESEARCH CENTER

More teens say social media has had a negative effect on people their age than on them, personally

% of U.S. teens who say social media has had a ___ effect on ...

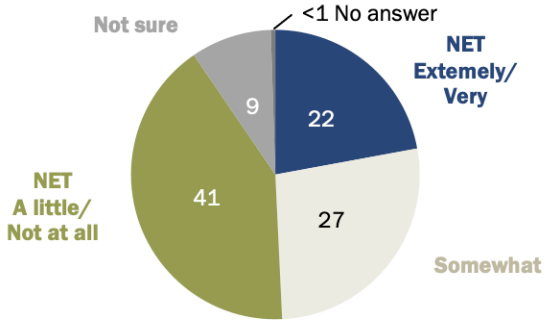


Note: Teens are those ages 13 to 17. Those who did not give an answer are not shown.
Source: Survey conducted April 14-May 4, 2022.
"Connection, Creativity and Drama: Teen Life on Social Media in 2022"

PEW RESEARCH CENTER

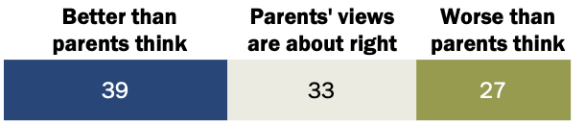
Only a minority of teens say their parents are extremely or very worried about their social media use

% of U.S. teens who say they think their parents are ___ worried about them using social media



About four-in-ten teens say teens' experiences on social media are better than what parents think

% of U.S. teens who say they think teens' experiences on social media are ...



Note: Teens are those ages 13 to 17. Those who did not give an answer are not shown.
Source: Survey conducted April 14-May 4, 2022.
"Connection, Creativity and Drama: Teen Life on Social Media in 2022"

PEW RESEARCH CENTER

4.3.4 Stress in America: Generation Z (2018). *American Psychological Association.*

EXCERPT: …Despite high percentages of Gen Zs feeling stress from different causes, only half (50 percent) feel they do enough to manage their stress; **one in four Gen Zs (25 percent) say they do not feel they do enough.** Additionally, nearly three-quarters in this generation (73 percent) say they could have used more emotional support in the past year. **It's clear that social media is an enormous part of Gen Zs' lives, and for more than half of them (55 percent), it provides a feeling of support. The flipside, however, is that nearly half say social media makes them feel judged (45 percent), and nearly two in five (38 percent) report feeling bad about themselves as a result of social media use.**

4.3.5 Nesi, Mann, & Robb (2023). Teens and mental health: How girls really feel about social media. *Common Sense Media.*

EXCERPT: This report documents the results of a demographically representative national survey, conducted in November and December 2022, of more than 1,300 adolescent girls (age 11 to 15) in the United States. This report does not aim to explore whether girls' use of social media causes positive or negative mental health outcomes. Rather, the purpose of this report is to explore girls' perceptions of how popular social media platforms and their design features affect their well-being, to understand the frequency with which they report positive and negative experiences on these platforms, and to highlight the experiences of groups who may be more vulnerable (e.g., girls experiencing depressive symptoms, LGBTQ+ adolescents). We asked girls whether they have ever used a series of social media platforms, but we focused the majority of our questions and analysis on five popular platforms: YouTube, TikTok, Instagram, Snapchat, and messaging apps (e.g., iMessage, WhatsApp, GroupMe). For the majority of our findings, we relied on quantitative survey data, but in some cases, we also asked girls to share opinions in their own words.

TABLE 4. Say their lives would be better without social media, by demographics and LGBTQ+ identity

		Age		Race/Ethnicity				Family income			LGBTQ+ identity	
Platform	TOTAL	11 to 12	13 to 15	White	Black	Hispanic	Asian	Lower	Middle	Higher	Yes	No
YouTube	**11%**	11%	11%	9%	11%	15%	15%	8%[a]	10%[a]	16%[b]	9%[a]	21%[b]
TikTok	**16%**	17%	15%	17%	12%	20%	11%	14%	15%	20%	14%[a]	27%[b]
Instagram	**12%**	14%	12%	13%	11%	21%	17%	8%[a]	10%[a]	19%[b]	11%[a]	21%[b]
Snapchat	**13%**	16%	12%	14%	12%	15%	12%	10%	16%	14%	11%[a]	29%[b]
Messaging apps	**9%**	9%	10%	8%	4%	12%	14%	6%[a]	10%[a,b]	12%[b]	8%[a]	21%[b]

Notes: Among adolescent girls who have ever used each platform. Items with different superscripts differ significantly across rows within each category ($p < .05$). See *Methodology* for income breakdowns.

TABLE 5. Belief that platform has had a "mostly negative" impact on their age group, by demographics

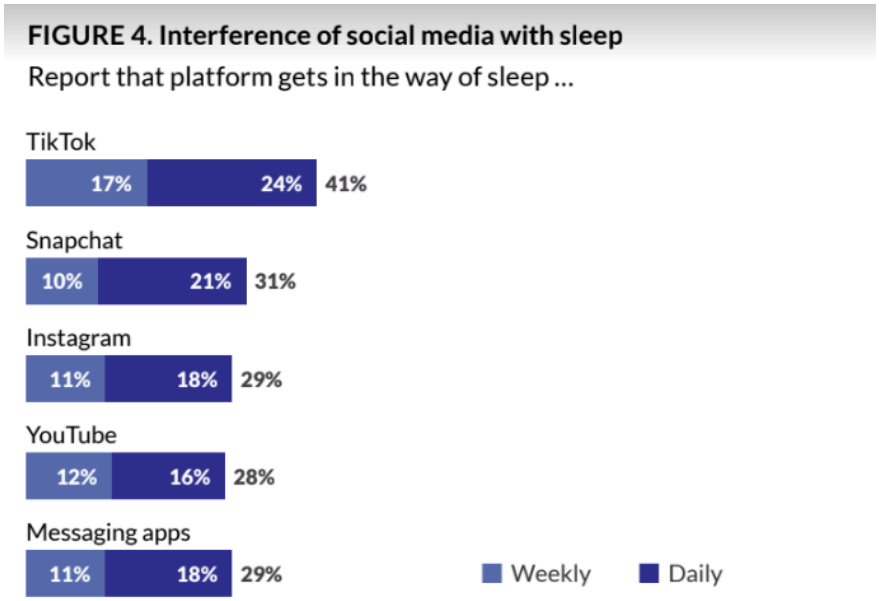
		Age		Race/Ethnicity				Family income		
Platform	TOTAL	11 to 12	13 to 15	White	Black	Hispanic	Asian	Lower	Middle	Higher
YouTube	**5%**	3%[a]	6%[b]	5%	3%	3%	4%	5%	4%	4%
TikTok	**26%**	25%	26%	29%[a]	15%[b]	24%[a,b]	28%[a]	23%	25%	29%
Instagram	**19%**	20%	18%	18%	19%	21%	12%	23%[a]	17%[b]	17%[b]
Snapchat	**26%**	27%	26%	29%[a]	22%[a,b]	23%[a,b]	17%[b]	25%	28%	25%
Messaging apps	**10%**	12%	9%	7%[a]	14%[b]	12%[a,b]	7%[a,b]	14%[a]	10%[a,b]	7%[b]

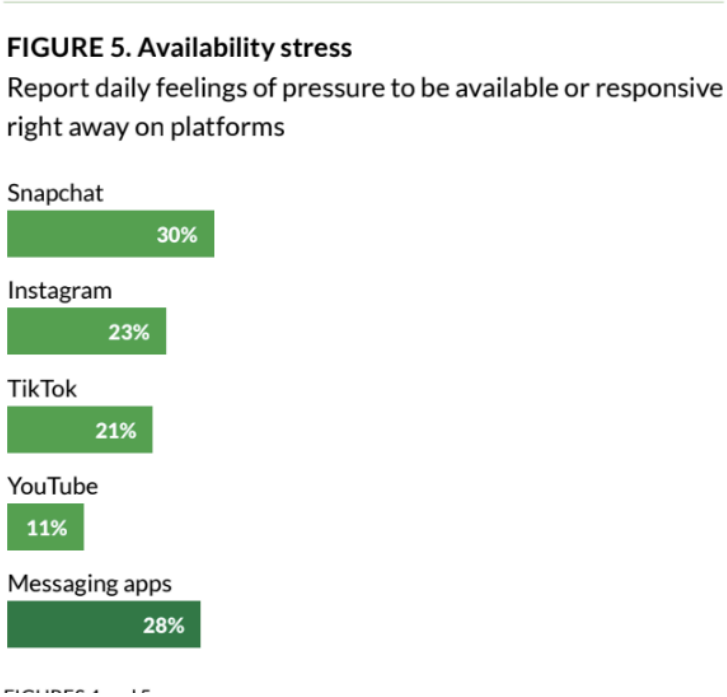
Notes: Among all adolescent girls surveyed. Items with different superscripts differ significantly across rows within each category ($p < .05$). See *Methodology* for income breakdowns.

TABLE 6. Age at which girls believe young people should be allowed to use each platform

Age	YouTube	TikTok	Instagram	Snapchat	Messaging apps
9 or younger	35%	9%	4%	5%	14%
10	24%	17%	14%	13%	21%
11	5%	6%	5%	6%	6%
12	14%	18%	16%	16%	15%
TOTAL: 12 and younger	**77%**	**49%**	**38%**	**40%**	**57%**
13	10%	19%	22%	21%	17%
14	4%	7%	10%	9%	8%
15	4%	8%	10%	10%	6%
16 or older	5%	17%	19%	21%	13%
TOTAL: 13 and older	**23%**	**51%**	**62%**	**60%**	**43%**

Note: Among all adolescent girls surveyed.



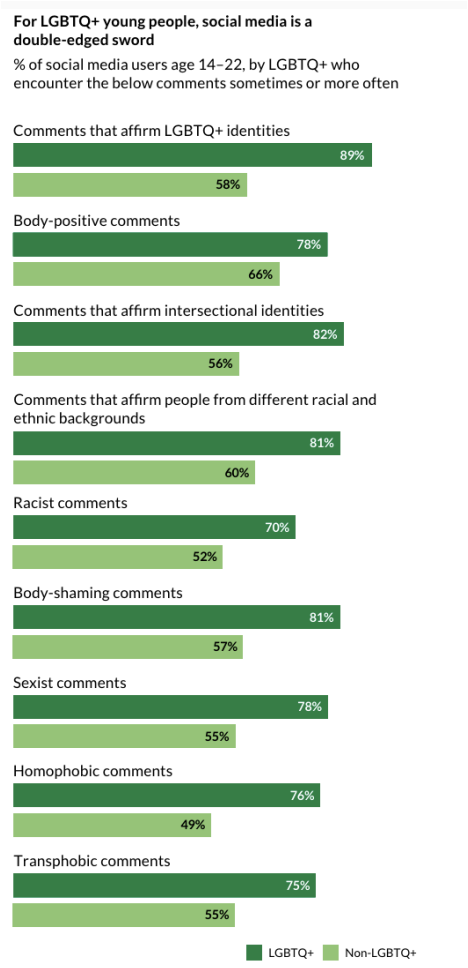


4.3.6 Common Sense Media (2024). A Double-Edged Sword: How Diverse Communities of Young People Think About the Multifaceted Relationship Between Social Media and Mental Health.

EXCERPT: this report shares the results of a nationally representative survey of 1,274 teens and young adults age 14 to 22 in the United States. It was fielded during October

and November of 2023 and includes oversamples of LGBTQ+, Black, and Latino youth to ensure representation and yield statistically meaningful results of these demographic groups in the data set. Trend questions allow for comparisons between two other cross-sectional samples, one from 2018 and one from 2020, that examine the role of digital technologies in youth well-being before, during, and after the COVID-19 pandemic. The survey also includes a set of items that allow us to identify and take a closer look at young people who are experiencing symptoms of depression, as measured by the PHQ-8 depression scale.

FIGURE:

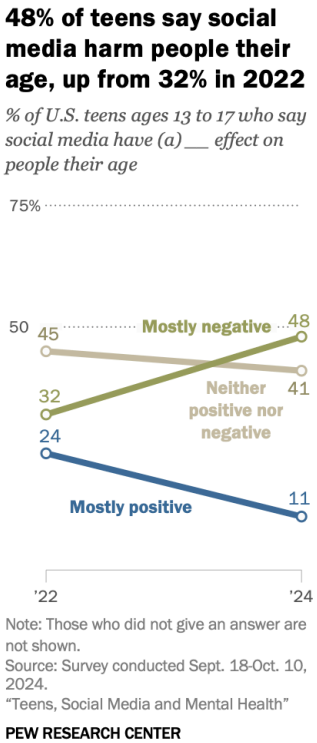


4.3.7 Pew (2025). Teens, Social Media, and Mental Health.

KEY FINDINGS:

- Roughly half of teens (48%) say these sites have a mostly negative effect on people their age, up from 32% in 2022. But fewer (14%) think they negatively affect them personally.
- More teens report spending too much time on social media: 45% of teens say they spend too much time on social media in our current survey, up from 36% in 2022.
- Girls' experiences on social media skew more negative, at times: Teen girls are more likely than boys to say social media hurt their mental health (25% vs. 14%), confidence (20% vs. 10%) or sleep (50% vs. 40%).
- A majority of teens see social media as a positive space for friendships and creativity: 74% of teens say these platforms make them feel more connected to their friends, and 63% say they give them a place to show off their creative side.
- Teens and parents have different comfort levels talking about teen mental health: 80% of parents say they're extremely or very comfortable talking to their teen about their teen's mental health. Smaller shares of teens (52%) feel the same way.
- Social media as a mental health resource: 34% of teens say they at least sometimes get information about mental health on social media.

FIGURE:



4.3.8 Faverio et al. (2026). Teens' experiences on TikTok, Instagram and Snapchat. *Pew Research Center*.

EXCERPT: How do teens think social media impact them? The answer depends on which part of their life *and* which platform we ask about.

Among teens, TikTok users are more likely to report that it negatively impacts their sleep than those on Snapchat or Instagram. Roughly four-in-ten say it hurts the amount of sleep they get, compared with about a quarter of those who say the same for Snapchat or Instagram.

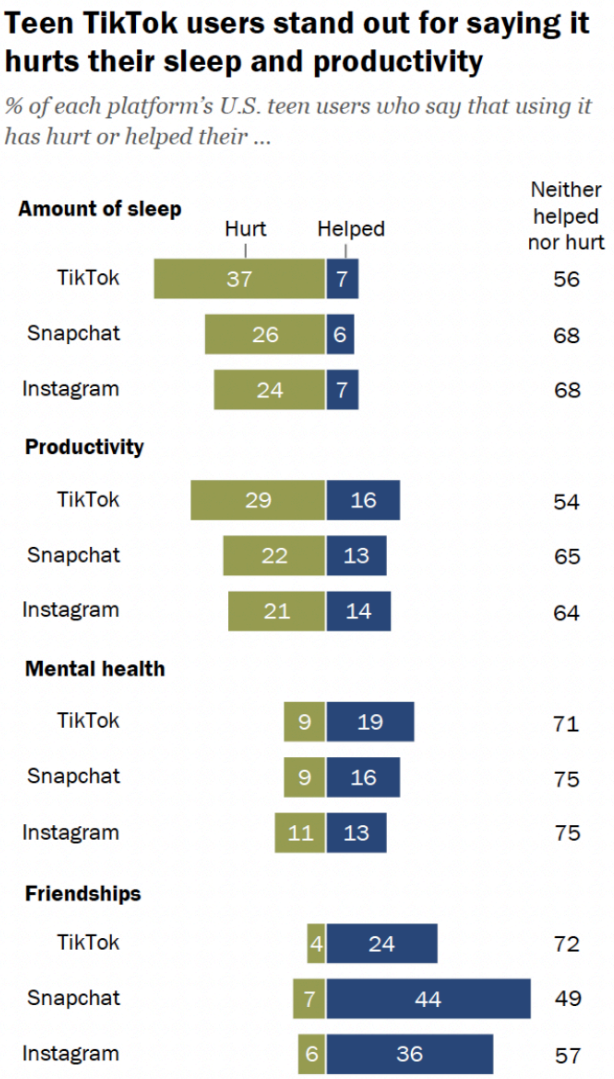
And larger shares of TikTok users also say it hurts their productivity, compared with the other two platforms.

Snapchat stands out for teens saying it *helps* their friendships. Just under half (44%) report this – higher than the shares on Instagram or TikTok who say the same.

Overall, far fewer teens say these sites *hurt* their friendships. This lines up with previous findings about teens' views of social media as a whole.

Across all three platforms, most teen users say it neither hurts nor helps their mental health. Though teens on TikTok and Snapchat are slightly more likely to say the platform helps rather than hurts their mental health. For Instagram, statistically equal shares say it helps as say it hurts. We asked parents how social media overall impacts their teen: About a quarter say they hurt their teen's mental health, compared with 8% who say they help.

That said, large shares report that these sites do not hurt or help them in these four ways. This is the case across platforms. For friendships, about half to roughly three quarters of users of each site say it neither hurts nor helps.



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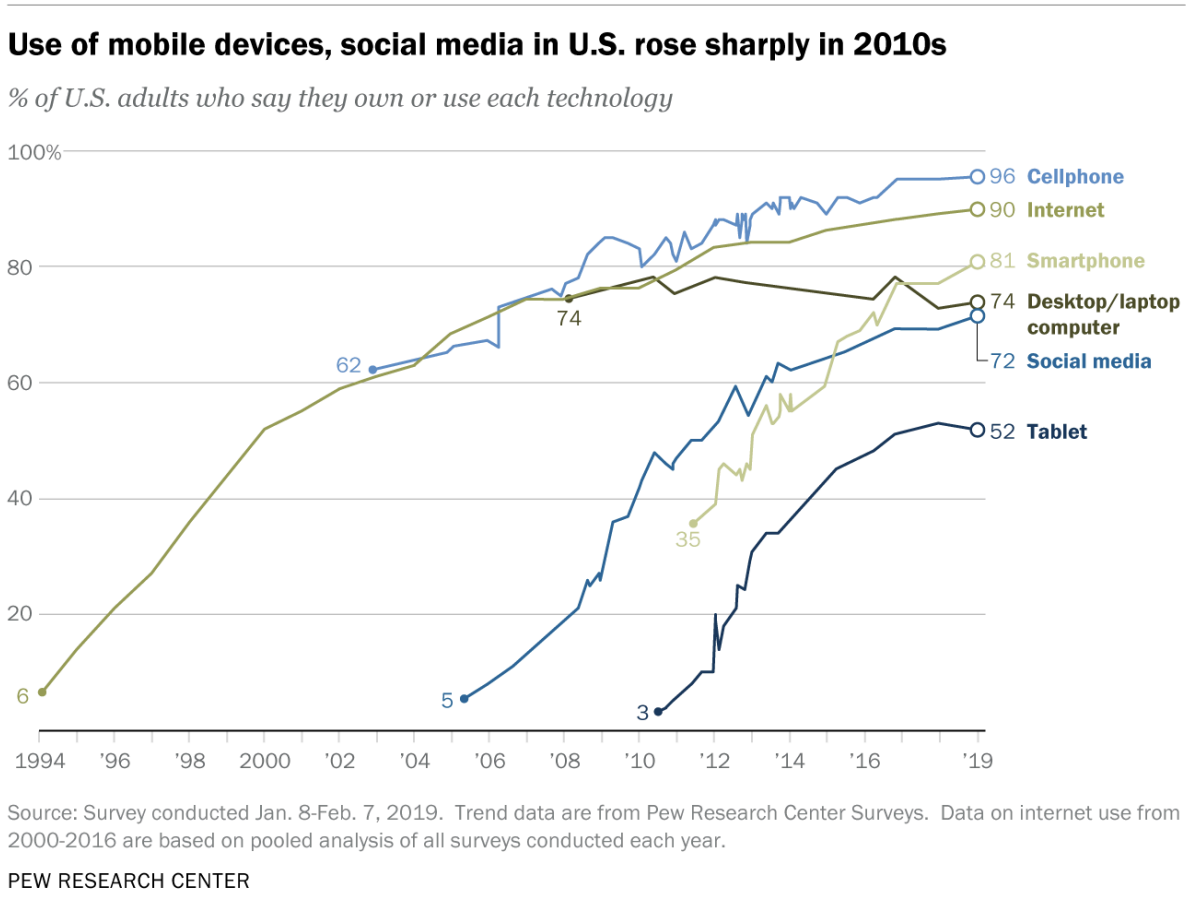
5. MAJOR REVIEW ARTICLES AND DATABASES

[We only include reviews published in 2017 or later, because depression rates only began increase around 2012, so data only shows up in studies published after 2015, so a review of relevant studies could not be published until 2017 at earliest]

5.1. Pew Research Center, Page of reports on social media
Contains many stories and graphs, including this one showing the pace of adoption of various technologies since 1994. The steepest upward slope for social media adoption

is roughly 2009 to 2012, which are the exact years in which Facebook, Twitter, and other platforms turned themselves into “outrage machines,” according to Haidt & Rose-Stockwell (2019).



5.2 Education Policy Institute (UK) (2017). Social media and children’s mental health: a review of the evidence.

ABSTRACT: KEY FINDINGS SECTION ON Risks of social media use:

- The report highlights several risks linked with social media use – including cyber-bullying, concerns about excessive internet use, sharing of private information and harmful content – such as websites that promote self-harm. 34 per cent of UK children have experienced at least one of these risks.
- Over a third (37.3 per cent) of UK 15 year olds can be classed as ‘extreme internet users’ (6+ hours of use a day) – markedly higher than the average of

OECD countries. Young people in the UK are also extensive users of social media sites – 94.8 per cent of 15 year olds in the UK used social media before or after school – slightly above the OECD average.

- **The evidence points towards a correlation between extreme use of social media and harmful effects on young people's wellbeing. Those classed as 'extreme internet users' were more likely to report being bullied (17.8 per cent) than moderate internet users (6.7 per cent).**
- **Further evidence points to a link between periods spent on social media and a rise in mental health problems.**
- More research is needed to understand the causal relationship between social networking and mental health and wellbeing problems.

5.3 Dickson, Richardson, Kwan et al. (2019). Screen-based activities and children and young people's mental health and psychosocial wellbeing: a systematic map of reviews. *Department of Health Reviews Facility (UK).*

CONCLUSIONS: This systematic map of reviews highlights some key gaps in the field. First, the tendency in primary studies to draw on cross-sectional data with a lack of prospective research designs, prevents reviews from providing a clear indication of nature of any causal relationship between screen-based activities and mental health outcomes. Second, evidence on the factors potentially mediating and/or moderating the relationship between screen-based activities and mental health outcomes was sparse, limiting our understanding of what influences CYP behaviour in this area. Third, few reviews analysed subsets of populations (e.g. specific age groups, gender, mental health status) which could help contextualise the relationship between screen-based activities and mental health and psychosocial outcomes. Lastly, although some reviews included qualitative studies, there is a lack of synthesis of critically appraised evidence about CYP's experiences of different types of screen-based activities. Future reviews generating evidence of this kind are needed to improve our understanding of the consequences of, and causal mechanisms that explain how and why, the use of screen-based activities may impact mental health and psychosocial outcomes, over time.

5.4 Lisak (2018). Adverse physiological and psychological effects of screen time on children and adolescents: Literature review and case study. *Environmental Research*.

ABSTRACT: A growing body of literature is associating excessive and addictive use of digital media with physical, psychological, social and neurological adverse consequences. Research is focusing more on mobile devices use, and **studies suggest that duration, content, after-dark-use, media type and the number of devices are key components determining screen time effects**. **Physical health effects: excessive screen time is associated with poor sleep and risk factors for cardiovascular diseases such as high blood pressure, obesity, low HDL cholesterol, poor stress regulation (high sympathetic arousal and cortisol dysregulation), and Insulin Resistance. Other physical health consequences include impaired vision and reduced bone density. Psychological effects: internalizing and externalizing behavior is related to poor sleep. Depressive symptoms and suicidal are associated to screen time induced poor sleep, digital device night use, and mobile phone dependency.** ADHD-related behavior was linked to sleep problems, overall screen time, and violent and fast-paced content which activates dopamine and the reward pathways. Early and prolonged exposure to violent content is also linked to risk for antisocial behavior and decreased prosocial behavior. Psychoneurological effects: addictive screen time use decreases social coping and involves craving behavior which resembles substance dependence behavior. Brain structural changes related to cognitive control and emotional regulation are associated with digital media addictive behavior. A case study of a treatment of an ADHD diagnosed 9-year-old boy suggests screen time induced ADHD-related behavior could be inaccurately diagnosed as ADHD. Screen time reduction is effective in decreasing ADHD-related behavior.

5.5 Yoon, Kleinman, Mertz, & Brannick (2019). Is social network site usage related to depression? A meta-analysis of Facebook–depression relations. *Journal of Affective Disorders*. [h/t Ian Goddard]

ABSTRACT: Facebook depression is defined as feeling depressed upon too much exposure to Social networking sites (SNS). Researchers have argued that upward social comparisons made on SNS are the key to the Facebook depression phenomenon. To examine the relations between SNS usage and depression, we conducted 4 separate meta-analyses relating depression to: (1) time spent on SNS, (2) SNS checking frequency, (3) general and (4) upward social comparisons on SNS. We compared the four mean effect sizes in terms of magnitude.
METHODS: Our literature search yielded 33 articles with a sample of 15,881 for time spent on SNS, 12 articles with a sample of 8041 for SNS checking frequency, and 5

articles with a sample of 1715 and 2298 for the general and the upward social comparison analyses, respectively.
RESULTS: **In both SNS-usage analyses, greater time spent on SNS and frequency of checking SNS were associated with higher levels of depression with a small effect size. Further, higher levels of depression were associated with greater general social comparisons on SNS with a small to medium effect, and greater upward social comparisons on SNS with a medium effect. Both social comparisons on SNS were more strongly related to depression than was time spent on SNS**.
LIMITATIONS: Limitations include heterogeneity in effect sizes and a small number of samples for social comparison analyses.
CONCLUSIONS: Our results are consistent with the notion of 'Facebook depression phenomenon' and with the theoretical importance of social comparisons as an explanation.

[note from haidt: few of the studies gave results for women separately, so this meta-analysis did not comment on whether the effect size was larger for girls]

5.6 Sohn, Reese, Wildridge, Kalk, & Carter (2019). Prevalence of problematic smartphone usage and associated mental health outcomes amongst children and young people: a systematic review, meta-analysis and GRADE of the evidence. *BMC Psychiatry.*

ABSTRACT: AIMS: To conduct a systematic review and meta-analysis to examine the prevalence of PSU and quantify the association with mental health harms.
METHODS: A search strategy using Medical Subject Headings was developed and adapted for eight databases between January 1, 1st 2011 to October 15th 2017. No language restriction was applied. Of 924 studies identified, 41 were included in this review, three of which were cohort studies and 38 were cross sectional studies. The mental health outcomes were self-reported: depression; anxiety; stress; poor sleep quality; and decreased educational attainment, which were synthesized according to an a priori protocol.
RESULTS: The studies included 41,871 CYP, and 55% were female. **The median prevalence of PSU amongst CYP was 23.3% (14.0–31.2%). PSU was associated with an increased odds of depression (OR = 3.17;95%CI 2.30–4.37;I2 = 78%); increased anxiety (OR = 3.05 95%CI 2.64–3.53;I2 = 0%); higher perceived stress (OR = 1.86;95%CI 1.24–2.77;I2 = 65%); and poorer sleep quality (OR = 2.60; 95%CI; 1.39–4.85, I2 = 78%).**

CONCLUSIONS: **PSU was reported in approximately one in every four CYP and accompanied by an increased odds of poorer mental health.** PSU is an evolving public health concern that requires greater study to determine the boundary between helpful and harmful technology use. Policy guidance is needed to outline harm reduction strategies.

5.7 Orben (2020). Teenagers, screens and social media: a narrative review of reviews and key studies. *Social Psychiatry and Psychiatric Epidemiology*.

ABSTRACT: [summary of results] When examining the reviews, it becomes evident that the research field is dominated by cross-sectional work that is generally of a low quality standard. While research has highlighted the importance of differentiating between different types of digital technology use many studies do not consider such necessary nuances. These limitations aside, **the association between digital technology use, or social media use in particular, and psychological well-being is—on average—negative but very small.** Furthermore, the direction of the link between digital technology use and well-being is still unclear: effects have been found to exist in both directions and there has been little work done to rule out potential confounders.

[OTHER QUOTES FROM THE ARTICLE:]

Reviews have found small correlations between social media use and depressive symptoms [24, 68] that (if numerically provided) range from $r = 0.11$ [75] and $r = 0.13$ [38] to $r = 0.17$ [64]. Another meta-analysis found no significant relationship between social media use and well-being ($r < -0.01$, [28]). Yet when this meta-analysis only examined studies of adolescents, this correlation did rise to levels similar to those found in other meta-analyses ($r = -0.07$). **The associations between social media use and well-being therefore range from about $r = -0.15$ to $r = -0.10$.**

Many studies and meta-analyses find a small negative association between social media use and well-being of about $r = -0.15$ to $r = -0.10$, while the correlations fall to about $r = -0.10$ to $r = -0.05$ in some work lauded as being more transparent [42, 43]. Correlations and observed effects in this ballpark have been shown in meta-analytic studies considering anxiety and depressive outcomes (e.g., [28, 38, 64, 75]), but have also been found in longitudinal research [5, 22, 33, 41, 47] and experimental work [2]. …. While age is not a routine focus of studies [28], **gender has been shown to be a predictive factor in recent work** [21, 41, 61].

[NOTE from Haidt: Orben notes that the general finding across reviews is correlations of roughly .10 to .15. Her own studies find lower correlations, but as we have noted (Twenge, Haidt, Joiner & Campbell, 2020), her SCA analyses make a number of decisions that reduce the correlations. **So if we go with .10 to .15 as the overall correlation of the very crude self-report measure of "hours of social media use" with depression/anxiety, and we note that these numbers are for ALL participants, and that correlations are almost always larger for women and girls, then the range for women/girls is higher, and could well be around r=.20. This is not trivial.**]

5.8 Keles, McCrae, & Grealish (2019). A systematic review: the influence of social media on depression, anxiety and psychological distress in adolescents. *Int J Adolesc Youth.*

ABSTRACT: While becoming inextricable to our daily lives, online social media are blamed for increasing mental health problems in younger people. This systematic review synthesized evidence on the influence of social media use on depression, anxiety and psychological distress in adolescents. A search of PsycINFO, Medline, Embase, CINAHL and SSCI databases reaped 13 eligible studies, of which 12 were cross-sectional. Findings were classified into four domains of social media: time spent, activity, investment and addiction. **All domains correlated with depression, anxiety and psychological distress. However, there are considerable caveats due to methodological limitations of cross-sectional design, sampling and measures**. Mechanisms of the putative effects of social media on mental health should be explored further through qualitative enquiry and longitudinal cohort studies.

5.9 Verduyn, Ybarra, Résibois, Jonides, & Kross (2017). Do social network sites enhance or undermine subjective well-being? A critical review. *Soc Issues Pol Rev*.

ABSTRACT: Social network sites are ubiquitous and now constitute a common tool people use to interact with one another in daily life. Here we review the consequences of interacting with social network sites for subjective well-being—that is, how people feel moment-to-moment and how satisfied they are with their lives. We begin by clarifying the constructs that we focus on in this review: social network sites and subjective well-being. Next, we review the literature that explains how these constructs are related. **This research reveals: (a) negative relationships between passively using social network sites and subjective well-being, and (b) positive**

relationships between actively using social network sites and subjective well-being, with the former relationship being more robust than the latter. Specifically, passively using social network sites provokes social comparisons and envy, which have negative downstream consequences for subjective well-being. In contrast, when active usage of social network sites predicts subjective well-being, it seems to do so by creating social capital and stimulating feelings of social connectedness. We conclude by discussing the policy implications of this work.

5.10 Odgers & Jensen (2020). Annual Research Review: Adolescent mental health in the digital age: facts, fears, and future directions. *The Journal of Child Psychology and Psychiatry*.

ABSTRACT: Adolescents are spending an increasing amount of their time online and connected to each other via digital technologies. Mobile device ownership and social media usage have reached unprecedented levels, and concerns have been raised that this constant connectivity is harming adolescents' mental health. This review synthesized data from three sources: (a) narrative reviews and meta-analyses conducted between 2014 and 2019, (b) large-scale preregistered cohort studies and (c) intensive longitudinal and ecological momentary assessment studies, to summarize what is known about linkages between digital technology usage and adolescent mental health, with a specific focus on depression and anxiety. The review highlights that most research to date has been correlational, focused on adults versus adolescents, and has generated a mix of often conflicting small positive, negative and null associations. **The most recent and rigorous large-scale preregistered studies report small associations between the amount of daily digital technology usage and adolescents' well-being that do not offer a way of distinguishing cause from effect and, as estimated, are unlikely to be of clinical or practical significance**. Implications for improving future research and for supporting adolescents' mental health in the digital age are discussed.

[NOTE from Haidt & Twenge: We agree with the authors' critiques of the literature and suggestions for future improvements. However their paper is mostly about "digital media" time (also known as "screen time"). But our review in this Google doc is focused on *social media*, and a general finding is that relationships between social media and bad mental health outcomes are larger, sometimes much larger, than for "screen time," which includes a wide range of activities such as watching videos, playing video games, or looking things up on Wikipedia. **Orben 2020 (see 4.7, above) reports a range of correlation coefficients for social media and mental health problems that is generally between r = .10 and .15. When you focus on *girls*, the effects get larger**

still, and may be near r = .20, which is far from lacking any "clinical or practical significance." r's in this range usually mean that twice as many heavy users (vs. light users) are depressed or unhappy, as you can see in the graphs in studies 1.1.2 through 1.1.4, above.

The authors examine three "evidence bases". **"Evidence Base 1"** is a review of 6 meta-analytic studies. But only two of the studies are well focused on adolescents as the population and social media use as the activity being studied. Keles, McCrae & Grealish (2019; see 4.8 above) found that "All domains correlated with depression, anxiety and psychological distress," although they note limitations of the studies. McCrae, Gettings and Pursell (2017, see below, 4.11) also found correlations in the same range as Orben: r = .12 for both cross sectional studies and for longitudinal studies.

Evidence Base 2 is large scale and multiple-cohort studies, such as the Millennium Cohort Study. Odgers & Jensen focus on the 3.2 million analyses done by Orben & Przybylski (2019) [see 1.2.1, above], looking at "*technology use*" and depression. As we showed in our comment on that study, *social media use* produces a much larger correlation, even in Orben & Przybylski's own SCA graphs. As just one example: Orben & Przybylski include TV under "technology use" -- and the r's for TV are considerably lower than for social media. They mention the 2017 study of UK adolescents concluding that there were only "small negative associations (less than 1% of the variation explained) for those with high levels of engagement" [see 1.1.1, above] but not the re-analysis finding that, in the same data, twice as many heavy users of smartphones are low in well-being [1.1.2].

Odgers & Jensen also mention the Monitoring the Future dataset and cite an unpublished study (Kreski et al.) showing small or unstable associations with "daily social media use." But that item in the MtF dataset asks teens if they use social media never, yearly, monthly, weekly, or daily, with most teens saying daily, so it has little variance, which keeps correlations very low.

Evidence base 3 is Daily diary studies and ecological momentary assessments. This section also focuses on "technology use," not on social media.

In sum: Odgers & Jensen give us an important study showing that "screen time" or "technology use" or "digital media" use, expressed in hours per day, does not seem to be consistently linked to depression/anxiety. That is important for parents to know. But this finding is consistent with the finding that shows up often in this Google doc: ***social media* usage is linked (correlationally and experimentally) to depression/anxiety, especially for girls, and especially for those who are heavy users.**

This study was written up in *The New York Times* with the headline: Panicking About Your Kids' Phones? New Research Says Don't

5.11 McCrae, Gettings & Purssell (2017). Social Media and Depressive Symptoms in Childhood and Adolescence: A Systematic Review. *Adolescent Research Review*.

ABSTRACT: Concerns are increasingly raised in academic and lay literature about the impact of the internet on young people's well-being. This systematic review examined empirical research on the relationship between social media use and depressive symptoms in the child and adolescent population. A systematic search of Medline, PsycInfo and Embase databases yielded **eleven eligible studies.** Relevant results were extracted from each study, with a total sample of 12,646. **Analysis revealed a small but statistically significant correlation between social media use and depressive symptoms in young people**. However, studies varied widely in methods, sample size and results, making the clinical significance of these findings nuanced. Over half of the studies were cross-sectional, while those of longitudinal design were of limited duration. This review justifies further investigation of this phenomenon, with a need for consensus on variables and measurement.

[From the Statistical Analysis section: To assess any possible impact from publication type, sub-group analyses were conducted for the two types of study design. **The pooled estimate for cross-sectional studies (n = 6) was r = 0.12**, (95% CI 0.02, 0.22), Q = 81.01, I2 = 93.8%; while **that for longitudinal studies (n = 5) was r = 0.12**, (95% -0.01, 0.25), Q = 38.98, I2 = 89.7%; suggesting little effect [of the type of study.]
[Note from Haidt: **Multiple review studies seem to be converging on correlation coefficients in the range from r = .11 to r = .15,** when both sexes are analyzed together. It is hard to find studies that analyzed girls separately]

5.12 Abi-Jaoude, Naylor & Pignatiello (2020). Smartphones, social media use and youth mental health. *CMAJ* (Canadian Medical Association Journal).

KEY POINTS [which serves as the abstract]:

- **Evidence from a variety of cross-sectional, longitudinal and empirical studies implicate smartphone and social media use in the increase in mental distress, self-injurious behaviour and suicidality among youth; there is a dose–response relationship, and the effects appear to be greatest among girls.**
- Social media can affect adolescents' self-view and interpersonal relationships through social comparison and negative interactions, including cyberbullying;

moreover, social media content often involves normalization and even promotion of self-harm and suicidality among youth.
- High proportions of youth engage in heavy smartphone use and media multitasking, with resultant chronic sleep deprivation, and negative effects on cognitive control, academic performance and socioemotional functioning.
- Clinicians can work collaboratively with youth and their families, using open, nonjudgmental and developmentally appropriate approaches to reduce potential harms from social media and smartphone use, including education and practical problem-solving.
- There is a need for public awareness campaigns and social policy initiatives that promote nurturing home and school environments that foster resilience as youth navigate the challenges of adolescence in today's world.

5.13 Vidal, Lhaksampa, Miller, & Platt, R. (2020). Social media use and depression in adolescents: A scoping review. *International Review of Psychiatry.*

ABSTRACT: There have been increases in adolescent depression and suicidal behaviour over the last two decades that coincide with the advent of social media (SM) (platforms that allow communication via digital media), which is widely used among adolescents. This scoping review examined the bi-directional association between the use of SM, specifically social networking sites (SNS), and depression and suicidality among adolescents. The studies reviewed yielded four main themes in SM use through thematic analysis: quantity of SM use, quality of SM use, social aspects associated with SM use, and disclosure of mental health symptoms. Research in this field would benefit from use of longitudinal designs, objective and timely measures of SM use, research on the mechanisms of the association between SM use and depression and suicidality, and research in clinical populations to inform clinical practice.

…A total of 42 studies published between 2011 and 2019 met the inclusion criteria. Of the studies included, 16 were conducted in European Countries, 14 in the USA, 5 in Asia, 3 in Canada, 2 in Australia, and 2 in Latin American Countries. The number of participants per study ranged from 23 in a qualitative study (94 in the smallest quantitative study) to 118,545 participants in the largest study (Table 2).

….extensive research on the quantity and quality of SM use has shown an association between SM use and depression in adolescents. Given that most studies are cross-sectional, longitudinal research would help assess the direction of this association. At the same time, some aspects of SM use may have a

beneficial effect on adolescent well-being, such as the ability to have diversity of friendships and easily accessed supports. Furthermore, the use of SM content to detect symptoms has potential in depression and suicide prevention. Finally, moderators of the association between SM and adolescent depression and suicidality (e.g. gender, age, parental involvement) are areas to explore that would allow more targeted interventions. Since SM will remain an important facet of adolescents' lives, a better understanding of the mechanisms of its relationship with depression could be beneficial to increase exposure to mental health interventions and promote well-being.

5.14 Sedwig, R., Epstein, S., Dutta, R., Ougrin, D. (2019). Social media, internet use, and suicide attempts in adolescence. *Current Opinion in Psychiatry*.

ABSTRACT: PURPOSE OF REVIEW: Suicide is the second leading cause of death in youth aged 10–24 years old globally, but detecting those at risk is challenging. Novel preventive strategies with wide influence across populations are required. Interest in the potential for both detrimental and supportive influences of social media/internet use on suicidal behaviour has been growing; however, the relationship remains unclear.
RECENT FINDINGS: A systematic search of articles from database inception up to 25 January 2019 across five databases: Medline, PsycINFO, EMBASE, HMIC and CINAHL revealed **nine independent studies investigating social media/internet use and suicide attempts in young people less than 19 years old (n = 346 416). An independent direct association was found between heavy social media/internet use and increased suicide attempts in seven studies (adjusted ORs ranged from 1.03 to 5.10), although adjusting for cyberbullying victimization and sleep disturbance reduced the strength of this association.** Two studies found that some social media/internet use, versus no use, may be associated with fewer suicide attempts. There were no studies investigating the relationship between social media/internetuse and completed suicide.
SUMMARY: There is an independent association between problematic use of social media/internet and suicide attempts in young people. However, the direction of causality, if any, remains unclear. Further evaluation through longitudinal studies is needed.

5.15 McCrory, Best, & Maddock (2020). The relationship between highly visual social media and young people's mental health: A scoping review. *Children and Youth Services Review.*

ABSTRACT: Users of highly visual social media (HVSM), such as Snapchat and Instagram, share their messages through images, rather than relying on words. A significant proportion of people that use these platforms are adolescents. Previous research reveals mixed evidence regarding the impact of online social technologies on this age group's mental wellbeing, but it is uncertain whether the psychological effects of visual content alone differ from text-driven social media. This scoping review maps existing literature that has published evidence about highly visual social media, specifically its psychological impact on young people. Nine electronic databases and grey literature from 2010 until March 2019 were reviewed for articles describing any aspect of visual social media, young people and their mental health. The screening process retrieved 239 articles. With the application of eligibility criteria, this figure was reduced to 25 articles for analysis. Results indicate a paucity of data that exclusively examines HVSM. The predominance of literature relies on quantitative methods to achieve its objectives. **Many findings are inconsistent and lack the richness that qualitative data may provide to explore the reasons for these mixed findings**.

5.16. Project AWeSome (Adolescents, Well-being, and Social Media), Academic collaboration in the Netherlands. Publication page is here.

5.17. Ferguson, Kaye, Branley-Bell et al. (2021) Like This Meta-Analysis: Screen Media and Mental Health. *Professional Psychology: Research and Practice.*

ABSTRACT: The question of whether screen time, particularly time spent with social media and smartphones, influences mental health outcomes remains a topic of considerable debate among policy makers, the public, and scholars. Some scholars have argued passionately that screen media may be contributing to an increase in poor psychosocial functioning and risk of suicide, particularly among teens. Other scholars contend that the evidence is not yet sufficient to support such a dramatic conclusion. The current meta-analysis included 37 effect sizes from 33 separate studies. To consider the most recent research, all studies analyzed were published between 2015 and 2019. **Across studies, evidence suggests that screen media plays little role in mental health concerns. In particular, there was no evidence that screen media contribute to suicidal ideation or other mental health outcomes. This result was also true when investigating smartphones or social media specifically.** Overall, as has been the case for previous media such as video games, concerns about screen time and mental health are not based in reliable data.

[Note from Haidt: Looking at the spreadsheet of supplemental information posted at OSF, we can see that only 6 of the 37 effect sizes, coming from 5 of the 33 studies, were coded as "Internet or social media." Here are the 5 studies that produced the estimate for "internet or social media". We examined the published articles more

carefully to figure out which of them gave an effect size for social media use alone, distinct from internet use. You can see our deep dive here, and you can see our summary conclusions here:

STUDY 1: Coyne, Rogers., Zurcher, Stockdale, & Booth (2020). Does time spent using social media impact mental health?: An eight year longitudinal study. *Computers in Human Behavior*.

NOTE: This is in our lit review at 2.2.7. Yes, the study did provide an effect size for time spent on social networking sites (specific platforms are not specified).

STUDY 2a: Heffer, Good, Daly, MacDonell, & Willoughby (2019). The longitudinal association between social media use and depressive symptoms among adolescents and young adults: An empirical reply to Twenge et al. (2018). *Clinical Psychological Science*.

NOTE: This is in our lit review at 2.2.1. Yes, the study did provide an effect size for time spent on social media (specific platforms are not specified).

STUDY 2b [This is not a repeat; it refers to the second study within the paper]**:** Heffer, Good, Daly, MacDonell, & Willoughby (2019). The longitudinal association between social media use and depressive symptoms among adolescents and young adults: An empirical reply to Twenge et al. (2018). *Clinical Psychological Science.*

NOTE: Yes, the study did provide an effect size for time spent on social media (specific platforms are not specified).

STUDY 3: Berryman, Ferguson, & Negy (2018). Social media use and mental health among young adults. *Psychiatric Quarterly.*

NOTE: This is in our lit review at 1.2.2 Yes, the study did provide an effect size for time spent on social media (but item is specified as "on social media with friends," so may have pulled for the most productive activities, such as DM with friends, rather than scrolling through Instagram).

STUDY 4: Oberst, Wegmann, Stodt, Brand, & Chamarro (2016; 2017). Negative consequences from heavy social networking in adolescents: The mediating role of fear of missing out. *Journal of Adolescence.*

NOTE: No, The study did provide an effect size for "social network intensity." But the outcome variable is not depression and anxiety (that is the IV). The outcome variable is negative consequences of mobile device use (e.g., lost a relationship because of phone use). They did not test whether Social Network Intensity predicts depression or anxiety. The direction of the tests were the other way around. Sex difference: The effects of FOMO were only present for females. There was no relationship between depression and maladaptive phone use for males

STUDY 5: Hoare, Milton, Foster, & Allender (2017). Depression, psychological distress and internet use among community-based australian adolescents: A cross-sectional study. *BMC Public Health.*

NOTE: No, this study looked specifically at internet use. No separate variable for social media.

Conclusion: of the 37 effect sizes (from 33 separate studies) in the meta-analysis, only 6 effect sizes (from 5 studies) were listed as "internet or social media." Of those, only 4 effect sizes (from 3 studies) actually allowed us to look at the relationship between time spent using social media and poor mental health. Of those, three effect sizes (from 2 studies) were from longitudinal studies (where much depends on the interval between measurements and results are hard to interpret) and the remaining study (Berryman) used a non-standard item to measure social media time "with friends."

In sum: this meta analysis is consistent with the claim in the abstract that "screen media plays little role in mental health concerns," but it does not shed light on the subset of screen time that we are studying in this Google doc: Social media.

5.18. Valkenburg, Meier & Beyens (2022). Social media use and its impact on adolescent mental health: An umbrella review of the evidence.

ABSTRACT:: Literature reviews on how social media use affects adolescent mental health have accumulated at an unprecedented rate of late. Yet, a higher-level integration of the evidence is still lacking. We fill this gap with an up-to-date umbrella review, a review of reviews published between 2019 and mid-2021. Our search yielded 25 reviews: seven meta-analyses, nine systematic, and nine narrative reviews. **Results showed that most reviews interpreted the associations between social media use and mental health as 'weak' or 'inconsistent,' whereas a few qualified the same associations as 'substantial' and 'deleterious.'** We summarize the gaps identified in the reviews, provide an explanation for their diverging interpretations, and suggest several avenues for future research.

[Note from Haidt: See my response to this meta-analysis in section 8.8.1 below, in my responses to my November 2021 Atlantic article]

5.19. Stoilova, Edwards, Kostyrka-Allchorne, Livingstone, & Sonuga-Barke (2021). The impact of digital experiences on adolescents with mental health vulnerabilities

5.20 Kross, Verduyn et al.(2021). Social Media and Well-Being: Pitfalls, Progress, and Next Steps

ABSTRACT:: Within a relatively short time span, social media have transformed the way humans interact, leading many to wonder what, if any, implications this interactive revolution has had for people's emotional lives. Over the past 15 years, an explosion of research has examined this issue, generating countless studies and heated debate. Although early research generated inconclusive findings, several experiments have revealed small negative effects of social media use on well-being. These results mask, however, a deeper set of complexities. Accumulating evidence indicates that social media can enhance or diminish well-being depending on how people use them. Future research is needed to model these complexities using stronger methods to advance knowledge in this domain.

5.21 Memon, Sharma, Mohite, & Jain (2018). The role of online social networking on deliberate self-harm and suicidality in adolescents: A systematized review of literature. *Indian Journal of Psychiatry*.

ABSTRACT: Social media use by minors has significantly increased and has been

linked to depression and suicidality. Simultaneously, age-adjusted suicide rates have steadily increased over the past decade in the United States with suicide being the second most common cause of death in youth. Hence, the increase in suicide rate parallels the simultaneous increase in social media use. In addition, the rate of nonsuicidal self-injury ranges between 14% and 21% among young people. Evidence suggests that self-harming youth is more active on online social networks than youth who do not engage in self-harm behavior. The role of online social networking on deliberates self-harm and suicidality in adolescents with a focus on negative influence was assessed by conducting a systematized literature review. A literature search on "PubMed" and "Ovid Medline" using a combination of MeSH terms yielded nine articles for data extraction satisfying predefined inclusion/exclusion criteria. It was found that **social networking websites are utilized by suicidal and self-harming youth as a medium to communicate with and to seek social support from other users. Online social networking also leads to increased exposure to and engagement in self-harm behavior due to users receiving negative messages promoting self-harm, emulating self-injurious behavior of others, and adopting self-harm practices from shared videos. Greater time spent on social networking websites led to higher psychological distress, an unmet need for mental health support, poor self-rated mental health, and increased suicidal ideation.** In conclusion, greater time spent on online social networking promotes self-harm behavior and suicidal ideation in vulnerable adolescents.

5.22. Meier & Reinecke (2020). Computer-Mediated Communication, Social Media, and Mental Health: A Conceptual and Empirical Meta-Review. *Communication Research.*

Abstract: Computer-mediated communication (CMC), and specifically social media, may affect the mental health (MH) and well-being of its users, for better or worse. Research on this topic has accumulated rapidly, accompanied by controversial public debate and numerous systematic reviews and meta-analyses. Yet, a higher level integration of the multiple disparate conceptual and operational approaches to CMC and MH and individual review findings is desperately needed. To this end, we first develop two organizing frameworks that systematize conceptual and operational approaches to CMC and MH. Based on these frameworks, we integrate the literature through a meta-review of 34 reviews and a content analysis of 594 publications. **Meta-analytic evidence, overall, suggests a small negative association between social media use and MH**. However, effects are complex and depend on the CMC and MH indicators investigated. Based on our conceptual review and the evidence synthesis, we devise an agenda for future research in this interdisciplinary field.

[Note: This review is useful in urging researchers to be specific about the “channels” and “levels of analysis” they are studying, e.g., a device? An application on that device? A feature of that application? Meier & Reinecke report many correlations involving “screen time,” some of which show positive relationships with good mental health

outcomes. When they report findings for SNS (social network sites), the correlations are generally with negative mental health outcomes and are generally in the range of .10 to .20, which they refer to as “small” or “very small.” However this range is consistent with the general consensus emerging in this lit review: the overall correlations for social media usage and internalizing disorders (depression/anxiety) are not mostly around r = .05 (as reported by Orben & Przybylski, 2019), they are usually in the range of .10 to .20, as reported by both Orben (2020) and by Twenge, Haidt & Cummins (2022). The most relevant passage from the results section is this, from p. 1197:

> **Psychopathology.** The most commonly meta-analyzed indicator of internalizing PTH was depressive symptoms. No meta-analyses of externalizing PTH were found (see also RQ2. below). **Five meta-analytic effect sizes for the relationship between SNS use and depressive symptoms existed, all showing a small positive association (e.g., r = .11,** 95% CI [.08; .14]). In addition, one meta-analysis reported **a small positive association between general social comparison on SNS and depressive symptoms (r = .23, 95% CI [.12; .34]), and a somewhat higher one for upward comparison (r = .33**, 95% CI [.20; .47]).

The review found “little meta-analytic evidence for gender effects.” p. 1198.

5.23 Radtke, Apel, Schenkel, Keller, & von Lindern (2021). Digital detox: An effective solution in the smartphone era? A systematic literature review

Abstract: Smartphone use, e.g., on social network sites or instant messaging, can impair well-being and is related to clinical phenomena, like depression. Digital detox interventions have been suggested as a solution to reduce negative impacts from smartphone use on outcomes like well-being or social relationships. **Digital detox is defined as timeouts from using electronic devices (e.g., smartphones), either completely or for specific subsets of smartphone use**. However, until now, it has been unclear whether digital detox interventions are effective at promoting a healthy way of life in the digital era. This systematic literature review aimed to answer the question of whether digital detox interventions are effective at improving outcomes like health and well-being, social relationships, self-control or performance. Systematic searches of seven databases were carried out according to PRISMA guidelines, and intervention studies were extracted that examined timeouts from smartphone use and/or smartphone-related use of social network sites and instant messaging. The review yielded **k = 21 extracted studies** (total N = 3,625 participants). The studies included interventions in the field, from which **12 were identified as randomized controlled trials**. The results showed that the effects from digital detox interventions varied across studies on health and well-being, social relationships, self-control, or performance. For example, **some studies found positive intervention effects, whereas others found**

no effect or even negative consequences for well-being. Reasons for these mixed findings are discussed. Research is needed to examine mechanisms of change to derive implications for the development of successful digital detox interventions.

[NOTE from Haidt: the 21 studies analyzed in this review included several that asked participants to eliminate or greatly reduce *smartphone* usage, which generally led to negative emotional outcomes (perhaps because people were cut off from their relationships). If we look only at studies in which participants were asked to eliminate all *social media platforms* (or sometimes just Facebook specifically), and that also had some measure related to depression, anxiety, or mental health among the dependent variables, that leaves us with *13 studies*. Zach Rausch made a separate Google doc to examine these 13 studies. We find that: **Seven of the studies showed improvements on variables related to mental health** (Brown; Fioravanti; Hinsch study 1; Hinsch study 2; Hunt; Tromhold, and Turel). **Four of the studies found no effect or mixed effects** (Hall; Hanley; Stieger, Vanman). **Two of the studies showed backfire effects** (Vally; Sheldon). In other words, **the majority of studies *did* find a benefit from taking time away from social media**. Both of the studies that included a measure of depression found that spending a week or more away from social media reduced depression.]

5.24 Tang, Werner-Seidler, Torok, Mackinnon, & Christensen, (2021). The relationship between screen time and mental health in young people: A systematic review of longitudinal studies. *Clinical Psychology Review*.

ABSTRACT: An increase in time spent on screen-based technologies has been suggested to underlie recent increases in mental health problems among young people. However, this hypothesis has primarily been based on the findings of cross-sectional studies. The aim of the current review was to provide a comprehensive overview of longitudinal studies examining the relationship between screen time and internalising mental health symptoms. PsycINFO, PubMed/Medline and EMBASE were systematically searched for articles published up to August 2020. **Thirty-five studies**, with sample sizes ranging from 126 to 12,866 participants, met inclusion criteria. **The association between screen time and subsequent depressive symptoms was found to be small to very small in size**. There was limited evidence of any reverse association between depressive symptoms and subsequent screen time. The association between screen time and depressive symptoms varied between different devices and uses. In contrast to depressive symptoms, evidence to support longitudinal

associations between screen time and other internalising mental health symptoms, including anxiety, self-esteem, and general internalising problems, was lacking. Together, **these results suggest that the impact of increased screen time on the prevalence of mental health problems among young people is likely to be negligible or small**. Further longitudinal studies that examine screen content and motivations underlying screen use are required to better discern any relationship between screen time and internalising mental health symptoms.

[Note from Haidt: Like most lit reviews, this one focuses on "screen time" rather than social media. Out of the 35 studies they examined, only 7 looked at links between social media use at time 1 and depression at time 2. We list those studies in this spreadsheet (with Coyne et al. counted twice, for both depression and anxiety). Of the 8 rows in the spreadsheet, we can see that Tang et al. counted 3.5 of them as having found a significant effect. However, Boers et al. says "Significant within-person associations revealed that a further 1-hour increase in social media use in a given year was associated with a further 0.41-unit increase in depressive symptoms in that same year." Also, from the discussion section, p. 12:

> "We found that the relationship between total screen time and subsequent depressive symptoms was stronger than the relationship between depressive symptoms and subsequent screen time, which provides partial support for the hypothesis that **greater screen time is associated with increases in internalising mental health problems.** However, the magnitude of this relationship was small to very small in size. Specifically, among studies where reasonable, comparable effects could be derived, **effect sizes were around r = 0.10**."
> [But note that effect sizes of r = .10 are not negligible; in fact there is a growing recognition that public health issues are generally in this ballpark; they are rarely in the ballpark of r=.30]

5.25 Appel, Marker, & Gnambs (2020). Are social media ruining our lives? A review of meta-analytic evidence. *Review of General Psychology*.

ABSTRACT: A growing number of studies have examined the psychological corollaries of using social networking sites (SNSs) such as Facebook, Instagram, or Twitter (often called social media). The interdisciplinary research area and conflicting evidence from primary studies complicate the assessment of current scholarly knowledge in this field of high public attention. We review meta-analytic evidence on three hotly debated topics regarding the effects of SNSs: well-being, academic achievement, and narcissism. **Meta-analyses from different laboratories draw a rather equivocal picture. They show small associations in the r = .10 range between the intensity of SNS use and**

loneliness, self-esteem, life satisfaction, or self-reported depression, and somewhat stronger links to a thin body ideal and higher social capital. There is no indication for potential devastating effects of social media on school achievement; social media use and school grades are unrelated for adolescents. The meta-analyses revealed small to moderate associations between narcissism and SNS use. In sum, meta-analytic evidence is not in support of dramatic claims relating social media use to mischief.

[Note from Haidt: The authors interpret associations in the ballpark of r = .10 as being too small to make much difference. But see Appendix 8.10, on effect sizes, for an explanation of why such effects are common and important in public health matters]

5.26 Valkenburg, Beyens, Meier, Vanden Abeele, Editors (2022). Special issue on Social Media and Well-Being. *Current Opinion in Psychology.*

[The special issue contains 27 essays. Below we include links only to the 10 essays that relate to teen mental health and social media.]

Vandenbosch, Fardouly, & Tiggemann (2022). Social media and body image: Recent trends and future directions. *Current Opinion in Psychology*.
Beyens, Keijsers, & Coyne (2022). Social media, parenting, and well-being. *Current Opinion in Psychology*.
Pouwels, Keijsers, & Odgers (2022). Who benefits most from using social media, the socially rich or the socially poor? *Current Opinion in Psychology*.
Ghai, Magis-Weinberg, Stoilova, Livingstone, & Orben (2022). Social media and adolescent well-being in the Global South. *Current Opinion in Psychology*.
Wolfers, & Utz (2022). Social media use, stress, and coping. *Current Opinion in Psychology*.
Giumetti, & Kowalski (2022). Cyberbullying via social media and well-being. *Current Opinion in Psychology*.
Meier, & Johnson (2022). Social comparison and envy on social media: A critical review. *Current Opinion in Psychology.*
Valkenburg (2022). Social media use and welCingel, D. P., Carter, M. C., & Krause, H.-V. (2022). Social media and self-esteem. *Current Opinion in Psychology*, *45*, 101304.
Hardman Taylor, Zhao, & Bazarova (2022). Social media and close relationships: a puzzle of connection and disconnection. *Current Opinion in Psychology.*
Cingel, Carter, & Krause (2022). Social media and self-esteem. *Current Opinion in*

Psychology.

5.27 Hancock, Liu, Luo & Mieczkowski (2022). Psychological Well-Being and Social Media Use: A Meta-Analysis of Associations between Social Media Use and Depression, Anxiety, Loneliness, Eudaimonic, Hedonic and Social Well-Being. [Unpublished manuscript posted at SSRN.]

ABSTRACT: The issue of how social media use relates to psychological well-being has been the subject of intense scrutiny across academic disciplines and in the popular media, and the debate has important implications for public policy. **We collected all empirical publications that examined the association between the amount of social media use and at least one of six forms of psychological well-being over the past 12 years, and conducted a meta-analysis to calculate the effect size between social media use and well-being. The results of a random-effects model across 226 studies (N = 275,728) indicated that social media use is not associated with a combined measure of well-being (r = 0.01, n.s., 95% CI [-.02, .04]).** There were, however, small but significant effects for specific dimensions of well-being, including **small positive associations with anxiety (r = .13, p < .01, 95% CI [.04, .22]) and depression (r = .12, p < .01, 95% CI [.07, .17]), as well as social well-being (r = .20, p < .01, 95% CI [.14, .27]).** These effects varied by population cohort, geographic region, study methodology, and types of social media use, among other moderators. We identified 15 different conceptual mechanisms across five categories that authors described as underlying links between social media use and well-being, although these mechanisms were not frequently measured or tested. Overall, **our findings are consistent with recent large-scale studies suggesting that there are small but significant associations between social media use and an individual's well-being, with a trade-off between increased depression and anxiety, along with improved social well-being.**

[Note from Haidt: This meta-analysis is important because it is one of the few that focused on social media, rather than on "screen time." The headline result here is that the overall correlation of social media use with wellbeing is r = .01, which is about as close to zero as you can get. However, there are several problems with using this meta-analysis to make inferences about social media's effects on adolescent mental health:

1) *It is not about adolescents*. Hancock et al. report that "For participant population, more than 50% of effect sizes were from college students, compared to approximately 20% for adults, **15% for adolescents** and 11% for others."
2) *It's mostly about Facebook. "*Facebook had approximately 63% of effect sizes, general platforms had 24% of effect sizes and other platforms had 12.67% effect sizes in the combined well-being index analysis." We don't learn anything about Instagram, Tumblr, or the other more visually oriented

platforms which are most heavily implicated in causing depression among teen girls.

3) *It says nothing about gender.* The words “sex” and “gender” do not appear in the manuscript. Boys and girls, men and women, are always analyzed together, even though effects for girls are usually larger than for boys.

4) It is outdated. It draws from studies published between 2006 and August 2018, and it appears to have been written in 2019, with no updates or references to any publications since then. Yet the mental health crisis only began around 2012, which is why we limit this collaborative review document to studies published in or after 2014. In fact, Hancock et al. report that “The effect of publication year was significant for depression, suggesting that the association between social media use and depression has increased slightly over time.”

In conclusion: as with many other meta-analyses in section 5 of this document, when you look at the correlation of everything for everyone, you usually find very little. **But as you zoom in on the key population (teen girls) and key outcome variables (depression and anxiety) and key platforms (Instagram), and key time period (after 2014) the effects get larger.** In fact, even with all the concerns I listed above, this meta-analysis still found effects in the same range that Amy Orben reported (see study 5.7), between r = .10 and r = .15, for depression and anxiety. As we show in appendix 8.10, these correlations are not negligible; they are the size of many major public health threats. So if we could zoom in on females only, the effect size would likely get larger. Girls under 13, larger still. Girls under 13 using Instagram, larger still, and probably well over r = .20.

5.28 Damodar…, & Branch (2021). #Trending: Social Media’s Influence on Adolescent Anxiety and Depression. *Journal of the American Academy of Child & Adolescent Psychiatry*.

ABSTRACT: BACKGROUND: With new technological advancements, adolescents can obtain devices that give them virtually unlimited access to social media (SM) which may impact adolescent mental health.
OBJECTIVES: This literature review aims to evaluate the influence of social media use on adolescent anxiety and depression.
METHODS: A literature search of PubMed from June 2010 through June 2020 was completed for the following MeSH terms: social media, adolescent, anxiety, depression, and mental health. English language articles that discussed adolescents aged 13 to 18 years, anxiety and/or depression and SM were included. Extracted data included the SM platform, impact on anxiety and depression, interventions, temporal and dose-response relationships, and observed versus self-reported usage.
RESULTS: **The majority of articles positively associated depression (82.6%) and anxiety (78.3%) with SM use. Depression corresponded with cyber-bullying (42.1%), negative**

social perspective (21.0%), diminished self-esteem (15.8%), and sleep disturbance (10.5%). Anxiety corresponded with a negative social perspective (44.4%), diminished self-esteem (33.3%), sleep disturbance (16.7%), and cyber-bullying (16.7%). Many studies suggested the use of interventions to reduce depression (72.7%) and anxiety (72.7%), such as screen time restrictions (n=6) and social support (n=4), but lacked evaluation of their implementation.
CONCLUSION: Current literature suggests a positive association between adolescent SM use with anxiety and depression. Our study highlights the need for further investigation of temporal and dose-response associations between SM use and adolescent mental health, and the potential benefits of SM-driven interventions.

5.29. Bottaro & Faraci (2022). The Use of Social Networking Sites and Its Impact on Adolescents' Emotional Well-Being: a Scoping Review. *Internet Use Disorders.* (h/t Raphael Aubry)

ABSTRACT:Purpose of Review The rapid development of social networking sites (SNSs) has affected adolescents' well-being with great impact on social experience. In this scoping review, we aimed to map out what is known from the most recent literature about adolescents' emotional well-being and the role of emotional regulation skills in preventing problematic SNS use. We used the Arksey and O'Malley methodological framework, and we based the study selection procedure on the PRISMA process. Then, we selected 52 English and peer-reviewed papers from PubMed, MEDLINE, PsycARTICLES, PsycINFO, Psychology and Behavioral Sciences Collection, Wiley Online Library, and Web of Science. Recent Findings We found both positive and negative effects of SNS use on adolescents' emotions with online self-presentation and social comparison as key mechanisms to explain differences in subjective well-being. The risk of developing problematic use of SNSs is influenced by time spent on SNSs, active or passive use, and adolescents' social and emotional skills. Summary This review suggested the importance of emotional experiences and social support in both in-person and online interactions. Future research is needed to provide the basis for a better forthcoming classification of problematic SNS use.

5.30 Winther (2017). How Does the Time Children Spend Using Digital Technology Impact Their Mental Well-being, Social Relationships and Physical Activity? An Evidence-focused Literature Review. *UNICEF-IRC.*

ABSTRACT: Based on an evidence-focused literature review, the first part of this paper examines existing knowledge on how the time children spend using digital technology

impacts their well-being across three dimensions; mental/psychological, social and physical. The evidence reviewed here is largely inconclusive with respect to impact on children's physical activity, but indicates that **digital technology seems to be beneficial for children's social relationships. In terms of impact on children's mental well-being, the most robust studies suggest that the relationship is U-shaped, where no use and excessive use can have a small negative impact on mental well-being, while moderate use can have a small positive impact.** In the second part of the paper, the hypothetical idea of addiction to technology is introduced and scrutinized. **This is followed by an overview of the hypothetical idea that digital technology might re-wire or hijack children's brains; an assumption that is challenged by recent neuroscience evidence.** In conclusion, considerable methodological limitations exist across the spectrum of research on the impact of digital technology on child well-being, including the majority of the studies on time use reviewed here, and those studies concerned with clinical or brain impacts. This prompts reconsideration of how research in this area is conducted. Finally, recommendations for strengthening research practices are offered.

5.31 Bozzola… & Staiano (2022). The Use of Social Media in Children and Adolescents: Scoping Review on the Potential Risks. *International Journal of Environmental Research and Public Health*.

ABSTRACT: In recent years, social media has become part of our lives, even among children. From the beginning of COVID-19 pandemic period, media device and Internet access rapidly increased. Adolescents connected Internet alone, consulting social media, mostly Instagram, TikTok, and YouTube. During "lockdown", the Internet usage allowed communication with peers and the continuity activities such as school teaching. However, we have to keep in mind that media usage may be related to some adverse consequences especially in the most vulnerable people, such as the young. Aim of the review is to focus on risks correlated to social media use by children and adolescents, identifying spies of rising problems and engaging in preventive recommendations. The scoping review was performed according to PRISMA guidelines, searching on PubMed the terms "social media" or "social network", "health", and "pediatrics". Excluding articles not pertinent, we found 68 reports. **Out of them, 19 were dealing with depression, 15 with diet, and 15 with psychological problems, which appeared to be the most reported risk of social media use.** Other identified associated problems were **sleep, addiction, anxiety, sex related issues, behavioral problems, body image, physical activity, online grooming, sight, headache, and dental caries**. Public and medical awareness must rise over this topic and new prevention measures must be found,

starting with health practitioners, caregivers, and websites/application developers. Pediatricians should be aware of the risks associated to a problematic social media use for the young's health and identify sentinel signs in children as well as prevent negative outcomes in accordance with the family.

5.32 Keles, McCrae, & Grealish (2020). A systematic review: The influence of social media on depression, anxiety and psychological distress in adolescents. *International Journal of Adolescence and Youth*.

ABSTRACT: While becoming inextricable to our daily lives, online social media are blamed for increasing mental health problems in younger people. This systematic review synthesized evidence on the influence of social media use on depression, anxiety and psychological distress in adolescents. A search of PsycINFO, Medline, Embase, CINAHL and SSCI databases reaped 13 eligible studies, of which 12 were cross-sectional. **Findings were classified into four domains of social media: time spent, activity, investment and addiction. All domains correlated with depression, anxiety and psychological distress.** However, there are considerable caveats due to methodological limitations of cross-sectional design, sampling and measures. Mechanisms of the putative effects of social media on mental health should be explored further through qualitative enquiry and longitudinal cohort studies.

5.33 Twenge, Wang, Erickson, & Wilcox (2022). Teens and Tech: What Difference Does Family Structure Make? *Institute for Family Studies.*

EXCERPT: Consistent with previous research, **youth who spend more time on digital media are more likely to report more symptoms of mental health problems. Moreover, family structure interacts with digital media use, with teenagers in non-intact families who are heavy tech users most at risk.**

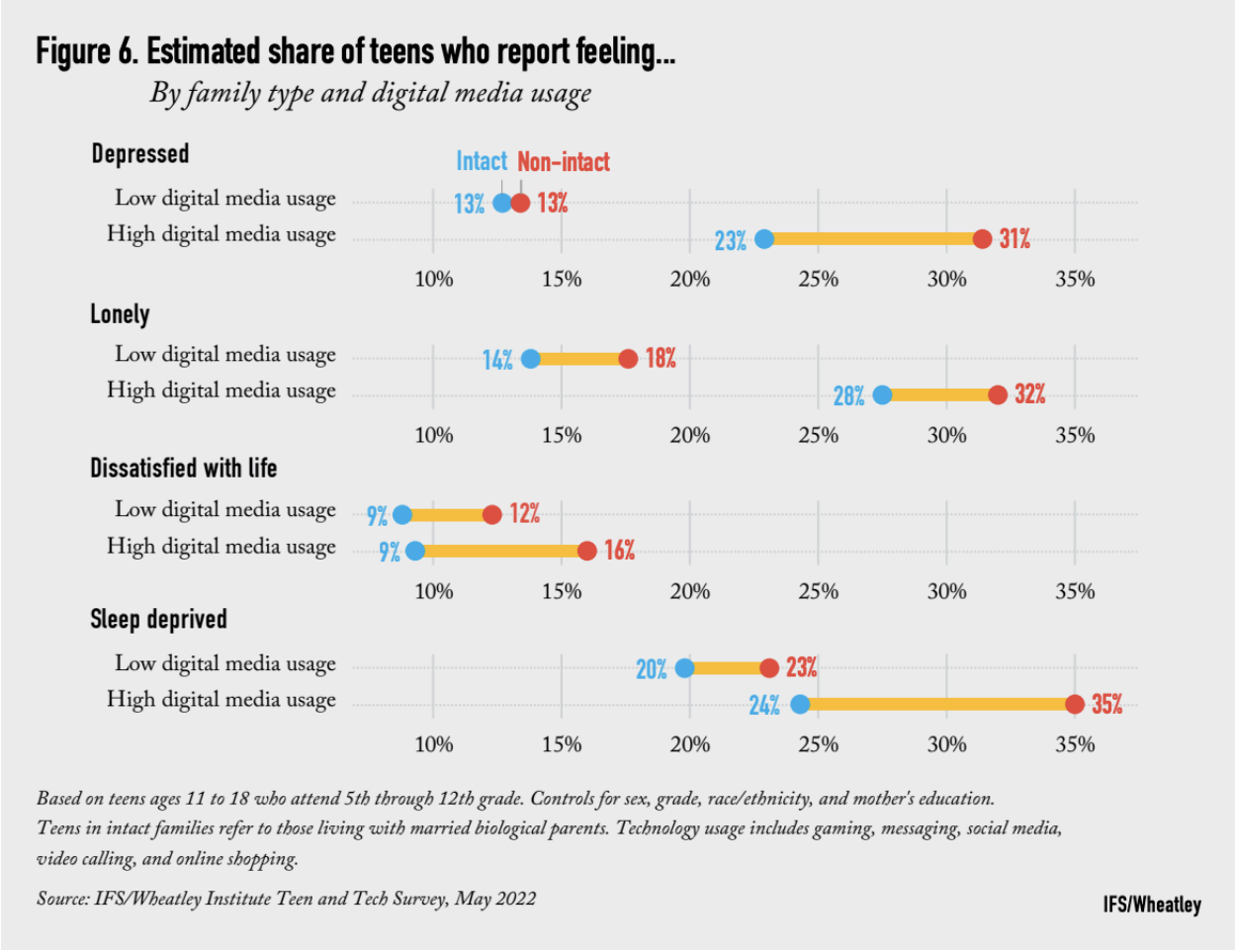
Take depression. While there were few differences in depression by family type among lighter digital media users (less than 8 hours per day), there were larger differences among heavier users (8 hours + a day). The teens most likely to be depressed are heavy digital media users in non-intact families.

The same is true for loneliness. Youth who are heavy users of digital media are more likely to report high levels of loneliness, with the highest percentage among heavy users in non-intact families.

Feeling dissatisfied with life is also more common among youth in non-intact families, particularly those who are heavy users of digital media. The link between dissatisfaction and digital media use is more pronounced in non-intact families than in intact families, where dissatisfaction does not differ by digital media use.

Youth in non-intact families who are heavy users of digital media are also more likely to not get enough sleep, reporting less than 7 hours of sleep on most nights (youth in these age groups require 9 to 10 hours of sleep per night). Sleep deprivation is most strongly linked to digital media use among non-intact families, compared to intact families. Thus, regulating technology use among youth may be especially important in non-intact families.

FIGURE:



5.34 Shannon, Bush, Villeneuve, Hellemans, & Guimond (2022). Problematic Social Media Use in Adolescents and Young Adults: Systematic Review and Meta-analysis. *JMIR Mental Health*.

ABSTRACT: BACKGROUND: Technology is ever evolving, with more and more diverse activities becoming possible on screen-based devices. However, participating in a heavy screen-based lifestyle may come at a cost. Our hypothesis was that problematic social media use increased the prevalence of mental health outcomes.
OBJECTIVE: This study seeks to systematically examine problematic social media use in youth and its association with symptoms of depression, anxiety, and stress.
METHODS: A systematic search was conducted to identify studies in adolescents and young adults, using the databases Engineering Village, Psycinfo, Pubmed, and Web of Science. A total of 18 studies were identified, with a total of 9269 participants in our review and included in the meta-analysis.
RESULTS: **Our metaregression shows moderate but statistically significant correlations between problematic social media use and depression (r=0.273, P<.001), anxiety (r=0.348, P<.001), and stress (r=0.313, P<.001). We did not find evidence of heterogeneity of these summary correlations by age, gender, or year of publication.**
CONCLUSIONS: This study provides further evidence of the association between problematic social media use and negative mental health among adolescents and young adults and supports future research to focus on the underlying mechanisms of problematic use of social media.

5.35 Cunningham, Hudson, & Harkness (2021). Social Media and Depression Symptoms: A Meta-Analysis. *Research on Child and Adolescent Psychopathology*.

ABSTRACT: Social Networking Sites (SNS) have close to 3 billion users worldwide. Recently, however, SNS have come under media scrutiny for their potential association with depression. Two previous meta-analyses failed to find evidence for a robust concurrent association between SNS use and depression symptoms. However, these analyses focused primarily on the time spent using SNS. The current meta-analysis is the first to consider the multi-dimensional nature of SNS use, and examines separately the quantitative associations of depression symptoms to SNS use in three types of SNS studies examining three distinct constructs of SNS use: time spent using SNS, intensity of SNS use, and problematic SNS use. Sixty-two studies (N = 451,229) met inclusion criteria. **Depression symptoms were significantly, but weakly, associated with time spent using SNS (r = 0.11) and intensity of SNS use (r = 0.09). However, the**

association of depression symptoms to problematic SNS use was moderate (r = 0.29), was significantly higher than for time spent using SNS (Qbetween = 35.85, p < 0.001) or intensity of SNS use (Qbetween = 13.95, p < 0.001), and was not significantly moderated by age, gender, year of study publication, or mode of recruitment. These results suggest that future research examining causal models of the relation of SNS use and depression, as well as research on intervention and prevention, should focus in more detail on individuals who are engaging in a pattern of problematic SNS use.

5.36 Cataldo, Lepri, Neoh, & Esposito (2021). Social Media Usage and Development of Psychiatric Disorders in Childhood and Adolescence: A Review. *Frontiers in Psychiatry*.

ABSTRACT: Social media platforms, such as Facebook, Twitter, and Instagram, are now part of almost everyone's social life, especially for the newer generations. Children and teenagers grew up together with these Internet-based services, which have become an integral part of their personal and social life. However, as reported in various studies, psychological and psychiatric problems are sometimes associated with problematic usage of social media. The primary purpose of this review is to provide an overview of the cognitive, psychological, and social outcomes correlated with a problematic use of social media sites during the developmental stages, from age 10 to 19 years. **With a specific focus on depression, anxiety, eating, and neurodevelopmental disorders, the review also discusses evidence related to genetic and neurobiological issues, together with the implications in clinical work and future directions under a multidisciplinary perspective.** While the scientific community has made significant progress in enhancing our understanding of the impact of social media on teenagers' lives, more research integrating biological and environmental factors is required to fully elucidate the development of these disorders.

5.37 Yin, de Vries, Gentile, & Wang (2019). Cultural Background and Measurement of Usage Moderate the Association Between Social Networking Sites (SNSs) Usage and Mental Health: A Meta-Analysis. *Social Science Computer Review*.

ABSTRACT: The present meta-analysis reviews English-language studies from 2005 to 2016 to investigate the relationship between social networking sites (SNSs) usage and mental health and to explore whether cultural background, measurement of usage, gender and age influence this relationship. A total of 63 studies and 144 effect sizes

(positive indicators of mental health k = 62, negative indicators of mental health k = 82) were analyzed. **We found that (1) SNSs usage was positively correlated with both positive and negative indicators of mental health, and no significant difference between these two mean correlations was found; (2) age did not moderate the relationship between SNSs usage and mental health; (3) SNSs usage was positively related to positive indicators for measures of social network size, while general use was positively related to negative indicators; (4) stronger correlations were found between SNSs usage and positive indicators of mental health in collectivist cultures than in individualistic cultures; (5) as percentage of female participants increased, a stronger relationship between social network sites and negative indicators of mental health was observed.** This meta-analysis allows for integration of conclusions of past studies and establishes a clearer understanding of the relations between SNSs usage and mental health, including recognizing that complex factors (such as cultural background and gender) moderate these relations.

5.38 O'Day & Heimberg (2021). Social media use, social anxiety, and loneliness: A systematic review. *Computers in Human Behavior Reports*.

ABSTRACT: BACKGROUND: Social media use (SMU) has become highly prevalent in modern society, especially among young adults. Research has examined how SMU affects well-being, with some findings suggesting that SMU is related to social anxiety and loneliness. Socially anxious and lonely individuals appear to prefer and seek out online social interactions on social media.
OBJECTIVE: This systematic review examines social anxiety (SA) and loneliness (LO) in the context of SMU.
METHODS: A multi-database search was performed. Papers published prior to May 2020 relevant to SMU and SA and/or LO were reviewed.
RESULTS: **Both socially anxious and lonely individuals engage online more problematically and seek out social support on social media, potentially to compensate for lack of in-person support. SA and LO are associated with problematic SMU; LO appears to be a risk factor for engaging problematically online.**
CONCLUSIONS: LO is a risk factor for problematic SMU. More research on the relationship between SA and SMU is needed. To date, problematic SMU has been defined in terms of frequency rather than pattern of use. Most research has relied on self-report cross-sectional examinations of these constructs. More experimental and longitudinal designs are needed to elucidate potential bidirectional relationships between SA, LO, and SMU.

5.39 McComb, Vanman, & Tobin (2023). A Meta-Analysis of the Effects of Social Media Exposure to Upward Comparison Targets on Self-Evaluations and Emotions. *Media Psychology*.

ABSTRACT: Social media have become a pervasive part of contemporary culture and are an essential part of the daily lives of an increasing number of people. Its popularity has brought unlimited opportunities to compare oneself with other people. This meta-analysis combined and summarized the findings of previous experimental research, with the aim of generating causal conclusions regarding the effects of exposure to upward comparison targets on self-evaluations and emotions in a social media context. We identified 48 articles involving 7679 participants through a systematic search and entered 118 effect sizes into a multilevel, random-effects meta-analysis. **Analyses revealed an overall negative effect of upward social comparison relative to downward comparison and controls on social media users' self-evaluations and emotions ($g = -0.24$, $p < .001$). Specifically, there were significant negative effects of upward comparison on each outcome variable: body image ($g = -0.31$, $p < .001$), subjective well-being ($g = -0.19$, $p < .001$), mental health ($g = -0.21$, $p < .001$) and self-esteem ($g = -0.21$, $p < .001$).** This meta-analysis indicates that contrast is the dominant response to upward comparison on social media, which results in negative self-evaluations and emotions.

5.40 Sanders… & Lonsdale (2023). An umbrella review of the benefits and risks associated with youths' interactions with electronic screens. *Nature Human Behaviour*.

ABSTRACT: The influence of electronic screens on the health of children and adolescents and their education is not well understood. In this prospectively registered umbrella review (PROSPERO identifier CRD42017076051), we harmonized effects from 102 meta-analyses (2,451 primary studies; 1,937,501 participants) of screen time and outcomes. In total, 43 effects from 32 meta-analyses met our criteria for statistical certainty. Meta-analyses of associations between screen use and outcomes showed small-to-moderate effects (range: r = –0.14 to 0.33). In education, results were mixed; for example, screen use was negatively associated with literacy (r = –0.14, 95% confidence interval (CI) = –0.20 to –0.09, P ≤ 0.001, k = 38, N = 18,318), but this effect was positive when parents watched with their children (r = 0.15, 95% CI = 0.02 to 0.28, P = 0.028, k = 12, N = 6,083). **In health, we found evidence for several small negative associations; for example, social media was associated with depression (r = 0.12, 95% CI = 0.05 to 0.19, P ≤ 0.001, k = 12, N = 93,740).** Limitations of our review

include the limited number of studies for each outcome, medium-to-high risk of bias in 95 out of 102 included meta-analyses and high heterogeneity (17 out of 22 in education and 20 out of 21 in health with I2 > 50%). We recommend that caregivers and policymakers carefully weigh the evidence for potential harms and benefits of specific types of screen use.

[NOTE from Zach: As was also found in Orben (2020) and Hancock (2022), a consensus is emerging for the correlation between social media use and depressive symptoms: somewhere between .1 and .15 for *boys and girls combined.* Girls are consistently impacted more than boys by these platforms, meaning that the correlation for girls lies between .15 and .20, **a non-trivial effect**]

5.41 Ferguson (2024). Do Social Media Experiments Prove a Link With Mental Health: A Methodological and Meta-Analytic Review. *Psychology of Popular Media.*

ABSTRACT: Whether social media influences the mental well-being of users remains controversial. Evidence from correlational and longitudinal studies has been inconsistent, with effect sizes weak at best. However, some commentators are more convinced by experimental studies, wherein experimental groups are asked to refrain from social media use for some length of time, compared to a control group of normal use. This meta-analytic review examines the evidence provided by these studies. All studies, regardless of outcome, have fairly straightforward weaknesses related to demand characteristics. Thus, it is unclear whether these study designs are capable of answering causal questions. Nonetheless, meta-analytic evidence for causal effects was statistically no different than zero. However, remarkable between-study heterogeneity was observed. Studies with citation bias produced higher effect sizes, suggesting a research expectancy effect in some studies. Better designs and closer adherence to open science principles and care not to exaggerate the importance of weak effect sizes may help improve rigor in this field.

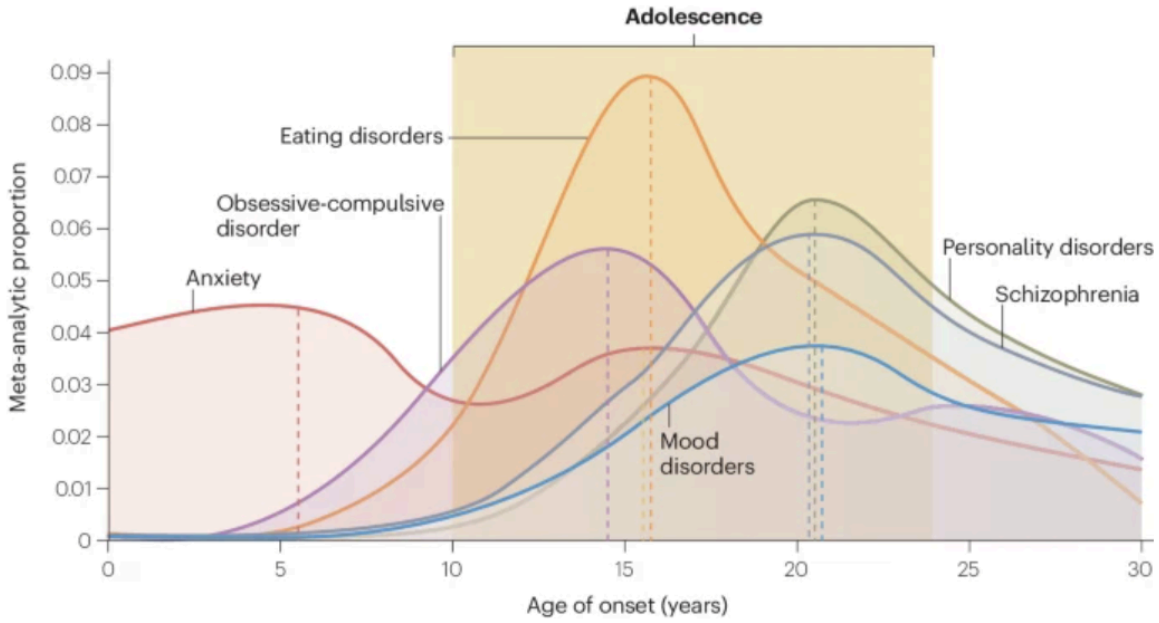
[Commentary to come. In the meantime, you can see one critique of this meta-analysis by David Stein]

5.42 Orben, Meier, Dalgleish, & Blakemore (2024). Mechanisms linking social media use to adolescent mental health vulnerability. *Nature Reviews Psychology*.

ABSTRACT: Research linking social media use and adolescent mental health has produced mixed and inconsistent findings and little translational evidence, despite

pressure to deliver concrete recommendations for families, schools and policymakers. At the same time, it is widely recognized that developmental changes in behaviour, cognition and neurobiology predispose adolescents to developing socio-emotional disorders. In this Review, we argue that such developmental changes would be a fruitful focus for social media research. Specifically, we review mechanisms by which social media could amplify the developmental changes that increase adolescents' mental health vulnerability. **These mechanisms include changes to behaviour, such as sharing risky content and self-presentation, and changes to cognition, such as modifications in self-concept, social comparison, responsiveness to social feedback and experiences of social exclusion.** We also consider neurobiological mechanisms that heighten stress sensitivity and modify reward processing. By focusing on mechanisms by which social media might interact with developmental changes to increase mental health risks, our Review equips researchers with a toolkit of key digital affordances that enables theorizing and studying technology effects despite an ever-changing social media landscape.

Fig. 1: Age of onset for different mental disorders.



Meta-analytic proportion of age of onset of anxiety (red), obsessive-compulsive disorder (purple), eating disorders (orange), personality disorders (green), schizophrenia (grey) and mood disorders (blue). The peak age of onset (dotted lines) is 5.5 and 15.5 years for anxiety, 14.5 years for obsessive-compulsive disorder, 15.5 years for eating disorders and 20.5 years for personality disorders, schizophrenia and mood disorders. Adapted from ref. [258], CC BY 4.0 (https://creativecommons.org/licenses/by/4.0/).

5.43 Panayiotou, Black, Carmichael-Murphy, Qualter, & Humphrey (2023). Time spent on social media among the least influential factors in adolescent mental health: Preliminary results from a panel network analysis. *Nature Mental Health.*

ABSTRACT: There is growing concern about the role of social media use in the documented increase of adolescent mental health difficulties. However, the current evidence remains complex and inconclusive. While increasing research on this area of work has allowed for notable progress, the impact of social media use within the complex systems of adolescent mental health and development is yet to be examined. The current study addresses this conceptual and methodological oversight by applying a panel network analysis to explore the role of social media on key interacting systems of mental health, wellbeing and social life of 12,041 UK adolescents. **Here we find that, across time, estimated time spent interacting with social media predicts concentration problems in female participants.** However, of the factors included in

the current network, **social media use is one of the least influential factors of adolescent mental health, with others (for example, bullying, lack of family support and school work dissatisfaction) exhibiting stronger associations.** Our findings provide an important exploratory first step in mapping out complex relationships between social media use and key developmental systems and highlight the need for social policy initiatives that focus on the home and school environment to foster resilience.

5.44 Fassi, Thomas, Parry, et al. (2024). Social Media Use and Internalizing Symptoms in Clinical and Community Adolescent Samples. A Systematic Review and Meta-Analysis. *JAMA Pediatrics.*

ABSTRACT:
IMPORTANCE: In response to widespread concerns about social media's influence on adolescent mental health, most research has studied adolescents from the general population, overlooking clinical groups.

OBJECTIVE: To synthesize, quantify, and compare evidence on the association between social media use and internalizing symptoms in adolescent clinical and community samples.Data Sources Peer-reviewed publications from MEDLINE, Web of Science, PsycInfo, and Scopus (initially reviewed in May 2022 and updated in October 2023) and preprints from Europe PubMed Central (February 2023) published in English between 2007 and 2023.Study Selection Two blinded reviewers initially identified 14 211 cross-sectional and longitudinal studies quantifying the association between social media use and internalizing symptoms, excluding experimental studies and randomized clinical trials.

DATA EXTRACTION AND SYNTHESIS: PRISMA and MOOSE guidelines were followed, pooling data using a random-effects model and robust variance estimation. The quality of evidence was assessed using the Quality of Survey Studies in Psychology Checklist.

MAIN OUTCOMES AND MEASURES: Articles were included if they reported at least 1 quantitative measure of social media use (time spent, active vs passive use, activity, content, user perception, and other) and internalizing symptoms (anxiety, depression, or both).

RESULTS: The 143 studies reviewed included 1 094 890 adolescents and 886 effect sizes, 11% of which examined clinical samples. **In these samples, a positive and**

significant meta-correlation was found between social media use and internalizing symptoms, both for time spent (n = 2893; *r*, 0.08; 95% CI, 0.01 to 0.15; *P* = .03; I^2, 57.83) **and user engagement** (n = 859; *r*, 0.12; 95% CI, 0.09 to 0.15; *P* = .002; I^2, 82.67). These associations mirrored those in community samples.

CONCLUSIONS AND RELEVANCE: The findings in this study highlight a lack of research on clinical populations, a critical gap considering public concerns about the increase in adolescent mental health symptoms at clinical levels. This paucity of evidence not only restricts the generalizability of existing research but also hinders our ability to evaluate and compare the link between social media use and mental health in clinical vs nonclinical populations.

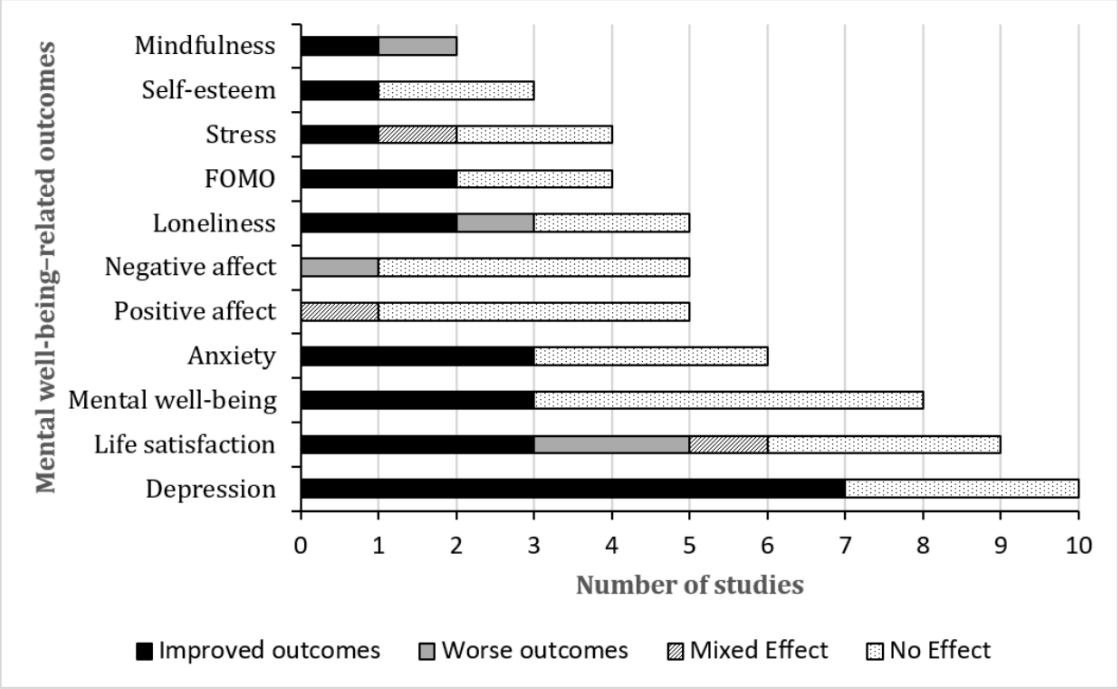
5.45 Plackett, Blyth, & Schartau (2023). The Impact of Social Media Use Interventions on Mental Well-Being: Systematic Review. *Journal of Medical Internet Research*.

ABSTRACT: BACKGROUND:
There is some evidence that more social media use is related to poorer mental well-being and that social media use can become problematic when it starts to interfere with a person's daily life and mental well-being. To address this issue and improve users' mental well-being, social media use interventions (eg, abstinence from social media) have been developed and evaluated. However, there is limited understanding of the effectiveness of these interventions in improving mental well-being.
OBJECTIVE: This systematic review aimed to synthesize the literature on the effectiveness of social media use interventions in improving mental well-being in adults.
METHODS: A systematic search (January 1, 2004, to July 31, 2022) was completed across 3 databases in accordance with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. Experimental studies evaluating the impact of social media use interventions on mental well-being in adults were included. Outcomes related to mental well-being, such as depression, anxiety, stress, and loneliness, were included. A narrative synthesis without meta-analysis was completed to summarize the study characteristics and effectiveness by outcome and intervention type. The Effective Public Health Practice Project Quality Assessment Tool was used to measure the quality of the studies.
RESULTS: Of the 2785 studies identified through the systematic search, 23 (0.83%) were included in the analysis. **Many of the included studies (9/23, 39%) found improvements in mental well-being, some (7/23, 30%) found mixed effects, and others (7/23, 30%) found no effect on mental well-being**. Therapy-based interventions that used techniques such as cognitive behavioral therapy were more effective than limiting use of social media or full abstinence from social media, with 83%

(5/6) of these studies showing improvements in mental well-being compared with 20% (1/5) and 25% (3/12), respectively. **Depression was the most frequently investigated and improved outcome with 70% (7/10) of the studies showing a significant improvement in depression after the intervention, whereas other outcomes showed more varied results**. Quality was poor, with 96% (22/23) of the studies receiving a weak global score, mostly for issues related to selection bias because most of the studies (16/23, 70%) used a convenience sampling of university students. CONCLUSIONS: **This review provides some evidence that social media use interventions are effective in improving mental well-being, especially for depression and when using therapy-based interventions**. Further experimental and longitudinal research is needed with representative samples to investigate who may benefit most from social media use interventions. This will help to develop guidance and recommendations for policy makers and clinicians on how best to manage problematic social media use.

FIGURE:

Figure 2. Summary of social media use intervention effects on mental well-being–related outcomes. FOMO: fear of missing out.



5.46 Montag… & van den Eijnden (2024). Problematic social media use in childhood and adolescence. *Addictive Behaviors*.

ABSTRACT: At the time of writing, about 4.59 billion people use social media with many adolescents using their social media accounts across a myriad of applications and platforms. According to recent statistics, in 2022 individuals spent an average of 151 minutes on social media each day, illustrating the global relevance of social media (Dixon, 2022a, Dixon, 2022b). One of the pressing questions, internationally, is whether social media use is harmful and/or addictive. This question is of particular importance because many teenagers - and younger adolescents - spend considerable time on these platforms, which have increasingly become an integral part of their lives. Moreover, considering lifespan development, adolescents may be particularly vulnerable to specific features and advertisements shown to them on social media platforms. Growing prevalence of poor mental health in young people has led to recent recommendations in the United States to routinely screen for anxiety in 8-18 year olds, and for depression and suicide risk for adolescents between 12-18 years of age US Preventive Services Task Force et al., 2022a, US Preventive Services Task Force et al., 2022b) – the conditions often accompanying problematic social media use. The present work not only provides insights into the current state of the literature but provides also recommendations.

5.46 Marciano (2024). Digital Detox and Well-Being.

In June 2023, we conducted a literature search in Google Scholar, PubMed, and ScienceDirect. We included reviews and original research articles (1) focusing on interventions to reduce screen time/social media time and (2) its impact on/association with well-being. We summarized the key points of the 2 published reviews and 6 articles (published between 2013 and 2023), including 139 articles in total. Our main findings are: 1. there is no clear definition of digital detox and no consistency in the assessment of interventions' effectiveness; 2. reducing social media/smartphone time rather than promoting total abstinence showed more beneficial effects on well-being; 3. the effect of the interventions and their duration varies depending on the type of outcome; and4. the effects are influenced by gender, age, and contextual factors.

Available evidence on interventions aiming at reducing social media use on well-being is limited, leaving no clear implications for policymaking at this point. More empirical, high-quality research is needed to understand the circumstances under which digital detox interventions are helpful and for whom.

5.47 Liu, Wu, & Yao (2016). Dose–response association of screen time-based sedentary behaviour in children and adolescents and depression: a meta-analysis of observational studies. *British Journal of Sports Medicine.*

[Thanks to Ian Goddard for suggesting this article]

ABSTRACT: Background Depression represents a growing public health burden. Understanding how screen time (ST) in juveniles may be associated with risk of depression is critical for the development of prevention and intervention strategies. Findings from studies addressing this question thus far have been inconsistent. Therefore, we conducted a comprehensive systematic review and meta-analysis of data related to this question.
METHODS The meta-analysis was conducted in accordance with the PRISMA guideline. We searched the electronic databases of PubMed, Web of Science and EBSCO systematically (up to 6 May 2015). OR was adopted as the pooled measurement of association between ST and depression risk. Dose–response was estimated by a generalised least squares trend estimation.
RESULTS Twelve cross-sectional studies and four longitudinal studies (including 1 cohort study) involving a total of 127 714 participants were included. **Overall, higher ST in preadolescent children [preteens] and adolescents was significantly associated with a higher risk of depression (OR=1.12**; 95% CI 1.03 to 1.22). Screen type, age, population and reference category acted as significant moderators. Compared with the reference group who had no ST, there was a **non-linear dose–response association** of ST with a decreasing risk of depression at ST<2 h/day, with the lowest risk being observed for 1 h/day (OR=0.88; 95% CI 0.84 to 0.93).
CONCLUSIONS **Our meta-analysis suggests that ST in children and adolescents is associated with depression risk in a non-linear dose–response manner**.

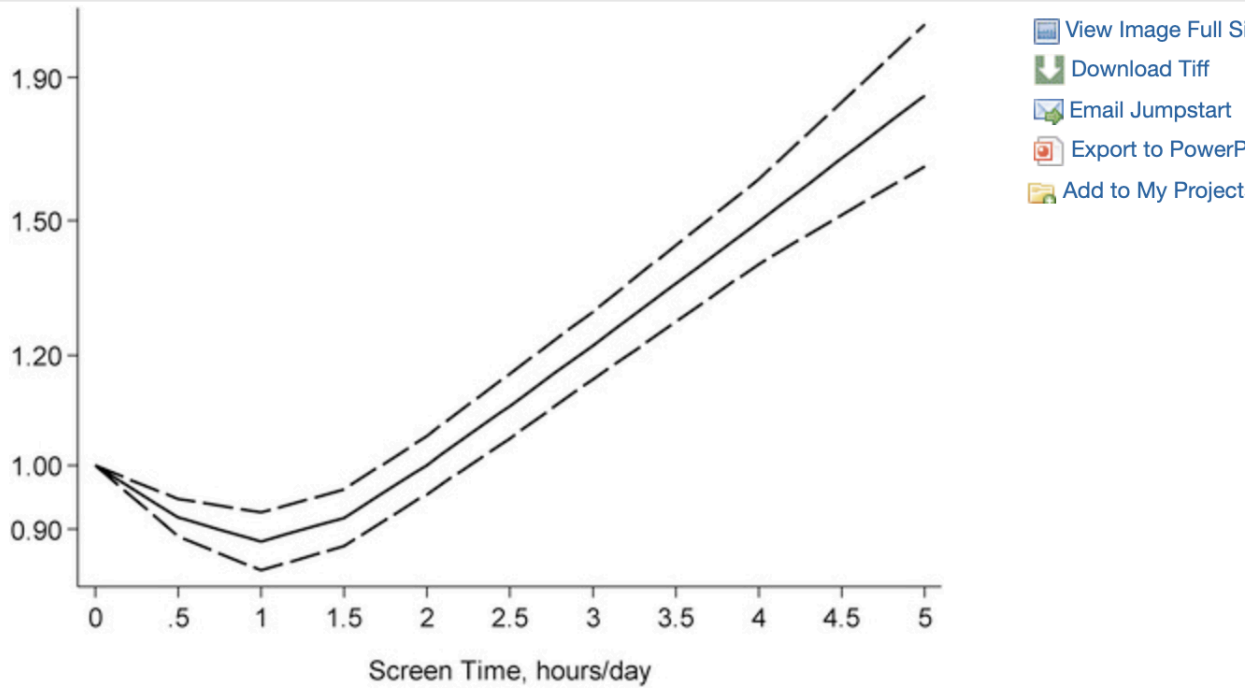


Figure 3. The dose-response relationship for the association between screen time in children and adolescents and risk of

5.48 Sala, Porcaro, & Gómez (2024). Social Media Use and adolescents' mental health and well-being: An umbrella review. *Computers in Human Behavior Reports*.

ABSTRACT: This umbrella review analyses the risks and opportunities for adolescents' mental health and well-being associated with Social Media Use (SMU) and the main risk mitigation proposals presented in systematic, scoping and narrative literature reviews and meta-analyses. Following the PRIOR guidelines, we defined inclusion and exclusion criteria for Population (10-19 years), Exposure (Social Media Use) and Outcomes (Well-being, Ill-being, Mental health) and searched articles published from January 2015 to April 2023 in four databases: Scopus, Web of Science, PsychInfo, and Pubmed. We screened titles and abstracts of 1470 publications, and after conducting the quality assessment based on the AMSTAR 2 protocol, we selected 24 articles on which we performed a thematic analysis. We highlight that the relationship between SMU and adolescents' mental health is influenced by several intervening factors: 1) individual demographic and psycho-socio characteristics, 2) individual use of Social Media (SM), and 3) SM' content and design. Furthermore, we describe the risks and opportunities associated with SMU that emerge from the reviewed articles. We discuss how the limitation to collecting SM data hinders the research on the impact of SMU and how the adoption of responsible design principles by SM platforms would contribute to introducing a societal change to achieve a population-level shift, which is harder to

attain if the burden of responsible use is only attributed to individuals' choices. Finally, we discuss the opportunities brought about by upcoming regulatory frameworks, such as the EU Digital Services Act.

5.49 Ramadhan, Rampengan, Yumnanisha, Setiono, Tjandra, Ariyanto, Idrisov, & Empitu (2024). Impacts of digital social media detox for mental health: A systematic review and meta-analysis. *Narra J*.

ABSTRACT: The impact of social media has been significant on various aspects of life, particularly mental health. Growing concerns about the adverse effects of social media use have prompted the exploration of experimental interventions, defined as digital detox interventions. However, it remains unclear whether digital detox interventions are effective for mental health outcomes. The aim of this study was to provide comprehensive insights into the effects of digital detox interventions on various mental health outcomes, including depression, life satisfaction, stress, and mental well-being. Following the PRISMA guidelines, systematic searches were carried out in online databases, including PubMed and ScienceDirect, within the publication range of 2013 and 2023. A total of 2578 titles and abstracts were screened, and 10 studies were included in the analysis. A risk of bias assessment was conducted using RoB 2.0 and the Newcastle-Ottawa scale, while statistical analysis was conducted using RevMan 5.4.1. Our data indicated a **significant effect of digital detox in mitigating depression with the standardized mean difference (SMD: -0.29; 95%CI: -0.51, -0.07, p=0.01). No statistically significant effects were discerned in terms of life satisfaction (SMD: 0.20; 95%CI: -0.12, 0.52, p=0.23), stress (SMD: -0.31; 95%CI: -0.83, 0.21, p=0.24), and overall mental well-being (SMD: 0.04; 95%CI: -0.54, 0.62, p=0.90).** These data underscore the nuanced and selective influence of digital detox on distinct facets of mental health. In conclusion, digital detox interventions significantly reduce depressive symptoms, suggesting that intentional reduction or cessation of digital engagement may help alleviate contributing factors. However, no statistically significant effects were observed in mental well-being, life satisfaction, and stress. This discrepancy may be due to the complex nature of these constructs, involving various factors beyond the scope of digital detox interventions.

[COMMENT: This study found a significant positive effect of social media reduction on depression, and no significant effects for other variables such as life satisfaction and mental well-being. However, the authors included a comparatively small number of experimental studies (10), while in Section 3 of this Google doc we have found at least 40. This is because the authors restricted their meta-analysis to studies that had free

full-access text available online. It is worth noting, though, that even given the small number of studies found, this meta-analysis supports our hypothesis that social media reduction has a greater positive effect on internalizing disorders such as depression than on other mental well-being variables.]

5.50 Liu, Baumeister, & Yang (2024). A meta-analysis on the relationship between the use of electronic media and psychological well-being. *Emerging Trends in Drugs, Addictions, and Health*.

ABSTRACT: The effect of digital media use on psychological well-being has been debated among scholars and the public for a long time. This study investigates the relationship between various types of media use and psychological well-being. It was proposed that communication media such as phone calls, texting, and instant messaging positively correlate with well-being. In contrast, the usage of social network sites (SNSs) and online gaming would be negatively correlated. To test this hypothesis, we conducted a meta-analysis of 292 studies. The meta-analysis revealed **a positive correlation between phone calls and psychological well-being and a negative correlation between online gaming and psychological well-being**. **However, the overall correlations between digital media use and well-being were weak.** Furthermore, the impact of digital media on well-being was influenced by how technology was utilized. For example, **using SNSs for entertainment was linked to better well-being, whereas self-presentation and content consumption on SNSs were correlated to poorer well-being**.

5.51 Marciano, Ostroumova, Schulz, & Camerini (2021). Digital Media Use and Adolescents' Mental Health During the Covid-19 Pandemic: A Systematic Review and Meta-Analysis. *Frontiers in Public Health*.

ABSTRACT: The Covid-19 physical distancing measures had a detrimental effect on adolescents' mental health. Adolescents worldwide alleviated the negative experiences of social distancing by spending more time on digital devices. Through a systematic literature search in eight academic databases (including Eric, Proquest Sociology, Communication & Mass Media Complete, Psychology and Behavioral Sciences Collection, PsycINFO, CINAHL, Pubmed, and Web of Science), the present systematic review and meta-analysis first summarized the existing evidence from 30 studies, published up to September 2021, on the link between mental health and digital media use in adolescents during Covid-19. Digital media use measures included social media, screen time, and digital media addiction. Mental health measures were grouped into conceptually similar dimensions, such as well-being, ill-being, social well-being, lifestyle

habits, and Covid-19-related stress. Results showed that, although most studies reported a **positive association between ill-being and social media use** (r = 0.171, p = 0.011) **and ill-being and media addiction** (r = 0.434, p = 0.024), not all types of digital media use had adverse consequences on adolescents' mental health. In particular, one-to-one communication, self-disclosure in the context of mutual online friendship, as well as positive and funny online experiences mitigated feelings of loneliness and stress. Hence, these positive aspects of online activities should be promoted. At the same time, awareness of the detrimental effects of addictive digital media use should be raised: That would include making adolescents more aware of adverse mechanisms such as social comparison, fear of missing out, and exposure to negative contents, which were more likely to happen during social isolation and confinement due to the pandemic.

5.52 Rahaman & Saidi (2024). The Effect of Social Media Use on Adolescents' Psychological Well-Being: A Systematic Literature Review. *Asian Journal of Research in Education and Social Sciences*.

ABSTRACT: Social media has experienced significant growth over the past twenty years and has facilitated online communication. With 4.95 billion global users as of October 2023, it has become an important aspect of everyday life, with a third of the global population using at least one app. Using a systematic literature review methodology, this study explores screening methods used to measure the impact of social media and its impact on adolescent psychological well-being. This study was conducted according to the systematic review guidelines proposed in the PRISMA statement. A total of 948 studies published between 2019 and 2023 on the Google Scholar and Scopus databases were identified, but only 9 articles met the inclusion criteria and were analyzed. **Cross-sectional studies have shown a higher correlation between excessive social media use and depression among girls aged 13-15 years.** In addition, the results of the study also found that the use of social media can cause anxiety, depression, and loneliness among adolescents.

5.53 Allen, Ryan, Gray, McInerney, & Waters (2014). Social media use and social connectedness in adolescents: The positives and the potential pitfalls. *The Australian Educational and Developmental Psychologist*.

ABSTRACT: As social media use is rising among adolescents, the issue of whether this use leads to positive or negative outcomes warrants greater understanding. This article critically reviews the literature related to this important topic. Specifically, we examine how social media use affects social connectedness in terms of three elements of

adolescent development: sense of belonging, psychosocial wellbeing, and identity development and processes. Mixed findings are reported regarding the role that social media plays in fostering social connectedness, which suggests that young people may experience both positive and negative psychological outcomes. As a result, this article argues that online tools create a paradox for social connectedness. On one hand, they elevate the ease in which individuals may form and create online groups and communities, but on the other, they can create a source of alienation and ostracism. This article contributes to ongoing discourse in the area of educational and developmental psychology, and has implications for researchers and practitioners working with adolescents. (PsycInfo Database Record (c) 2024 APA, all rights reserved)

5.54 Dahl, Foldnes, Grønneberg, & Aaen-Stockdale (preprint). The risks remain unknown for social media use and adolescent well-being.

ABSTRACT: Social media use is today the dominant form of communication for young people. Observational studies have reported near-zero associations between social media use and adolescent mental health. The research design used in these studies is tabulated and grouped as cross-sectional, longitudinal, between-country, and meta studies.Such observational studies, some of which have been highly influential, cannot address the critical question of whether we should regulate social media use. We argue that a potential negative causal effect of social media use on well-being may be masked by confounders and model misspecification, so that the observed association does not reflect the causal link. We discuss the social “cost of missing out” as one such confounder. Large-scale partially controlled experiments are discussed as a promising alternative way forward in deciding whether regulating young people’s social media use is warranted. However, in light of the difficulty of estimating causal connections from data, social media use remains an unknown risk factor for adolescent well-being, warranting caution and regulatory measures.

5.55 Vasconcellos, … & Noetel (2025). Electronic Screen Use and Children’s Socioemotional Problems: A Systematic Review and Meta-Analysis of Longitudinal Studies. *Psychological Bulletin*.

ABSTRACT: Electronic screens are everywhere and are easily accessible to children. Parents report fears that screens cause socioemotional problems. But most research has been cross-sectional, making it difficult to establish causality. We reviewed the longitudinal evidence to answer two fundamental questions: Does screen use lead to

socioemotional problems, and do socioemotional problems lead children to use screens more often? A total of 132 longitudinal studies met the inclusion criteria and were included in the systematic review. From these, 117 studies (292,739 children; 2,284 effects) were meta-analyzed. Small significant associations were found in both directions: **Screen use led to socioemotional problems, b = 0.06, 95% confidence interval (CI) [0.02, 0.11], p ≤ 0.05, n = 200,018, K = 117, and socioemotional problems led to greater screen use (b = 0.06, 95% CI [0.01, 0.12], p = .01, n = 200,018, K = 117).** Moderation analyses showed stronger effects in both directions when screens were used for gaming than for other purposes: **Socioemotional problems led to more gaming behavior (b = 0.44, 95% CI [0.29, 0.60], n = 80,809, K = 31), and playing games led to later socioemotional problems (b = 0.32, 95% CI [0.23, 0.42], n = 80,809, K = 31).** The reciprocal relationship between socioemotional problems and screen use was moderated by children's age, total screen time at baseline, and type of socioemotional problem (i.e., externalizing and internalizing behavior). Compared with prior cross-sectional studies, our temporal evidence reinforces the benefits of screen time guidelines but suggests a change in focus. Instead of merely emphasizing the reduction of screen time, guidelines should prioritize improving the quality of screen content and enhancing social interactions during screen use. Additionally, screen time guidelines should discourage high levels of the most high-risk behaviors like gaming.

[Other studies? What have we missed?]

* * * * * * * * * * * * * * *

6. BEYOND DOSE-RESPONSE MODELS

This entire review so far has examined just one hypothesis: that social media use is harmful to the mental health of the person who uses it, in a dose-response manner, like sugar. In other words, a little bit is OK, but as a young person uses more and more, then that person's mental health will decline. But is that all we need to look at? What about emergent effects and 2nd order effects (e.g., as most teens moved onto social media, could that have changed the dynamics of teen life in ways that were harmful to many,

even those who rarely or never used it)? And what about outcomes other than anxiety/depression, such as sleep, body image, exercise, academics….. All of which could then influence mental health? And what about sensitive periods -- age ranges in which the harm could be greater, and potentially permanent? There are so many ways that social media can cause harm, and only one of them has been intensively studied.

6.1: EMERGENT/NETWORK EFFECTS

6.1.1 Lee, & Lee (2020). The role of multilayered peer groups in adolescent depression: A distributional approach. *American Journal of Sociology.*

ABSTRACT: Much literature on peer influence has relied on central tendency–based approaches to examine the role of peer groups. This article develops a distributional framework that (1) differentiates between the influence of depressive peers and that of a majority group of nondepressive peers; and (2) considers the multilayered nature of peer environments. The authors investigate which segments of the distribution of peer depressive symptoms drive peer effects on adolescent depression across different layers of peer groups. Results from the Add Health data show that, **for institutionally imposed peer groups, exposure to depressive peers significantly increases adolescents' depressive symptoms.** For self-selected peer groups, the central tendency of peer depression largely captures its impact on adolescent depression. **High parent-child attachment buffers the deleterious consequence of exposure to depressive grademates.** The implications of these findings are discussed for research and policy regarding peer effects on adolescent well-being.

6.1.2 Kramer, Guillory, & Hancock (2014). Experimental evidence of massive-scale emotional contagion through social networks. PNAS. [h/t Ian Goddard]

ABSTRACT: Emotional states can be transferred to others via emotional contagion, leading people to experience the same emotions without their awareness. Emotional contagion is well established in laboratory experiments, with people transferring positive and negative emotions to others. Data from a large real-world social network, collected over a 20-y period suggests that longer-lasting moods (e.g., depression, happiness) can be transferred through networks [Fowler JH, Christakis NA (2008) BMJ 337:a2338], although the results are controversial. In an experiment with people who use Facebook, we test whether emotional contagion occurs outside of in-person interaction between

individuals by reducing the amount of emotional content in the News Feed. When positive expressions were reduced, people produced fewer positive posts and more negative posts; when negative expressions were reduced, the opposite pattern occurred. **These results indicate that emotions expressed by others on Facebook influence our own emotions, constituting experimental evidence for massive-scale contagion via social networks.** This work also suggests that, in contrast to prevailing assumptions, in-person interaction and nonverbal cues are not strictly necessary for emotional contagion, and that the observation of others' positive experiences constitutes a positive experience for people.

[COMMENT: the simplest mechanism by which social media may be causing depression and anxiety is simple contagion, combined with the general principle that "bad is stronger than good," so if everyone shares equal amounts of bad and good stuff, negative moods would be the result across the network.]

6.1.3 Nilsen, Stormark, Heradstveit, & Breivik (2023). Trends in physical health complaints among adolescents from 2014 – 2019: Considering screen time, social media use, and physical activity. *SSM - Population Health*.

ABSTRACT: The rising rates of physical and mental health complaints among adolescents observed in many countries have coincided with an increased time spent on screen-based devices, including social media use. We sought to document recent trends in physical health complaints (PHC) and whether co-occurring trends in screen time, social media use, and physical activity may account for these trends.

To achieve these aims, we used data from the nationwide Ungdata surveys conducted annually at the municipality level in Norway, comprising 419,934 adolescents aged 13–18 from six survey years (2014–2019). Six items assessed PHC, including neck and shoulder pain, headache, and abdominal pain, during the past month. To account for the nesting structure of Ungdata, and to exploit the variation within and between municipalities, we used multilevel analyses with adolescents nested in municipality-years (n = 669), nested in municipalities (n = 345). We found a small to moderate linear increase in number of PHC among boys and girls from 2014 to 2019. Screen time and social media use moderately attenuated the trend for girls, and to a lesser extent for boys. Screen time and social media use were further positively associated with PHC across the between and within-municipality levels, and social media use was more strongly associated with PHC for girls than boys across all levels of analysis. A similar pattern emerged when considering each symptom individually. The

results suggest that the prevalence of PHC rose in tandem with a group-level shift towards higher screen time and social media use. Moreover, the results indicate that higher screen time and social media use may have led to changes in the youth culture with potential consequences for adolescents' well-being.

6.1.4 Bursztyn, Handel, Jimenez, & Roth (2023). *When Product Markets Become Collective Traps: The Case of Social Media* (Working Paper 31771). National Bureau of Economic Research.

ABSTRACT: Individuals might experience negative utility from not consuming a popular product. For example, being inactive on social media can lead to social exclusion or not owning luxury brands can be associated with having a low social status. We show that, in the presence of such spillovers to non-users, standard measures that take aggregate consumption as given fail to appropriately capture welfare. We propose a new methodology to measure welfare that accounts for these consumption spillovers, which we apply to estimate the consumer surplus of two popular social media platforms, TikTok and Instagram. In large-scale, incentivized experiments with college students, we show that, while the standard welfare measure suggests a large and positive surplus, our measure accounting for consumption spillovers indicates a negative surplus, with a large share of active users deriving negative utility. We also shed light on the drivers of consumption spillovers to non-users in the case of social media and show that, in this setting, the "fear of missing out" plays an important role. Our framework and estimates highlight the possibility of product market traps, where large shares of consumers are trapped in an inefficient equilibrium and would prefer the product not to exist.

6.1.5 Abrahamsson (2024) Smartphone Bans, Student Outcomes and Mental Health, *Norwegian Institute of Public Health.*

ABSTRACT: How smartphone usage affects well-being and learning among children and adolescents is a concern for schools, parents, and policymakers. Combining detailed administrative data with survey data on middle schools' smartphone policies, together with an eventstudy design, I show that **banning smartphones significantly decreases the health care take-up for psychological symptoms and diseases among girls. Post-ban bullying among both genders decreases. Additionally, girls' GPA improves, and their likelihood of attending an academic high school track increases. These effects are larger for girls from low socio-economic**

backgrounds. Hence, banning smartphones from school could be a low-cost policy tool to improve student outcomes.

DATA: For this study, I link three primary data sources: a compilation of Norwegian administrative data sets, including the national educational registers, family registers, tax registries, and health registers; a nationwide pupil survey; and survey data on middle schools' smartphone policies. I study a sample of students who completed grade 10 between 2010 and 2018.

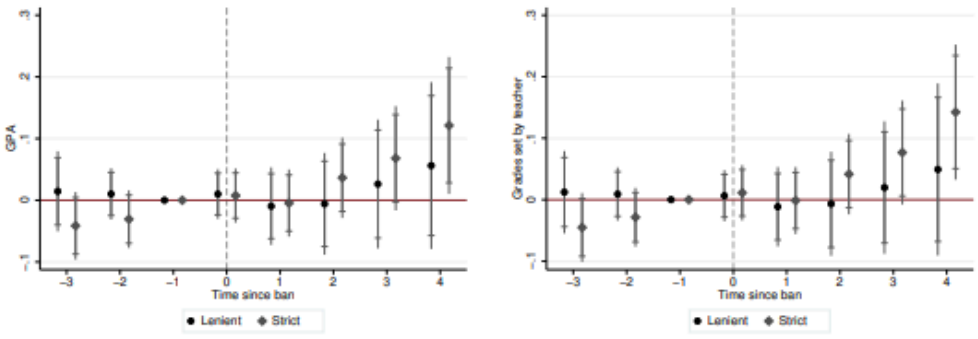
CONCLUSION: In this paper, I evaluate the effect of banning smartphones from school on students' outcomes. (...) Importantly **Boys GPA, test scores, and choice of track at high school is not affected** as seen in Appendix Figure A22. My results show that **banning smartphones leads to a significant decline at the intensive margin for the number of consultations related to diagnosis and treatment for psychological symptoms and diseases, both for specialist and GP care, by 60% and 29% relative to pretreatment mean**, respectively. Thus, **banning smartphones leads to a reduction in girls' need for care related to mental health issues**. Additionally, **girls' educational performance improves as their GPA increases by 0.08 and their teacher-awarded grades increase by 0.09 standard deviations**. **Post-ban girls' externally graded exams in mathematics improved by 0.22 standard deviations**, suggesting that the human capital accumulation of girls is improved post-ban. **Girls are also 4–7 percentage points more likely to attend an academic high school track post-ban**, suggesting that banning smartphones leads to an improvement in girls' mid-term educational outcomes. Further, I provide evidence that **bullying decreases by 0.42 and 0.39 of a standard deviation for girls and boys, respectively, when they are exposed full-time in middle school**. The magnitudes of all my estimates are larger among girls from low socioeconomic backgrounds, suggesting that this particular group of students is distracted by unstructured technology in the classroom. There are no negative effects of banning smartphones on students from high socioeconomic families, or on boys.

[**Ban Stringency**: Looked at differences across types of bans.

Finding: girls attending a middle school introducing a strict policy against smartphones, experience an increase by 0.12 standard deviations in GPA. This estimate is significant four years post-ban at the 5% level (p-value 0.032). Additionally, girls attending a middle school with a strict policy have significantly higher teacher-awarded test scores by 0.08 and 0.14 standard deviations, three and four years post-ban (p-values 0.075 and 0.011). These results, shown in Panel A and B in Figure 12, show that both GPA and average grades set by teachers for girls improve after strict smartphone bans in schools are implemented... These results by type of policy, suggest that at schools with a strict

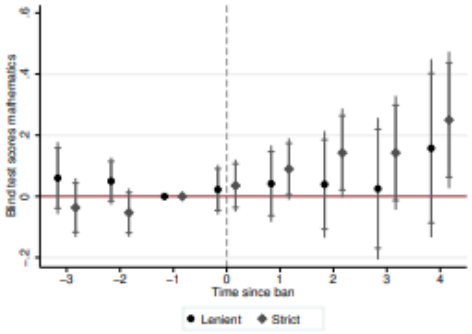
policy, students experienced a larger increase in their educational performance, when it comes to GPA and test scores. This is in line with several behavioral experiments showing that having the phone nearby but in a silent mood, is still distracting and could potentially even increase phone usage, especially among persons with phone addiction having increased FoMO (Liao and Sundar, 2022). For high school track, mental health, and bullying the results are less pronounced by type of ban.”]

Figure 12: Effect of Smartphone Ban on GPA, Test Scores and Likelihood of Attending an Academic High School Track by Type of Ban for Girls

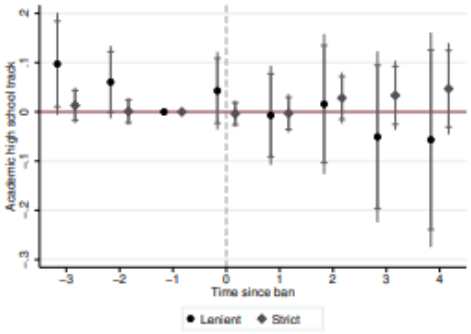


(a) GPA

(b) Teacher's grades

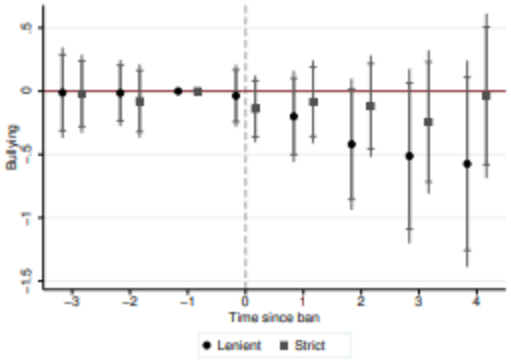


(c) Externally corrected mathematics exam



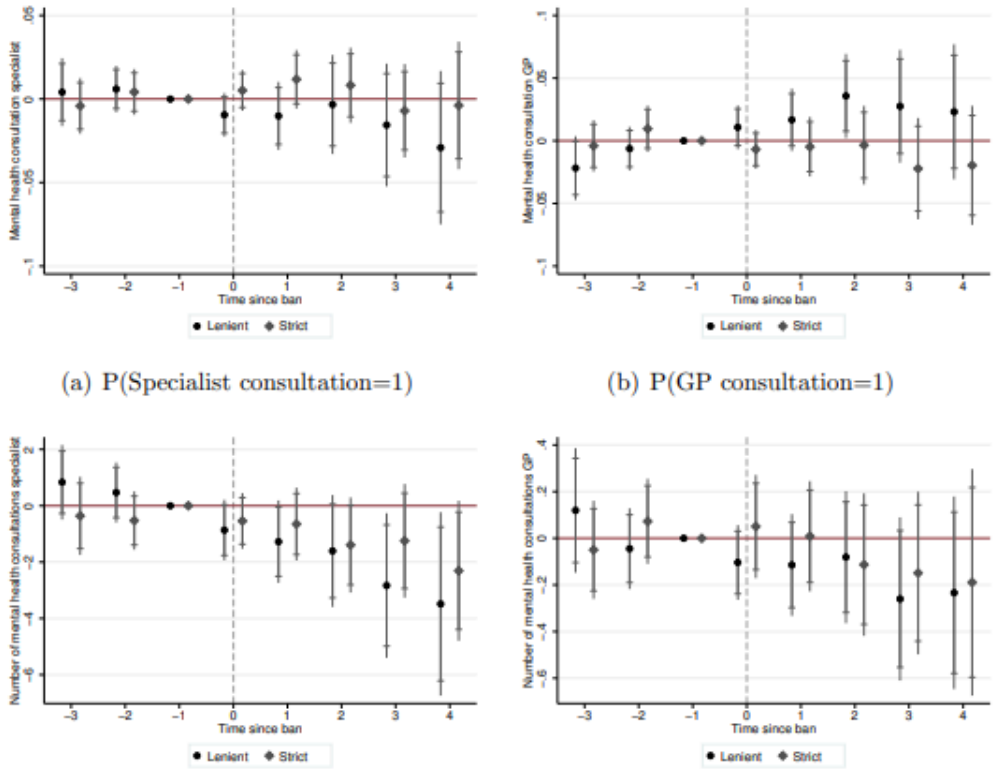
(d) P(Academic track=1)

Figure 11: Effect of Smartphone Ban on Bullying by Type of Ban for Girls



(a) Bullying

Figure 10: Effect of Smartphone Ban on Diagnosis and Treatment by Specialist and GPs for Psychological Symptoms and Diseases by Type of Ban for Girls



(a) P(Specialist consultation=1)

(b) P(GP consultation=1)

(c) Number of specialist consultations

(d) Number of GP consultations

[What are we missing?]

6.2: SENSITIVE PERIODS

Psychologists distinguish between *critical periods* (an age range within which an ability must be learned or can only be learned, e.g., geese imprinting on whatever is moving around, 13-16 hours after hatching, as their mother) and *sensitive periods* (an age range within which something is more easily learned, or more deeply imprinted, e.g, early childhood for attachment theory, or all of pre-puberty for second language learning). Are there sensitive periods for social and cognitive development during which social media might cause more harm, perhaps by altering brain development during the relatively rapid changes that occur throughout puberty? If so, then correlational studies that look for correlations in teens who are outside of that age window might turn up with

nothing—a correlation coefficient or beta of zero—because permanent damage was done (perhaps in a dose-response fashion) only during the sensitive period.

In fact, a study that we list above finds that there could be sensitive periods for social media harm: Study 2.1.18 Orben, Przybylski, Blakemore, & Kievit (2022). Windows of developmental sensitivity to social media. *Nature Communications*.
That study finds that the correlations with harm are larger for girls between 11 and 13, while for boys there is weaker evidence of a sensitive period at ages 14-15. The authors note that boys begin puberty later than girls. Adding in the repeated finding of curvilinear relationships (where the harm accrues to the heavy users primarily), we can formulate *the sensitive period hypothesis*: Going through puberty while being a heavy user of social media may interfere with a sensitive period for social learning and friendship formation such that teens emerge stunted or otherwise damaged, possibly permanently. These teens would then show up in later studies with higher scores on measures of depression, anxiety, and loneliness *even if they are no longer heavy users of social media*. If this hypothesis is true, then it could, in theory, be the case that social media explains *the entirety of the increase* in mental illness since 2010 while, simultaneously, correlational studies that use only teens older than 13 could find *correlations and betas of zero* (because the damage to girls was already done by the time they turn 14 or enter high school). I am not saying that this hypothesis is true, but it gives us a reason to reject the common argument that the relatively small correlations found in most studies (r between .10 and .20) are too small to pin the blame on social media for the tidal wave of mental illness that began around 2012.

6.3: WHO IS AT RISK?

6.3.1 Dyer, Coyne, Gale, & Sheppard (2024). Who's most at risk? A person-centered approach to understanding the long-term relationship between early social media use and later depression across adolescence. *Journal of Adolescence*.

ABSTRACT: INTRODUCTION: Person-centered analyses examined the relationship between social media use and depression over an 8-year period. The purpose was to examine the varying ways early social media use was associated with the development of depressive symptoms with a hypothesis that social media would not have a uniform association with depressive symptoms across adolescents.

METHODS: Participants included 488 adolescents (52% female), living in the United States, who were surveyed once a year for 8 years (beginning in 2010 when the average age for participants was 13.33 years old).
RESULTS: Longitudinal mixture regression was used to identify classes of adolescents representing unique ways their early social media use was related to the development of depressive symptoms over an 8-year period. Five classes were found representing unique ways social media use was related to depression. Findings suggest social media use does not impact all adolescents in the same way. **Social media use was related to increased depression for adolescents with greater parental hostility, peer bullying, anxiety, reactivity to stressors, and lower parental media monitoring. In other instances, social media use was related to less depression or was unrelated to depression.**
CONCLUSIONS: By identifying which adolescents may be most at risk from social media use, health providers, schools, and caregivers can tailor interventions to fit the needs of each adolescent.

6.3.2 Ayorech, Baldwin, Pingault, Rimfeld, & Plomin (2023). Gene-environment correlations and genetic confounding underlying the association between media use and mental health. *Scientific Reports*.

ABSTRACT: The increase in online media use and mental health problems have prompted investigations into their association, although most literature is focussed on deleterious effects. We assessed the aetiology of media use and mental health associations (M age = 22.14, SD = 0.85) using twin (n = 4000 pairs) and polygenic score methods (n = 6000 unrelated individuals) in the Twins Early Development Study. Beyond the traditionally explored negative uses of online media (online victimisation and problematic internet use), we investigate general media uses such as posting online and watching videos and distinguish both positive (pro-social behaviour) and negative (anxiety, depression, peer and behaviour problems) mental health measures. Negative media use correlated with poor mental health (r = 0.11–0.32), but general media use correlated with prosocial behaviour (r = 0.20) and fewer behavioural problems (r = −0.24). Twin analyses showed that **both general and negative media use were moderately heritable** (ranging from 20 to 49%) **and their associations with mental health were primarily due to genetic influences** (44–88%). Genetic sensitivity analysis combining polygenic scores with heritability estimates also suggest genetic confounding. Results indicate research on the mental health impact of media use should adopt genetically informed designs to strengthen causal inference.

6.3.3 Vaid… & Harari (2024). Variation in social media sensitivity across people and contexts. *Scientific Reports*.

ABSTRACT: Social media impacts people's wellbeing in different ways, but relatively little is known about why this is the case. Here we introduce the construct of "social media sensitivity" to understand how social media and wellbeing associations differ across people and the contexts in which these platforms are used. In a month-long large-scale intensive longitudinal study (total n = 1632; total number of observations = 120,599), we examined for whom and under which circumstances social media was associated with positive and negative changes in social and affective wellbeing. Applying a combination of frequentist and Bayesian multilevel models, we found a small negative average association between social media use AND subsequent wellbeing, but the associations were heterogenous across people. **People with psychologically vulnerable dispositions (e.g., those who were depressed, lonely, not satisfied with life) tended to experience heightened negative social media sensitivity in comparison to people who were not psychologically vulnerable. People also experienced heightened negative social media sensitivity when in certain types of places (e.g., in social places, in nature) and while around certain types of people (e.g., around family members, close ties), as compared to using social media in other contexts**. Our results suggest that an understanding of the effects of social media on wellbeing should account for the psychological dispositions of social media users, and the physical and social contexts surrounding their use. We discuss theoretical and practical implications of social media sensitivity for scholars, policymakers, and those in the technology industry.

[Other studies? What have we missed?]

* * * * * * * * * * * * * * *

7. DISCUSSION

We believe the evidence reviewed above supports these tentative answers to the three questions: [written in 2020; Jon is updating in Jan 2023]

QUESTION 1: IS THERE AN ASSOCIATION BETWEEN SOCIAL MEDIA USE AND BAD MENTAL HEALTH OUTCOMES?

ANSWER 1: Yes.
Almost all of the studies we listed above for Question 1 showed an association between hours of social media use and bad mental health outcomes. But how large is that association? In 2019, when we began this project there was not consensus on this question, but in 2023 there is, as **researchers who had come to contrary conclusions in 2019 are now agreeing that the size of the association is not near zero, it is in the range of r = .10 to r = .15 for all teens, with larger values for girls.** Amy Orben, whose 2019 paper with Przybylski yielded the finding that the associations are no larger than for "eating potatoes," conducted a "narrative review" of many other reviews of the academic literature (Orben, 2020; see **5.7**). Her conclusion is that **"The associations between social media use and well-being therefore range from about r = − 0.15 to r = − 0.10."**

Similarly, Jeff Hancock and his team posted a meta-analysis in 2022, which analyzed studies published between 2006 and 2018 (Hancock, Liu, Luo & Mieczkowski, 2022, Study **5.27**). The studies were mostly of young adults, not teens, and because many of the studies were done before Instagram was popular, Facebook is the main platform used. The headline finding is that "social media use is not associated with a combined measure of well-being," and yet here too, when you zoom in on depression and anxiety, they find the same values as Orben: they report **"small positive associations with anxiety (r = .13, p < .01, 95% CI [.04, .22]) and depression (r = .12, p < .01, 95% CI [.07, .17]**)." [see the abstract, and p. 30]. They note that the correlations were even larger for adolescents than for young adults (p. 32). They do not mention sex or gender in the report, but we can assume that the correlations are larger for girls than for boys. The correlations for adolescent girls are therefore surely above r = .15, and could be closer to r = .20. And that's using mostly Facebook, not Instagram.

Similarly Sanders et al. (2023) [article 5.40x above] reached the same conclusion in their umbrella review of 102 meta-analyses: **"we found evidence for several small negative associations; for example, social media was associated with depression (r = 0.12, 95% CI = 0.05 to 0.19**)"

Notes and qualifications:

A) there is little evidence of an association with harm for light daily usage (e.g., an hour a day)

B) the relationships are usually curvilinear, with harmful effects often only becoming visible for heavy users (and for moderate users in some cases). Light users are sometimes in slightly better shape than non-users.

C) In studies that offer a comparison between males and females, the associations with harm are almost always larger for females.

D) Mental health problems consistently show stronger associations with social media use than other forms of screen time or device use, including watching TV and movies, and playing video games.

D) We do NOT know, from these studies, whether light daily usage is harmless for *pre-teens*. The studies mostly involved teens 14 and older, or college students and young adults. Most studies that used teens failed to break out younger adolescents. Study 2.1.3 (Booker) looked at pre-teens and found that early heavy social media use, at age 10, was associated with declines in well being in later adolescence, for girls only.

QUESTION 2: DOES SOCIAL MEDIA USE AT TIME 1 PREDICT ANYTHING ABOUT MENTAL HEALTH OUTCOMES AT TIME 2?

ANSWER 2: Yes, though with less consistency than the correlational studies in Question 1. Of the 41 studies in this section [on Jan 27, 2023], 26 studies found a significant effect, and 15 did not. That doesn't automatically mean that the "yes" side wins. Answering this question will require a wider set of papers, and a deeper dive into the papers. It is possible, given what we learned in section 1, that changes in average time spent on social media between T1 and T2 only matter when one shifts from being a consistently heavy user to being a consistently light user, or vice versa. Most changes (e.g., from 2 hours a day to a half hour, or vice versa) may indeed have no effect on mental health outcomes measured weeks or months later. [Someone should re-analyze the datasets in these papers to determine if linkages grow stronger when we only look at changes from light or non-user, to heavy user, or vice versa.]

An interesting difference emerges between the "yes" and "no" studies: nearly all of the studies that found an effect looked at time durations of a year or more. In contrast, 8 of the 15 that failed to find an effect looked at intervals of a month or less, and most of those were daily. So daily fluctuations don't predict much about feelings the next day, but changes in social media usage over longer time periods do.

--[need to comment on age differences and sex differences]

--[need to comment on new section 2.3 on mediators and moderators]

QUESTION 3: DO EXPERIMENTS SHOW A CAUSAL EFFECT OF SOCIAL MEDIA USE ON MENTAL HEALTH OUTCOMES?

ANSWER 3: Yes, in both kinds of experiments.
Of the 18 true experiments we list in sections 3.1 and 3.2, 13 found a significant effect on a measure related to mental health (usually anxiety or depression), and 5 did not.

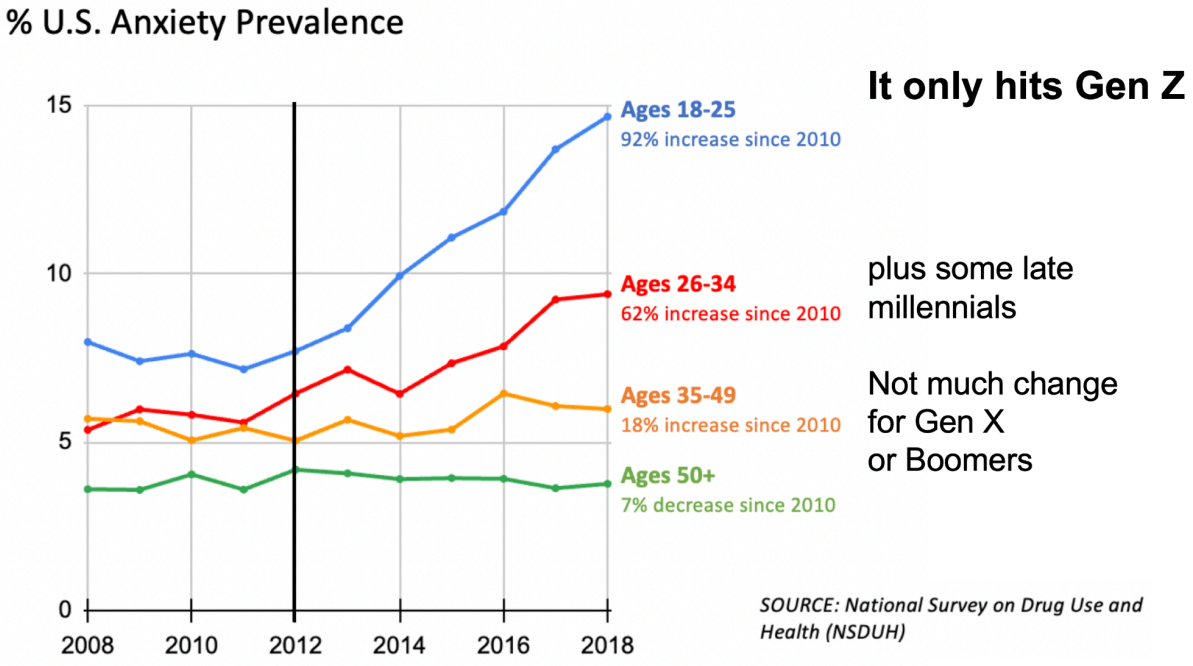
Of the 6 quasi-experiments we list in sections 3.3 and 3.4, all 6 found an effect -- mental health got worse as soon as Facebook came to campus, or high speed internet came to town.

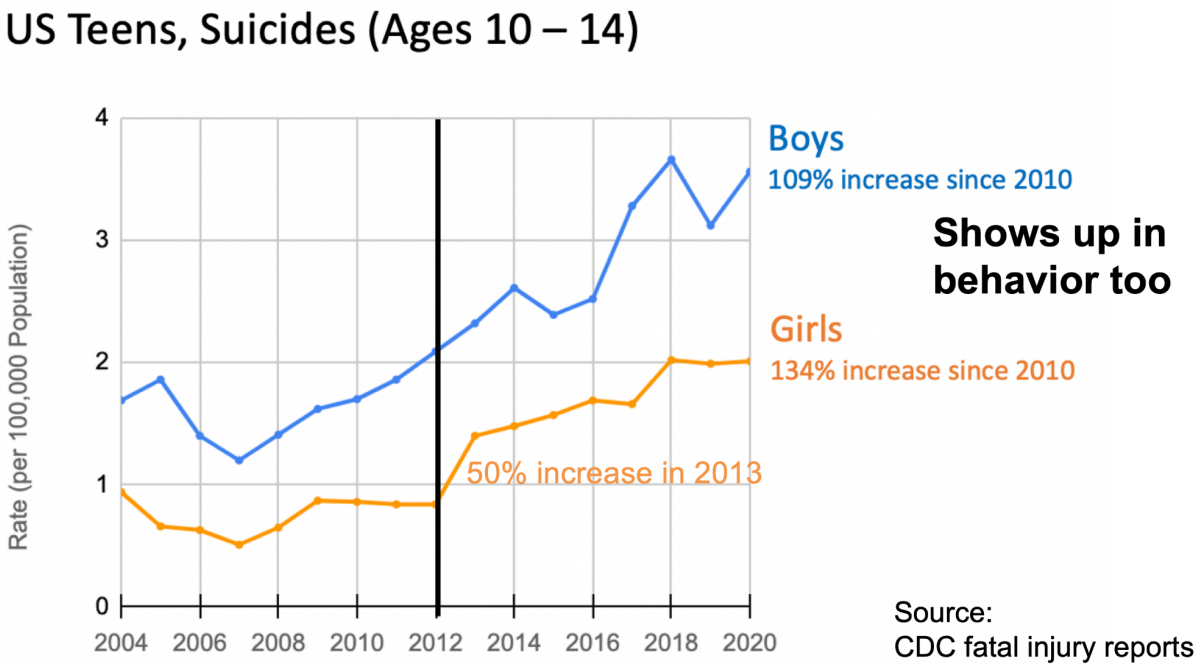
QUESTION 4: WHAT CAN WE SAY ABOUT GENDER DIFFERENCES?
[TO COME]

QUESTION 5: WHAT CAN WE SAY ABOUT AGE DIFFERENCES IN VULNERABILITY?

Answer: Vulnerability appears to be greatest in pre-teen or early teen years, and to be lower for adults. We do not yet have certainty about how and when vulnerability declines among young adults (college-age students and those in their 20s).

First, we note that the mental health crisis that began in 2012 is concentrated in Gen Z, followed by the Millennials, with no sign at all among older generations, even though they use social media as well:





To get a first look at age differences in susceptibility to harm, we can examine the size of the correlations found for different ages. Orben, Przybylski, Blakemore, & Kievit (2022). (study 2.1.18) found that “the cross-sectional relationship between self-reported estimates of social media use and life satisfaction ratings is most negative in younger

adolescents," meaning ages 11-13 for girls and 14-15 for boys. This study alone offers a good reason to raise the minimum age for social media to 16.

--Compare evidence on pre-teens, teens, young adults, and older adults

--Age findings from correlational studies:

--Age findings from time lag studies

--Age findings from experiments

Conclusion about age differences in vulnerability [in progress]

//////////

OVERALL CONCLUSION: Many studies, using a variety of methods, have found associations between heavy social media use and bad mental health outcomes, particularly for girls. Some of the associations are very small, some are larger (e.g., a doubling of rates of depression as one moves from light to heavy usage in 1.1.4, Kelly et al. 2019; a large decline in depressive symptoms when college students were assigned to reduce social media usage in 3.1.1, Hunt et al. 2018). The recent publication of two papers that find no effect (2.2.1, Heffer et al. 2019), or negligible effects (1.2.1, Orben & Przybylski, 2019) is a normal part of the ongoing scientific debate about the effects of social media on teen mental health. We believe that journalists, legislators, parents, and teens would be making a potentially serious mistake if they interpret the minority of studies that find negligible or null effects as offering an "all clear" signal for teens to use social media in unlimited quantities, or from an early age. But we welcome feedback from researchers who disagree, and we will post short response essays below. (Please *contact Haidt* to do so, or just request commenting access to this Google Doc.)

ADVICE FOR PARENTS [to come]

- See the "Wiser Kids" page at TheCoddling.com

8. APPENDICES

8.1 ADDITIONAL COMMENTS FROM RESEARCHERS

After they have reviewed this document

From Richard Lopez, at Worcester Polytechnic Institute

- Overall, this body of research to date consists of measures and analyses that are pretty coarse and likely not sensitive enough to pick up on problematic/concerning links between social media use and health/WB, especially ***platform-specific*** **effects. The user experience when a teen uses Snapchat (vs. Instagram) is very different (from an UX perspective), so *how* users interact with these platforms needs to be validly assessed (beyond mere time spent / screen time, even app level hours logged by Apple's Screen Time function**). One step, which some studies have already taken, is to assess passive versus active use, but even that kind of measure is quite vague and not informative (e.g., I can imagine teens have problematic passive OR problematic active use, depending on which cognitive and attentional processes are engaged as they interact with the platform passively or actively).
- Relatedly, I think it would be fruitful to ask questions like: **what aspects of UX generally differ by platform? And: which social psychological processes (e.g., FOMO, social comparison, curating one's self-image, etc.) are *more or less likely to be elicited* on a given platform and/or a given platform's features?** And **which aspects of the individual's demographics, personality, affect, etc., would make such processes more likely to occur for some users than others ?** (e.g., do girls with lower self-esteem feel worse about themselves (and engage in rumination about how dissatisfied they are with their body image) when scrolling through their Instagram feed than when they receive a silly, LOL-worthy snap from a close friend on Snapchat? Does a college aged male feel left out of his frat's social fabric by not "keeping up" with snaps sent over a weekend?)
- To get even more granular: **which *app-level behaviors* (e.g., posting, liking, accepting/denying followers, etc.) would induce or correlate with these processes?** And for which particular individuals? This would allow one to capture user-by-platform interaction effects and dynamics. Again, a *few* studies

have started to move in this direction, but certainly not enough to form a conclusive picture of finer-grained app behaviors and subsequent health risks.

- On the DV/outcome side, one issue that's related to another mentioned at the end of the doc ("outcome switching") is the potential lack of consistency and validity of the various health/WB measures used across the reviewed studies. **How valid/trustworthy are the measures used to assess mental health/WB/QoL? What do associations or effects look like in studies *that use the same outcome measure*?** Might jingle/jangle fallacies be at work when it comes to assessing different dimensions/facets/symptoms of anxiety and depression? Not unlike what I brought up above, I think having more specific operationalizations and measurement on the "back end" of these studies will only help resolve ambiguity about the nature and direction of any effects and patterns observed in studies thus far. For example, I can imagine studies that home in on a specific *app behavior --> symptom* link, e.g., Do girls who have "rinsta" and "finsta" accounts [a relatively new and interesting IG phenomenon] ruminate [depression facet] more frequently about XYZ?
- Lastly—and I don't know if this is possible (especially given different outcomes used)—but instead of (or in addition) to separating and dichotomizing studies as providing evidence for or against links between SMU and poorer health outcomes, it may be useful to **generate a forest plot, with standardized betas and an overall, meta-analytic estimate of effect size based on a random effects model.** There are many ways to do this, and to not lose your valid point that effects/associations are most robust with *heavy* use, you can perhaps include that (as well as age and gender) as moderators if it's possible to go the route of a more quantitative meta-analysis.

From Tom Hollenstein: *We must use what we already know about socio-emotional development to understand how these digital contexts do or do not differ from the real world.* The developmental achievements, evolutionary and biological adaptations, parenting practices, and social interests of youth have not suddenly and inexorably changed with the presence of a device. The successful digital platforms that have engaged youth the most have been those that facilitate those basic needs and functions. Social support, for example, is a key protective factor. Pre-digital-age experiences can still occur, but now they can transcend time and space - a text message can be a reminder that you are not alone. Positive impacts such as these are going to inexorably cloud the search for how and when digital contexts might be deleterious. Furthermore, crude measures of total time spent doing anything with peers

have been more proximally explained by parental monitoring - in the absence of parental guidance youth will associate with deviant peers, antisocial behavior, social isolation, etc., all of which can also occur online. Hence, developmental models and more precise empirical investigations are the only way to make sense of digital contexts. Without these, any claim about the uniqueness of digital contexts is unfounded.

========== CRITICAL RESPONSES FROM RESEARCHERS =========

From Patrick Markey (Villanova), via Twitter: “Another major issue with most of this research - almost all of these studies have used self report assessments that have never been validated. Even more troubling - recent research suggests these self reports are not related to actual screen use.” [He links to this paper:]

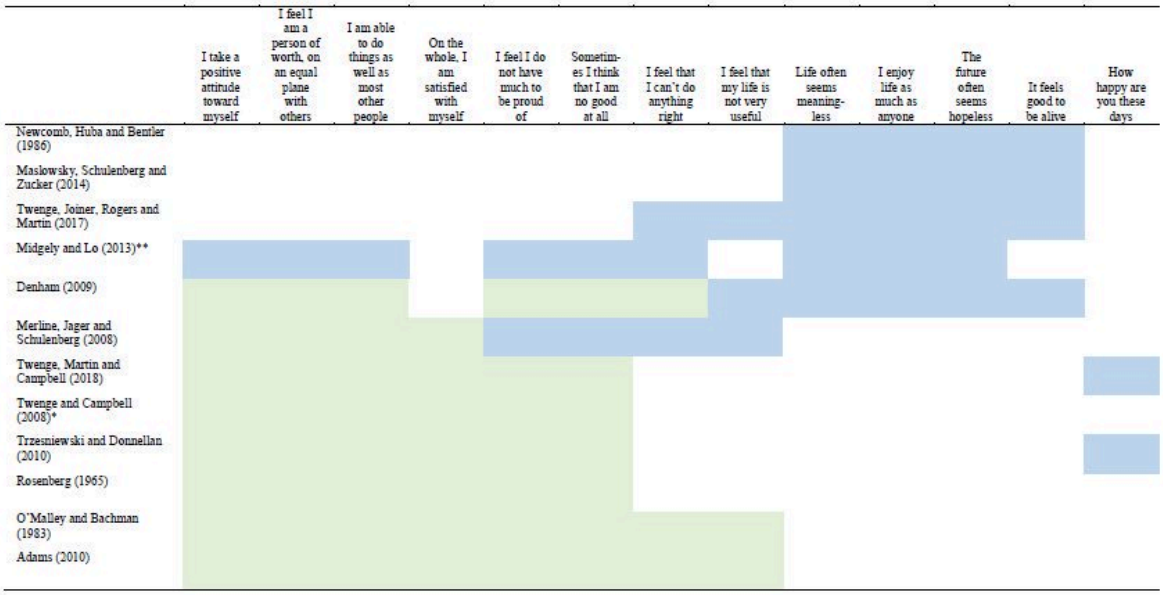
Ellis, Davidson, Shaw, Geyer (2018). Do smartphone usage scales predict behaviour?
ABSTRACT: Understanding how people use technology remains important, particularly when measuring the impact this might have on individuals and society. However, despite recent methodological advances in portable computing and the ability to record digital traces of behaviour, research concerning smartphone use overwhelmingly relies on self-reported assessments, which have yet to convincingly demonstrate an ability to predict objective behaviour. Here, and for the first time, we compare a variety of smartphone use and ‘addiction’ scales with objective behaviours derived from Apple’s Screen Time application. While correlations between psychometric scales and objective behaviour are generally poor, measures that attempt to frame technology use as habitual rather than ‘addictive’ correlate more favourably with subsequent behaviour. We conclude that existing self-report instruments are unlikely to be sensitive enough to accurately predict basic technology use related behaviours. As a result, conclusions regarding the psychological impact of technology are unreliable when relying solely on these measures to quantify typical usage.

Ellis (2019). Are smartphones really that bad? Improving the psychological measurement of technology-related behaviors. *Computers in Human Behavior*
[Nominated by Patrick Markey, on Twitter]
ABSTRACT: Understanding how people use technology remains important, particularly when measuring the impact this might have on individuals and society. To date, research within psychological science often frames new technology as problematic with overwhelmingly negative consequences. However, **this paper argues that the latest generation of psychometric tools, which aim to assess smartphone usage, are**

unable to capture technology related experiences or behaviors. As a result, many conclusions concerning the psychological impact of technology use remain unsound. Current assessments have also failed to keep pace with new methodological developments and these data-intensive approaches challenge the notion that smartphones and related technologies are inherently problematic. The field should now consider how it might re-position itself conceptually and methodologically given that many 'addictive' technologies have long since become intertwined with daily life.

Markey and Przybylski both cited the problem of "outcome switching" as described in Orben & Przybylski (2019),

Table showing how research papers have used different combinations of MTF measures to define depressive symptoms (blue) and self-esteem (green). This illustrates the abundance of analytical flexibility in this area. We also include Newcomb, Huba and Bentler (1986) and Rosenberg (1965) who originally devised parts of the scales.



MORE CRITICS WILL BE ADDED HERE….

8.2 QUALITATIVE RESEARCH

8.2.1 Shankleman, Hammond, & Jones (2021). Adolescent Social Media Use and Well-Being: A Systematic Review and Thematic Meta-synthesis. *Adolescent Research Review.*

Qualitative research into adolescents' experiences of social media use and well-being has the potential to offer rich, nuanced insights, but has yet to be systematically reviewed. The current systematic review identified 19 qualitative studies in which adolescents shared their views and experiences of social media and well-being. A critical appraisal showed that overall study quality was considered relatively high and represented geographically diverse voices across a broad adolescent age range. A thematic meta-synthesis revealed four themes relating to well-being: connections, identity, learning, and emotions. These findings demonstrated the numerous sources of pressures and concerns that adolescents experience, providing important contextual information. The themes appeared related to key developmental processes, namely attachment, identity, attention, and emotional regulation, that provided theoretical links between social media use and well-being. Taken together, the findings suggest that well-being and social media are related by a multifaceted interplay of factors. Suggestions are made that may enhance future research and inform developmentally appropriate social media guidance.

8.2.2 Pescott (2020). "I wish I was wearing a filter right now": An exploration of identity formation and subjectivity of 10- and 11- year olds' social media use. *Social Media + Society.*

ABSTRACT: Social media use is changing the experience of socialization for younger children, as they are heavy adopters of these platforms despite the terms of service being 13 years of age. This research recruited eight Year 6 focus groups in four primary schools and employed a range of activities to explore their views surrounding social media. **Results indicate that young children are aware of overt dangers, such as catfishing, but may experience negative subjective experiences when interacting on social media. This was particularly apparent in the discussions around Snapchat filters** (digital overlays placed over photographs). It is necessary to address emotional resilience in response to this.

[Other studies? What have we missed?]

8.3: SOCIAL MEDIA AND SLEEP

See section 3 of the Google doc I curate with Zach Rausch and Eli George, *Digital Media Effects on Adolescents: A Review* for more studies on sleep and social media use. Below are a few key studies:

8.3.1 STUDIES SHOWING LINK TO IMPAIRED SLEEP

8.3.1.1 Scott, Biello, & Woods (2019). Social media use and adolescent sleep patterns: cross-sectional findings from the UK millennium cohort study. *Pediatrics Research.*

ABSTRACT: OBJECTIVES: This study examines associations between social media use and multiple sleep parameters in a large representative adolescent sample, controlling for a wide range of covariates.
DESIGN: The authors used cross-sectional data from the Millennium Cohort Study, a large nationally representative UK birth cohort study.
PARTICIPANTS: Data from 11 872 adolescents (aged 13–15 years) were used in analyses.
METHODS: Six self-reported sleep parameters captured sleep timing and quality: sleep onset and wake times (on school days and free days), sleep onset latency (time taken to fall asleep) and trouble falling back asleep after nighttime awakening. Binomial logistic regressions investigated associations between daily social media use and each sleep parameter, controlling for a range of relevant covariates.
RESULTS: Average social media use was 1 to <3 hours per day (31.6%, n=3720). 33.7% were classed as low users (<1 hour; n=3986); 13.9% were high users (3 to <5 hours; n=1602) and 20.8% were very high users (5+ hours; n=2203). Girls reported spending more time on social media than boys. **Overall, heavier social media use was associated with poorer sleep patterns, controlling for covariates. For example, very high social media users were more likely than comparable average users to report late sleep onset (OR 2.14, 95% CI 1.83 to 2.50) and wake times (OR 1.97, 95% CI 1.32 to 2.93) on school days and trouble falling back asleep after nighttime awakening (OR 1.36, 95% CI 1.10 to 1.66).**
CONCLUSIONS: This study provides a normative profile of UK adolescent social media use and sleep. Results indicate statistically and practically significant associations between social media use and sleep patterns, particularly late sleep onset. Sleep education and interventions can focus on supporting young people to balance online interactions with an appropriate sleep schedule that allows sufficient sleep on school nights.

8.3.1.2 Levenson, Shensa, Sidani, Colditz & Primack (2017). Social media use before bed and sleep disturbance among young adults in the United States: A nationally representative study. *Sleep.*

ABSTRACT: STUDY OBJECTIVES: Social media (SM) use has been positively

associated with disturbed sleep among young adults. However, previous studies have not elucidated the specific importance of SM use immediately before bed. We aimed to determine the independent association of SM use during the 30 minutes before bed and disturbed sleep while controlling for covariates including total SM use throughout the day.
METHODS: We assessed a nationally representative sample of 1763 US young adults aged 19–32. Participants estimated to what extent they used SM in the 30 minutes before bed. We assessed sleep disturbance using the brief Patient-Reported Outcomes Measurement Information System (PROMIS®) Sleep Disturbance measure. After testing the proportional odds assumption, we used ordered logistic regression to compute the independent association between SM use before bed and sleep disturbance controlling for covariates, including total SM use.
RESULTS: Compared with those who rarely or very rarely check SM in the 30 minutes before bed, **those who often or very often check SM at that time had an adjusted odds ratio of 1.62 (95% confidence interval = 1.31–2.34) for increased sleep disturbance. Additionally, we found a significant linear trend in the odds ratios between the frequency of checking SM in the 30 minutes before bed and increased sleep disturbance (*p* = .007).** Results were consistent in all sensitivity analyses.
CONCLUSIONS: SM use in the 30 minutes before bed is independently associated with disturbed sleep among young adults. Future work should use qualitative and experimental methods to further elucidate the directionality of—and mechanisms underlying—this association.

8.3.1.3 Hisler, Twenge, & Krizan (2019). Associations between screen time and short sleep duration among adolescents varies by media type: evidence from a cohort study. *Sleep Medicine.*

ABSTRACT: STUDY OBJECTIVES: Different types of electronic screen media have repeatedly been linked to impaired sleep; yet, how different uses of electronic media are linked to sleep has received much less attention. Currently, the role of chronotype in these associations is understudied. To address these gaps, this study examined how different uses of screen media are linked to sleep, and whether these associations were accounted for or differed across chronotype.
METHODS: Data were from 11,361 children aged 13 to 15 from the United Kingdom who participated in the 2015 wave of the Millennium Cohort Study.
RESULTS: **Heavy use of screen media was associated with shorter sleep duration, longer sleep latency, and more mid-sleep awakenings. The strongest associations emerged for using screen media to engage in social media or to use the internet.**

Overall, these associations were weakened, but remained after controlling for chronotype and tended to be the strongest amongst robins (children with an intermediate chronotype).
CONCLUSIONS: Spending too much time on electronic devices is associated with multiple dimensions of impaired sleep, especially if this time on devices is used for social media or surfing the internet. Chronotype does not account for the associations between screen media and sleep and can be used to identify children who may be particularly susceptible to the effects of screen media on sleep.

8.3.1.4 Garett, Liu, & Young (2018). The relationship between social media use and sleep quality among undergraduate students. *Information, Communication & Society*.

ABSTRACT: Insufficient sleep is a growing health problem among university students, especially for freshmen during their first quarter/semester of college. Little research has studied how social media technologies impact sleep quality among college students. This study aims to determine the relationship between social media use and sleep quality among freshman undergraduates during their first quarter in college. Specifically, we explored whether variations in Twitter use across the time of day and day of the week would be associated with self-reported sleep quality. We conducted a study of freshman Twitter-using students (N = 197) over their first quarter of college, between October and December of 2015. We collected students' tweets, labeled the content of the tweets according to different emotional states, and gave theme weekly surveys on sleep quality. **Tweeting more frequently on weekday late nights was associated with lower sleep quality (β = −0.937, SE = 0.352); tweeting more frequently on weekday evenings was associated with better quality sleep (β = 0.189, SE = 0.097). Tweets during the weekday that were labeled related to the emotion of fear were associated with lower sleep quality (β = −0.302, SE = 0.131). Results suggest that social media use is associated with sleep quality among students.** Results provided can be used to inform future interventions to improve sleep quality among college students.

8.3.1.5 Alonzo, Hussain, Stranges, & Anderson (2021). Interplay between social media use, sleep quality, and mental health in youth: A systematic review. *Sleep Medicine Reviews*.

ABSTRACT: Social media applications are increasingly prominent among youth. This systematic review provides a comprehensive assessment of the literature on the

relationship between active social media use, sleep quality, and common mental health outcomes (anxiety, depression, and psychological distress) among youth. MEDLINE, PsychINFO, EMBASE and Scopus were searched for observational studies investigating this relationship among youth (aged 16–25). Thirty-six cross-sectional studies and six prospective cohort studies met the inclusion criteria. Among cross-sectional studies, **significant associations between excessive social media use with poor mental health outcomes (n = 33), poor sleep quality (n = 24), and significant associations between poor sleep quality and negative mental health (n = 16) were found. In longitudinal studies, frequent social media use was a risk factor for both poor mental health (n = 6) and poor sleep outcomes (n = 5).** Some studies showed sleep quality mediating the relationship between social media use and negative mental health outcomes in youth. Overall, included evidence links excessive social media use to poor sleep quality and negative mental health in youth. Given the public health implications of sleep problems, excessive social media use warrants further investigation to clarify the directionality and strength of their associations with poor sleep quality and negative mental health outcomes.

8.3.1.6 Levenson, Shensa, Sidani, Colditz, & Primack (2016). The association between social media use and sleep disturbance among young adults. *Preventive Medicine*.

ABSTRACT: INTRODUCTION: Many factors contribute to sleep disturbance among young adults. Social media (SM) use is increasing rapidly, and little is known regarding its association with sleep disturbance.
METHODS: In 2014 we assessed a nationally representative sample of 1788 U.S. young adults ages 19–32. SM volume and frequency were assessed by self-reported minutes per day spent on SM (volume) and visits per week (frequency) using items adapted from the Pew Internet Research Questionnaire. We assessed sleep disturbance using the brief Patient-Reported Outcomes Measurement Information System (PROMIS®) sleep disturbance measure. Analyses performed in Pittsburgh utilized chi-square tests and ordered logistic regression using sample weights in order to estimate effects for the total U.S. population.
RESULTS: In models that adjusted for all sociodemographic covariates, participants with higher SM use volume and frequency had significantly greater odds of having sleep disturbance. For example, **compared with those in the lowest quartile of SM use per day, those in the highest quartile had an AOR of 1.95 (95% CI = 1.37–2.79) for sleep disturbance. Similarly, compared with those in the lowest quartile of SM use frequency per week, those in the highest quartile had an AOR of 2.92 (95% CI =**

1.97–4.32) for sleep disturbance. All associations demonstrated a significant linear trend.
DISCUSSION: The strong association between SM use and sleep disturbance has important clinical implications for the health and well-being of young adults. Future work should aim to assess directionality and to better understand the influence of contextual factors associated with SM use.

8.3.1.7 Hale, Li, Hartstein, & LeBourgeois (2019). Media Use and Sleep in Teenagers: What Do We Know? *Current Sleep Medicine Reports*.

ABSTRACT: PURPOSE: The screen-based media landscape has changed markedly during the last decade, with 95% of American teens owning or having access to a smartphone. Coinciding with the rise in digital media devices, researchers have noted a high prevalence of insufficient sleep among youth. In this article, we review recent literature about adolescents' screen use behaviors and sleep health outcomes published between 2015 and 2019.
RECENT FINDINGS: **Overall, we found a high level of screen use and poor sleep health (i.e., short duration, poor quality, late timing) among adolescents. The great majority of recent observational studies demonstrated a robust inverse association between screen media device use and sleep outcomes among adolescents all over the world.** Screen-based media use has also been linked to a series of adverse psychosocial and behavioral outcomes, partially if not fully mediated through impaired sleep health. **Experimental data, however, offer mixed findings on the causal relationship between teen media use and sleep.** In addition, there is uncertainty as to the relative roles of the proposed mechanisms underlying those relationships, whether driven by the light emitted by devices, time displacement, or the media content affecting psychological state (e.g., fear of missing out, anxiety).
SUMMARY: Current empirical research demonstrates that screen-based digital media use is closely associated with sleep duration and sleep quality among teens; however, **limited data show a direct causal effect of screen-based media use on adolescent sleep health.** With very few studies demonstrating easy-to-implement and effective interventions, we argue that more basic, translational, and clinical research is necessary.

8.3.1.8 Carter, Rees, Hale, Bhattacharjee, & Paradkar (2016). Association Between Portable Screen-Based Media Device Access or Use and Sleep Outcomes: A Systematic Review and Meta-analysis. *JAMA Pediatrics*.

ABSTRACT: IMPORTANCE: Sleep is vital to children's biopsychosocial development. Inadequate sleep quantity and quality is a public health concern with an array of detrimental health outcomes. Portable mobile and media devices have become a ubiquitous part of children's lives and may affect their sleep duration and quality.
OBJECTIVE: To conduct a systematic review and meta-analysis to examine whether there is an association between portable screen-based media device (eg, cell phones and tablet devices) access or use in the sleep environment and sleep outcomes.
DATA SOURCES: A search strategy consisting of gray literature and 24 Medical Subject Headings was developed in Ovid MEDLINE and adapted for other databases between January 1, 2011, and June 15, 2015. Searches of the published literature were conducted across 12 databases. No language restriction was applied.
STUDY SELECTION: The analysis included randomized clinical trials, cohort studies, and cross-sectional study designs. Inclusion criteria were studies of school-age children between 6 and 19 years. Exclusion criteria were studies of stationary exposures, such as televisions or desktop or personal computers, or studies investigating electromagnetic radiation.
DATA SYNTHESIS: Of 467 studies identified, 20 cross-sectional studies were assessed for methodological quality. Two reviewers independently extracted data.
OUTCOMES AND MEASURES: The primary outcomes were inadequate sleep quantity, poor sleep quality, and excessive daytime sleepiness, studied according to an a priori protocol.
RESULTS: Twenty studies were included, and their quality was assessed. The studies involved 125 198 children (mean [SD] age, 14.5 [2.2] years; 50.1% male). **There was a strong and consistent association between bedtime media device use and inadequate sleep quantity (odds ratio [OR], 2.17; 95% CI, 1.42-3.32) ($P < .001$, $I^2 = 90\%$), poor sleep quality (OR, 1.46; 95% CI, 1.14-1.88) ($P = .003$, $I^2 = 76\%$), and excessive daytime sleepiness (OR, 2.72; 95% CI, 1.32-5.61) ($P = .007$, $I^2 = 50\%$).** In addition, **children who had access to (but did not use) media devices at night were more likely to have inadequate sleep quantity (OR, 1.79; 95% CI, 1.39-2.31) ($P < .001$, $I^2 = 64\%$), poor sleep quality (OR, 1.53; 95% CI, 1.11-2.10) ($P = .009$, $I^2 = 74\%$), and excessive daytime sleepiness (OR, 2.27; 95% CI, 1.54-3.35) ($P < .001$, $I^2 = 24\%$).**
CONCLUSIONS: To date, this study is the first systematic review and meta-analysis of the association of access to and the use of media devices with sleep outcomes. Bedtime access to and use of a media device were significantly associated with the following: inadequate sleep quantity, poor sleep quality, and excessive daytime sleepiness. An integrated approach among teachers, health care professionals, and

parents is required to minimize device access at bedtime, and future research is needed to evaluate the influence of the devices on sleep hygiene and outcomes.

8.3.1.9 van der Schuur, Baumgartner, & Sumter (2019). Social Media Use, Social Media Stress, and Sleep: Examining Cross-Sectional and Longitudinal Relationships in Adolescents. *Health Communication*.

ABSTRACT: There are concerns that social media (SM) use and SM stress may disrupt sleep. However, evidence on both the cross-sectional and longitudinal relationships is limited. Therefore, the main aim of this study is to address this gap in the literature by examining the cross-sectional and longitudinal relationships between SM use, SM stress, and sleep (i.e., sleep latency and daytime sleepiness) in adolescents. In total, 1,441 adolescents 11–15 years, 51% boys) filled out a survey in at least one of three waves that were three to four months apart (NWave1 = 1,241; NWave2 = 1,216; NWave3 = 1,103). **Cross-sectionally, we found that SM use and SM stress were positively related to sleep latency and daytime sleepiness. However, when examined together, SM use was not a significant predictor of sleep latency and daytime sleepiness above the effects of SM stress. The longitudinal findings showed that SM stress was positively related to subsequent sleep latency and daytime sleepiness, but only among girls.** Our findings stress that it is important to focus on how adolescents perceive and cope with their SM use, instead of focusing on the mere frequency of SM use.

8.3.1.10 Lüscher, & Radtke (2022). The impact of adolescent's daily electronic media use on sleep: Insights from adolescent's and their mother's point of view. *Applied Psychology: Health and Well-Being*.

ABSTRACT: Several studies demonstrated that electronic media use (EMU) is negatively associated with sleep in adolescents. Most studies however are cross-sectional, self- or parents reports, and not distinguishing between different EMU types. Therefore, this study aimed to examine associations between adolescent's EMU and sleep reported by adolescents and from their mothers' perspective in a dyadic ambulatory assessment design. One hundred and five mother–adolescent dyads reported for 14 consecutive days adolescent's EMU for different EMU types and sleep duration. Mothers reported less EMU in the evening and more sleep of their adolescents than adolescents themselves. **Multilevel analyses revealed that at the between- and withinperson level, EMU in the evening was negatively associated with sleep.**

Different EMU types differed in effect sizes of associations with sleep. No effects were found for watching TV/DVD/video, whereas for gaming at the between- and within-person level, negative associations with sleep duration were found. For PC/tablet and smartphone use in the evening significant between-person association with sleep duration for adolescent's self-reports and from mother's point of view was found. It is important to investigate adolescent's EMU on a daily basis, from a dyadic perspective, and for different EMU types separately.

8.3.1.11 Khan, Reyad, Edwards, & Horwood (In Progress, 2023). Associations between adolescent sleep difficulties and active versus passive screen time across 38 countries. *Journal of Affective Disorders*.

ABSTRACT: BACKGROUND: High screen use has been adversely linked with mental wellbeing; however, little is known about how active versus passive screen time are associated with sleep-onset difficulties among adolescents.
METHODS: We analysed data from 38 European and North American countries that participated in the 2014 Health Behaviour in School-aged Children (HBSC) survey. Difficulties in falling sleep were assessed using a self-reported item with a 5-point Likert scale, and then dichotomised. Participants reported h/day of discretional time spent watching television, electronic gaming, and computer use.
RESULTS: Of the 195,668 participants (Mage 13.59 [1.62] years; 51 % girls), **about 25 % of girls reported sleep-onset difficulties, while the rate was 18 % in boys. Adolescents who played electronic games >4 h/day (≤1 h/day as reference) had 30 % higher odds in boys (OR 1.30; 95 % CI: 1.23–1.38) and 38 % higher odds in girls (OR 1.38; 95 % CI: 1.31–1.45) of reporting sleep difficulties. High computer use (>4 h/day) increased the odds of sleep difficulties by 41 % in boys (OR 1.41, 95 % CI: 1.33–1.49) and 61 % in girls (OR 1.61, 95 % CI: 1.53–1.69). Similarly, high television time (>4 h/day) had increased the odds of sleep difficulties by 15 % in boys (OR 1.15, 95 % CI: 1.08–1.22) and 19 % in girls (OR 1.19, 95 % CI: 1.12–1.25).**
LIMITATIONS: Cross-sectional analyses cannot establish causality of the associations.
CONCLUSIONS: Higher levels of recreational screen use of any type were associated with sleep-onset difficulties among adolescents with adverse effects being more prevalent in active than passive screen time. Prospective research with objective measures is warranted to understand causality of these relationships.

FIGURE:

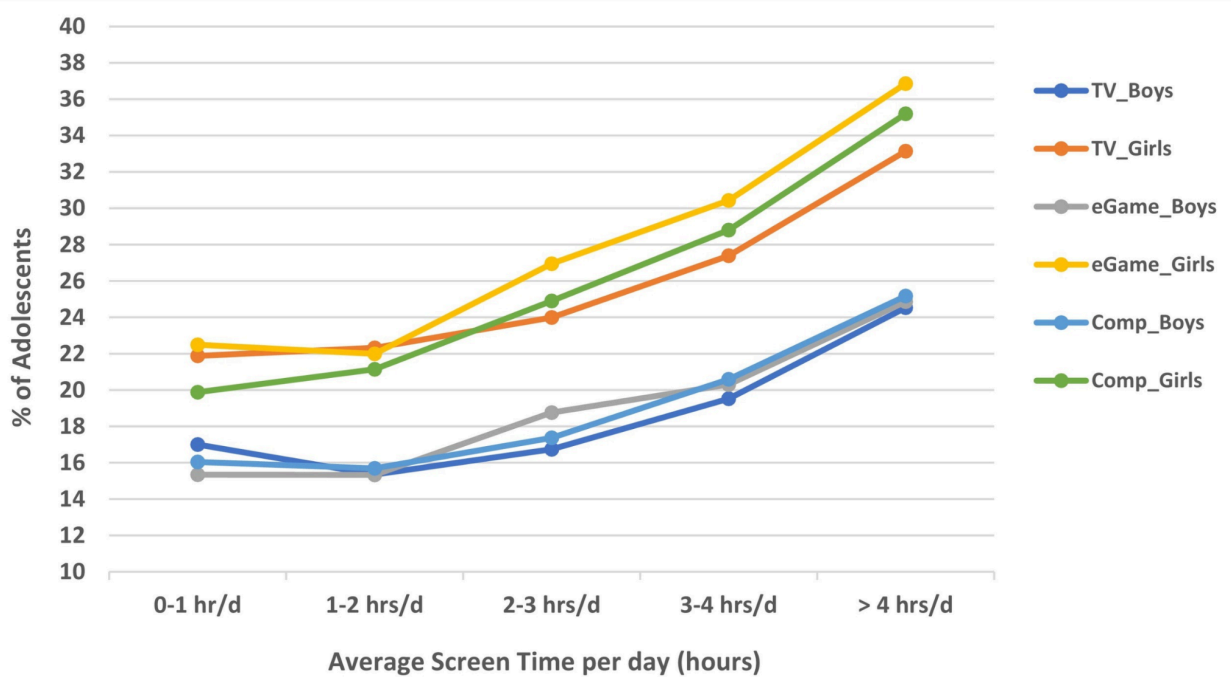


Fig. 1. Percent distribution of adolescents reporting sleep difficulties by different types of screen uses across gender, HBSC 2014.

8.3.1.12 Dissing, Andersen, Jensen, Lund, & Rod (2022). Nighttime smartphone use and changes in mental health and wellbeing among young adults: A longitudinal study based on high-resolution tracking data. *Scientific Reports*.

ABSTRACT: Frequent nighttime smartphone use can disturb healthy sleep patterns and may adversely affect mental health and wellbeing. This study aims at investigating whether nighttime smartphone use increases the risk of poor mental health, i.e. loneliness, depressive symptoms, perceived stress, and low life satisfaction among young adults. High-dimensional tracking data from the Copenhagen Network Study was used to objectively measure nighttime smartphone activity. We recorded more than 250,000 smartphone activities during self-reported sleep periods among 815 young adults (university students, mean age: 21.6 years, males: 77%) over 16 weekdays period. Mental health was measured at baseline using validated measures, and again at follow-up four months later. Associations between nighttime smartphone use and mental health were evaluated at baseline and at follow-up using multiple linear regression adjusting for potential confounding. **Nighttime smartphone use was associated with a slightly higher level of perceived stress and depressive symptoms at baseline. For example, participants having 1–3 nights with smartphone use (out of 16**

observed nights) had on average a 0.25 higher score (95%CI:0.08;0.41) on the Perceived stress scale ranging from 0 to 10. These differences were small and could not be replicated at follow-up. Contrary to the prevailing hypothesis, nighttime smartphone use is not strongly related to poor mental health, potentially because smartphone use is also a social phenomenon with associated benefits for mental health.

8.3.1.13 Nagata… & Baker (2024). Bedtime Screen Use Behaviors and Sleep Outcomes in Early Adolescents: A Prospective Cohort Study. *Journal of Adolescent Health*.

ABSTRACT: PURPOSE: To determine prospective associations between bedtime screen use behaviors and sleep outcomes one year later in a national study of early adolescents in the United States.
METHODS: We analyzed prospective cohort data from 9,398 early adolescents aged 11e12 years (48.4% female, 45% racial/ethnic minority) in the Adolescent Brain Cognitive Development Study (Years 2e3, 2018e2021). Regression analyses examined the associations between self-reported bedtime screen use (Year 2) and sleep variables (Year 3; self-reported sleep duration; caregiver-reported sleep disturbance), adjusting for sociodemographic covariates and sleep variables (Year 2).
RESULTS: Having a television or Internet-connected electronic device in the bedroom was prospectively associated with shorter sleep duration one year later. Adolescents who left their phone ringer activated overnight had greater odds of experiencing sleep disturbance and experienced shorter sleep duration one year later, compared to those who turned off their phones at bedtime. Talking/texting on the phone, listening to music, and using social media were all prospectively associated with shorter sleep duration, greater overall sleep disturbance, and a higher factor score for disorders of initiating and maintaining sleep one year later.
DISCUSSION: In early adolescents, several bedtime screen use behaviors are associated with adverse sleep outcomes one year later, including sleep disturbance and shorter weekly sleep duration. Screening for and providing anticipatory guidance on specific bedtime screen behaviors in early adolescents may be warranted.

[Other studies? What have we missed?]

8.3.2 STUDIES SHOWING LITTLE OR NO LINK TO IMPAIRED SLEEP

8.3.2.1 Orben, & Pryzbylski (2020). Teenage sleep and technology engagement across the week. *Peer J.*

ABSTRACT: METHODS: This study analyses data from 11,884 adolescents included in the UK Millennium Cohort Study to examine the association between digital engagement and adolescent sleep, comparing the relative effects of retrospective self-report vs. time-use diary measures of technology use. By doing so, it provides an empirical lens to understand the effects of digital engagement both throughout the day and before bedtime and adds nuance to a research area primarily relying on retrospective self-report.
RESULTS: The study finds that **there is a small negative association relating digital engagement to adolescent sleep both on weekdays and weekend days (median standardized association $\beta_{weekday} = -0.06$ and $\beta_{weekend} = -0.03$).** There is a more negative association between digital engagement and total sleep time on weekdays compared to weekend days (median standardized $\beta_{weekday} = -0.08$, median standardized $\beta_{weekend} = -0.02$), while there is no such difference when examining adolescents' bedtime. **Surprisingly, and contrary to our expectations, digital technology use before bedtime is not substantively associated with the amount of sleep and the tardiness of bedtime in adolescents.**
CONCLUSIONS: Results derived from the use of transparent Specification Curve Analysis methods show that the negative associations in evidence are mainly driven by retrospective technology use measures and measures of total time spent on digital devices during the day. The effects are overall very small: for example, an additional hour of digital screen time per day was only related to a 9 min decrease in total time spent sleeping on weekdays and a 3 min decrease on weekends. Using digital screens 30 min before bed led to a 1 min decrease in total time spent sleeping on weekdays and weekends. The study shows that more work should be done examining how to measure digital screen time before interventions are designed.

8.3.2.2 Dissing, Andersen, Jensen, Lund, & Rod (2022). Nighttime smartphone use and changes in mental health and wellbeing among young adults: A longitudinal study based on high-resolution tracking data. *Scientific Reports*.

ABSTRACT: Frequent nighttime smartphone use can disturb healthy sleep patterns and may adversely affect mental health and wellbeing. This study aims at investigating whether nighttime smartphone use increases the risk of poor mental health, i.e. loneliness, depressive symptoms, perceived stress, and low life satisfaction among young adults. High-dimensional tracking data from the Copenhagen Network Study was

used to objectively measure nighttime smartphone activity. We recorded more than 250,000 smartphone activities during self-reported sleep periods among 815 young adults (university students, mean age: 21.6 years, males: 77%) over 16 weekdays period. Mental health was measured at baseline using validated measures, and again at follow-up four months later. Associations between nighttime smartphone use and mental health were evaluated at baseline and at follow-up using multiple linear regression adjusting for potential confounding. **Nighttime smartphone use was associated with a slightly higher level of perceived stress and depressive symptoms at baseline.** For example, participants having 1–3 nights with smartphone use (out of 16 observed nights) had on average a 0.25 higher score (95%CI:0.08;0.41) on the Perceived stress scale ranging from 0 to 10. **These differences were small and could not be replicated at follow-up. Contrary to the prevailing hypothesis, nighttime smartphone use is not strongly related to poor mental health, potentially because smartphone use is also a social phenomenon with associated benefits for mental health.**

8.3.2.3 Mac Cárthaigh, Perry, & Griffin (2022). Do objective data support the claim that problematic smartphone use has a clinically meaningful impact upon adolescent sleep duration? *Behaviour & Information Technology*.

ABSTRACT: Sleep insufficiency is a risk factor for mental and physical ill-health. In recent years, research has attributed sleep insufficiency to problematic smartphone use (PSU). In addition, research has indicated a relationship between sleep and the construct of mental toughness (MT). However, previous research exploring the relationship between sleep, PSU and MT has relied on self-report measures. Therefore, this study aimed to explore the tentative links between sleep, PSU and MT by gathering objective data. 2053 participants completed measures of sleep quality, PSU and MT. Objective smartphone usage data were collected using pre-installed smartphone applications. A sub-sample of 614 participants provided sleep duration data from validated sleep tracking devices. In line with previous research, sleep quality was found to correlate weakly with both MT and PSU. **While several significant correlations emerged when objective data were explored, in all cases, the effect sizes were negligible. This study does not support the claim that PSU has a clinically meaningful impact upon sleep duration.** Sleep hygiene recommendations with more well-established empirical support should be prioritised during sleep promotion efforts.

8.3.2.4 Tkaczyk, Lacko, Elavsky, Tancoš, & Šmahel (2023). Are smartphones detrimental to adolescent sleep? An electronic diary study of evening smartphone use and sleep. *Computers in Human Behavior*.

ABSTRACT: Previous research associated smartphone use with worsened sleep among adolescents. However, the prior findings were mainly based on cross-sectional, self-reported data, and a between-person level of analysis. This study examined between- and within-person associations for adolescents' smartphone use and multiple sleep outcomes: sleep onset time, sleep onset latency, sleep duration, subjective sleep quality, and subjective daily sleepiness. The participants were 201 Czech adolescents (aged 13–17) who daily reported their sleep outcomes, daily stressors, and other media use for 14 consecutive days via a custom-made research app on their smartphones. The app also collected logs of the participants' smartphone use. We found that **interindividual differences within the average volume of smartphone use before sleep were not associated with differences in sleep outcomes. At the within-person level, we found that, when adolescents used smartphones before sleep for longer than usual, they went to sleep earlier and slept longer. However, these two associations were weak. No other sleep outcomes were affected by the increased use of a smartphone before sleep on a given day. We found no interaction effects for age, gender, insomnia symptoms, media use, or daily stressors**. However, the association between smartphone use and earlier sleep onset time was stronger on nights before a non-school day. Our findings suggest that the link between smartphone use and adolescent sleep is more complex, and not as detrimental, as claimed in some earlier studies.

[Other studies? What have we missed?]

8.4 RESEARCH ON YOUNGER KIDS (K-5)

For more studies, see: The Impact of Screens on Infants, Toddlers, and Preschoolers: A Collaborative Review

8.4.1 STUDIES GENERALLY SUPPORTING CONCERN ABOUT SOCIAL MEDIA OR "SCREEN TIME"

8.4.1.1 Paulich, Ross, Lessem, & Hewitt (2021). Screen time and early adolescent mental health, academic, and social outcomes in 9- and 10- year old children: Utilizing the Adolescent Brain Cognitive Development (ABCD) Study. *PLOS ONE*.

ABSTRACT: In a technology-driven society, screens are being used more than ever. The high rate of electronic media use among children and adolescents begs the question: is screen time harming our youth? The current study draws from a nationwide sample of 11,875 participants in the United States, aged 9 to 10 years, from the Adolescent Brain Cognitive Development Study (ABCD Study®). We investigate relationships between screen time and mental health, behavioral problems, academic performance, sleep habits, and peer relationships by conducting a series of correlation and regression analyses, controlling for SES and race/ethnicity. We find that **more screen time is moderately associated with worse mental health, increased behavioral problems, decreased academic performance, and poorer sleep, but heightened quality of peer relationships. However, effect sizes associated with screen time and the various outcomes were modest**; SES was more strongly associated with each outcome measure. Our analyses do not establish causality and the small effect sizes observed suggest that increased screen time is unlikely to be directly harmful to 9-and-10-year-old children.

8.4.1.2 Lee, Kim, Yang, & Shin (2022). Effects of frequent smartphone use on sleep problems in children under 7 years of age in korea: A 4-year longitudinal study. *Int. J. Environ. Res. Public Health.*

ABSTRACT: The use of electronic screen devices has a negative effect on sleep. The purpose of this study is to longitudinally examine the effects of various screen use on sleep problems in children under 7 years of age. A total of 314 caregivers of children aged 4–7 years from three cities in Korea were recruited and responded to a self-administered questionnaire from 2017 to 2020. As a result of the analysis of the mixed model designed as a two-leveled structure, the use **frequency of smartphones significantly predicted children's sleep problems ($\beta = 0.328$, $p < 0.001$) compared to that of TV, PC, and tablet PC. In addition, the frequency of smartphone screen use showed a weak but significant correlation with bedtime resistance ($r = 0.067$, $p = 0.009$), sleep duration ($r = 0.089$, $p < 0.001$), nighttime awakening ($r = 0.066$, $p = 0.010$), and daytime sleepiness ($r = 0.102$, $p < 0.001$).** The results of this study suggest that screen time education in Korea should focus on smartphones above all else.

8.4.1.3 Takahashi… & Kuriyama (2023). Screen Time at Age 1 Year and Communication and Problem-Solving Developmental Delay at 2 and 4 Years. *JAMA Pediatrics*.

ABSTRACT: IMPORTANCE: Whether some domains of child development are specifically associated with screen time and whether the association continues with age remain unknown.
OBJECTIVE: To examine the association between screen time exposure among children aged 1 year and 5 domains of developmental delay (communication, gross motor, fine motor, problem-solving, and personal and social skills) at age 2 and 4 years.
DESIGN: This cohort study was conducted under the Tohoku Medical Megabank Project Birth and Three-Generation Cohort Study. Pregnant women at 50 obstetric clinics and hospitals in the Miyagi and Iwate prefectures in Japan were recruited into the study between July 2013 and March 2017. The information was collected prospectively, and 7097 mother-child pairs were included in the analysis. Data analysis was performed on March 20, 2023.
EXPOSURE: Four categories of screen time exposure were identified for children aged 1 year (<1, 1 to <2, 2 to <4, or ≥4 h/d).
OUTCOMES: Developmental delays in the 5 domains for children aged 2 and 4 years were assessed using the Japanese version of the Ages & Stages Questionnaires, Third Edition. Each domain ranged from 0 to 60 points. Developmental delay was defined if the total score for each domain was less than 2 SDs from its mean score.
RESULTS: Of the 7097 children in this study, 3674 were boys (51.8%) and 3423 were girls (48.2%). With regard to screen time exposure per day, 3440 children (48.5%) had less than 1 hour, 2095 (29.5%) had 1 to less than 2 **hours, 1272 (17.9%) had 2 to less than 4 hours, and 290 (4.1%) had 4 or more hours. Children's screen time was associated with a higher risk of developmental delay at age 2 years in the communication (odds ratio [OR], 1.61 [95% CI, 1.23-2.10] for 1 to <2 h/d; 2.04 [1.52-2.74] for 2 to <4 h/d; 4.78 [3.24-7.06] for ≥4 vs <1 h/d), fine motor (1.74 [1.09-2.79] for ≥4 vs <1 h/d), problem-solving (1.40 [1.02-1.92] for 2 to <4 h/d; 2.67 [1.72-4.14] for ≥4 vs <1 h/d), and personal and social skills (2.10 [1.39-3.18] for ≥4 vs <1 h/d) domains. Regarding risk of developmental delay at age 4 years, associations were identified in the communication (OR, 1.64 [95% CI, 1.20-2.25] for 2 to <4 h/d; 2.68 [1.68-4.27] for ≥4 vs <1 h/d) and problem-solving (1.91 [1.17-3.14] for ≥4 vs <1 h/d) domains.**
CONCLUSIONS: In this study, greater screen time for children aged 1 year was associated with developmental delays in communication and problem-solving at ages 2

and 4 years. These findings suggest that domains of developmental delay should be considered separately in future discussions on screen time and child development.

[Other studies? What have we missed?]

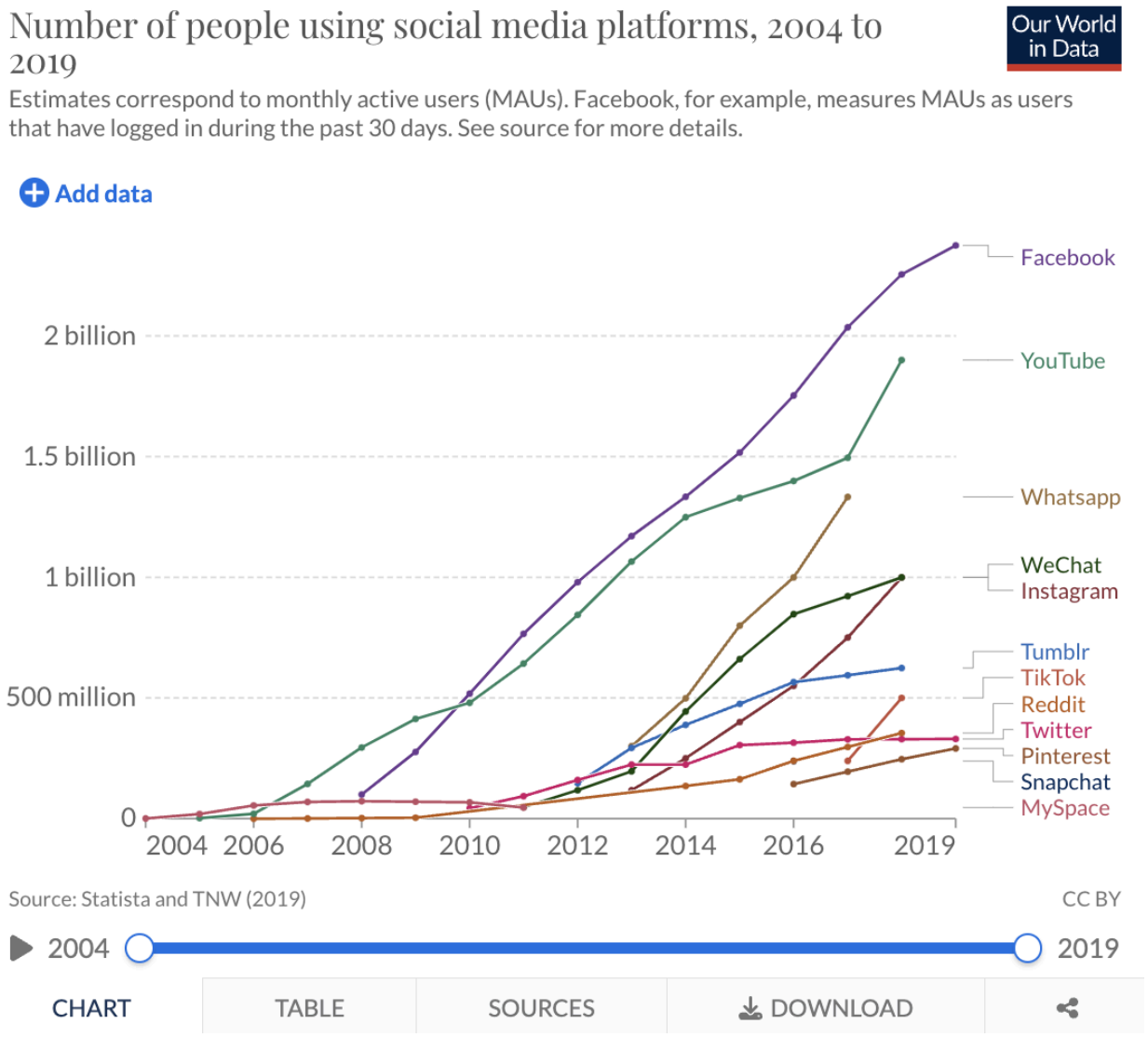
8.4.2 STUDIES GENERALLY SUGGESTING THAT SOCIAL MEDIA IS NOT HARMFUL

[Other studies? What have we missed?]

8.5 USAGE STUDIES (Who is using which apps?)

This section, added in November 2021, collects studies that let us see who is using which apps (e.g., Twitter, Instagram) and for how long, both currently, and historically.

8.5.1 Ortiz-Ospina, E. (2019). The rise of social media. *Our World in Data.*

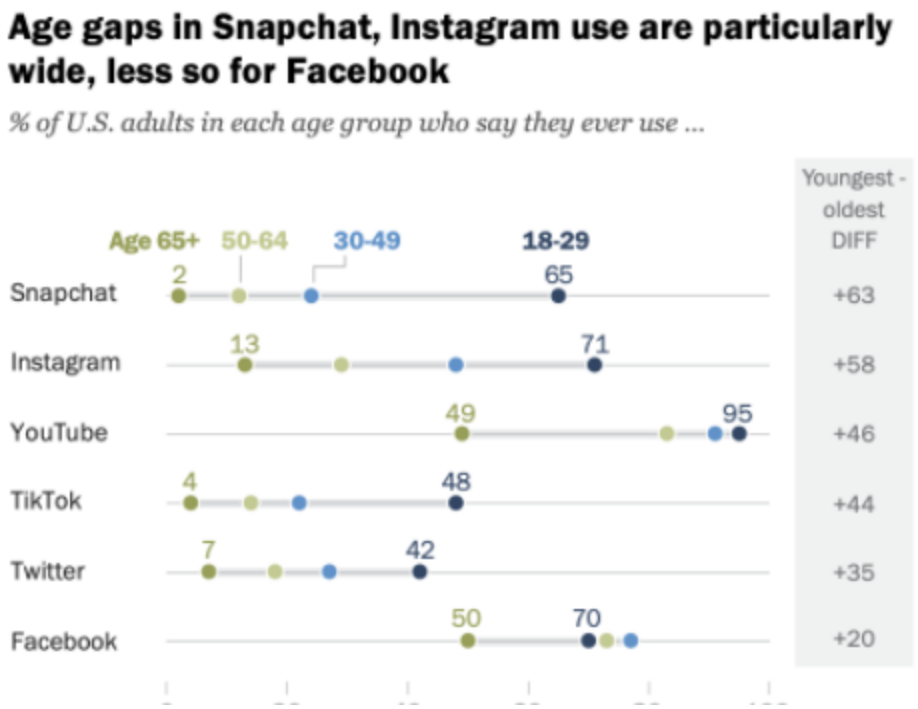


8.5.2 Demographics of social media users and adoption in the United States (2021). *Pew Research Center: Internet, Science & Tech*.

% of U.S. adults in each demographic group who say they ever use ...

	Facebook	Instagram	LinkedIn
Total	69%	40%	28%
Men	61%	36%	31%
Women	77%	44%	26%
Ages 18-29	70%	71%	30%
30-49	77%	48%	36%
50-64	73%	29%	33%
65+	50%	13%	11%

These statistics comes from a survey conducted in Jan-Feb 2021



8.5.3 Parry, & Sewall (2021). Do smartphone application preferences change over time or vary by demographics? A longitudinal study using behavioral data. PrePrint: *SocArXiv.*

ABSTRACT: Smartphones afford users the ability to select their own custom mobile application repertoires through the installation of a nearly endless array of applications. Acknowledging the need for increased attention to the description of digital media usage, this paper reports a quantitative descriptive study that investigates the types of applications that people commonly use, the amount of time they spend with these applications, the application combinations that they construct, the consistency of these combinations over time, and differences in these outcomes by three demographic characteristics. Using a longitudinal dataset that includes behavioural data collected via data donations, the study identifies key application adoption patterns and shows that peoples' mobile application repertoires are concentrated around a subset of popular applications that is relatively consistent over time. However, within this subset there is substantial diversity between applications and between individuals. These results suggest that quantifying smartphone usage with a single metric—total aggregate usage duration (i.e., screentime)—is unlikely to capture the full extent and diversity of media that users curate for themselves as part of their mobile application repertoires.

ADDITIONAL EXCERPTS:

"**[T]he proportion of older people using Facebook is almost double the proportion of younger people who use the platform. Conversely, the proportion of younger participants using TikTok was almost three times as large compared to the proportion among older participants. Similar differences, albeit of a smaller magnitude, were observed for Snapchat and Instagram…**

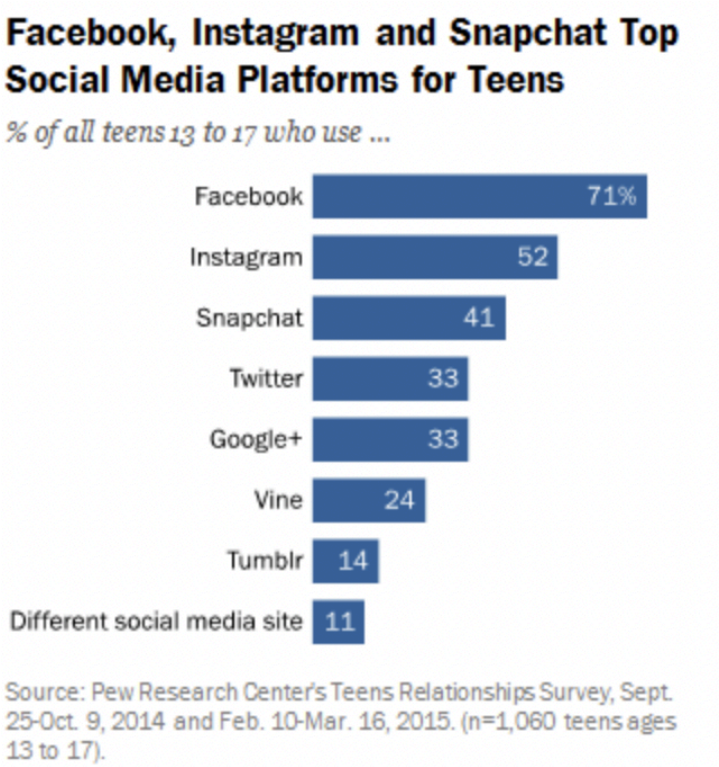
In contrast to the substantial differences by age category, application choices were fairly similar between male and female participants. However, notable distinctions emerge when looking at age differences within each gender category. For instance, nearly 75% of GenZ females had Instagram as one of their most-used applications, while only 47% of Millennial males did. In a similar vein, over 75% of GenZ males had YouTube as one of their most-used applications, while only 43% of Millennial females did…

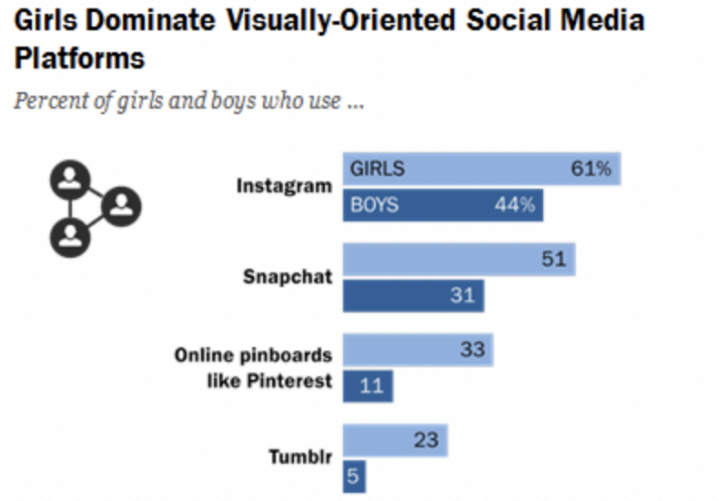
At a high level, across all four data collection waves, females' per-application weekly usage duration was on average higher than males' usage. The magnitude of this difference was far larger than the difference observed between age groups and education categories."

8.5.4 *Global Social Media Stats*. (2021). DataReportal – Global Digital Insights.

8.5.5 Teens, social media and technology. *Pew Research Center. (2015, 2018, and 2021 Reports)*

FIGURES FROM THE 2015 REPORT:





Half of American Teens Use Instagram

% of all teens who use Instagram

All teens	52%
Sex	
a Boys	44
b Girls	61[a]
Race/ethnicity	
c White, non-Hispanic	50
d Black, non-Hispanic	64[c]
e Hispanic	52
Age	
f 13-14	44
g 15-17	58[f]

71% of Teens are Facebook Users

% of all teens who use Facebook

All teens	71%
Sex	
a Boys	72
b Girls	70
Race/ethnicity	
c White, non-Hispanic	71
d Black, non-Hispanic	75
e Hispanic	70
Age	
f 13-14	57
g 15-17	80[f]
Sex by age	
h Boys 13-14	62
i Boys 15-17	78[hj]
j Girls 13-14	52
k Girls 15-17	81[hj]

FIGURE FROM THE 2018 REPORT:

Online platform use among U.S. teens, by demographic group

% of U.S. teens who say they use ...

	YouTube	Instagram	Snapchat	Facebook	Twitter	Tumblr	Reddit
U.S. teens	85	72	69	51	32	9	7
Boys	89	69	67	49	33	9	11
Girls	81	75	72	53	32	9	4
White	86	73	72	48	33	10	8
Black	79	72	77	57	29	11	5
Hispanic	85	72	64	58	36	7	7
13-14	84	63	63	47	24	7	4
15-17	86	78	74	54	38	11	9
Less than $30K	86	74	77	70	40	10	10
$30K to $74,999	84	72	71	56	30	8	4
$75K and up	85	71	64	36	30	11	8
Parent's level of educational attainment							
High school or less	85	73	73	65	35	12	6
Some college	87	73	74	61	37	9	7
College graduate+	84	71	63	33	27	8	8

Note: Whites and blacks include only non-Hispanics. Hispanics are of any race. Parent's level of education based on highest level of education associated with a teen's parent.
Source: Survey conducted March 7- April 10, 2018.
"Teens, Social Media & Technology 2018"

EXCERPT FROM 2018 REPORT: "The social media landscape in which teens reside looks markedly different than it did as recently as three years ago. In the Center's 2014-2015 survey of teen social media use, 71% of teens reported being Facebook users. No other platform was used by a clear majority of teens at the time: Around half (52%) of teens said they used Instagram, while 41% reported using Snapchat.

In 2018, three online platforms other than Facebook – YouTube, Instagram and Snapchat – are used by sizable majorities of this age group. Meanwhile, 51% of teens now say they use Facebook. The shares of teens who use Twitter and Tumblr are largely comparable to the shares who did so in the 2014-2015 survey...

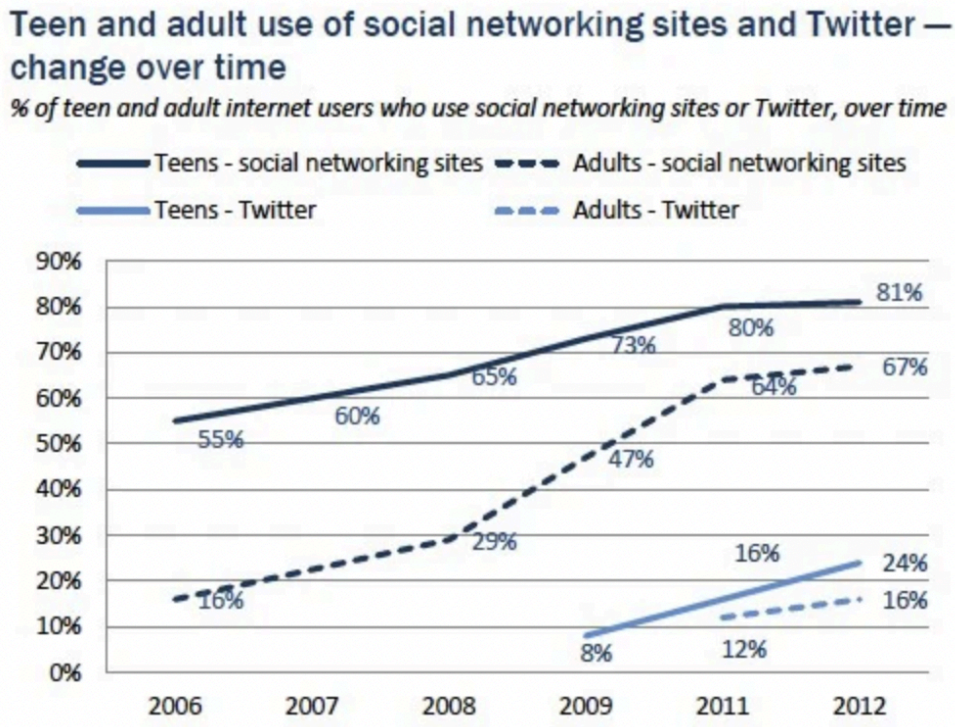
As smartphone access has become more prevalent, a growing share of teens now report using the internet on a near-constant basis. **Some 45% of teens say they use the internet "almost constantly," a figure that has nearly doubled from the 24% who said this in the 2014-2015 survey**. Another 44% say they go online several times a day, meaning roughly nine-in-ten teens go online at least multiple times per day."

8.5.6 Madden, Lenhart, Cortesi, Gasser, Duggan, Smith, & Beaton, (2013, May 21). Part 1: Teens and social media use. *Pew Research Center: Internet, Science & Tech*.

EXCERPT: [In 2012] Girls and older teens continue to be the heaviest users of social media sites. Among teen girls who are social media users, 48% say they visit social networking sites several times per day, compared with 36% of teen boys. Looking at younger teens ages 12-13, 26% use the sites several times per day, while nearly twice as many teens ages 14-17 (47%) use the sites that often.

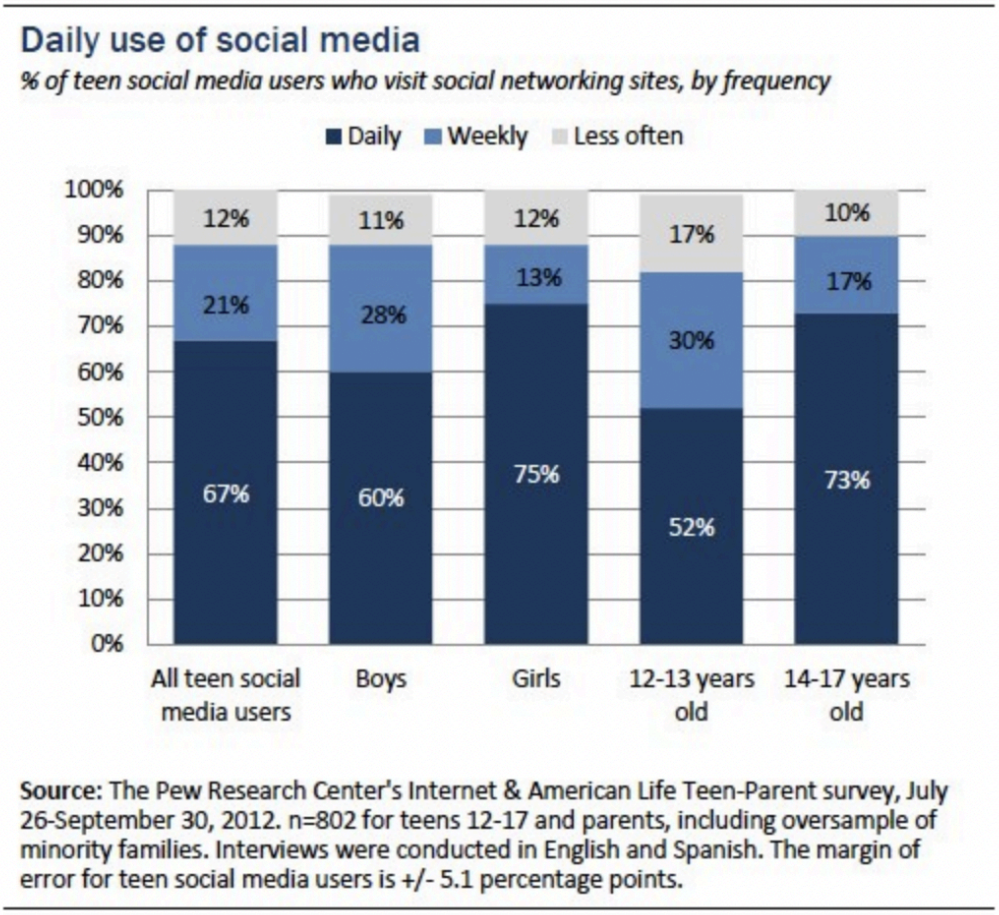
[In 2012] Fully 95% of those ages 12-17 use the internet. Eight in ten online teens use some kind of social media. Twitter is still not in the same league as Facebook, which attracts 77% of online teens.

FIGURE 1:



Source: The Pew Research Center Internet & American Life Project Teen & Parent surveys. Source: Teen data taken from surveys of teens age 12-17 conducted October-November 2006, September-November 2007, November 2007-February 2008, June-September 2009, April-July 2011, and July-September 2012 (n=802). Adult data taken from surveys of adults ages 18+ conducted August 2006, April-May 2009, August-September 2009, July-August 2011, and November-December 2012 (n=2,261). Methodological information for each survey is available from http://pewrsr.ch/ZLGBUL

FIGURE 2:



8.5.7 Madden, M. (2013, August 15). Teens haven't abandoned Facebook (Yet). *Pew Research Center: Internet, Science & Tech*.

EXCERPT: According to our survey, 94% of teen social media users said they had a Facebook profile, and 81% said that Facebook is the profile they use most often. While other platforms—like Twitter and Instagram—are growing in popularity, teen usage of Facebook still dwarfed every other platform at the time of our survey.

One-in-four (26%) teen social media users said they had a profile or account on Twitter and just 7% said that was their main profile. By comparison, 11% had a profile or account on Instagram with 3% saying that profile was the one they use most often…

Our research has found teens to be fickle social media users; just six years ago, 85% of teens with profiles said MySpace was their most frequently used account. (Only 7% do today.) But Facebook is arguably a much different animal, and has become more deeply integrated across multiple generations, multiple platforms and devices, and multiple spheres of public and private life.

FIGURE:

Where teens have social media profiles or accounts

% of teen social media users who use the following sites ...

	2011	2012
Facebook	93%	94%
Twitter	12	26
Instagram	n/a	11
MySpace	24	7
YouTube	6	7
Tumblr	2	5
Google Plus	n/a	3
Yahoo (unspecified)	7	2
myYearbook	2	*
Pinterest	n/a	1
Gmail	n/a	1
Meet Me	n/a	1
Other	8	6
Don't know / Don't have own profile	2	1

8.5.8 Smartphone ownership, for access to social media away from home:

Pew Report (2012). Cell Phone Ownership. *Pew Research Center.*

EXCERPT: According to the Pew Internet Project's 2011 teen survey, **three quarters (77%) of teens have a cell phone**, a figure that is similar to the **75% of teens who owned a cell phone in September 2009** and up dramatically from the 45% of teens who were cell owners in late 2004. [so no rise in total phone ownership between 2009 and 2011]. One quarter **(23%) of teens 12 to 17 indicate that their phone is a smartphone**, while 54% have a regular cell phone (or are not sure what kind of phone they have), and another 23% of teens do not have a cell phone at all.

In 2011, 77% of teens had a phone; just 23% had a smartphone.

8.5.9 Common Sense Media Reports (2015 and 2019). Media Use by Tweens and Teens.

2019 Report: Sample**:** 1,677 U.S. young people ages 8 to 18 years old, conducted from March 11 to April 3, 2019. Operationalization: Includes the use of social-networking sites and mobile apps such as Facebook, Twitter, or Instagram.

Summary of the report, via a post at the Good Men Project: A 2019 report by Common Sense Media found that American teenagers spend an astounding nine hours a day with digital technology, which includes social media, streaming video, listening to music, playing games; this total does not include screen time on homework. "Tweens" aged 8 to 12 are spending six hours with media; preschoolers—yes, kids under five—with their own smartphones or tablets averaged two hours of screen time a day. Most important: These figures are all pre-Covid; in the past 18 months, daily life for most kids has involved remote screen time for much of the school day.

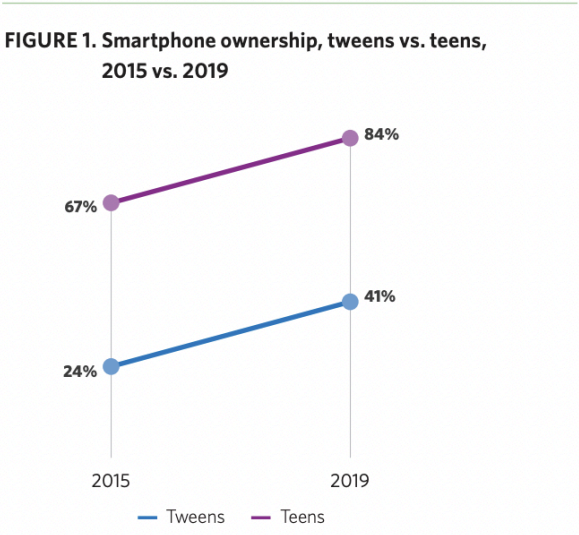


TABLE 1. Average daily screen media use, by activity and age, 2015 vs. 2019

Average daily use devoted to ...	Among 8- to 12-year-olds		Average daily use devoted to ...	Among 13- to 18-year-olds	
	2015	2019		2015	2019
TV/Videos	2:29	2:30	TV/Videos	2:41	2:52
Games	1:19	1:28	Games	1:21[a]	1:36[b]
Browsing websites	:12	:14	Social media	1:11	1:10
Social media	:16	:10	Browsing websites	:36	:37
Content creation*	:05	:08	Video-chatting	:13[a]	:19[b]
Video-chatting	:06	:05	E-reading	:03[a]	:08[b]
E-reading	:03[a]	:05[b]	Content creation*	:09	:12
Other†	:08	:07	Other†	:23	:28
Total screen use	**4:36**	**4:44**	**Total screen use**	**6:40**	**7:22**

* Includes making digital art or music, or writing on a digital device.

†Includes using GPS or other functional apps, emailing, shopping, and doing any other digital activities not specifically asked about in the survey.

Note: Superscripts (a,b) are used to denote whether differences over time are statistically significant ($p < .05$). Items with different superscripts differ significantly.

EXCERPT: **There continues to be a big difference between boys and girls in terms of enjoyment and use of social media. Among teens, where social media use is most common, half (50%) of all girls say they enjoy using social media "a lot" compared to about a third (32%) of boys. Seventy percent of teen girls say they use social media "every day," compared to 56% of boys. Teen girls average an hour and a half (1:30) a day on social media, compared to 51 minutes a day among teen boys.**

TABLE 2. Screen media use, by age, 2015 vs. 2019

Percent who use for ... per day	Tweens		Teens	
	2015	2019	2015	2019
None	6%	8%	6%	4%
2 hours or less	28%	26%	16%	15%
2–4 hours*	27%	25%	20%	18%
4–8 hours†	26%	26%	31%	33%
More than 8 hours	14%	15%	26%	29%

*Includes from 2:01 up to and including 4 hours.

†Includes from 4:01 up to and including 8 hours.

2015 Report: Sample: 2,658 U.S. children ages 8 to 18 years old, conducted from February 6 to March 9, 2015. Operationalization: Includes the use of social-networking sites and mobile apps such as Facebook, Twitter, or Instagram.

TABLE 28. SOCIAL MEDIA USE: TIME SPENT IN INCREMENTS

On any given day ...	Among Tweens	Among Teens
Percent who use social media for:		
• No time	85%	42%
• 1 hour or less	10%	32%
• 1-2 hours	3%	11%
• 2-4 hours	2%	8%
• More than 4 hours	1%	7%
Total who use social media	15%	58%
Average time *among those who use*	1:43	2:04
Average time *among all*	:16[a]	1:11[b]

Note: 1-2 hours includes from 61 minutes up to and including two hours; 2-4 hours includes from 121 minutes up to and including four hours.

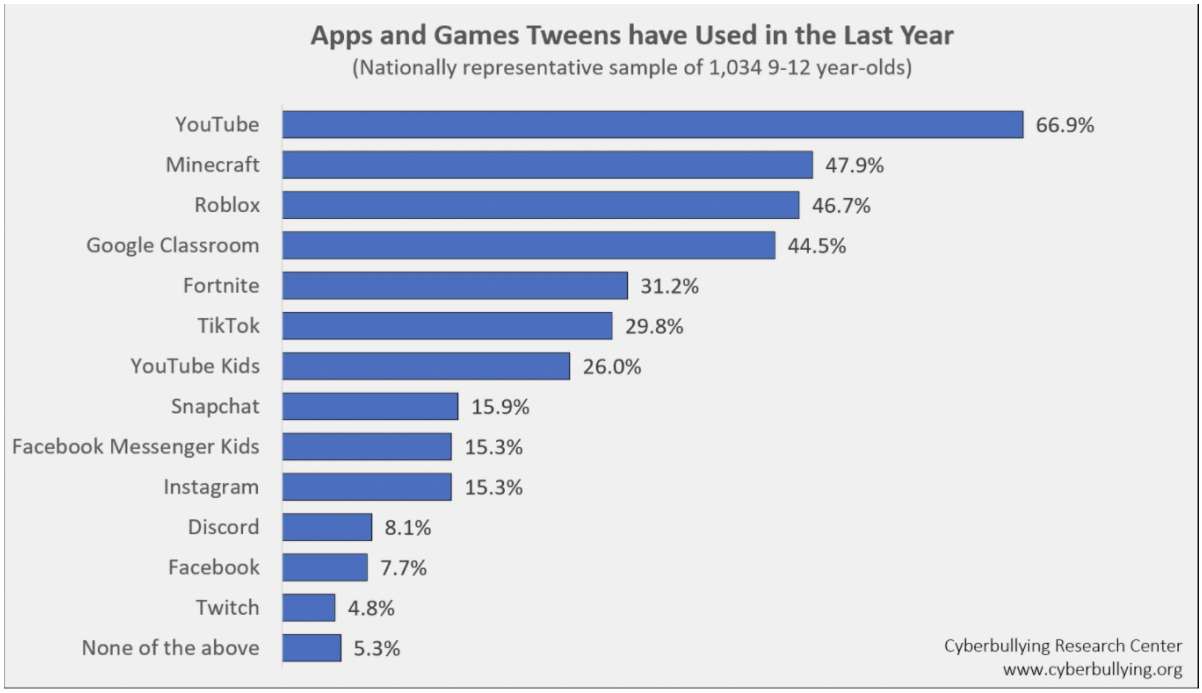
TABLE 27. SOCIAL MEDIA ENJOYMENT AND USE, BY AGE AND GENDER

	Among Tweens			Among Teens		
Social Media Habits/Opinions	All	Boys	Girls	All	Boys	Girls
Enjoy it "a lot"	13%	7%[a]	18%[b]	36%	29%[a]	44%[b]
Say it is their "favorite" activity	4%	1%[a]	7%[b]	10%	5%[a]	14%[b]
Use it "every day"	10%	7%[a]	14%[b]	45%	38%[a]	52%[b]
On any given day, percent who use it	15%	9%[a]	22%[b]	58%	51%[a]	64%[b]
Average time *among those who use*	1:43	1:09	1:57	2:04	1:42[a]	2:22[b]
Average time *among all*	:16	:06[a]	:26[b]	1:11	:52[a]	1:32[b]

Note: Superscripts (a,b) are used to denote whether differences between groups are statistically significant ($p<.05$). Items with different superscripts differ significantly. Items that do not have a superscript, or that share a common superscript, do not differ significantly.

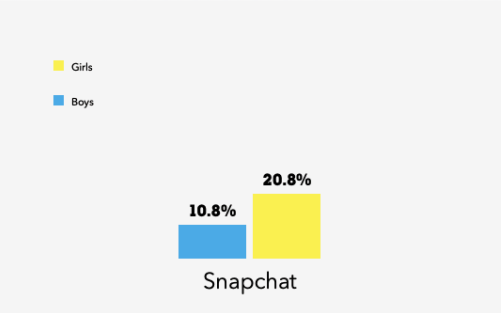
8.5.10 Cyberbullying Research Center (2020). Tween Cyberbullying in 2020.

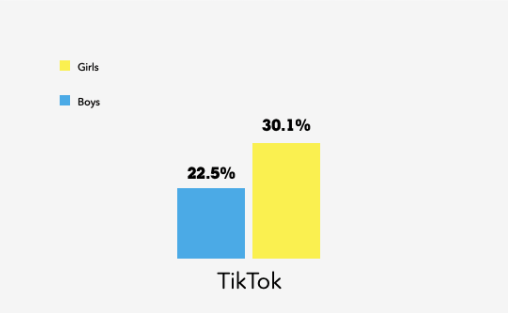
Sample: nationally representative survey of 1,034 children between the ages of 9 and 12 years-old.

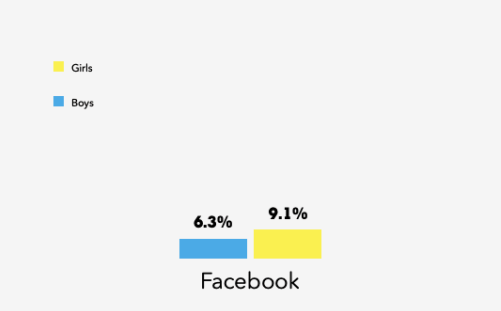

Apps and Games Tweens have Used in the Last Year
(Nationally representative sample of 1,034 9-12 year-olds)
YouTube 66.9%
Minecraft 47.9%
Roblox 46.7%
Google Classroom 44.5%
Fortnite 31.2%
TikTok 29.8%
YouTube Kids 26.0%
Snapchat 15.9%
Facebook Messenger Kids 15.3%
Instagram 15.3%
Discord 8.1%
Facebook 7.7%
Twitch 4.8%
None of the above 5.3%
Cyberbullying Research Center
www.cyberbullying.org

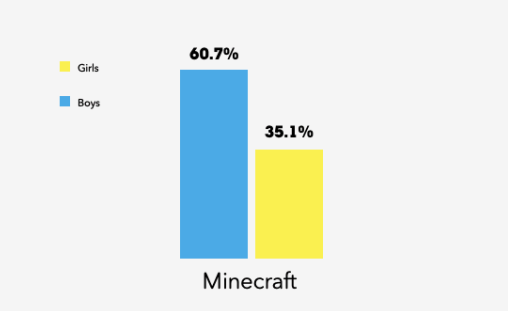
APPS AND GAMES TWEENS HAVE USED IN THE LAST YEAR - BY GENDER

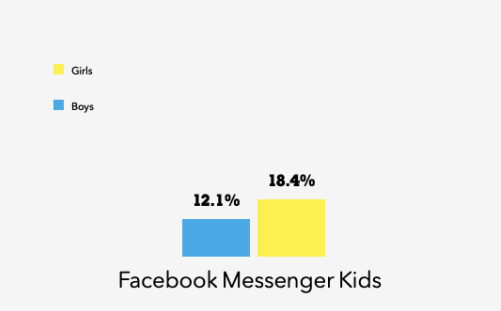
9- TO 12-YEAR-OLDS

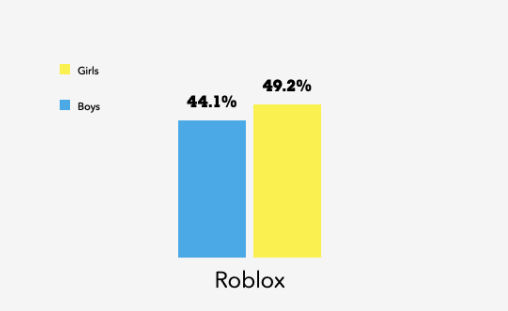


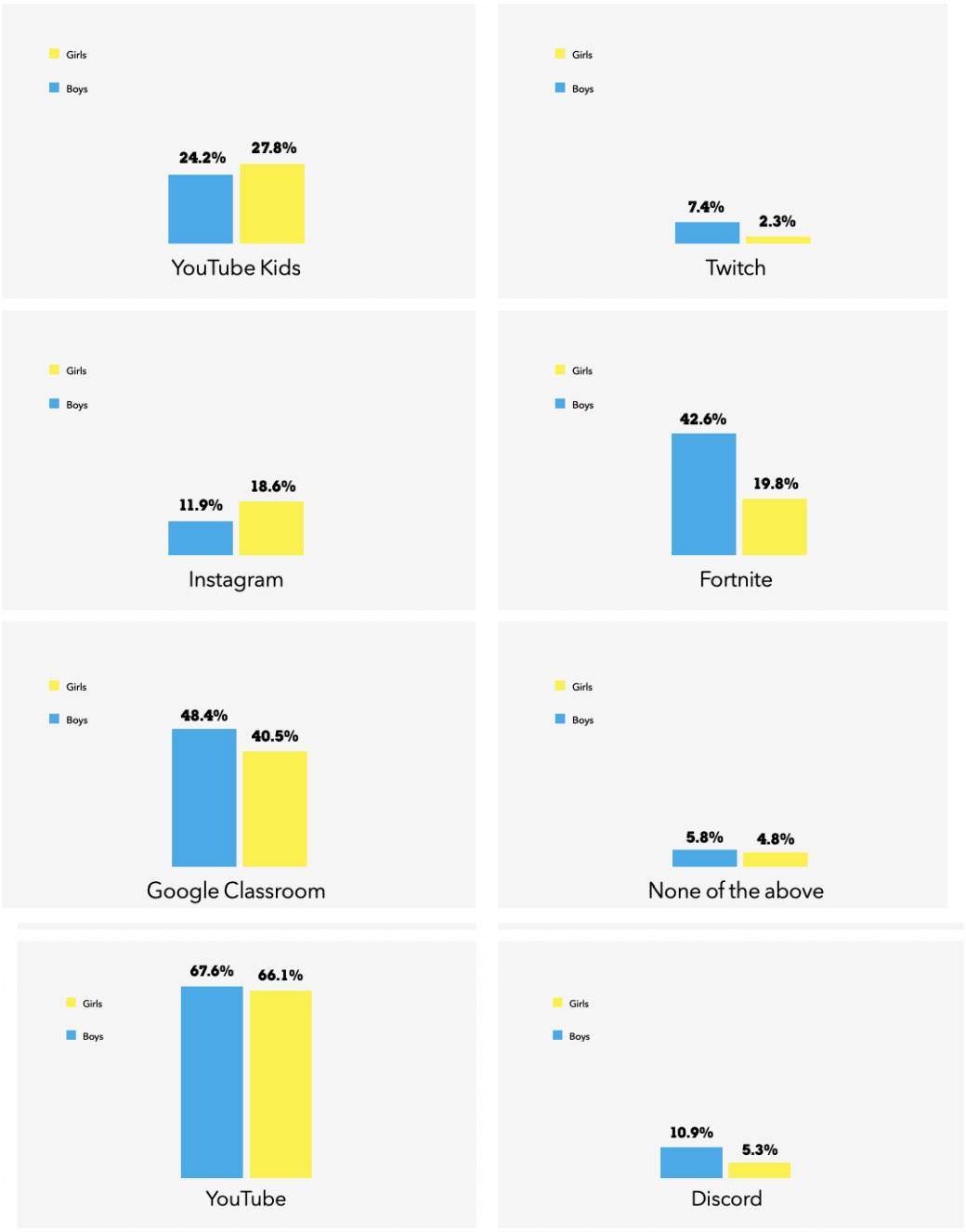












A 2019 report by Common Sense Media found that American teenagers spend an astounding nine hours a day with digital technology, which includes social media, streaming video, listening to music, playing games; this total does not include screen time on homework. “Tweens” aged 8 to 12 are spending six hours with media; preschoolers—yes, kids under five—with their own smartphones or tablets averaged two hours of screen time a day. Most important: These figures are all pre-Covid; in the

past 18 months, daily life for most kids has involved remote screen time for much of the school day.

8.5.11 Vogels, Gelles-Watnick, & Massarat (2022). Teens, Social Media and Technology 2022. *Pew Research Center: Internet, Science & Tech*.

EXCERPT: This survey asked whether U.S. teens use 10 specific online platforms: YouTube, TikTok, Instagram, Snapchat, Facebook, Twitter, Twitch, WhatsApp, Reddit and Tumblr.

YouTube stands out as the most common online platform teens use out of the platforms measured, with 95% saying they ever use this site or app. Majorities also say they use TikTok (67%), Instagram (62%) and Snapchat (59%). Instagram and Snapchat use has grown since asked about in 2014-15, when roughly half of teens said they used Instagram (52%) and about four-in-ten said they used Snapchat (41%).

The share of teens using Facebook has declined sharply in the past decade. Today, 32% of teens report ever using Facebook, down 39 points since 2014-15, when 71% said they ever used the platform.

Other social media platforms have also seen decreases in usage among teens since 2014-15. Some 23% of teens now say they ever use Twitter, compared with 33% in 2014-15. Tumblr has seen a similar decline. While 14% of teens in 2014-15 reported using Tumblr, just 5% of teens today say they use this platform.

The online platforms teens flock to differ slightly based on gender. **Teen girls are more likely than teen boys to say they ever use TikTok, Instagram and Snapchat, while boys are more likely to use Twitch and Reddit. Boys also report using YouTube at higher rates than girls, although the vast majority of teens use this platform regardless of gender.**

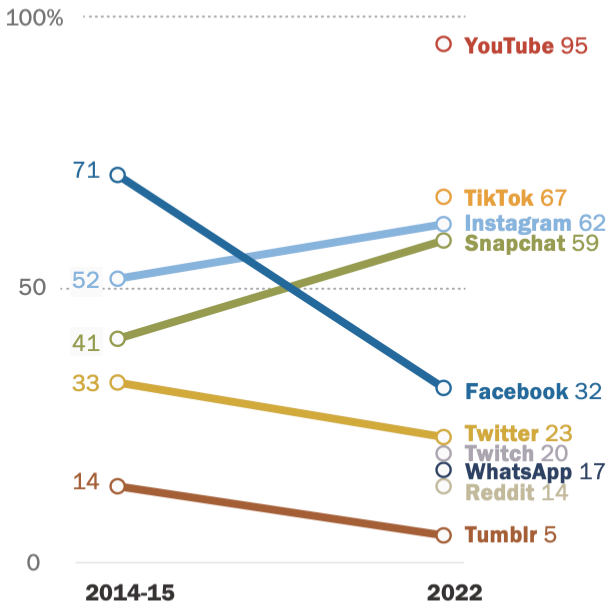
…Across these five platforms, 35% of all U.S. teens say they are on at least one of them almost constantly. While this is not a comprehensive rundown of all teens who use any kind of online platform almost constantly, this 35% of teens represent a group of relatively heavy platform users and they clearly have different views about their use of social media compared with those who say they use at least one of these platforms, though less often than "almost constantly."

…While a majority of teen boys and half of teen girls say they spend about the right amount of time on social media, this sentiment is more common among boys. Teen girls are more likely than their male counterparts to say they spend too much time on social media.

FIGURES:

Since 2014-15, TikTok has arisen; Facebook usage has dropped; Instagram, Snapchat have grown

% of U.S. teens who say they ever use any of the following apps or sites

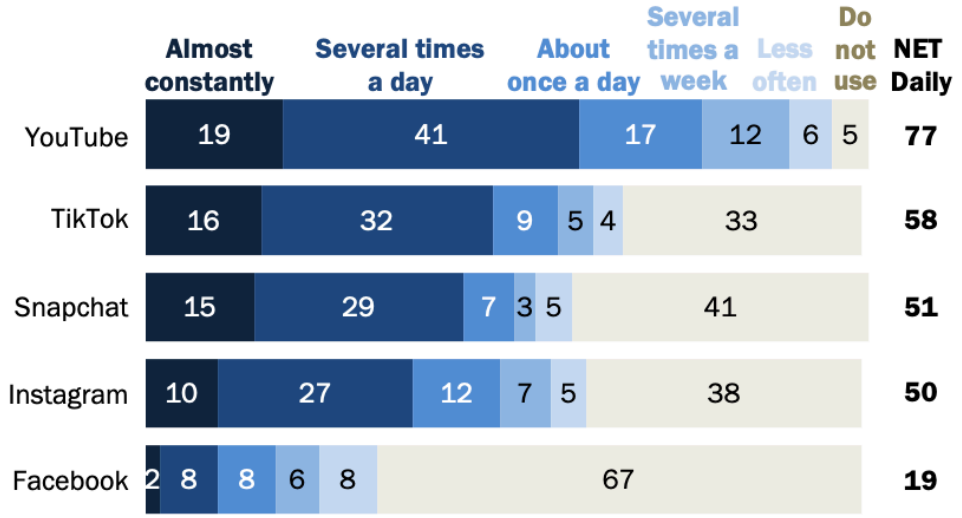


Note: Teens refer to those ages 13 to 17. Those who did not give an answer are not shown. The 2014-15 survey did not ask about YouTube, WhatsApp, Twitch and Reddit. TikTok debuted globally in 2018.
Source: Survey conducted April 14-May 4, 2022.
"Teens, Social Media and Technology 2022"

PEW RESEARCH CENTER

Roughly one-in-five teens are almost constantly on YouTube; only 2% say the same for Facebook

% of U.S. teens who say they visit or use each of the following sites or apps ...



Note: Teens refer to those ages 13 to 17. Those who did not give an answer are not shown.
Figures may not add up to the NET values due to rounding.
Source: Survey conducted April 14-May 4, 2022.
"Teens, Social Media and Technology 2022"

PEW RESEARCH CENTER

Teen girls are more likely than boys to use TikTok, Instagram and Snapchat; teen boys more likely to use Twitch, Reddit and YouTube; and Black teens are especially drawn to TikTok compared with other groups

% of U.S. teens who say they ever use each of the following apps or sites

	YouTube	TikTok	Instagram	Snapchat	Facebook	Twitter	Twitch	WhatsApp	Reddit	Tumblr
Total	95	67	62	59	32	23	20	17	14	5
Boys	97	60	55	54	31	24	26	17	20	4
Girls	92	73	69	64	34	22	13	18	8	6
White	94	62	58	59	32	20	20	10	16	5
Black	94	81	69	59	34	31	18	19	9	4
Hispanic	95	71	68	62	32	28	22	29	14	6
Ages 13-14	94	61	45	51	23	15	17	16	8	3
15-17	95	71	73	65	39	29	22	18	19	7
Urban	95	71	70	58	40	28	15	29	13	6
Suburban	94	64	61	58	24	24	24	16	17	5
Rural	95	67	58	62	43	19	17	11	11	5
Household income										
< $30,000	93	72	64	60	44	26	17	19	10	4
$30K-$74,999	94	68	62	57	39	24	19	19	13	7
$75,000+	95	65	62	60	27	22	21	17	16	4

Note: Teens refer to those ages 13 to 17. Not all numerical differences between groups shown are statistically significant. Those who did not give an answer or gave other responses are not shown. White and Black teens include those who report being only one race and are not Hispanic. Hispanic teens are of any race.
Source: Survey conducted April 14-May 4, 2022.
"Teens, Social Media and Technology 2022"

PEW RESEARCH CENTER

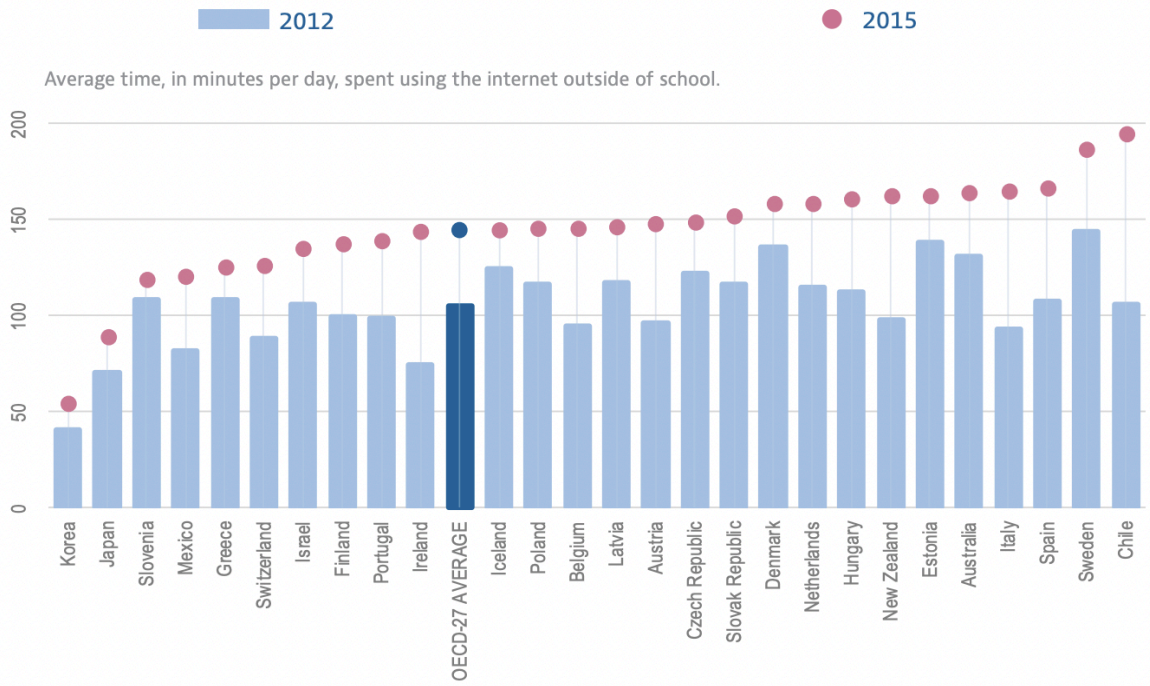
Sex differences: Asked about the idea of giving up social media, 54% of teens say it would be at least somewhat hard to give it up, while 46% say it would be at least somewhat easy. Teen girls are more likely than teen boys to express it would be difficult to give up social media (58% vs. 49%). Conversely, a quarter of teen boys say giving up social media would be very easy, while 15% of teen girls say the same.

8.5.12 Children & Young People's Mental Health in the Digital Age (2018). *OECD.*

EXCERPT: Kids spend an average of more than two hours online on weekdays and more than three hours on weekend days. Children and young people today have grown up in an era of digital technology and been familiar with computers, mobile devices and the internet from an early age. **On average across OECD countries, a typical 15-year-old student in 2015 had been using the internet since age 10 and spent an average of 29 hours per week on the internet – a noticeable increase from the 21 hours spent by an average 15-year old in 2012 (OECD, 2017[2]).** In Denmark and

Korea, boys spend half an hour more online than girls on a typical weekend day, while in Israel, the opposite occurs – girls spend half an hour more online than boys during weekend days (OECD, 2017[2]). One quarter of students reported that they were extreme internet users during weekends, spending more than 6 hours a day

Figure 2. **Between 2012 and 2015, the time spent online outside of school increased by 40 minutes per day on both weekdays and weekends**



8.5.13 Nesi, Mann, & Robb (2023). Teens and mental health: How girls really feel about social media. Common Sense Media.

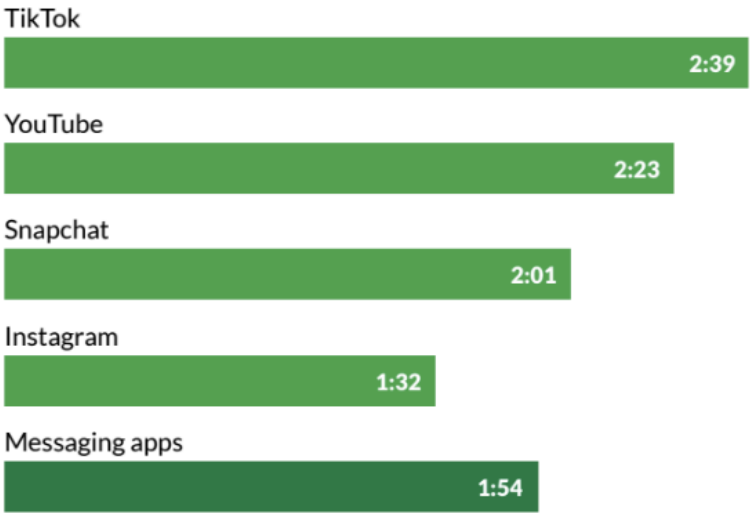
FIGURES:

TABLE 3. Social media platform use frequency and daily time spent

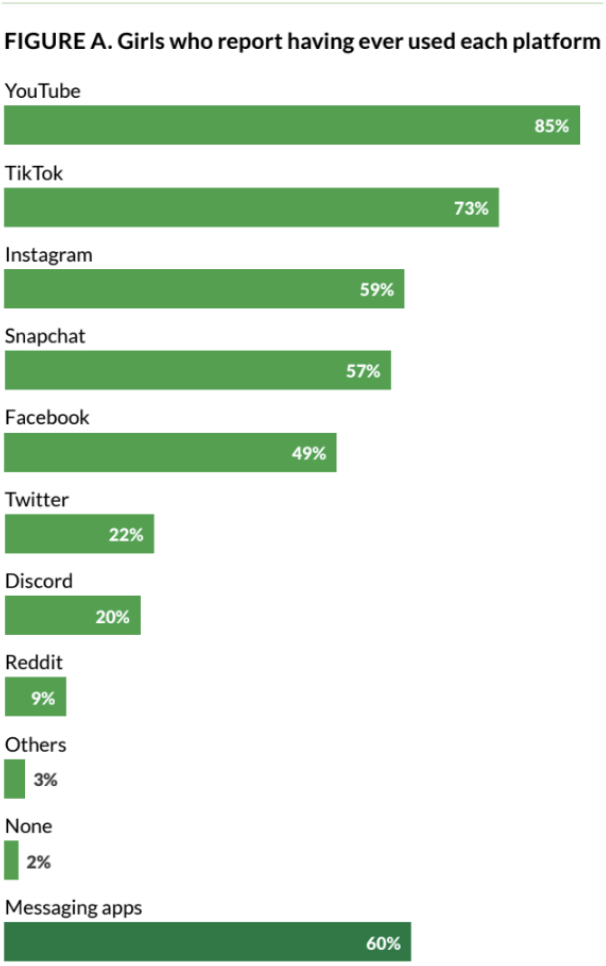
	YouTube	TikTok	Instagram	Snapchat	Messaging apps
Frequency: Percent who use platform ...					
Once or twice per month	6%	6%	10%	11%	8%
Once or twice per week	14%	11%	16%	12%	16%
About once per day	22%	14%	24%	15%	16%
Multiple times per day	41%	41%	32%	34%	39%
Almost constantly	16%	23%	12%	17%	16%
Daily time spent	2:23	2:39	1:32	2:01	1:54

Notes: Frequency items among adolescent girls who have ever used each platform. Daily time spent among adolescent girls who have used each platform in the past month.

FIGURE B. Daily time spent on platforms (hours:minutes)



FIGURES A and B:
Note: Among adolescent girls who use each platform (i.e., have used in the past month).



[Other studies? What have we missed?]

8.6 STUDIES NOT YET CATEGORIZED

8.6.1 Jensen, George, Russell, Lippold, & Odgers (2021). Does adolescent digital technology use detract from the parent-adolescent relationship? *Journal of Research on Adolescence.*

ABSTRACT: A population-representative sample of young adolescents (*N* = 2,104, mean age 12.4) reported on digital technology use and relationships in 2015. A subsample (*N* = 388) completed a 14-day ecological momentary assessment in 2016–2017 via mobile phone. **Across the 2,104 adolescents, those who reported**

more social networking site engagement were more likely to live in families characterized by more family chaos and to report that their online experiences resulted in problems with their parents. However, when the subsample of adolescents was followed daily, there was little consistent evidence that adolescents' quantity of daily digital technology use detracted from the amount of time they spend interacting with close others (including parents) nor that adolescent daily technology use was associated with more negative or less positive parent–adolescent interactions.

8.6.2 Lindstrom, Bellander, Schultner, Chang, Tobler, & Amodio (2021). A computational reward learning account of social media engagement. *Nature Communications.*

ABSTRACT: Social media has become a modern arena for human life, with billions of daily users worldwide. The intense popularity of social media is often attributed to a psychological need for social rewards (likes), portraying the online world as a Skinner Box for the modern human. Yet despite such portrayals, empirical evidence for social media engagement as reward-based behavior remains scant. Here, we apply a computational approach to directly test whether reward learning mechanisms contribute to social media behavior. We analyze over one million posts from over 4000 individuals on multiple social media platforms, using computational models based on reinforcement learning theory. **Our results consistently show that human behavior on social media conforms qualitatively and quantitatively to the principles of reward learning. Specifically, social media users spaced their posts to maximize the average rate of accrued social rewards, in a manner subject to both the effort cost of posting and the opportunity cost of inaction.** Results further reveal meaningful individual difference profiles in social reward learning on social media. Finally, an online experiment ($n = 176$), mimicking key aspects of social media, **verifies that social rewards causally influence behavior as posited by our computational account.** Together, these findings support a reward learning account of social media engagement and offer new insights into this emergent mode of modern human behavior.

8.6.3 Marciano, Schulz, & Camerini (2021). How smartphone use becomes problematic: Application of the ALT-SR model to study the predicting role of personality traits. *Computers in Human Behavior.*

ABSTRACT: Smartphones have become a ubiquitous part of adolescents' life, and studies have repeatedly revealed a positive association between smartphone use (SU) and problematic smartphone use (PSU). However, longitudinal research investigating

the reciprocal relationship among SU and PSU during adolescence are scarce, and studies that take into consideration personality traits as predisposing factors are lacking. This study used survey data collected annually over four years from 855 adolescents aged 11 at time 1 and distributed across 37 Swiss middle schools. An Autoregressive Latent Trajectory Model with Structured Residuals (ALT-SR model) was used to investigate *between*- and *within*-person effects over time. Additionally, gender and personality traits, measured according to the recently developed DSM-5 domains, were entered as predictors of the latent intercepts and slopes. The final model showed that, at the *within*-person level, **SU significantly increased PSU at all four time points, but not *vice versa*. At the *between*-person level, the personality traits antagonism and negative affect significantly and positively predicted the latent intercepts, whereas being female, psychoticism, and disinhibition significantly and positively influenced the latent slopes.** This study highlights the importance of investigating predisposing factors of PSU in adolescence, using advance statistical approaches. The results are discussed against the background of the I-PACE model on predisposing factors and mechanisms that lead to addictive behaviors such as PSU.

8.6.4 Rodman, Vidal Bustamante, Dennison, et al. (2021). A year in the social life of a teenager: Within-persons fluctuations in stress, phone communication, and anxiety and depression. *Clinical Psychological Science.*

ABSTRACT: Stressful life events (SLEs) are strongly associated with the emergence of adolescent anxiety and depression, but the underlying mechanisms remain poorly understood, especially at the within-persons level. We investigated how adolescent social communication (i.e., frequency of calls and texts) following SLEs relates to changes in internalizing symptoms in a multitimescale, intensive, year-long study (N = 30; n = 355 monthly observations; n ≈ 5,000 experience-sampling observations). Within-persons increases in SLEs were associated with receiving more calls than usual at both the month and moment levels and making more calls at the month level. Increased calls were prospectively associated with worsening internalizing symptoms at the month level only, suggesting that SLEs rapidly influence phone communication patterns, but these communication changes may have a more protracted, cumulative influence on internalizing symptoms. Finally, increased incoming calls prospectively mediated the association between SLEs and anxiety at the month level. We identify adolescent social communication fluctuations as a potential mechanism conferring risk for stress-related internalizing psychopathology.

8.6.5 Allcott, Gentzkow, & Song (2021). Digital addiction (working paper). *National Bureau of Economic Research.*

ABSTRACT: Many have argued that digital technologies such as smartphones and social media are addictive. We develop an economic model of digital addiction and estimate it using a randomized experiment. **Temporary incentives to reduce social media use have persistent effects, suggesting social media are habit forming. Allowing people to set limits on their future screen time substantially reduces use, suggesting self-control problems.** Additional evidence suggests people are inattentive to habit formation and partially unaware of self-control problems. Looking at these facts through the lens of our model suggests that self-control problems cause 31 percent of social media use.

8.6.6 Johannes, Nguyen, Weinstein, & Przybylski (2021). Objective, subjective, and accurate reporting of social media use: No evidence that daily social media use correlates with personality traits, motivational states, or well-being. *Technology, Mind, and Behavior*.

ABSTRACT: There is a lively debate on the effects of social media use, shaped by self-reported measurements of social media use. However, self-reports have been shown to suffer from low accuracy compared to logged measures of social media use. Even though it is unclear how problematic that measurement error is for our inferences, many scholars call for the exclusive use of “objective” measures. But if measurement error is not systematic, self-reports will still be informative. In contrast, if there is systematic error, associations between social media use and other variables, including well-being, are likely biased. Here, we report an exploratory 5 day experience sampling study among 96 participants (435 observations) to understand factors that could relate to low accuracy. First, we asked what stable individual differences are related to low accuracy. Second, we explored what daily states relate to accuracy. Third, we explored whether accuracy relates to well-being. **Although we did find evidence for a systematic tendency to overestimate social media use, neither individual differences nor daily states were related to that tendency. Accuracy was also unrelated to well-being.** Our results suggest that blindly calling for objective measures foregoes a responsibility to understand measurement error in social media use first.

8.6.7 Taylor & Bazarova (2021). Always available, always attached: A relational perspective on the effects of mobile phones and social media on subjective well-being. *Journal of Computer-Mediated Communication*.

ABSTRACT: In this study, we examine the effects of the near-constant use of digital media in everyday life on well-being in the context of close relationships. Building on media multiplexity and attachment perspectives, we argue that communication over a dyad's media ecosystem, including face-to-face, text messaging, cellphone calls, e-mail, and instant messaging, creates connected availability. Connected availability is the perception that a partner is at a continuous (digital) arm's reach offering protection and security. Using longitudinal dyadic data of cohabitating romantic partners, we track the effects of media multiplexity on well-being by factoring in both partners' perspectives to untangle the security offered through partner's availability from the stress of maintaining one's own constant availability to a partner. **The results support salutary effects of media use on well-being because of increased connected availability, with limited evidence for adverse impacts of maintaining constant availability with a close partner.**

The always-on, always-available nature of digital life means almost constant connection and availability between romantic partners, family members, and close friends. Being tethered to one another can give people a sense of security, while simultaneously causing more stress. In this article, we find that keeping a romantic partner constantly within a (digital) arm's reach promotes better well-being for oneself. In addition, keeping a romantic partner always available also predicted better well-being for the romantic partner. Further, the analysis did not show added stress for the partner.

8.6.8 Ferguson (2021). Links between screen use and depressive symptoms in adolescents over 16 years: Is there evidence for increased harm? *Developmental Science*.

ABSTRACT: Recent scholarship has been divided on whether an observed increase in suicides in the United States among teenagers and preteens (12-18) can be attributed to an increased use in social screen media beginning in 2009. If these concerns are accurate effect sizes for the relationship between screen use and suicide should increase over the 16 years since 2001. The current study used the Florida Youth Risk Behavior Survey data (n = 45,992) from 2001 to 2017, to track effect sizes for screen/depression correlations, controlling for age and gender. A second dataset from the UK Understanding Society dataset (ns for each wave ranged between 3,536 and 4,850) was used to study associations between time spent on social media and emotional problems. Meta Regression was used to examine whether effect sizes increase across time. **Results generally did not support the hypothesis that effect sizes between screen and social media use are increasing over time. Aside from the trends over time, for any given year, most effect sizes were below the r = .10 threshold used for interpretation with the exception of computer use which was**

just at that threshold. It is concluded that screens and social media use are unlikely to bear major responsibility for youth suicide trends.

[NOTE: Contact Chris Ferguson to see if he can break down the analysis by sex]

8.6.9 Griffioen, Scholten, Lichtwarck-Aschoff, van Rooij, & Granic (2021). Everyone Does It—Differently: A Window Into Emerging Adults' Smartphone Use. *Humanities and Social Sciences Communications.*

ABSTRACT: Concerns regarding smartphones' and social media's impact on youth remain high amidst a growing realization that current research is not designed to confirm (or refute) such concerns. This study aims to answer fundamental questions regarding youths' use of smartphones, by implementing a novel user-centric research method. The smartphone use of 114 emerging adults was recorded, followed by in-depth interviews that incorporated the recording and in-app information to help participants recall their behaviours, motivations, and feelings. Results indicate that smartphone use is indeed ubiquitous; 88 out of 114 participants started using their smartphone as soon as they were left alone. However, the findings of this study also demonstrate great diversity in smartphone use, in e.g. social media platforms used and motivations for using different apps. **These results illustrate that it no longer seems sensible to refer to "screen time" as if it represents a homogeneous phenomenon across youth. Additionally, preliminary indications have been found of relationships between individual differences in mental health indices and variations in smartphone use.** The current study provides new insights into youths' smartphone use and its relationship with wellbeing.

8.6.10 Mancinelli, Ruocco, Napolitano, & Salcuni (2021). A network analysis on self-harming and smartphone addiction – The role of self-control, internalizing and externalizing problems in a sample of self-harming adolescents. Comprehensive Psychiatry.

ABSTRACT: BACKGROUND: Research has shown an increased risk for Non-suicidal self-injurious (NSSI) behavior and Smartphone Addiction and particularly in adolescence, a developmental period defined by multi-level changes and still poor self-control capacities associating with risk-taking behaviors.
OBJECTIVE: The current study was aimed to assess the pattern of mutual relations characterizing NSSI considering self-control, internalizing and externalizing problems, and investigating how Smartphone Addiction fits within the network since NSSI and Smartphone Addiction are here conceptualized as an attempt at emotion regulation.

Age and gender differences were also assessed.
METHOD: Participants were Italian adolescents presenting NSSI behavior (N = 155; Mage = 14.68; SD = 1.647; Range = 11–18; 43.2%-females). A Network Analysis was performed to assess the organizational structure of NSSI; age and gender differences were assessed through multivariate rank tests further applying multiplicity control.
RESULTS: The emerged Network showed the centrality of low self-control and internalizing problems for NSSI. **NSSI and Smartphone Addiction were associated through low self-control, and so were Smartphone Addiction and externalizing problems. Significant age differences were observed showing a decrease in NSSI as age increases (stat = −2.86; adj.p = .29).** No gender differences have emerged.
CONCLUSIONS: The current findings provide support for the consideration of Smartphone addiction and addiction tendencies within the NSSI context in adolescence. Moreover, these findings point to the relevance of prevention practices during this peculiar developmental period, particularly sustaining self-control capacities and the use of more adaptive emotion regulation strategies, thereby limiting the accrue of at-risk behaviors.

8.6.11 Sternberg, Luria, Chandhok, Vickers, Kross, & Sheppes (2020). When facebook and finals collide—Procrastinatory social media usage predicts enhanced anxiety. *Computers in Human Behavior*.

ABSTRACT: In the digital age we live in, refraining from procrastinatory social media usage, particularly when conflicting with highly valued goal pursuit, can result in failure and subsequent negative psychological outcomes. Despite mounting interest, existing evidence remains correlational and restricted to mundane contexts. To fill these gaps the current two study investigation provides converging ecological and causal evidence for the influence of procrastinatory social media usage on subsequent anxiety. Study 1 used longitudinal unobtrusive measurement of actual procrastinatory Facebook usage (using designated software) together with experience-sampling, during real-life academic exam preparation period. Findings showed that **enhanced procrastinatory Facebook usage predicted increased levels of anxiety over time.** Further evidence provided inferences regarding the likely ordering of this association, by ruling out a reversed directionality between anxiety and subsequent Facebook usage. Providing direct causal evidence, Study 2 created a laboratory exam context conceived as highly predictive of academic success, that directly manipulated whether actual Facebook usage was procrastinatory or not, prior to examining its influence on anxiety. Supporting predictions, **only when Facebook was used instead of studying, it resulted in enhanced anxiety.** The present investigation illuminates when and why social media usage leads to adverse psychological consequences.

8.6.12 Park, Hwang, Lee, & Bhang (2022). Food addiction and emotional eating behaviors co-occurring with problematic smartphone use in adolescents? *International Journal of Environmental Research and Public Health*.

ABSTRACT: Addiction in adolescence is increasing and has a significant impact on physical and mental health. Notably, addictions can be comorbid and affect each other. Despite the recent growing interest in food addiction (FA) and problematic smartphone use (PSU), few studies have investigated their association in adolescents. We investigated the relationship between FA and PSU in adolescents and the effects of eating behaviors. A total of 209 adolescents (44.5% male; mean age = 12.86 ± 0.7 years) participated in the current school-based community study. We found a positive correlation between the dimensional Yale Food Addiction Scale for Children 2.0 (dYFAS-C2.0) and the Smartphone Overdependence Scale after adjusting for age, sex, body mass index, and socioeconomic status. The high-risk PSU group accounted for 17.2% of participants. Furthermore, this group showed 2.3 times higher dYFAS-C2.0 scores than the general group. **Emotional overeating and satiety responsiveness were correlated with PSU.** A comprehensive evaluation of addiction symptoms is needed for proper intervention, especially in adolescents with symptoms of abnormal eating behaviors.

8.6.13 Patchin, Hinduja, & Meldrum (2023). Digital self-harm and suicidality among adolescents. *Child and Adolescent Mental Health*.

ABSTRACT: BACKGROUND: Research on digital self-harm – the anonymous online posting, sending, or otherwise sharing of hurtful content about oneself – is still in its infancy. Yet unexplored is whether digital self-harm is related to suicidal ideation or suicide attempts.
METHODS: In the current study, survey data were collected in 2019 from a national sample of 4972 American middle and high school students (Mage = 14.5; 50% female). Logistic regression analysis was used to assess whether lifetime engagement in two different indicators of digital self-harm was associated with suicidal thoughts and attempts within the past year.
RESULTS: Logistic regression analysis showed that engagement in digital self-harm was associated with a five- to sevenfold increase in the likelihood of reporting suicidal thoughts and a nine- to 15-fold increase in the likelihood of a suicide attempt.
CONCLUSIONS: Results suggest a connection between digital self-harm and suicidality. As such, health professionals must screen for digital self-harm to address

underlying mental health problems among youth that may occur prior to or alongside suicidality, and parents/caregivers must convey to children that they are available to dialog, support, and assist with the root issues that may eventually manifest as digital self-harm.

8.6.14

OBJECTIVE: The study aims to identify typical interplay between the use of social media apps on smartphones and Problematic Internet Usage (PIU).
METHOD: Our study utilizes data from a smartphone app that objectively monitors user usage, including the apps used and the start and finish times of each app session. This study included 334 participants who declared a need to be aware of their smartphone usage and control it. Problematic Internet Usage (PIU) was measured using the Problematic Internet Use Questionnaire-Short Form-6 (PIUQ-SF6). The total PIU score can range from 6 to 30, with a score above 15 indicating that a person is at risk of PIU. Time spent on Social Media (SM) apps of Facebook, WhatsApp, and Instagram, and whether people used each of these apps were studied along with the total PIU score. K-Prototype clustering was utilized for the analysis.
RESULTS: Four distinct clusters, typifying the relationship between social media use and PIU, were identified. All the individuals in Cluster 1 (Light SM Use Cluster; Cluster size = 270, 80.84% of total dataset) spent between 0 and 109.01 min on Instagram, between 0 and 69.84 min on Facebook, and between 0 and 86.42 min on WhatsApp and its median PIU score was 17. Those who were in cluster 2 (Highly Visual SM Cluster; Cluster size = 23, 6.89% of total dataset) all used Instagram, and each member spent between 110 and 307.63 min on Instagram daily. The cluster median PIU score and average daily usage of Instagram were respectively 20 and 159.66 min. Those who were in Cluster 3 (Conversational SM Cluster; Cluster size = 19, 5.69% of total dataset) all used WhatsApp, and spent between 76.68 and 225.22 min on WhatsApp daily. The cluster median PIU score and average time spent per day on WhatsApp were 20 and 132.65 min, respectively. Those who were in Cluster 4 (Social Networking Cluster; (Cluster size = 22, 6.59% of total dataset) all used Facebook, and each spent between 73.09 and 272.85 min daily on Facebook. The cluster median PIU score and average time spent per day on Facebook were 18 and 133.61 min respectively.
CONCLUSION: **The clusters indicate that those who use a particular social media app spend significantly less time on other social media apps. This indicates that problematic attachment to social media occurs primarily for one of three reasons: visual content and reels, conversations with peers, or surfing network content and news.** This finding will help tailor interventions to fit each cluster, for example by

strengthening interpersonal skills and resistance to peer pressure in the case of Cluster 3 and increasing impulse control in the case of Cluster 2.

8.6.15 García-Manglano, Fernández, Serrano, López-Madrigal, Fernández-Duval, de la Rosa Fernández-Pacheco, & Sádaba (2024). Social media and mental health: The role of interpersonal relationships and social media use motivations, in a nationally representative, longitudinal sample of Spanish emerging adults. *Journal of Social and Personal Relationships*.

ABSTRACT: Using a representative longitudinal sample of emerging adults aged 18 to 24 in Spain, we apply a relational lens to the association between social media and mental health. We explore how, beyond time in social media, mental health is influenced by three distinct motivations for social media use: communication (interacting with others), surveillance (finding out what others are doing), and escapism (evading uncomfortable thoughts). Next, we explore the role of relational satisfaction with family and friends in the association between social media use and mental health. We find negative reinforcement patterns (reverse causation) between non-relational motivations in the use of social media (escapism), internalizing psychopathological symptoms, and time in social media; that is, increasing one of them leads to higher levels of the others. We also find that satisfaction with family reduces internalizing psychopathological symptoms, and satisfaction with friends predicts a communicative use of social media. In sum, promoting healthy relationships and relational motivations in the use of social media might help prevent mental health issues among Spanish emerging adults.

8.6.16 Janssen, Valkenburg, Keijsers, & Beyens (2025). A harsher reality for adolescents with depression on social media. *Scientific Reports*.

ABSTRACT: Social media use is often highlighted as an important cause of the recent rise in depression among adolescents. However, this perspective overlooks a crucial reverse causality, namely that levels of depression might also shape adolescents' social media use. In a diary study among 479 adolescents (Mage = 15.98; 16.9% clinically depressed), we assessed their level of depression and then monitored their social media activities and experiences daily for 100 subsequent days. Depressed adolescents did not differ from their non-depressed peers in the frequency of posting and the time spent scrolling. However, they reported feeling twice as insecure after scrolling, nearly twice as rejected during online communication with friends, and significantly more preoccupied with feedback. Our findings underscore the need for further research into the mechanisms of how depressive symptoms influence

adolescents' social media experiences, to inform the development of effective digital tools and therapeutic approaches to support adolescent mental health.

8.6.17 Radesky & Hiniker (2025). Problematic Media Use as a Content-Agnostic, Enforceable Harm. *Journal of Online Trust and Safety*.

EXCERPT: Many users of internet platforms spend more time online than they want. Parents report frequent arguments with their children about transitioning away from media or looking up from their phone (Radesky et al. 2024), teens describe social media or gaming eating up time they would rather spend sleeping or outdoors (Weinstein and James 2022), and adults feel guilty for getting stuck in a loop of content (Torres et al. 2021). In its most extreme form, overuse manifests as problematic media use (PMU), defined as digital media use that is risky, compulsive, feels out of control, causes impairments in daily functioning (e.g., sleep problems, arguments, school problems), and persists despite negative consequences (Rega, Gioia, and Boursier 2023; Pluhar et al. 2019).

In this commentary, we explore PMU as a possible objective metric that could be measured and mitigated by online platforms in order to reduce related harms and impaired user functioning. PMU is unique among online harms in that its potential telemetry correlates (e.g., data regarding frequency and timing of pickups, posts, etc.) can be directly measured by platforms, both at baseline and in response to design changes directed by trust and safety teams. Such measures could be mandated by policymakers and monitored through regulation as a content-agnostic approach to improving user well-being.

8.7 STUDIES THAT ARE RELEVANT BUT NOT FOCUSED ON THE CENTRAL QUESTION OF SOCIAL MEDIA AND TEEN MENTAL HEALTH

8.7.1: STUDIES GENERALLY SUPPORTING CONCERN ABOUT SOCIAL MEDIA OR "SCREEN TIME"

8.7.1.1 Madigan, Browne, & Racine (2019). Association Between Screen Time and Children's Performance on a Developmental Screening Test. *JAMA Pediatrics*.

ABSTRACT: Importance Excessive screen time is associated with delays in development; however, it is unclear if greater screen time predicts lower performance scores on developmental screening tests or if children with poor developmental performance receive added screen time as a way to modulate challenging behavior.
OBJECTIVE: To assess the directional association between screen time and child development in a population of mothers and children.
DESIGN, SETTING, AND PARTICIPANTS: This longitudinal cohort study used a 3-wave, cross-lagged panel model in 2441 mothers and children in Calgary, Alberta, Canada, drawn from the All Our Families study. Data were available when children were aged 24, 36, and 60 months. Data were collected between October 20, 2011, and October 6, 2016. Statistical analyses were conducted from July 31 to November 15, 2018.
EXPOSURES: Media.
MAIN OUTCOME AND MEASURES: At age 24, 36, and 60 months, children's screen-time behavior (total hours per week) and developmental outcomes (Ages and Stages Questionnaire, Third Edition) were assessed via maternal report.
RESULTS: Of the 2441 children included in the analysis, 1169 (47.9%) were boys. **A random-intercepts, cross-lagged panel model revealed that higher levels of screen time at 24 and 36 months were significantly associated with poorer performance on developmental screening tests at 36 months (β, −0.08; 95% CI, −0.13 to −0.02) and 60 months (β, −0.06; 95% CI, −0.13 to −0.02), respectively.** These within-person (time-varying) associations statistically controlled for between-person (stable) differences.
CONCLUSIONS AND RELEVANCE: **The results of this study support the directional association between screen time and child development. Recommendations include encouraging family media plans, as well as managing screen time, to offset the potential consequences of excess use.**

8.7.1.2 Maras, Flament et al. (2015). Screen time is associated with depression and anxiety in Canadian youth. *Preventive Medicine.*

ABSTRACT: METHODS: Participants were 2482 English-speaking grade 7 to 12 students. Cross-sectional data collected between 2006 and 2010 as part of the Research on Eating and Adolescent Lifestyles (REAL) study were used. Mental health status was assessed using the Children's Depression Inventory and the

Multidimensional Anxiety Scale for Children—10. Screen time (hours/day of TV, video games, and computer) was assessed using the Leisure-Time Sedentary Activities questionnaire.
RESULTS: Linear multiple regressions indicated that after controlling for age, sex, ethnicity, parental education, geographic area, physical activity, and BMI, duration of screen time was associated with severity of depression ($\beta = 0.23$, $p < 0.001$) and anxiety ($\beta = 0.07$, $p < 0.01$). Video game playing ($\beta = 0.13$, $p < .001$) and computer use ($\beta = 0.17$, $p < 0.001$) but not TV viewing were associated with more severe depressive symptoms. Video game playing ($\beta = 0.11$, $p < 0.001$) was associated with severity of anxiety.
CONCLUSION: Screen time may represent a risk factor or marker of anxiety and depression in adolescents. Future research is needed to determine if reducing screen time aids the prevention and treatment of these psychiatric disorders in youth.

[NOTE: Thanks to Ian Goddard for suggesting this article. It is down here rather than in section 1.1 because it collected data before social media became so popular, and it does not let us examine effects of social media specifically]

8.7.1.3 Brailovskaia, Rohman, Bierhoff et al. (2019). The relationship between daily stress, social support and Facebook Addiction Disorder. *Psychiatry Research*.
[h/t Ian Goddard]

ABSTRACT: The present study investigated the links between daily stress, social support, Facebook use, and Facebook Addiction Disorder (FAD). Two varieties of social support were considered, according to the communication channel: offline and online. In a sample of 309 Facebook users (age: M(SD) = 23.76(4.06), range: 18–56), daily stress was positively related to the intensity of Facebook use and to tendencies towards Facebook addiction. The link between daily stress and intensity of Facebook use was negatively moderated by perceived offline social support, indicating that individuals who received low levels of support offline were particularly likely to increase their Facebook use at higher levels of daily stress. Perceived online social support partly mediated the positive relationship between Facebook use intensity and tendencies towards FAD. It is remarkable that Facebook use intensity is systematically related to both positive (i.e., receiving online social support) and negative (i.e., building up FAD) consequences. **Thereby, individuals who receive high levels of social support online tend to be at risk for tendencies towards FAD. Thus, while offline social support might protect mental health, online support might influence it negatively.** This should be

considered when assessing individuals at risk for obsessive Facebook use and when planning interventions to deal with FAD.

8.7.1.4 Marino, Gini, Vieno, & Spada (2018). The associations between problematic Facebook use, psychological distress and well-being among adolescents and young adults: A systematic review and meta-analysis. *Journal of Affective Disorders*.

ABSTRACT: BACKGROUND: A growing body of research has analyzed the potential risks of problematic Facebook use for mental health and well-being. The current meta-analysis is the first to examine the associations between problematic Facebook use, psychological distress (i.e., depression, anxiety, etc.) and well-being (life satisfaction, positive mental health) among adolescents and young adults. Method: A comprehensive search strategy identified relevant studies in PsychInfo, Pubmed, Scopus, ResearchGate, and Google Scholar.
RESULTS: The final sample included 23 independent samples with a total of 13,929 participants (60.7% females; *M*age= 21.93, range: 16.5–32.4). **Results of random effects meta-analysis confirmed a positive correlation between problematic Facebook use and psychological distress (*r* = .34, 95% CI [.28, .39]). Moderation analysis revealed that effect sizes were larger in older samples. Moreover, a negative correlation between problematic Facebook use and well-being was observed (*r* = −.22, 95% CI [−.28, −.15]).**
LIMITATIONS: All available studies used a cross-sectional design thus hampering the possibility to establish the direction of the association between problematic Facebook use and psychological distress and well-being.
CONCLUSIONS: Results are discussed within the extant literature on problematic Facebook use and future research directions are proposed. This research may also inform clinical and prevention interventions on problematic Facebook use.

[NOTE: this study is about “problematic” facebook behavior, which is, unsurprisingly, strongly related to bad mental health outcomes. It does not tell us about Facebook use overall.]

8.7.1.5 Levenson, Shensa, Sidani, Colditz & Primack (2017). Social media use before bed and sleep disturbance among young adults in the United States: A nationally representative study.

ABSTRACT: METHODS: We assessed a nationally representative sample of 1763 US young adults aged 19–32. Participants estimated to what extent they used SM in the 30 minutes before bed. We assessed sleep disturbance using the brief Patient-Reported Outcomes Measurement Information System (PROMIS®) Sleep Disturbance measure. After testing the proportional odds assumption, we used ordered logistic regression to compute the independent association between SM use before bed and sleep disturbance controlling for covariates, including total SM use.
RESULTS: Compared with those who rarely or very rarely check SM in the 30 minutes before bed, **those who often or very often check SM at that time had an adjusted odds ratio of 1.62 (95% confidence interval = 1.31–2.34) for increased sleep disturbance.** Additionally, we found a significant linear trend in the odds ratios between the frequency of checking SM in the 30 minutes before bed and increased sleep disturbance (p = .007). Results were consistent in all sensitivity analyses.
CONCLUSIONS: SM use in the 30 minutes before bed is independently associated with disturbed sleep among young adults. Future work should use qualitative and experimental methods to further elucidate the directionality of—and mechanisms underlying—this association.

8.7.1.6 Midgley, Thai, Lockwood, Kovacheff, & Page-Gould (2020). When every day is a high school reunion: Social media comparisons and self-esteem. *Journal of Personality and Social Psychology.* Advance online publication.

ABSTRACT: Although past research has shown that social comparisons made through social media contribute to negative outcomes, little is known about the nature of these comparisons (domains, direction, and extremity), variables that determine comparison outcomes (post valence, perceiver's self-esteem), and how these comparisons differ from those made in other contexts (e.g., text messages, face-to-face interactions). In 4 studies (N = 798), we provide the first comprehensive analysis of how individuals make and respond to social comparisons on social media, using comparisons made in real-time while browsing news feeds (Study 1), experimenter-generated comparisons (Study 2), and comparisons made on social media versus in other contexts (Studies 3 and 4). More frequent and more extreme upward comparisons resulted in immediate declines in self-evaluations as well as cumulative negative effects on individuals' state self-esteem, mood, and life satisfaction after a social media browsing session. Moreover, downward and lateral comparisons occurred less frequently and did little to mitigate upward comparisons' negative effects. Furthermore, low self-esteem individuals were particularly vulnerable to making more frequent and more extreme upward comparisons on social media, which in turn threatened their already-lower

self-evaluations. Finally, social media comparisons resulted in greater declines in self-evaluations than those made in other contexts. Together, these studies provide the first insights into the cumulative impact of multiple comparisons, clarify the role of self-esteem in online comparison processes, and demonstrate how the characteristics and impact of comparisons on social media differ from those made in other contexts.

8.7.1.7 Luyten (2022). The global rise of online chatting and its adverse effect on reading literacy. *Studies in Educational Evaluation*.

ABSTRACT: In the past decade, reading has moved massively from printed paper to digital displays. Thus far, large-scale surveys have not shown clear-cut effects of ICT use on reading literacy. This study addresses the impact of per country increases in online chatting, using data from the worldwide PISA surveys in 2009 and 2018 covering 63 countries. During that period, online chatting increased substantially in nearly every country, but the rate of increase varied considerably across countries. **The empirical evidence shows a strong correlation of per country increase in online chatting among 15-year-olds with per country declines in both reading literacy and awareness of useful reading strategies.**

8.7.1.8 Kwon, Kim, Lee, Kim, Song, & Oh (2022). Association of smartphone use with body image distortion and weight loss behaviors in Korean adolescents. *Pediatrics.*

ABSTRACT: IMPORTANCE: Despite high use of smartphones among adolescents, little is known about the association of smartphone use with body image and related behaviors.
OBJECTIVE: To examine the associations of duration of smartphone use and types of content most frequently accessed via smartphone with body image distortion and weight loss behaviors in adolescents.
DESIGN, SETTING, AND PARTICIPANTS: This cross-sectional study used data from the populationbased Korea Youth Risk Behavior Web-Based Survey 2017. Participants comprised a nationally representative sample of 53 133 Korean adolescents aged 12 to 18 years. Data were collected from June 1 to July 18, 2017. The analysis was performed from February 7, 2020, to March 30, 2022.
EXPOSURES: Self-reported duration of smartphone use (min/d) and types of content (educational or informational searches; chatting, messaging, or email; social networking services or forums; games; videos, movies, or music; webtoons or web novels; and shopping or other activities) most frequently accessed during smartphone use. MAIN

OUTCOMES AND MEASURES: Body image distortion (overperception of body weight), weight loss attempt, use of inappropriate weight loss strategies (skipping meals, eating only 1 food at a time, vomiting, or using laxatives), and healthy weight loss behaviors (muscle-strengthening and aerobic physical activity). Multivariable logistic regression analysis was performed to estimate odds ratios (ORs) and 95% CIs, accounting for survey sampling and adjusting for potential confounders. RESULTS Among 53 133 participants, the mean (SD) age was 15.0 (1.8) years; 50.7% of participants were female, and 49.3% were male. After adjusting for types of content accessed, prolonged smartphone use (301 min/d) was positively associated with body image distortion (boys: OR, 1.17; 95% CI, 1.07-1.28; girls: OR, 1.20; 95% CI, 1.10-1.30) and inappropriate weight loss strategies (boys: OR, 1.54; 95% CI, 1.25-1.90; girls: OR, 2.45; 95% CI, 2.14-2.79) in both sexes compared with minimal smartphone use (1-120 min/d). **After adjusting for duration of smartphone use, the use of smartphones mainly for videos, movies, or music (OR, 1.15; 95% CI, 1.02-1.29), webtoons or web novels (OR, 1.28; 95% CI, 1.10-1.48), and games (OR, 1.17; 95% CI, 1.03-1.32) was positively associated with body image distortion in boys compared with the use of smartphones mainly for educational or informational content.** Among boys, the use of smartphones mainly for chatting, messaging, or email was positively associated with muscle-strengthening activity (OR, 1.31; 95% CI, 1.18-1.44) and aerobic physical activity (OR, 1.41; 95% CI, 1.29-1.55), as was the use of smartphones mainly for social networking services or forums (muscle-strengthening activity: OR, 1.27; 95% CI, 1.13-1.42; aerobic physical activity: OR, 1.28; 95% CI, 1.15-1.43). Among girls, the use of smartphones mainly for chatting, messaging, or email was positively associated with weight loss attempts (OR, 1.34; 95% CI, 1.19-1.51) and the use of inappropriate weight loss strategies (OR, 1.57; 95% CI, 1.25-1.99), as was the use of smartphones mainly for social networking services or forums (weight loss attempts: OR, 1.20; 95% CI, 1.07-1.36; use of inappropriate weight loss strategies: OR, 1.37; 95% CI, 1.08-1.73). CONCLUSIONS AND RELEVANCE In this cross-sectional study, both the duration of smartphone use and the types of content most frequently accessed via smartphone were associated with body image distortion and weight loss behaviors in adolescents. These findings suggest a need for the identification of strategies to help adolescents develop healthy smartphone use behaviors.

8.7.1.9 Precht, Mertens, Brickau, Kramm, Margraf, Stirnberg, & Brailovskaia (2023). Engaging in physical activity instead of (over)using the smartphone: An experimental investigation of lifestyle interventions to prevent problematic smartphone use and to promote mental health. *Journal of Public Health*.

ABSTRACT: AIM: Tendencies of problematic smartphone use (PSU) have risen during the past decade. As PSU is consistently linked to mental health issues, measures to prevent its appearance and to promote mental health are urgently required.
SUBJECT AND METHODS: The present study investigated the impact of three interventions on health behavior, PSU, positive mental health (PMH), and depression and anxiety symptoms. Overall, 503 persons from Germany (Mage = 29.19, SDage = 10.51, range: 18–79) participated in the study. Over 14 days, the three experimental groups (a) reduced their daily smartphone use time by 60 minutes, (b) increased their daily level of physical activity by 30 minutes, and (c) combined both measures. The control group continued its behavior as usual. Outcomes were assessed via online surveys at five measurement time points (baseline, intermediate, post-intervention, and 1 and 3 months after the intervention).
RESULTS: **All interventions resulted in a significant increase in weekly physical activity and in reduced symptoms of PSU, depression, and anxiety.** Furthermore, the smartphone reduction and the combination of both measures contributed to a **significant reduction of participants' daily smartphone use and higher levels of PMH.** The effects of the reduction of smartphone use time and its combination with increased physical activity were more stable in the longer term than the increase in physical activity only.
CONCLUSION: Combined with an increase in physical activity, the reduction of smartphone use time could serve as an efficient and cost-effective measure for the prevention of PSU and the promotion of mental health.

8.7.1.10 Kelly & Sharot (2025). Web-browsing patterns reflect and shape mood and mental health. *Nature Human Behavior*.

ABSTRACT: Humans spend on average 6.5 hours a day online. A large portion of that time is dedicated to information-seeking. How does this activity impact mental health? We assess this over four studies (*n* = 1,145). We reveal that the valence of information sought affects mental health, which in turn influences the valence of information sought, forming a self-reinforcing loop. We quantified the valence of text on webpages participants chose to browse usin

g natural language processing and found that browsing more negative information was associated with worse mental health and mood. By manipulating the webpages browsed and measuring mood and vice versa, we show that the relationship is causal and bidirectional. Finally, we developed an intervention that altered web-browsing

patterns in a manner that improved mood. Together, the findings suggest that the information sought reflects mental state and shapes it, creating a loop that may perpetuate mental health problems. The results also provide a potential method for assessing and enhancing welfare in the digital age.

8.7.1.11 Ma et al. (2025). Low self esteem contributes to medical student social media addiction through chain mediation by academic Involution and anxiety. *Scientific Reports*.

ABSTRACT: This study aimed to investigate the impact of low self-esteem on social media addiction among medical students, as well as the underlying mechanisms involving academic involution and anxiety. A cross-sectional survey was conducted among 1055 medical students from two universities in China. Subjective data regarding self-esteem, academic involution, anxiety, and social media addiction were collected. Correlation analyses were performed, and a mediation model was constructed to examine the relationships. **The results indicated that: (1) self-esteem, academic involution, anxiety, and social media addiction were significantly correlated with each other; (2) self-esteem significantly negatively predicted social media addiction; (3) in the relationship between self-esteem and social media addiction, anxiety and academic involution played both independent mediating roles and a sequential mediating role.** Specifically, self-esteem not only directly influenced social media addiction but also exerted an indirect effect through the chain mediation of academic involution and anxiety. These findings provide new insights into the mechanisms underlying social media addiction among medical students and suggest potential targets for prevention and intervention.

8.7.1.12 Oztekin et al. (2025). Loneliness and rumination serially mediate the relationship between social anxiety and internet addiction among Turkish university students. *Scientific Reports*.

ABSTRACT: The widespread use of the internet brings with it both advantages and disadvantages. The current research sought to investigate the serial mediating role of loneliness and rumination in the link between social anxiety and internet addiction. This study consisted of 1,717 Turkish university students. The participants' mean age was 21.70 (SD = 1.90)**. The findings indicated that social anxiety was positively related to internet addiction. Loneliness served as a mediator in the link between social anxiety and internet addiction. Rumination mediated the effect of social anxiety**

on internet addiction. The results also supported the serial mediation model, specifically revealing that individuals with social anxiety may have high levels of loneliness, which may be associated with high levels of rumination, and this was related to high levels of internet addiction. The results of this study indicate the need for psychoeducational programs for university students to raise awareness about the negative consequences of social anxiety, loneliness, rumination, and excessive internet use.

8.7.1.13 Nagata et al. (2026). Associations of adolescent social media use trajectories with spatial and verbal memory: A prospective cohort study. *The Lancet Regional Health - Americas*.

ABSTRACT: Background: Evidence on screen time and cognition is mixed, with few longitudinal studies on social media patterns and memory. This study aimed to examine how social media trajectories relate to cognitive performance in early adolescence. Methods: We analyzed a prospective cohort (N = 7528, 51.1% male, mean age: 10 years (8–13 years), 41.8% non-White) from the Adolescent Brain Cognitive Development (ABCD) Study (baseline (2016–2018) to Year 2 (2018–2020)). Group-based trajectory modeling estimated patterns of daily social media use from baseline–Year 2. Three social media time trajectories: (1) no or very low use, (2) low but increasing use, and (3) high and increasing use were identified. Cognitive functioning was measured using the Little Man Task (LMT) and the Rey Auditory Verbal Learning Test (RAVLT). Linear regression models estimated the association between social media time trajectories and cognitive functioning at Year 2, adjusting for baseline age, sex, race, ethnicity, household income, parent education, attention-deficit/hyperactivity symptoms, depressive symptoms, respective baseline cognitive measures, non-social media screen use, and study site. Findings: Compared to no or very low social media use, low increasing social media use was associated with lower performance on the RAVLT Initial Trials (B: −1.38; 95% CI: −1.82, −0.94), RAVLT Retroactive Interference Trial (B: −0.38; 95% CI: −0.52, −0.25), and RAVLT Long Delay Trial (B: −0.41; 95% CI: −0.55, −0.26). Compared to no or very low social media use, high increasing social media use was associated with lower accuracy on the LMT (B: −0.03; 95% CI: −0.05, −0.01), and lower performance on the RAVLT Initial Trials (B: −1.90; 95% CI: −2.76, −1.04), RAVLT Retroactive Interference Trial (B: −0.61; 95% CI: −0.89, −0.32), and RAVLT Long Delay Trial (B: −0.55; 95% CI: −0.84, −0.27). Interpretation: **Increases in social media time were prospectively associated with lower cognitive performance two years later.** Monitoring digital use, implementing a Family Media Use Plan, and balancing screen time with cognitively enriching activities may help mitigate

these effects. Future studies should examine the effects of various contemporary media on cognitive functioning.

8.7.2: STUDIES GENERALLY SUGGESTING THAT SOCIAL MEDIA IS NOT HARMFUL

8.7.2.1 Stieger, & Wunderl (2022). Associations between social media use and cognitive abilities: Results from a large-scale study of adolescents. *Computers in Human Behavior*.

ABSTRACT: In adolescence, smartphone use in general and social media use in particular has often been associated with negative effects, such as higher anxiety levels and body dissatisfaction. Other outcomes – such as fundamental cognitive abilities and skills (e.g., intelligence, information processing, spatial perception) – have rarely been the focus of research. Here, we analysed data from a large sample of adolescents (12–16 years; N > 12,000) who performed a series of psychometric tests ranging from intelligence, spatial perception, and information processing, to practical numeracy, and compared their test results with their social media usage (average active and passive time per day, problematic social media use). We additionally applied a random-forest model approach, useful for designs with many predictors and expected small effect sizes. **Almost all associations did not outperform known age- and sex-differences on social media use; that is, effect sizes were small-to-tiny and had low importance in the random-forest analyses compared to dominant demographic effects. Negative effects of social media use may have been overstated in past research, at least in samples with adolescents.**

8.7.2.2 Sun, Haydel, Matheson, Desai, & Robinson (2022). Are mobile phone ownership and age of acquisition associated with child adjustment? A 5-year prospective study among low-income Latinx children. *Child Development*.

ABSTRACT: This prospective, longitudinal study examined associations between whether and when children first acquire a mobile phone and their adjustment measures, among low-income Latinx children. Children (N = 263; 55% female; baseline Mage = 9.5) and their parents were assessed annually for 5 years from 2012. Children first acquired a mobile phone at a mean (SD) age of 11.62 (1.41) years. Pre-registered multilevel models tested associations linking phone ownership, phone acquisition age, and the interaction between ownership and acquisition age to levels and changing trends of depressive symptoms, school grades, and reported and

objectively assessed sleep. **Results showed no statistically significant associations, controlling the False Discovery Rate. Findings suggest an absence of meaningful links from mobile phone ownership and acquisition age to child adjustment.**

8.7.2.3 Schreurs, Meier,·Vandenbosch (2022). Exposure to the Positivity Bias and Adolescents' Differential Longitudinal Links with Social Comparison, Inspiration and Envy Depending on Social Media Literacy. *Current Psychology.*

ABSTRACT: Social media literacy is assumed to protect adolescents from negative social media effects, yet research supporting this is lacking. The current three-wave panel study with a four-month interval among N = 1,032 adolescents tests this moderating role of social media literacy. Specifically, we examine between- vs. within-person relations of exposure to the positivity bias on social media, social comparison, envy, and inspiration. We find significant positive relations between these variables at the between-person level. At the within-person level, a different pattern of results occurred: higher exposure to others' perfect lives on social media was related to increased inspiration, and higher social comparison was related to increased envy, yet both associations only occurred in one of the two time intervals. **Additionally, no within-person associations between exposure to positive content and envy were significant, nor between exposure and social comparison or social comparison and inspiration. These results thus seem more complex than traditional paradigms of selective and transactional media effects assume**. Furthermore, multiple group tests showed that the within-person cross-lagged relation between social comparison and envy only occurred for adolescents with low affective social media literacy. The moderating role of social media literacy was not supported in any other instances. The results overall point at the need to instruct affective social media literacy to help adolescents navigate positively biased social media platforms in a healthy way.

8.7.2.4 Hua, Liu & Ma (2022). Does Upward Social Comparison on SNS Inspire Adolescent Materialism? Focusing on the Role of Self-Esteem and Mindfulness.

ABSTRACT: The present study tested the mediating role of self-esteem and the moderating role of mindfulness in the association between upward social comparison on social network sites (SNSs) and adolescent materialism. A sample of 880 Chinese adolescents completed measures of upward social comparison on SNSs, materialism, self-esteem, mindfulness, and demographic information. Results showed that self-esteem mediated the link between upward social comparison on SNSs and adolescent materialism. That is, upward social comparison on SNSs was positively associated with adolescent materialism through the decreased self-esteem. Moreover,

mindfulness acted as an important moderator in the mediation model. Both the direct association between upward social comparison on SNSs and materialism and the indirect association via self-esteem were moderated by mindfulness. These two associations were both weaker for adolescents with higher mindfulness than for those with lower mindfulness. These findings would advance our understanding of how and when upward social comparison on SNSs is associated with adolescent materialism. Limitations and implications of the present study are discussed.
Note: cross-sectionnal design

8.7.2.5.Wadsley, Covey & Ihssen (2022). The Predictive Utility of Reward-Based Motives Underlying Excessive and Problematic Social Networking Site Use. *Mental & Physical Health.*

Abstract Compulsive seeking of reward is a hallmark feature of drug addiction, but the role of reward is less well understood in behavioural addictions. The present study investigated the predictive utility of ten reward-based motives, which we identified in the literature, in explaining excessive and problematic use of social networking sites (SNSs). These motives were examined in a cross-sectional survey of 411 young adults, revealing that prolonged use and excessive checking were predicted by distinctly different motives. More frequent checking of SNSs was most closely associated with motives related to obtaining social rewards (impression management/ social comparisons/fear of missing out) and the desire to find/consume enjoyable content. In contrast, t**he amount of time an individual spends on SNSs was predicted by the desire to engage in negative social interactions or to fulfill personal needs (selfexpression/documentation of life events). Problematic SNS use was best explained by the motivation to obtain social rewards and to a lesser extent by enjoyment and negative social potency (e.g., trolling) motives.** Our results highlight the importance of social reward in explaining excessive and problematic SNS use, suggesting that a focus on reducing the desire to obtain social reward (e.g., through likes, social comparisons, continual connection) may be most beneficial in tackling problematic SNS behaviours.
Note: cross-sectionnal design.

[Other studies? What have we missed?]

8.7.3: STUDIES THAT ARE RELEVANT BUT THAT DON'T POINT IN EITHER DIRECTION

See work by John Protzko, e.g.,
--Protzko (2020). Kids These Days! Increasing delay of gratification ability over the past 50 years in children

8.8 CRITIQUES OF HAIDT'S 2021 ATLANTIC ARTICLE

This section collects criticisms and counter-evidence posted on Twitter, or entered directly into this document, in response to Haidt's Nov. 2021 essay in The Atlantic: The Dangerous Experiment on Teen Girls. See Jon's twitter thread summarizing the article.

The criticisms I've seen so far are these:

8.8.1 What about the latest meta-analysis that shows only small correlations?

Several people on Twitter pointed to a meta-analysis that was published the same week, by Ferguson, Kaye, Branley-Bell et al., titled "Like this meta-analysis." [It is study 4.17 above.] Others on Twitter pointed to a meta-analysis that will come out in 2022, but which is already available online, by Valkenburg, Meier, & Beyens, titled "Social media use and its impact on adolescent mental health: An umbrella review of the evidence." [It is study 4.18 above.] There will surely be additional meta-analyses coming out in 2022.

After reading both meta-analyses, I believe that they are consistent with my claim in the Atlantic article, in which I summarized what I have learned from curating this Google doc like this:

> *Most [of these studies and meta-analyses] lump all screen-based activities together (including those that are harmless, such as watching movies or texting with friends), and most lump boys and girls together. Such studies cannot be used to evaluate the more specific hypothesis that Instagram is harmful to girls. It's like trying to prove that Saturn has rings when all you have is a dozen blurry photos of the entire night sky. But as the resolution of the pictures increases, the rings appear.*

Ferguson et al. is consistent with this claim. It is almost entirely about screen time, not social media. The abstract states: "evidence suggests that screen media plays little role in mental health concerns. In particular, there was no evidence that screen media contribute to suicidal ideation or other mental health outcomes. This result was also true when investigating smartphones or social media specifically." The authors analyzed 33 published studies, *but only 5 of them were coded as "internet or social media."* Of those

5, one measured only time on the internet, leaving us with just 4 studies that even included a measure of time or intensity of social media use. One of those did not look at mental health as the outcome, leaving us with *just 3 out of 33 studies,* all of which were already included in this Google doc. Two of the 3 are longitudinal studies, which have the problem that nobody knows what the proper time interval is for finding lagged effects (see the introduction to section 2 of this Google doc), and the remaining one study is based on an unusual question asking how many hours per day participants spend "on social media with friends," which might guide participants to report the healthier parts of social media such as direct messaging, rather than the "posting and waiting and checking" which I suspect is the most harmful part. You can see my deep dive into the 5 studies in this google doc. I therefore believe that the Ferguson et al. meta-analysis is useful for evaluating claims about "screen time," but not about social media.

Turning to Valkenburg et al.: This "umbrella review" of other reviews and meta-analyses has some very valuable features, especially its focus on the most recent reviews, published since 2019. The authors say "Our search yielded 25 reviews, seven meta-analyses, which either included only adolescents or used age as a moderator; nine systematic reviews, (which reported a systematic search and a synthesis of included studies in tables); and nine narrative reviews." The conclusion they draw from these works is this: "Results showed that most reviews interpreted the associations between social media use and mental health as 'weak' or 'inconsistent,' whereas a few qualified the same associations as 'substantial' and 'deleterious.'" However, the authors note that there is *a lot of blurriness in the studies*. They note that many of the studies did not define either the inputs (social media vs digital media) or the outcomes (mental health) clearly. Many of them "regularly switched between terms such as digital media use, technology use, and SMU without specifying to which media activities these terms refer." Many of the reviews and meta-analyses, while published since 2019, included dozens of studies that collected data back in the 1990s or even 1980s, further reducing the ability of these studies to address the question: has social media since 2012 harmed girls?

Despite all of this blurriness, the authors find the same sorts of correlations that are reported throughout this Google doc. They note that "five meta-analyses yielded associations of general use of social network sites (SNS use) with higher levels of adolescent ill-being that ranged from very small to moderate (r = .05 to r = .17) and one did not find such an association (r = .02 ns)." This finding is consistent with Amy Orben's (2020) "narrative review" of other studies (which was included by Valkenburg), in which she concludes that the "associations between social media use and well-being therefore range from about r = − 0.15 to r = − 0.10." This number is *for all teens lumped*

together, and as Orben notes, the relationships are generally stronger for girls, weaker for boys. Therefore, I believe that **Orben's review supports the inference that *for girls, r is between .15 and .20.* This inference is also consistent with Valkenburg et al.**

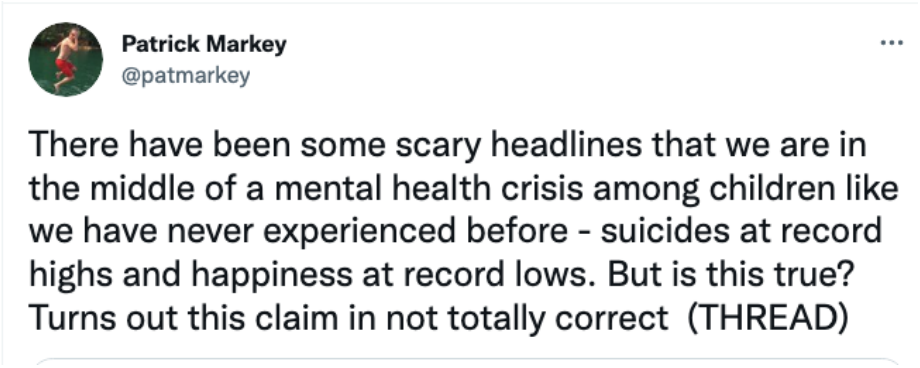
So is a correlation coefficient of .15, or .20, between a behavior and a health outcome "small potatoes"? Is it so small that it has no implications for public policy? No. In the Millennium Cohort Study, the correlation of well-being with social media use, for girls, is around .19. This is about the same as the correlation of well being with heroin use for boys (.19), and it is larger than the correlations of well-being with many known health-related behaviors for girls, including heroin use (.10), and exercise (.06).

8.8.2 Suicide statistics don't fit my story.

Critics have pointed out that rates were much higher for boys in the 1980s, and that the increase in the 2010s has been larger for men than for teen girls.

Made by Pat Markey

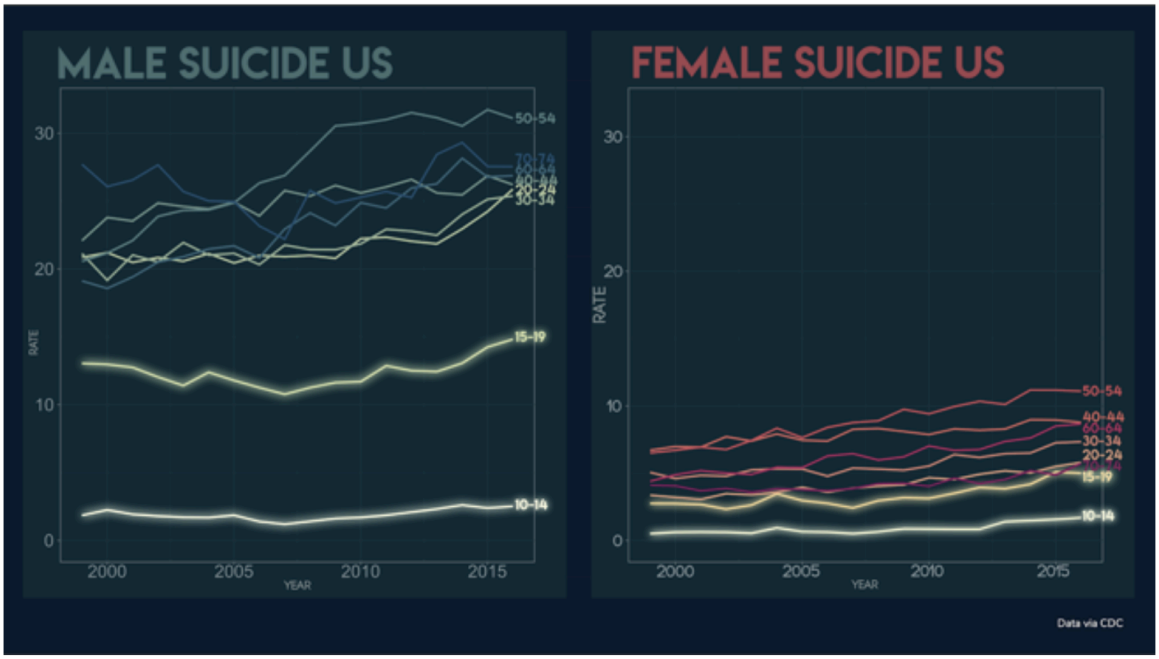
https://twitter.com/patmarkey/status/1108031465718190082



And also made by Chris Ferguson in a Newsweek essay, A Moral Panic is Brewing:

> although it's true that we've seen a rise in suicides among teen girls in recent years, that's also true for almost every age demographic. In fact, according to Centers for Disease Control data, suicides are most common among middle aged white men and young Native American men, both of whom have far high suicide rates than teen girls. And the raw increase in suicides among middle aged adults is also much higher than for teenagers.

My response: Suicide stats are complex, responding to many sociological variables, and the graphs don't correspond to social media use as tightly as they do for teen girls' rates of depression, anxiety, and self harm. So I did not focus on suicide in the Atlantic article, because it takes a while to get deep into the data. I go deep into the data in the companion Google doc lit review: Is there an increase in adolescent mood disorders, self-harm, and suicide since 2010 in the USA and UK? See section 3 of that google doc, which compiles suicide stats from the USA and UK. All data for the USA are from Centers for Disease Control, Fatal Injury Data. My critics are right that the rise in suicide is largest among older men—if you measure it in terms of the number of additional deaths. The rates for men in their 50s have always been much higher than for teen girls.



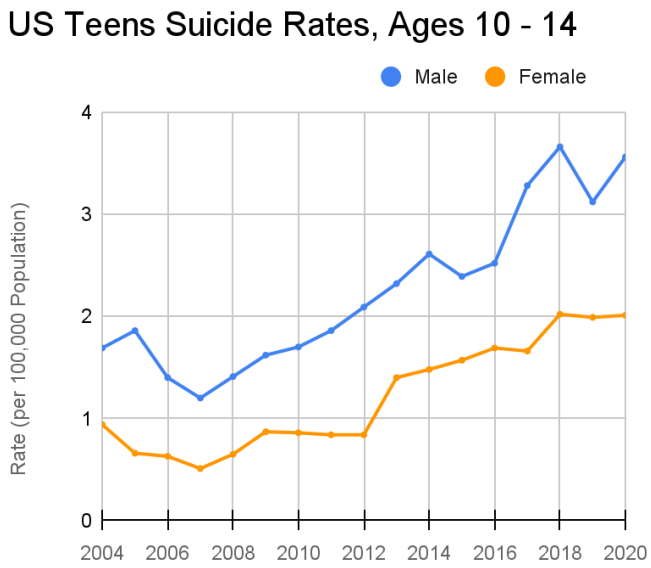
Source: CDC data, grouped into 5 year age bins, graphed by Chris Vaccaro. Rates are per 100,000 in the population of that age/gender group.

But if you look in terms of percentage increase, then the change is largest by far for teen girls. (Chris Ferguson and I debated in that google doc about which kind of comparison was the proper one). See the 151% increase in the upper left corner of the female graph below:

FIGURE: NOTE THAT **THE SUICIDE RATE FOR PRE-TEEN GIRLS HAS MORE THAN DOUBLED JUST SINCE 2012.** NO OTHER GROUP SHOWS SUCH A LARGE PERCENTAGE INCREASE:

Furthermore, if we focus in on the youngest age group, ages 10-14, we see a striking pattern: we see an anomaly that 2007 was a dip, for boys and for girls, and the rate goes up steadily for the boys after that, with no clear change around 2012/2013. *I do not know what has been driving up young teen boys' suicides since 2007* (or what brought it

down between 2005 and 2011).



But if we look at the girls--the orange line-- *we do see a perfect fit with the story I told in the Atlantic article*: No major change from 1999 through 2007, then a small rise over the next two years, but not out of line with the previous decade, and then: *a sharp jump up between 2012 and 2013*, with a continuous rise after that. The rate in 2019 (the last year before covid) is more than twice the rate in 2012, and three times [check this] the rate from 1999-2007. What changed in 2011 or 2012 that could have increased the rate so much beginning in 2013?

NOTE from Twenge: It's possible that the rise for boys is linked to the more general shift in teens' time use after about 2010, with teens spending less time with each other in person and more time online (including gaming and general internet use, not just social media). If social media's impact on suicide rates appeared only later (after 2013), that might be why the change is later for girls.

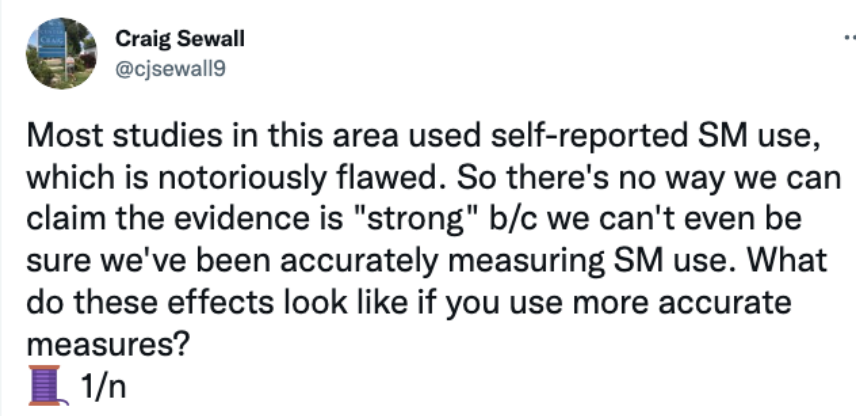
BUT, since this pattern of an earlier rise for boys appears only for completed suicides and not in depression or other mental health variables, there may be other factors involved unique to suicides (such as access to firearms or lack of mental health services).

ALSO – this pattern is unique to this age group of younger children and teens (ages 10-14). For 15- to 19-year-olds, suicide rates increased for both boys and girls between 2007 and 2012.

8.8.3 Analyses based on self-reports of app usage are inaccurate.

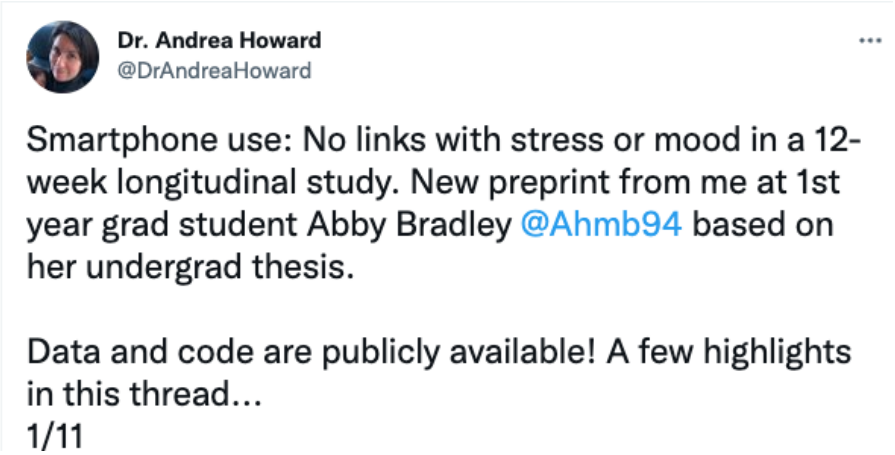
Offered by Craig Sewall:

https://twitter.com/cjsewall9/status/1462543783195648003



And a related thread by Andrea Howard:

https://twitter.com/DrAndreaHoward/status/1460347416302043141?s=20



My response: I agree with Sewall and Howard that the measures of the independent variables (screen time, social media time) are noisy, for many reasons. A big reason is the one Sewall cites, that teens have trouble accurately assessing the hours they spend using any particular app, or class of apps. (Try it yourself: how many hours a week do you spend doing email?). The same can be said for the dependent variables, which are often mental health constructs measured with a single question, not even a validated scale. This is why I talked about the “blurriness” of the main body of research, which is

the correlational research in Section 1 of this document: “It’s like trying to prove that Saturn has rings when all you have is a dozen blurry photos of the entire night sky.”

But what should our response be? One is to say “well, I guess the data is so bad that we should ignore it.” OK, if we ignore the correlational research we still have the experimental research (section 3) and the qualitative research (testimony from the girls themselves that Instagram harms many of them). So it would be irresponsible to say “we should not act until we have much better correlational data, which might come …. someday when Facebook lets us see exactly what is happening.”

The other response, which I think is more reasonable, is to say “wow, even with data this blurry, which generally fails to find more than tiny correlations for “screen time,” we STILL usually find larger correlations for social media time.”

There are some studies that are able to zoom in on social media, and even Instagram. Some have found clear links to mood or mental health; some have not. An example of the latter is this study from Bradley and Howard: Stress, Mood, and Smartphone Use in University Students: A 12-week Longitudinal Study. It fails to find longitudinal links between heavier smartphone use in one week and mental health changes in subsequent weeks. [More to come….]

8.8.4 I underestimated harm to boys, and links between harm and social media for boys; a set of critiques from David Stein, author of the blog The Shores of Academe:

> In your essay you wrote that "Girls in the U.K. also experienced very large increases in anxiety, depression, and self-harm (with much smaller increases for boys)", which you link to a UK study. Do you realize that the relative increases of depression and self-harm found by that UK study were actually larger for boys than for girls? E.g. 240% vs. 110% increase of depression ages 13-16 and 190% vs 90% increase of self-harm for ages 13-16.
>
> [Stein also emailed me to say:] suicide increases impacted boys more than girls: had the number of suicides remained at 2007 totals for both sexes, there would have been 3181 fewer suicide deaths among boys from 2008 and 2018, compared to 2091 fewer suicide deaths among girls. See https://theshoresofacademia.blogspot.com/2020/02/the-rise-boys-and-girls.html for details.

My response: Stein is correct. I made some judgments using the old “inter-occular test” (meaning i just looked at the graphs), and I saw sharp upturns in the curves for girls

(like from 12-25 for the NSDUH depression graph for girls), while not noticing that in some cases, the percentage increase for boys was as large or larger in percentage terms. The inter-occular test is not reliable because when the average is low and the line is near the bottom of a graph, a 100% increase (like from 2% to 4%) is easy to miss.

To compare percentage increases between boys and girls for all the studies for which we have good annual data going back before 2009, Zach Rausch and I created this spreadsheet. It takes the average of rates in 2000-2009 as the baserate and then calculates the % increase, for boys vs girls, on each outcome measure. We calculated the % increase for whatever the most recent year of data is (usually 2018 or 2019) compared to baseline. A summary of the results is that:

- *The % increase was larger for girls on*: Anxiety (UK), Self Harm (UK), Autism (UK), Suicide for 10-14 (USA), Suicide for 15-19 (USA), and suicide for 15-19 (UK).
- *The % increase was larger for boys on*: Depression (UK), self-harm (UK), Suicide for 10-14 (UK)
- *The % increase was basically the same o*n: Depression (USA).
- [Note: so far I have only analyzed the Cybulski data for teens aged 13-16; i still need to do the older and younger age groups]

So my claim that girls have been hit harder than boys, overall, is correct, whether you look at absolute increases or at percentage increases. However, that statement makes it sound as if boys are doing OK, and that is manifestly untrue. Boys' mental disorders and self-destructive behaviors have increased too, sometimes dramatically, and sometimes more than girls, especially in the Cybulski UK data. I thank David Stein for pointing this out, and I will speak in more nuanced ways about gender differences in the future.

Part of the reason I have focused on girls is that I do not know (or even have a clear idea about) what has been driving up mental health problems for boys since around 2007. Moving beyond the raw stats on mental health and turning to the studies that correlate social media use with poor mental health: These correlations are usually weaker for boys than for girls, and the elbows are not as clustered around a single year, as they are for girls around 2012. Also, when you interview groups of girls, as Facebook did, they will directly say that Instagram is harming them and their friends. As far as I know you don’t find anything like this when you ask boys what is happening to them and their friends. So I continue to believe that the evidence of harm is stronger for girls,

although I welcome counter-arguments [Does anyone know of qualitative work using boys? What do the boys say?]

NOTE from Twenge: The shift in socialization from in-person to online might be behind the trends for boys. Even though their experiences with social media are not as negative, they still spend less time with friends in person and more time online than boys 15 years ago. In other words, for boys it's the socialization shift plus some negative effects of social media, and for girls it's the socialization shift plus stronger negative effects of social media. (And shortened sleep for both, but more for girls).

8.8.5 Alternative explanations

In the article I wrote: "Correlation does not prove causation, but nobody has yet found an alternative explanation for the massive, sudden, gendered, multinational deterioration of teen mental health during the period in question." I have long been looking for alternative explanations, focused either on changes in the period 2009-2012 (just before the crisis began) or on the mid to late 1990s, when Gen Z was in utero and was particularly subject to effects of chemicals on their mothers. Here are the alternatives that readers and skeptics have offered:

A) Exposure to electromagnetic radiation from cell phones.

B) [readers, please add more!]

8.9 WHAT RESEARCH IS MOST NEEDED NOW?

Research can be divided into two categories: Dose-Response (which includes more than 90% of the existing research, including nearly all the studies reviewed in this document) and Everything Else (which includes most of the causal pathways by which social media may be causing the teen mental health crisis). I first say what research is needed to address debates within the dose-response framework, then I offer several other hypotheses that could easily be tested.

8.9.1. The Dose-Response Hypothesis

In this way of thinking, social media is thought to be like sugar, and researchers try to test the hypothesis that consuming more or less social media (by an individual teen) is

associated with better or worse mental health, either immediately, or after some time delay.

The studies we need:

- No more research on “screen time.” **Focus on social media**. Next step is specific platforms, especially Instagram, TikTok, and SnapChat.
- Always **show results separately for girls and boys**
- More research is needed on **younger teens, especially ages 10-14**
- We need more **true experiments with random assignment** of individuals to conditions that reduce or alter social media consumption for at least a week
- We need **more objective measurement of social media consumption and activities**. It is hard to estimate the number of hours per day or week that one spends “using” social media. (Try it now: how many hours per week do you spend on email?) Objective measures of app use would be helpful, but even that is not exactly what we need since many Instagram users, for example, spend additional hours taking and editing photos of themselves, and also thinking about Instagram even when not using the app.
- We need experiments that are limited to heavy users, who move down to being light users, who are then followed for at least a month (compared to heavy users who are not asked to change). It’s really the heavy users who are being heavily harmed, but a study of ALL users may then bury the benefit of reducing use.

8.9.2 The Rewiring Childhood Hypothesis.

The hypothesis is that social media radically altered normal childhood relationships beginning around 2012. There is almost no work within this framework, even though it could explain far more of the mental health crisis than does the dose-response framework. Research on this hypothesis would treat the school or community as the unit of analysis. **Middle school** is the most urgent and most tractable institution to study, because elementary school kids are mostly not using Instagram yet, while it would be nearly impossible to get High School students to give up social media for a month.

THE STUDY: What is most needed is a true experiment with random assignment of groups or entire schools so that in some schools, there is a comprehensive effort by parents, teachers, and principals to delay entry to social media, and to eliminate its usage during the school day.

- Along with efforts to delay entry, a policy of turning in phones during the school day would guarantee a period of 7 hours a day when kids can’t be on their

phones. This would likely have many benefits, including increased ability for students to talk to each other, and to pay attention to their teachers.

8.9.3 The Play Deprivation Hypothesis.

The hypothesis is that children need tens of thousands of hours of play, ideally unsupervised play, so that they learn the skills of autonomy, empathy, and conflict resolution. However, beginning in the 1990s and accelerating in the early 2000s, American parents deprived their children of unsupervised play because they were afraid of abduction, and because they came to prioritize academic work over play time and recess.

- See Peter Gray's 2011 essay: The Decline of Play and the Rise of Psychopathology in Children and Adolescents
- See this 2017 essay by Skenazy and Haidt: The Fragile Generation: Bad policy and paranoid parenting are making kids too safe to succeed.
- See this Lit Review of empirical research: Would More Free Play Improve Children's Mental Health?
- see LetGrow.org

THE STUDY WE MOST NEED:

Randomly assign **elementary schools** within a school district to either promote play and autonomy, or not. Specifically, the experimental schools do three things:

1) implement the Let Grow Play Club (keeping school playground open before and after school),
2) implement the Let Grow Project (in which kids propose activities to their parents that they think they can do themselves), and
3) longer or more frequent recess.

Dependent variables: mental health problems, particularly anxiety disorders and loneliness, as assessed by self-report, teacher report, parent report, and expert assessment. Also relevant: academic outcomes and measures of discipline problems.

- Note that this study can only work if kids are not able to use their phones during recess.
- Note that these interventions cost almost nothing and are easy to scale. The only expense is for conducting the research.

8.9.4 What do teens think?

We need a high quality survey of what teens themselves think would be best. Questions would have to get at the rewiring and group-effects framework, so not just asking “do you feel better or worse after you connect with friends on Instagram?” Yes, they often do, just as heroin addicts often feel better after they shoot up. What we need is a series of questions such as: “Suppose Instagram had never been invented, and there were no other programs that took its place. Would your life be better or worse? Would students in your school be happier? Would there be more or less depression?”
See the studies in Section 4 of this review. There are just a few studies, scattered across a few countries. We need much better work here.

8.10 EFFECT SIZES: ARE BETAS AND CORRELATIONS OF .10 TOO SMALL TO MATTER?

Many researchers learned in graduate school that a correlation coefficient of r = .5 and above is a “large” correlation, r = .3 and above is a “medium” sized correlation and r = .10 and above is a “small” correlation, with r < .10 being trivial, not even “small.” But recently, psychologists have noted that these cutoffs make no sense; what counts as large or small varies by domain. The key paper here is Gotz, Gosling, and Rentfrow (2020), *Small Effects: The Indispensable Foundation for a Cumulative Psychological Science*. The authors note that in the domains of public health and education, many of the things that warrant public expenditure are correlated with outcomes in the ballpark of r = .05 to r = .15. For example, Gotz et al. note that the correlation of calcium intake and bone mass in pre-menopausal women is r = .08, which is enough to recommend that women take calcium supplements. The correlation of childhood lead exposure and adult IQ is r = .11, which is enough to justify a national campaign to remove lead from water supplies. These correlations are *smaller* than the links between mood disorders and social media use for girls. Gotz et al. note that such putatively “small” effects can have a very large impact on public health when we are examining “effects that accumulate over time and at scale”, such as millions of teens spending 20 hours per week, every week for many years, trying to perfect their Instagram profiles while scrolling through the even-more-perfect profiles of other teens.

If researchers consistently found correlations below r = .05 for social media time with mental health problems, then I'd agree that there’s not much going on here. But here’s the strange thing: ***even the skeptics*** **find that the correlations are between r = .10**

and r = .15, for all teens, which means they are even higher for girls. See Amy Orben in 5.7. See Jeff Hancock in study 5.27. Yet to this day, news stories continue to report, erroneously, that the correlation is no larger than for “eating potatoes”.
[from Jon Haidt]

See also this paper: Twenge & Hamilton (2022). Linear correlation is insufficient as the sole measure of associations: The case of technology use and mental health. *Acta Psychologica*.
Abstract: It is common for psychology studies to rely solely on linear correlation (r) or similar statistics and not include other measures of association (such as relative risk, which examines differences in the number of people affected). For example, **the association between smoking and lung cancer (r = 0.06) could be dismissed as “small” if only linear r is examined, even though 30 times more smokers than non-smokers get lung cancer.** Many studies concluding that associations between technology use and well-being as too small to be of practical importance relied solely on linear r. **We show that, across five datasets, “small” correlations between technology use and mental health exist alongside practically important risk associations.** As there are several valid types of association, and characterizing an association based on a single type of a measure – such as linear r or r2 – can be misleading.

And see this essay by Chris Said: Small correlations can drive large increases in teen depression.
Excerpt: “In this blog post, I use a simple linear+threshold model and back-of-the-envelope calculations to show that these correlations are not small and are in fact of significant practical importance. In particular, the -0.17 correlation for teen girls is enough to fully explain the 52% increase in depression since 2005.”

8.11 DID COVID CHANGE THINGS?

8.11.1 Sousa Tavares, Souza Costa, Soares, Kestelman, da Silva, Malloy-Diniz, de Paula, & de Miranda (2022). Gaming addiction and screen time in a context of increase of internalizing symptoms: Moderation evaluation. *Clinical Child Psychology and Psychiatry*.

ABSTRACT: Children and adolescents were largely affected by the psychosocial impact of the 2019-2022 pandemic. During this time, there was an increase in internalizing

symptoms, screen and internet use, and internet addiction. However, the interaction of these variables are not fully understood in a stressful time. Here, we have a repeated cross-sectional study aiming to model internalizing symptoms' prediction depending on screen time and game addiction during the COVID-19 pandemic. Parent-reported online data were collected at three timepoints, 6 months apart from each other, from a total of 1211 participants. **We found an increase in screen time, game addiction, and internalizing symptoms. Regardless of the time spent in front of screens, higher levels of game addiction were associated with higher levels of internalizing symptoms in children and adolescents**. Even if participants demonstrated low screen time, if they were virtually dependent they tended to exhibit higher levels of internalizing symptoms. The same result was found in all three samples. There is a need to investigate the nature of the relationship between internet addiction and internalizing symptoms and the long lasting effects of long hours on the screen.

8.12.2 Petrovic et al. (2022). Problematic Internet Use, Anxiety, Depression, and Stress Symptoms in Adults with COVID-19 Pandemic and Earthquake Experience: Insights from Croatian Online Survey.

ABSTRACT: In 2020, Croatia was hit by the COVID-19 pandemic and two earthquakes. As previous research showed that Internet use (IU) increased during the COVID-19 pandemic, we carried out an online survey to determine the levels of problematic Internet use (PIU) and problematic specific Internet activities before and during the prolonged stress caused by the COVID-19 pandemic as well as earthquakes. We also determined the correlation between the PIU and specific Internet activities and anxiety, depression, and stress symptoms. According to the responses of 1,118 participants from all Croatian regions, PIU increased by 14.1 percent (odds ratio [OR] 6.2), problematic social media use by 12.6 percent (OR 4.8), and uncontrolled online shopping by 5.3 percent (OR 5.8) in comparison with presurvey period. The PIU increase was significantly higher in participants reporting only pandemic-related stress than in those reporting both pandemic- and earthquake-related stress. Problematic social media use increased in those reporting only pandemic-related stress and both pandemic- and earthquake-related stress. The strongest correlation between PIU and problematic social media use and anxiety, depression, intrusion, and avoidance symptoms was found among those reporting both pandemic- and earthquake-related stress. The correlation between psychiatric measures and PIU and problematic specific Internet activities varied depending on the source of experienced or perceived stress. Our findings show the relationship between the problematic stress-related Internet

behaviors, different types of stressors, and their impact on the overall PIU and problematic specific Internet activities in situations of prolonged stress.

8.12 SOCIAL MEDIA USE AND EFFECTS ON COGNITION

[This is a new section, added oct 26, 2022; we'll be adding more. Please suggest review articles]. See section 5 of the Google doc I curate with Zach Rausch and Eli George, *Digital Media Effects on Adolescents: A Collaborative Review*, as well as *Changes in Cognitive Ability Among Children and Teens: A Review*, for more studies. Below are a few key studies:

8.12.1 Aru & Rozgonjuk (2022). The effect of smartphone use on mental effort, learning, and creativity. *Trends in Cognitive Sciences*.

ABSTRACT: We argue that scientific studies have not directly assessed the key cognitive processes affected by smartphone use. **We propose that smartphone use can be disruptively habitual, with the main detrimental consequence being an inability to exert prolonged mental effort. This inability might negatively affect real-life creativity and domain-specific knowledge acquisition.**

8.13 EFFECTS OF PHONE RESTRICTIONS IN SCHOOL

In a Google doc started in February 2023, The Effects of Phone-Free Schools: A Collaborative Review, Zach Rausch and I collect and organize the published studies and essays addressing the questions: (1) What do we know about phone-free schools' social, educational, and mental health impacts? And (2) how can elementary and middle schools best manage smartphone use during the school day? Below are a few key studies and journalistic accounts.

8.13.1 JOURNALISM ON PHONE RESTRICTIONS

8.13.1.1 Oppenheimer (2023). The Schools That Ban Smartphones

8.13.2 RESEARCH ON PHONE RESTRICTIONS

8.13.2.1 Gajdics & Jagodics (2022). Mobile Phones in Schools: With or Without you? Comparison of Students' Anxiety Level and Class Engagement After Regular and Mobile-Free School Days. *Technology, Knowledge and Learning*.

ABSTRACT: Mobile phones are important for people, especially for young adults and adolescents. As people tend to form attachments to not only social partners, but inanimate targets as well, mobile devices can become important objects that provide safety and security. This could lead to separation anxiety, also known as “nomophobia”. Constant need for mobile use may result in problematic behaviors in schools, cause distraction in class, it is important to explore the students’ relationship to devices. Our study compares state anxiety level of high school students on a regular school day and on an experimental “mobile-free day”, when participants do not carry their mobile phones during classes. We hypothesized that separation from the mobiles would increase anxiety and decrease class engagement, especially in students with higher mobile attachment scores. The sample consisted of 235 secondary school students. **Results of Repeated Measures ANCOVA showed that anxiety levels increased on the mobile-free school day, but class engagement was not affected by the experiment.** Linear regression analysis revealed ‘Safe Haven’ mobile attachment to be a significant predictor of state anxiety on the mobile free school day. Moreover, correlation analysis revealed that **mobile use habits linked to social media and instant message services were associated with higher anxiety scores on the mobile-free school day.** Our results provide more insights on both use of mobile phones in learning environment and regarding school regulations of students’ device use.

8.13.2.2 Kessel, Hardardottir, & Tyrefors (2020). The impact of banning mobile phones in Swedish secondary schools. *Economics of Education Review*.

ABSTRACT: Recently, policy makers worldwide have suggested and passed legislation to ban mobile phone use in schools. The influential (and only quantitative) evaluation by Beland and Murphy (2016), suggests that this is a very low-cost but effective policy to improve student performance. In particular, it suggests that the lowest-achieving students have the most to gain. Using a similar empirical setup but with data from Sweden, we partly replicate their study and thereby add external validity to this policy question. Furthermore, we increase the survey response rate of schools to approximately 75%, although at the expense of the amount of information collected in the survey. **In Sweden, we find no impact of mobile phone bans on student performance and can reject even small-sized gains.**

8.13.2.3 Beneito & Vicente-Chirivella (2022). Banning mobile phones in schools: Evidence from regional-level policies in Spain. *Applied Economic Analysis*.

ABSTRACT: PURPOSE:The autonomous governments of two regions in Spain established mobile bans in schools as of the year 2015. Exploiting the across-region variation introduced by such a quasi-natural experiment, this study aims to perform a comparative-case analysis to investigate the impact of this non-spending-based policy on regional Programme for International Student Assessment (PISA) scores in maths and sciences and bullying incidence.
DESIGN: The authors apply the synthetic control method and diff-in-diff estimation to compare the treated regions with the rest of regions in Spain before and after the intervention.
FINDINGS: **The results show noticeable reductions of bullying incidence among teenagers in the two treated regions. The authors also find positive and significant effects of this policy on the PISA scores of the Galicia region that are equivalent to 0.6–0.8 years of learning in math and around 0.72 to near one year of learning in sciences.**
VALUE: To the best of the author's knowledge, this is the first empirical study analysing the impact of mobile phone bans in schools on bullying cases, exploiting variation across regions (or other units), years and age intervals. Besides, the scarce formal evidence that exists on the consequences of the mobile phones use in students' academic achievement comes from a micro perspective, while the paper serves as one more piece of evidence from a macro perspective.

8.13.2.4 Tulane, Vaterlaus, & Beckert (2017). An A in Their Social Lives, but an F in School: Adolescent Perceptions of Texting in School. *Youth & Society*, *49*(6), 711–732.

ABSTRACT: Text messaging, used by people of all ages, has become the preferred method of communication for teenagers. Teens spend a significant amount of their daytime hours in school. Schools have not readily accepted the use of cell phone technology for fear of academic dishonesty, distraction, and cyberbullying. The current study examined adolescent (n = 218) attitudes concerning text messaging in school. The majority of adolescents (71%) supported text messaging in school. A phenomenological qualitative approach revealed that adolescents' experience with texting and school centers on student attention, connection (with family, friends, and emergency responders), and levels of regulation (personal, circumstantial, and school).

EXCERPT: **Some students felt texting was distracting, and others felt that texting in school was simply misunderstood—not distracting at all.** Some felt that they had the ability to regulate their own texting in the classroom, and others felt that there should be external regulations. There appears to be conflict among adolescents regarding what is best in terms of texting in the classroom, and understandably so as adolescents have different lived experiences. Despite the differences identified within the themes, the phenomenological analysis identified that attention, connection, and regulation are the major areas of adolescent concern when discussing texting during the school day.

8.14 DOES AGE OF GETTING FIRST SMARTPHONE PREDICT LATER MENTAL HEALTH PROBLEMS?

[This is a new section that Haidt created on April 25, 2023. We have not yet done a scan of the literature; this is just to store the studies that Haidt and Rausch are finding.]

Data from Statista, in 2019, found that ⅔ of children in the USA get their first cell phone between ages 9-14, with 11 and 12 being the peak years of acquisition. [We assume the vast majority of phones are smartphones.]

8.14.1 STUDIES THAT SAY YES (INDICATING HARM)

8.14.1.1 Han (2022). Impact of smartphones on students: How age at first use and duration of usage affect learning and academic progress

ABSTRACT: This study examined how smartphones affect students in current times where they are gradually penetrating into our lives. This study used data from the Seoul Educational Longitudinal Study, of which the 9th year panel data was used. Structural equation modeling was utilized to examine the impacts of the age of the students when they use smartphones for the first time and how long they use it once addicted. The self-directed learning ability and academic achievement scores were also examined. **It was found that the age at which the students started using smartphones affected their daily smartphone usage hours and their degree of smartphone addiction.** Moreover, the amount of time the students used smartphones for entertainment or learning had different effects on smartphone addiction and self-directed learning ability directly and indirectly on academic achievement in Korean, mathematics, and English. The implications on education and research are also discussed.

8.14.1.2 Dempsey, Lyons, & McCoy (2019). Later is better: Mobile phone ownership and child academic development, evidence from a longitudinal study. *Economics of Innovation and New Technology*.

ABSTRACT: Digital technologies have become an increasingly prominent feature of children's lives both within and outside educational environments (McCoy, Quail, and Smyth 2012. Influences on 9-Year-Olds' Learning: Home, School and Community. Dublin: Department of Children and Youth Affairs). Despite considerable media debate, we have little robust evidence on the impact of technology use on children's development, both academically and socially. Much of the literature in this area relies on small-scale cross-sectional studies. Using longitudinal data on 8500 9-year-old children in Ireland, we examine the influence of early mobile phone ownership on children's performance in reading and maths between 9 and 13 years of age. **Across both reading and maths domains, children who already report owning a phone by the age of nine fare less well in terms of their academic development as they move into adolescence. The measured effects are sizeable, implying about 4 percentile lower ranking on standardised tests for an average student.** Our results are consistent with the idea that there may be significant educational costs arising from early mobile phone use by children. Parents and policymakers should consider whether the benefits of phone availability for children are sufficiently large to justify such costs. We suggest a range of direct and indirect cognitive effects that could help explain these results.

8.14.1.3 Dempsey, Lyons, & McCoy (2020). Early mobile phone ownership: Influencing the wellbeing of girls and boys in Ireland? *Journal of Children and Media*.

ABSTRACT: Children live in a technology-mediated world, and most young people use a variety of technologies in their daily lives. However, despite intense public discourse, we have little empirical evidence on how technology use impacts on children's development across a number of psycho-social domains. Research that has been conducted tends to be largely small-scale or cross-sectional in nature and most often focused on (young) adults rather than children. Using longitudinal data on one-in-eight Irish children, we use econometric methods to test for associations between early mobile phone ownership and two measures of children's psycho-social development between 9 and 13 years of age. We examine the Piers Harris Self-Concept Scale, reported by children, and the Strengths and Difficulties (SDQ) score, completed by the primary caregiver. **We find no generalised associations between early mobile**

phone ownership and psycho-social outcomes. However, there is evidence that associations differ by gender and across psycho-social sub-domains. We find no robust associations affecting boys, but girls who receive phones earlier fare less well in terms of their behavioural adjustment and academic self-concept scores at 13 years of age, all else being equal. Further research is needed to identify causal mechanisms and explore possible mediating effects of family/social context.

8.14.1.4 Adachi, Takahashi, Shinkawa, Mori, Nishimura, & Nakamura (2022). Longitudinal association between smartphone ownership and depression among schoolchildren under COVID-19 pandemic. *Social Psychiatry and Psychiatric Epidemiology*. [Study done in Japan]

ABSTRACT: Under the COVID-19 pandemic, concerns regarding prolonged screen time and mental health effects in children have increased. We examined the association of depression with smartphone ownership in school children at four time points: September 2019, July 2020, December 2020, and March 2021. **The analysis revealed an interaction between group and time, indicating that depressive symptoms among smartphone owners were significantly more severe than in the other group. These results were clearer for fourth-year students, pointing that smartphone possession at younger ages may be a risk factor for mental health in the new lifestyle caused by the COVID-19 pandemic.**

8.14.1.5. Charmaraman, Richer, Ben Joseph & Klerman (2021). Quantity, Content, and Context Matter: Associations Among Social Technology Use and Sleep Habits in Early Adolescents. Journal of Adolescent Health.

Abstract: Purpose: This study aimed to investigate the associations of social technology access and content, bedtime behaviors, parental phone restrictions, and timing and duration of sleep on school nights in early adolescents.
Methods: Adolescents (aged 11e15 years, n 1⁄4 772) in the Northeast U.S. completed an online survey during or after school in spring 2019.
Results: Quantity of social technology use (e.g., checking social media, problematic internet behaviors, mobile use), content viewed (e.g., emotional or violent videos, risky behaviors), and social context (e.g., bedtime behaviors, starting social media at an early age) were significantly related to later bedtimes and fewer hours of sleep on school nights. **Parental rules restricting mobile phone and online use before bed and obtaining a smartphone at a later age were associated with increased sleep time and earlier bedtime.**

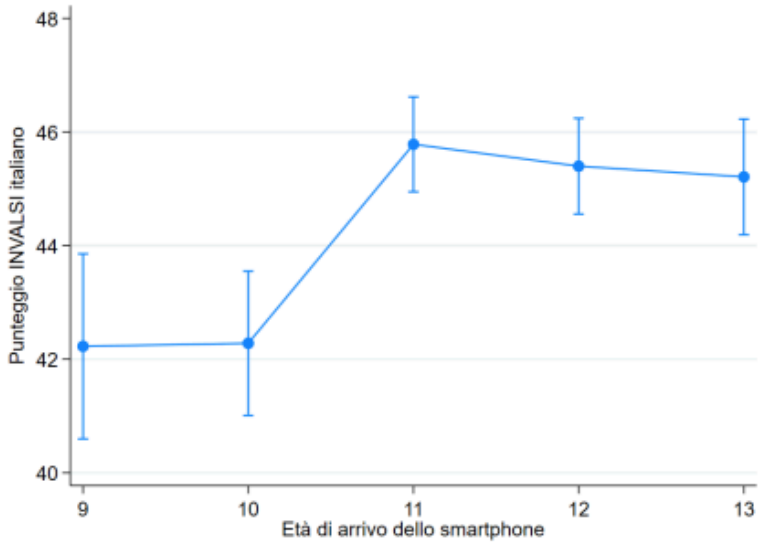
Conclusions: Quantity, content, and context of social technology use may affect sleep timing and duration in early adolescents.

8.14.1.6 Gui, Gerosa, Vitullo (2020). L'età dello smartphone. Un'analisi dei predittori sociali dell' età di accesso al primo smartphone personale e delle sue possibili conseguenze nel tempo. [in Italian, but you can read the title of the graph and an English abstract below]

ABSTRACT: Research on the long-term correlates of the age at first smartphone ownership on life outcomes is scarce. In this study we contribute to literature by employing data from a sample of 3.247 Italian 10 th grade students. Through OLS regressions, we investigate the relationship between age at reception of the first smartphone and various life outcomes, including school achievement, life satisfaction and smartphone use. Results show that females and students with low educated parents are more likely to receive a smartphone earlier in life. **Early smartphone ownership is negatively associated with adolescents' well-functioning and well-being, controlling for gender, ethnicity and parental education.**

Graph title: "Association between the timing of arrival of the first personal smartphone and the score on the INVALSI tests of Italian in the second year of high school."

Grafico 3.1.1 *Associazione tra il momento di arrivo del primo smartphone personale e il punteggio ai test INVALSI di italiano in seconda superiore*



[What are we missing?]

8.14.2 STUDIES THAT SAY NO (INDICATING NO HARM)

8.14.2.1 Sun, Haydel et al. (2022). Are mobile phone ownership and age of acquisition associated with child adjustment? A 5-year prospective study among low-income Latinx children

ABSTRACT: This prospective, longitudinal study examined associations between whether and when children first acquire a mobile phone and their adjustment measures, among low-income Latinx children. Children (N = 263; 55% female; baseline Mage = 9.5) and their parents were assessed annually for 5 years from 2012. Children first acquired a mobile phone at a mean (SD) age of 11.62 (1.41) years. Pre-registered multilevel models tested associations linking phone ownership, phone acquisition age, and the interaction between ownership and acquisition age to levels and changing trends of depressive symptoms, school grades, and reported and objectively assessed sleep. **Results showed no statistically significant associations, controlling the False Discovery Rate.** Findings suggest an absence of meaningful links from mobile phone ownership and acquisition age to child adjustment.

[Note from Haidt: this is a very small study, on an unusual and non-representative population, which found a variety of statistically significant effects at p < .05. But after applying corrections for running multiple comparisons, which lowers the p value needed, those findings were no longer significant. When such corrections are done in small samples, the likelihood of type II errors increases rapidly.]

8.14.2.2 Vaterlaus, Aylward et al. (2021). “A smartphone made my life easier”: An exploratory study on age of adolescent smartphone acquisition and well-being

ABSTRACT: Most adolescents in the United States have access to a smartphone. The appropriate timing of smartphone acquisition during adolescence has not been empirically determined. The current study included a diverse sample of 686 late adolescent (18–25 years old; n = 352 female) participants who acquired their smartphones in early (15.45%), middle (60.64%), and late (23.91%) adolescence. Multiple linear regression models were used to determine if age of smartphone acquisition was predictive of well-being outcomes in later adolescence. **Results**

indicated that age of smartphone acquisition was largely not predictive of later well-being (i.e., depression, loneliness, life satisfaction, interpersonal communication, cell phone addiction). A qualitative content analysis approach was used to identify the participants' experiences with smartphone acquisition during adolescence. Three themes were identified: development and growth, parents: gatekeepers to acquisition, and smartphones necessary for adolescent access. Results suggest that parents, maturity, and responsibility may be more important in determining timing of smartphone acquisition, rather than a specific age.

8.14.2.3 Coyne, Weinstein, James, Gale, & Van Alfen (2023). Teaching by Example. Report from the Wheatley Institution, Brigham Young University.

[From the executive summary:] This report examines how specific teen use patterns and parenting practices are related to adolescent mental health and other developmental outcomes - and what parents can do as they try to mitigate harm. We conducted a study comprised of two national quota samples to explore these aims. The first sample involved 1,231 adolescents (ages 10-17) from across the United States and focused on links between teen social media use and mental health. The second sample involved 201 adolescents (ages 10-17) and their parents who answered questions about social media, mental health, and parenting practices related to media use… Our data indicated that there is no "ideal" age for adolescents to receive their first smartphone. In fact, children who got their first phone earlier tended to have slightly better outcomes than those who got their phone later. (This may reflect that parents who give children phones at younger ages do so because their children show signs of readiness.) Overall, the data do not indicate that later is necessarily better. Instead, these findings support using a child-specific approach to smartphone timing decisions that prioritizes maturational factors more than relying on a numerical age.

[What are we missing?]

8.15 STUDIES SPECIFIC TO SMARTPHONE USAGE

8.15.1 Leitao, Proulx & Kushlev (2024). Smartphones Undermine Social Connectedness More in Men Than Women: A Mini Mega-Analysis. *Technology, Mind, and Behavior*.

ABSTRACT: Though smartphones have been shown to undermine well-being and social connection, evidence also suggests that these effects depend on when and how people use their phones. To examine whether the effects of phones on well-being (affect valence) and social connection depend on the situation, we compiled data across eight published and unpublished experiments where phone use was manipulated (N = 1,778). These experiments included situations ranging from parents visiting a science museum with their children, eating a meal with a group of strangers, to looking for an unfamiliar building. **We found that phones have a significant negative impact on people's feelings of social connectedness across situations**. The impact of phones on well-being, however, depended on the situation: Phones negatively impacted well-being when used during ongoing social interactions, but not when used to find information relevant to current goals. Our large data set also allowed us to examine whether the effects of phones depend on individual differences. We found that gender moderated the effects of phones on social connectedness, whereby **phones negatively impacted men more than women**. Overall, even after including unpublished studies with nonsignificant findings, we find that the negative effects of phones on well-being and social connection persist. Going beyond past research, however, we also show that these negative effects on social connection are driven by men more so than women.

8.16 SOCIAL MEDIA AND EXTERNALIZING PROBLEMS

8.16.1 Perlis, … & Lazer (2025). Irritability and Social Media Use in US Adults. *JAMA Network Open*.

ABSTRACT: IMPORTANCE: Efforts to understand the complex association between social media use and mental health have focused on depression, with little investigation of other forms of negative affect, such as irritability and anxiety. OBJECTIVE: To characterize the association between self-reported use of individual social media platforms and irritability among US adults. DESIGN, SETTING, & PARTICIPANTS: This survey study analyzed data from 2 waves of the COVID States Project, a nonprobability web-based survey conducted between November 2, 2023, and January 8, 2024, and applied multiple linear regression models to estimate associations with irritability. Survey respondents were aged 18 years and older. EXPOSURE: Self-reported social media use. MAIN OUTCOMES AND MEASURES: The primary outcome was score on the Brief Irritability Test (range, 5-30), with higher scores indicating greater irritability. RESULTS: Across the 2 survey waves, there were 42 597 unique participants, with

mean (SD) age 46.0 (17.0) years; 24 919 (58.5%) identified as women, 17 222 (40.4%) as men, and 456 (1.1%) as nonbinary. In the full sample, 1216 (2.9%) identified as Asian American, 5939 (13.9%) as Black, 5322 (12.5%) as Hispanic, 624 (1.5%) as Native American, 515 (1.2%) as Pacific Islander, 28 354 (66.6%) as White, and 627 (1.5%) as other (ie, selecting the other option prompted the opportunity to provide a free-text self-description). In total, 33 325 (78.2%) of the survey respondents reported daily use of at least 1 social media platform, including 6037 (14.2%) using once a day, 16 678 (39.2%) using multiple times a day, and 10 610 (24.9%) using most of the day. **Frequent use of social media was associated with significantly greater irritability in univariate regression models (for more than once a day vs never, 1.43 points [95% CI, 1.22-1.63 points]; for most of the day vs never, 3.37 points** [95% CI, 3.15-3.60 points]) **and adjusted models** (for more than once a day, 0.38 points [95% CI, 0.18-0.58 points]; for most of the day, 1.55 points [95% CI, 1.32-1.78 points]). These associations persisted after incorporating measures of political engagement. CONCLUSIONS AND RELEVANCE: In this survey study of 42 597 US adults, **irritability represented another correlate of social media use that merits further characterization, in light of known associations with depression and suicidality**.

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