

Digital Media Effects on Adolescents: A Review

An ongoing open-source literature review posted and curated by [Jonathan Haidt](#) (NYU-Stern) and Zach Rausch (NYU-Stern), with research assistance from Eli George.

In other Google documents (see [here](#) and [here](#)), we investigate the changing rates of adolescent depression, anxiety, self-harm, and suicide in the United States and other countries around the globe since the early 2010s. We also [examine](#) the relationship between social media use and these mental health outcomes.

In this Google doc, we expand our exploration to examine the effects of digital media, particularly smartphones and social media, on *other* social and psychological outcomes, such as addiction, sleep quality, eyesight, social skills, cognitive development, risky behavior, and more.

If you are a researcher and would like to notify us about other studies, or add comments or counterpoints to this document, please request commenting access to the Google Doc, or [contact Haidt](#) directly, and he will set your permissions to add comments to the Google doc, or will paste in your comments. This document is evolving based on feedback.]

We thank those researchers who put in the time to read this document and raise additional points and **counterpoints**, including...

NOTES

- See also our companion reviews:
 - [Adolescent mood disorders since 2010: A Collaborative Review](#)
 - [Social media and mental health: A Collaborative Review](#)
 - [What is happening to boys? A Collaborative Review](#)
 - [Free Play and Mental Health: A Collaborative Review](#)
 - [All international collaborative docs](#)
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INTRODUCTION

--Q: what is the scope? Is it really all “digital media use,” or is it limited to smartphones? Or smartphones and video games? It is definitely wider than social media. We are trying to capture the change in teens lives between 2010 and 2015 as they got smartphones and much more of their lives moved online.

--focus on teens and pre-teens, but include elementary school

--the two strands: the move onto platforms (2010-2015) and the loss of autonomy (1990s), combine to give us The Great Rewiring of childhood.

--may not be in all countries, but it IS in all the english speaking countries, and it may just be delayed in the others.

--I’ve been focusing on direct effects on mental health. Most of the research uses a dose-response model, as if it is sugar. But social media is not at all like sugar

--the great rewiring changed everything, with many sources of harm, which add up to many avenues to mental illness.

--in this chapter: just the stuff that’s common to both sexes;

--sex specific will be in next 2 chapters.

CAUTIONS AND CAVEATS

[To come]

SECTION 1: THE OPPORTUNITY COST

This section includes documentation of the total time spent, by each sex, on the major kinds of digital media platforms. We are also trying to find documentation of the change in time spent,

from the early 1990s (before the internet and cell phones) through the early 2000s (internet and flip phones) to the 2010s (internet plus smartphones)

1.1 SCREEN TIME

1.1.1 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.**

FIGURE 1. Smartphone ownership, tweens vs. teens, 2015 vs. 2019

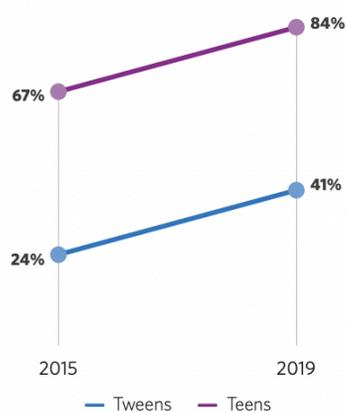


TABLE 2. Screen media use, by age, 2015 vs. 2019

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.

1.1.2 Common Sense Media Reports ([2017](#)). Media Use by Kids Age Zero to Eight.

EXCERPT:

- 58 minutes per day is the average amount of time 2-4 years old spend on mobile devices.
- 46% children under the age of 2 years have used a mobile device at least once, despite the American Academy of Pediatrics' recommendation that children under 2 years should not use any screen media.

1.1.3 [Chen, & Adler \(2019\)](#). Assessment of Screen Exposure in Young Children, 1997 to 2014. *JAMA Pediatrics*.

ABSTRACT: There is widespread concern that children are exposed to too much screen time via increasingly prevalent and accessible mobile devices. This study assesses young children's screen time before and after commonly used mobile devices were widely available.

METHODS: We estimated young children's screen time using time diary data from the 1997 and 2014 Child Development Supplement of the Panel Study of Income Dynamics, which collects information of a population-based representative sample of American children. **There were 1327 and 443 children younger than 6 years who completed the time diary in 1997 and 2014**, respectively. In each survey, the cohort was divided into **2 age groups: 0 to 2 years and 3 to 5 years**. In 1997, screen time was defined as **time spent on any activity while watching television programs or videotapes, plus time spent on electronic video games and home computer-related activities**. **By 2014, screen time activities included the use of television, videotapes, digital video disc, game devices, computer, cell phone,**

smartphone, tablet, electronic reader, and children’s learning devices. We calculated children’s mean daily screen time (in hours) during a typical week. We present the time spent on dominant device type in both 1997 and 2014 and the time spent on mobile devices (including cell phones, smartphones, tablets, electronic readers, and children’s learning devices) in 2014. Lastly, we classified children into high-user and low-user groups based on median screen time within age group and examined differences in individual and family characteristics. All analyses were adjusted for child-level sample weights. The P value level of significance was .05, and all P values were 2-sided.

RESULTS: In 1997, daily screen time averaged 1.32 hours for children aged 0 to 2 years and 2.47 hours for children aged 3 to 5 years (Figure). In comparison with other devices, screen time allocated to television was highest; children aged 0 to 2 years and children aged 3 to 5 years watched television for 0.56 and 1.19 hours (43% and 48% of total screen time) per day, respectively. **By 2014, total screen time among children aged 0 to 2 years had risen to 3.05 hours per day. Most of that time (2.62 hours) was spent on television, while 0.37 hours were spent on mobile devices. The older cohort experienced no significant change in total screen time but an increase of about 80% in television time.** On average, children aged 3 to 5 years spent 2.14 hours on television and 0.42 hours on mobile devices. In 2014, television time accounted for 86% and 78% of total screen time for the age groups of 0 to 2 years and 3 to 5 years, respectively.

In 1997 and 2014, the low-user group had higher family income (Table). Among other family characteristics, significant differences across user groups were found in age, race/ethnicity, employment status of primary caregiver, and number of children in the household in 1997 and in sex, education level of family unit head and spouse, and metropolitan area residence in 2014.

DISCUSSION: This study examines young children’s screen time based on time diary data. Such data are shown to be highly associated with directly observed use of time, whereas time use reported via parent surveys, such as those used in the Common Sense Census and other studies, is only moderately associated with direct observation. **We found that, between 1997 and 2014, screen time doubled among children aged 0 to 2 years and that, both before and after the advent of mobile devices, young children’s television time increased tremendously. The 2014 high-user group was dominated by boys and children with low parental education level and family income.** Future research should examine the association between screen time and other Child Development Supplement measures, such as parenting style and sibling and peer influence. Meanwhile, as stakeholders warn against an overreliance on mobile devices, they should be mindful that young children spend most of their screen time watching television.

1.1.4 [Roberts, Foehr, & Rideout \(2005\)](#). Generation M: Media in the lives of 8-18 year olds. *Kaiser Family Foundation*. ([1999](#); [2009](#))

Media Use Over Time

Among all 8- to 18-year-olds, average amount of time spent with each medium in a typical day:			
	2009	2004	1999
TV content	4:29 ^a	3:51 ^b	3:47 ^b
Music/audio	2:31 ^a	1:44 ^b	1:48 ^b
Computer	1:29 ^a	1:02 ^b	:27 ^c
Video games	1:13 ^a	:49 ^b	:26 ^c
Print	:38 ^a	:43 ^{ab}	:43 ^b
Movies	:25 ^a	:25 ^{ab}	:18 ^b
TOTAL MEDIA EXPOSURE	10:45 ^a	8:33 ^b	7:29 ^c
Multitasking proportion	29% ^a	26% ^a	16% ^b
TOTAL MEDIA USE	7:38 ^a	6:21 ^b	6:19 ^b

Notes: See Methodology section for a definition of terms, explanation of notations, and discussion of statistical significance. See Appendix B for a summary of key changes in question wording and structure over time. **Total media exposure** is the sum of time spent with all media. **Multitasking proportion** is the proportion of media time that is spent using more than one medium concurrently. **Total media use** is the actual number of hours out of the day that are spent using media, taking multitasking into account. See Methodology section for a more detailed discussion. In this table, statistical significance should be read across rows.

Note that multitasking is fragmenting; may be worse than simply staring at at one screen.

Media Services in the Home, Over Time

Among all 8- to 18-year-olds, percent who live in a home with:			
	2009	2004	1999
Internet access	84% ^a	74% ^b	47% ^c
High-speed/wireless	59% ^a	31% ^b	~
Dial-up	10% ^a	31% ^b	~
Cable/satellite TV	84% ^a	82% ^a	74% ^b
Premium channels	47% ^a	55% ^b	45% ^a

Note: Statistical significance should be read across rows.

Media in the Bedroom, Over Time

Among all 8- to 18-year-olds, percent with each item in their bedroom:			
	2009	2004	1999
Radio	75% ^a	84% ^b	86% ^b
TV	71% ^a	68% ^{ab}	65% ^b
CD player	68% ^a	86% ^b	88% ^b
DVD or VCR player	57% ^a	54% ^a	36% ^b
Cable/satellite TV	49% ^a	37% ^b	29% ^c
Computer	36% ^a	31% ^b	21% ^c
Internet access	33% ^a	20% ^b	10% ^c
Video game console	50%	49%	45%
Premium channels	24% ^a	20% ^b	15% ^c
TiVo/other DVR	13% ^a	10% ^b	~

Note: Statistical significance should be read across rows.

Media Equipment in the Home, Over Time

Among all 8- to 18-year-olds, percent who live in homes with at least one:			
	2009	2004	1999
TV	99%	99%	99%
DVD or VCR player	97%	97%	98%
Radio	94% ^a	97% ^b	98% ^b
Computer	93% ^a	86% ^b	73% ^c
Video game console	87% ^a	83% ^b	81% ^b
CD player	87% ^a	98% ^b	95% ^c
TiVo/other DVR	52% ^a	34% ^b	~
Among all 8- to 18-year-olds, average number of each media platform in the home:			
	2009	2004	1999
TV	3.8 ^a	3.5 ^b	3.1 ^c
DVD or VCR player	2.8 ^a	2.9 ^a	2.0 ^b
Radio	2.5 ^a	3.3 ^b	3.4 ^b
Video game console	2.3 ^a	2.1 ^b	1.7 ^c
CD player	2.2 ^a	3.6 ^b	2.6 ^c
Computer	2.0 ^a	1.5 ^b	1.1 ^c
TiVo/other DVR	1.0 ^a	.6 ^b	~

Note: Statistical significance should be read across rows.

1.1.5 [American College of Pediatrics \(2020\)](#). Media Use and Screen Time - Its Impact on Children, Adolescents, and Families.

ABSTRACT: All forms of media, especially visual media, play an increasing role in the lives of children, adolescents, and families in the United States. While limited use of high-quality and developmentally appropriate media may have a positive influence, excessive or developmentally inappropriate use carries grave health risks. Excessive exposure to screens (television, tablets, smartphones, computers, and video game consoles), especially at young ages, is associated with lower academic performance, sleep disturbances, obesity, attention deficit, increased aggression, lower self-esteem, depression, and increased rates of high-risk behaviors. The American College of Pediatricians (ACPeds) encourages parents to become media literate and limit screen time for their children. Parents must lead by example and restrict their own screen time to foster a healthy relationship with their children. The ACPeds encourages pediatricians to regularly warn families about the negative impact of media during well

child visits, and calls upon the media industry, sponsors, educators, and policymakers to act responsibly to protect the physical and emotional health of children and families.

ADDITIONAL EXCERPT: Children and adolescents' use of media has greatly increased in the past 5 – 10 years, and the type of media accessed has changed. Common Sense Media released a report in 2019 that surveyed a representative sample of 1677 families from all regions of the United States. **Their report found 8 – 12-year old's experience almost five hours of screen exposure each day, and teens are viewing screens for an average of almost 7 ½ hours each day.** These numbers do not include time the children are using screens for school work.¹ This report also noted an unexpected increase in the amount of time that the tweens and teens were spending watching online videos. **From 2015 to 2019, the percentage of children watching online videos daily more than doubled so that by 2019, 56% of 8 to 12-year-old and 69% of 13 – 18-year olds were watching every day, spending on average 56 to 59 minutes a day.** This correlates with a significant decrease of approximately 30 minutes in the amount of time that both groups spent watching television.

The Kaiser Family Foundation regularly surveyed media use in children between the late 1990's and 2011. The Foundation's most recent report from 2010 examined the behavior of two thousand **8 – 18-year old's and showed that the average child spent 7.5 hours each day using media. However, because of multi-tasking, children actually crammed 10.75 hours of media use into that 7.5-hour period of time.** On a typical day, these 8 - 18-year olds spent approximately 4.39 hours viewing television, 2.31 hours listening to music, 1.29 hours using computers, and 1.13 hours playing video games. It is important to note that print media, such as books or magazines, and movies, are also consumed on a daily basis but the least amount of time is spent with these media.² Another study found 18-year old's in America spent nearly 40 hours each week accessing the Internet from their home computers.

As part of the 2018 International Study of Asthma and Allergies in Children Phase Three, adolescents between 12 and 15 years of age from 37 countries provided information on television viewing habits. Eighty-nine percent of adolescents reported more than one hour of television viewing daily.³ Ninety-five percent of adolescents own a smartphone or have access to one and 45% of teens report they are online almost constantly.⁴ Common Sense Media found the majority (53%) of 11-year olds also have their own smartphone, and even 19% of 8-year olds have their own phone. This was a significant increase from 2015.

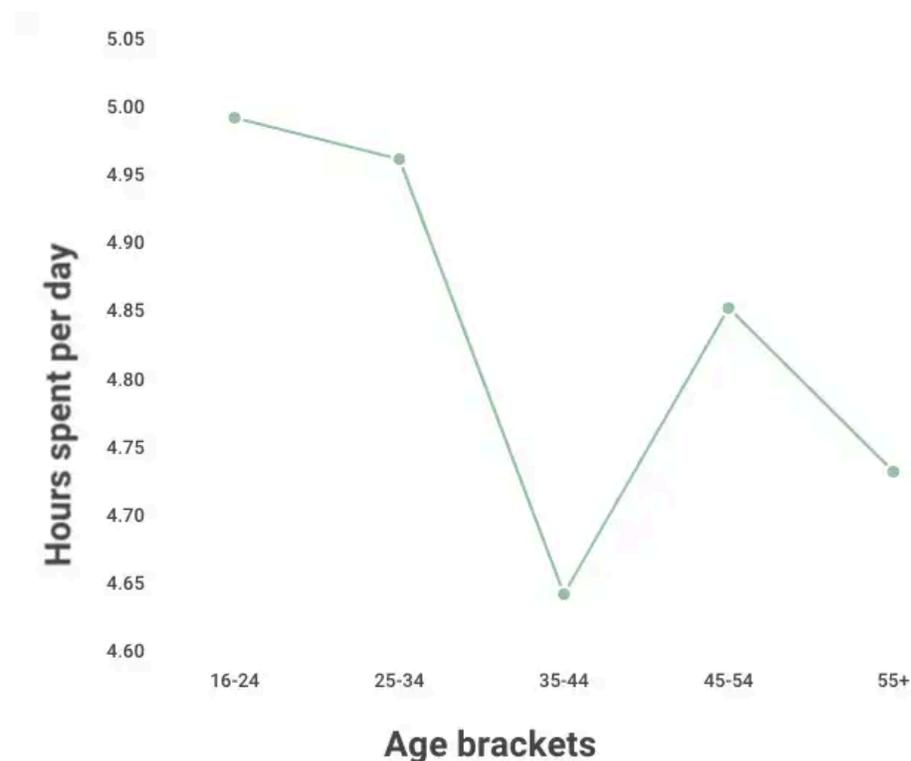
The Pew Research Center released a study in August, 2018, revealing that 54% of American teens between 13 and 17 years of age worried they were spending too much

time on their cell phones and 52% tried to cut back their use. Four in ten teens stated they felt anxious when they did not have their cell phone with them, with more girls (49%) experiencing anxiety than boys (35%), and 25% of teens felt lonely without their phones.

1.1.6 [Hiley \(2022\)](#). How much of your time is Screen Time? *Uswitch*.

EXCERPT: Younger generations are spending less time watching TV, and more time scrolling through social media, with those aged 16-24 spending the most amount of time on Instagram compared to any other age group. In fact, almost one in 10 people aged between 16 and 24 spend seven hours a day on Instagram. That's 2,555 hours a year scrolling through the image-focused app. Millennials, the last generation to grow up without smartphones and social media as we know it today, are most active at setting screen time limits, with almost half of those aged 25 to 34 setting daily caps.

FIGURE:



1.1.7 [Wendy \(2020\)](#). How much time do people spend on social media (11 insights) *Whatagraph*.

EXCERPT: The elderly, ages between 55 and 64 years, spend 1 hour, 53 minutes per day on social media on an average. The ones from 25 years to 34 years of age spend on social media 2 hours 37 minutes each day, which is only 2 hours 4 minutes for individuals aged between 35-44-year-olds. As for 44-54-year-old people, this time is limited to 1 hour 39 minutes. Now coming back to how much time young adults, aged between 16 and 24 years, spend on social media, **it is around 3 hours and 2 minutes every day.**

1.1.8 [Twenge, Martin, & Spitzberg \(2019\)](#). Trends in U.S. Adolescents' media use, 1976–2016: The rise of digital media, the decline of TV, and the (near) demise of print. *Psychology of Popular Media Culture*.

ABSTRACT: Studies have produced conflicting results about whether digital media (the Internet, texting, social media, and gaming) displace or complement use of older legacy media (print media such as books, magazines, and newspapers; TV; and movies). Here, we examine generational/time period trends in media use in nationally representative samples of 8th, 10th, and 12th graders in the United States, 1976 –2016 (N 1,021,209; 51% female). **Whereas only half of 12th graders visited social media sites almost every day in 2008, 82% did by 2016.** At the same time, iGen adolescents in the 2010s spent significantly less time on print media, TV, or movies compared with adolescents in previous decades. The percentage of 12th graders who read a book or a magazine every day declined from 60% in the late 1970s to 16% by 2016, and 8th graders spent almost an hour less time watching TV in 2016 compared with the early 1990s. Trends were fairly uniform across gender, race/ethnicity, and socioeconomic status. The rapid adoption of digital media since the 2000s has displaced the consumption of legacy media.

FIGURES:

TWENGE, MARTIN, AND, SPITZBERG



Figure 10. Hours per day spent watching TV, 8th and 10th graders, by gender, race/ethnicity, and SES, 1991–2016.

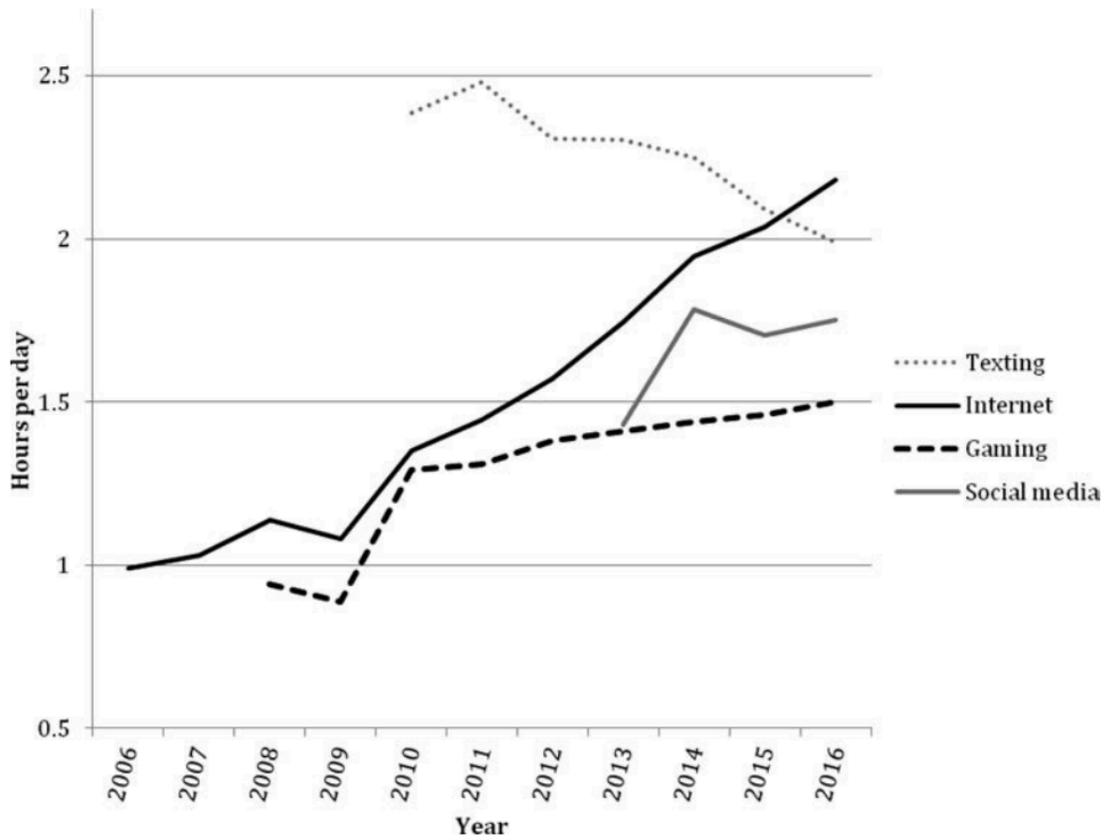
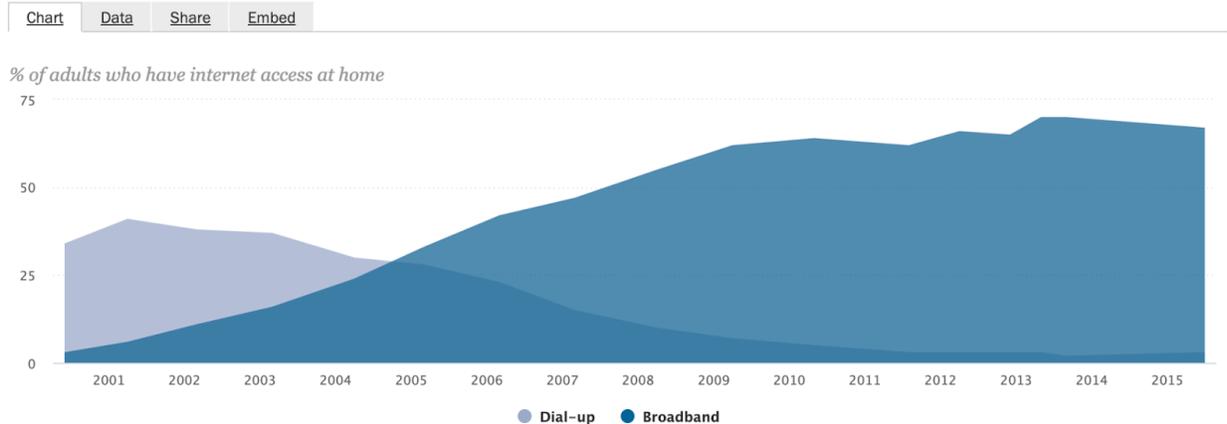


Figure 1. Digital media use, hours per day, 12th graders, 2006–2016.

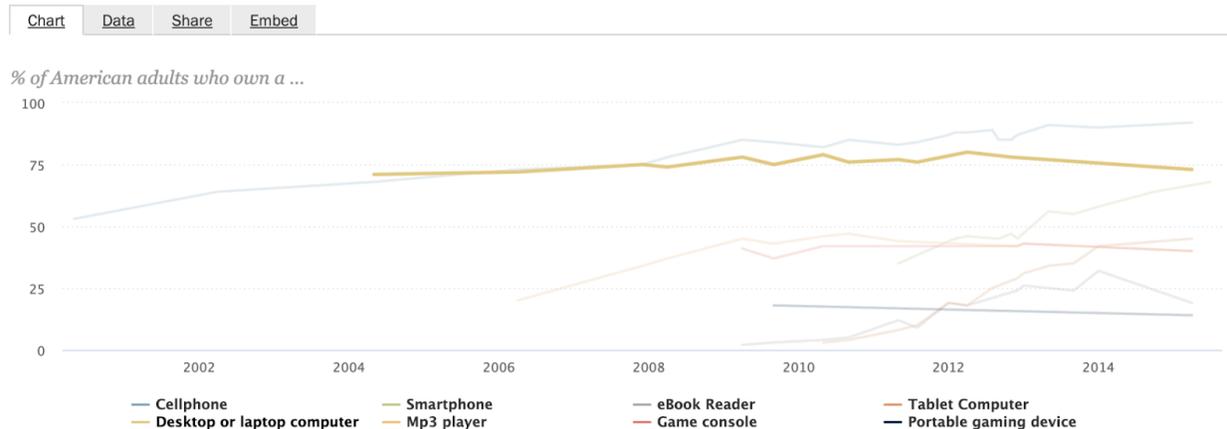
1.1.9 [Three Technology Revolutions](#). Pew Research Center: Internet, Science & Tech.

FIGURES:

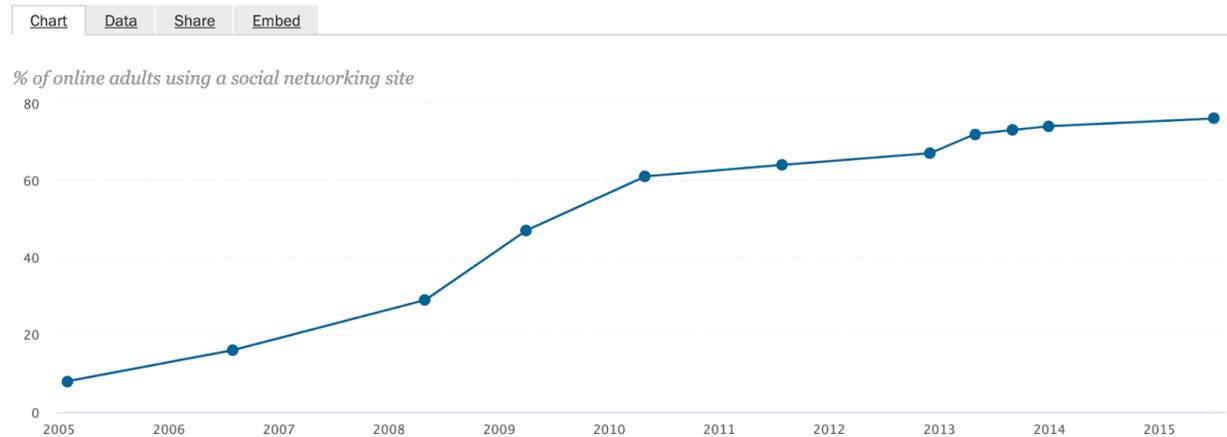
Broadband vs. Dial-up Adoption Over Time



Mobile Device Ownership Over Time



Social Media Use Over Time



OTHER NOTES:

—repeat the time costs; explain opportunity cost

—ask: the benefits would have to be huge, to be worth 15-30 hours per week ([1,300 hours](#) per week, on average, in 2021), equivalent to the benefits of schooling.

CHT:

– gather and save your time, which till lately has been forced from you, or filched away, or has merely slipped from your hands. Make yourself believe the truth of my words, - that certain moments are torn from us, that some are gently removed, and that others glide beyond our reach. The most disgraceful kind of loss, however, is that due to carelessness. Seneca, letters #1 On Saving Time

[What are we missing?]

1.2 SOCIAL MEDIA

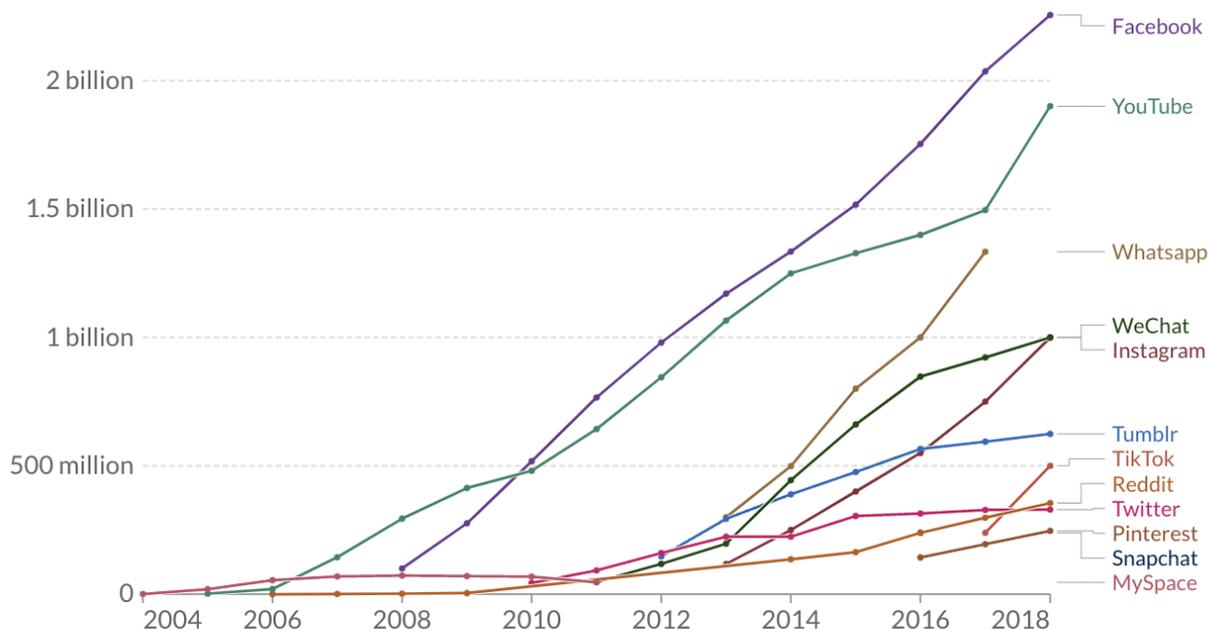
1.2.1 [Ortiz-Ospina, E. \(2019\)](#). The rise of social media. *Our World in Data*.

Number of people using social media platforms, 2004 to 2018

Estimates correspond to monthly active users (MAUs). Facebook, for example, measures MAUs as users that have logged in during the past 30 days. See source for more details.

Our World
in Data

+ Add data



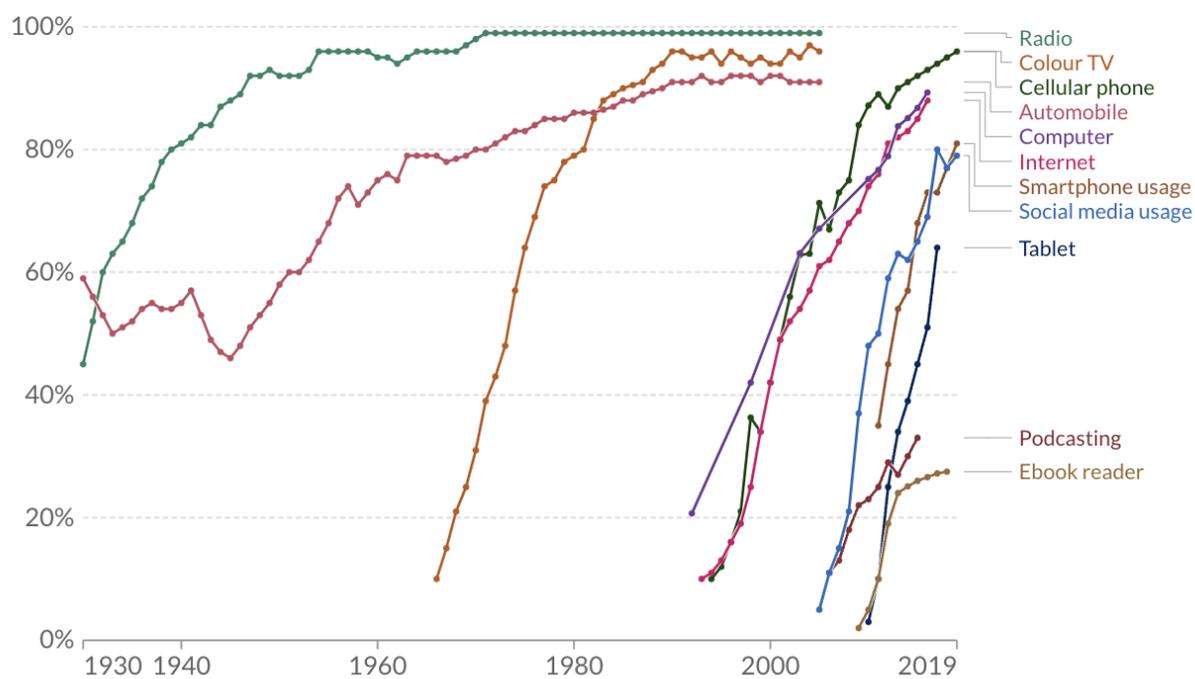
Source: Statista and TNW (2019)

CC BY

Share of US households using specific technologies, 1930 to 2019

Our World
in Data

+ Add technology



Source: Comin and Hobijn (2004) and others

OurWorldInData.org/technology-adoption/ • CC BY

▶ 1915

CHART

TABLE

SOURCES

↓ DOWNLOAD

🔗

1.2.2 [Demographics of social media users and adoption in the United States \(2021\).](#)*Pew Research Center: Internet, Science & Tech.*

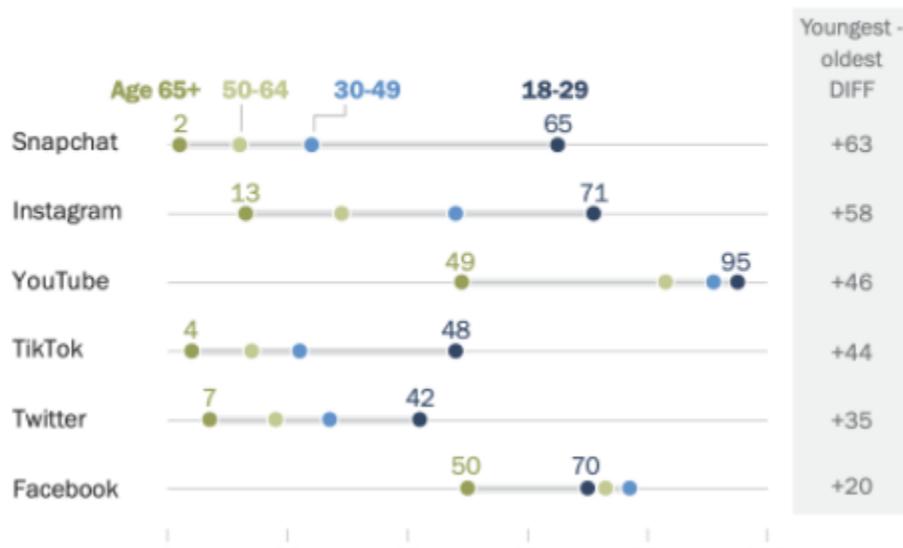
% of U.S. adults in each demographic group who say they ever use ...

	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

Age gaps in Snapchat, Instagram use are particularly wide, less so for Facebook

% of U.S. adults in each age group who say they ever use ...



- 1.2.3 [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.”

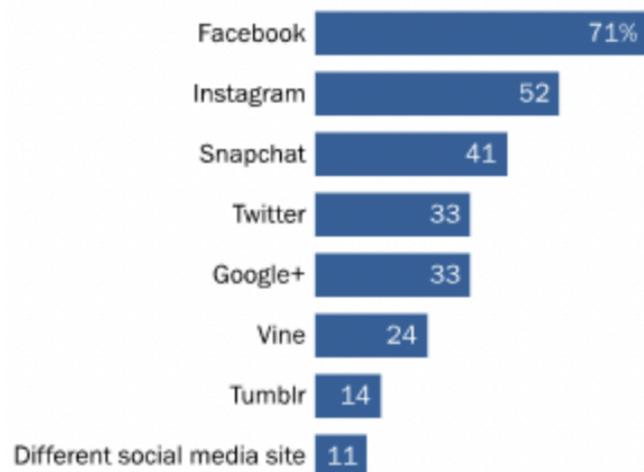
1.2.4 [Global Social Media Stats. \(2021\)](#). DataReportal – Global Digital Insights.

1.2.5 Teens, social media and technology. *Pew Research Center. (2015, 2018, and 2021 Reports)*

FIGURES FROM THE 2015 REPORT:

Facebook, Instagram and Snapchat Top Social Media Platforms for Teens

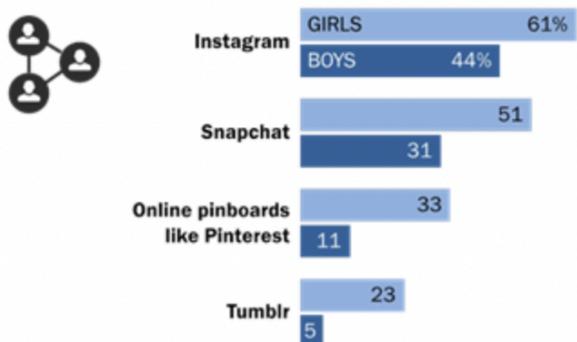
% of all teens 13 to 17 who use ...



Source: Pew Research Center's Teens Relationships Survey, Sept. 25-Oct. 9, 2014 and Feb. 10-Mar. 16, 2015. (n=1,060 teens ages 13 to 17).

Girls Dominate Visually-Oriented Social Media Platforms

Percent of girls and boys who use ...



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
<i>Parent's level of educational attainment</i>							
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."

1.2.6 [Madden, Lenhart, Cortesi, Gasser, Duggan, Smith, & Beaton, \(2013, May 21\).](#)
Part 1: Teens and social media use. *Pew Research Center: Internet, Science & Tech.*

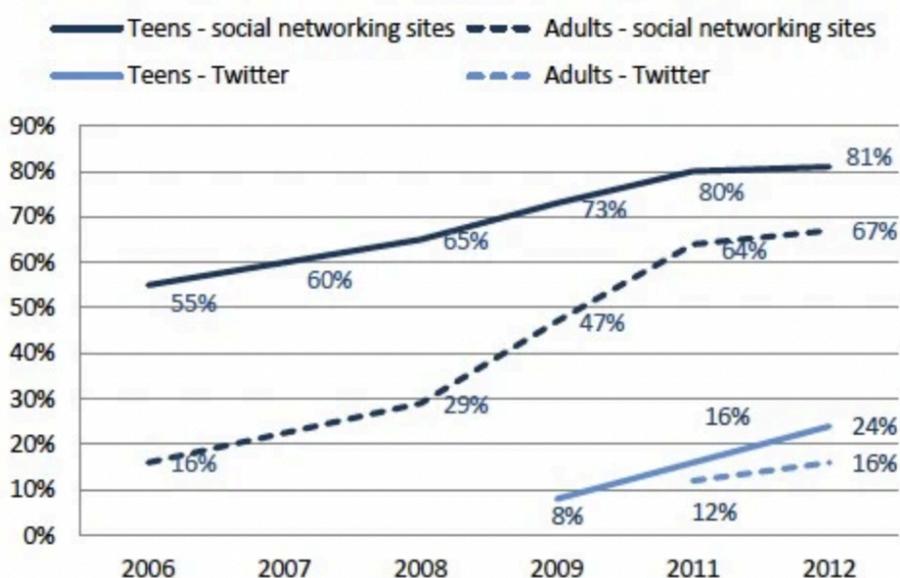
EXCERPT: [In 2012] Girls and older teens continue to be the heaviest users of social media sites. Among teen girls who are social media users, 48% say they visit social networking sites several times per day, compared with 36% of teen boys. Looking at younger teens ages 12-13, 26% use the sites several 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:

Teen and adult use of social networking sites and Twitter — change over time

% of teen and adult internet users who use social networking sites or Twitter, over time

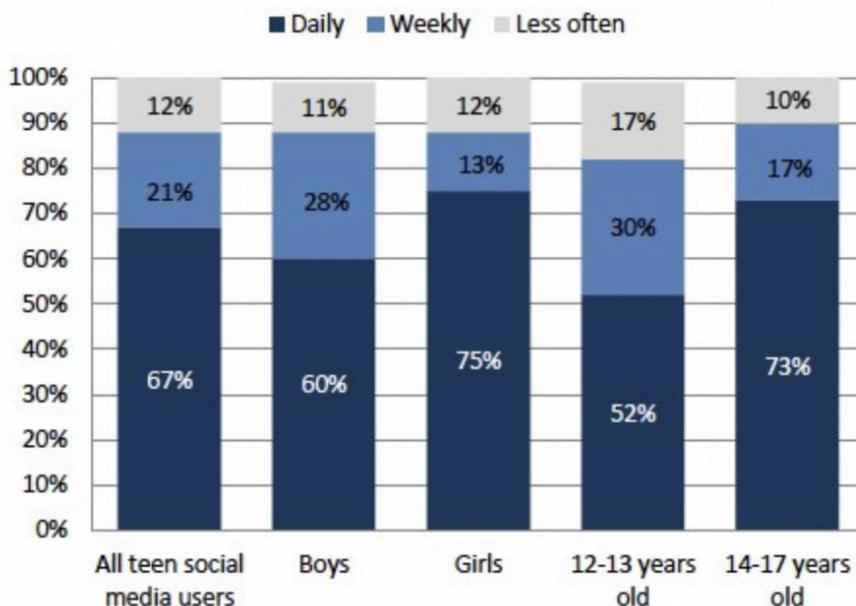


Source: The Pew Research Center Internet & American Life Project Teen & Parent surveys. Source: Teen data taken from surveys of teens age 12-17 conducted October-November 2006, September-November 2007, November 2007-February 2008, June-September 2009, April-July 2011, and July-September 2012 (n=802). 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:

Daily use of social media

% of teen social media users who visit social networking sites, by frequency



Source: The Pew Research Center's Internet & American Life Teen-Parent survey, July 26-September 30, 2012. n=802 for teens 12-17 and parents, including oversample of minority families. Interviews were conducted in English and Spanish. The margin of error for teen social media users is +/- 5.1 percentage points.

1.2.7 [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

1.2.8 [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.

1.2.9 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.

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.

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 <i>among those who use</i>	1:43	2:04
Average time <i>among all</i>	: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.

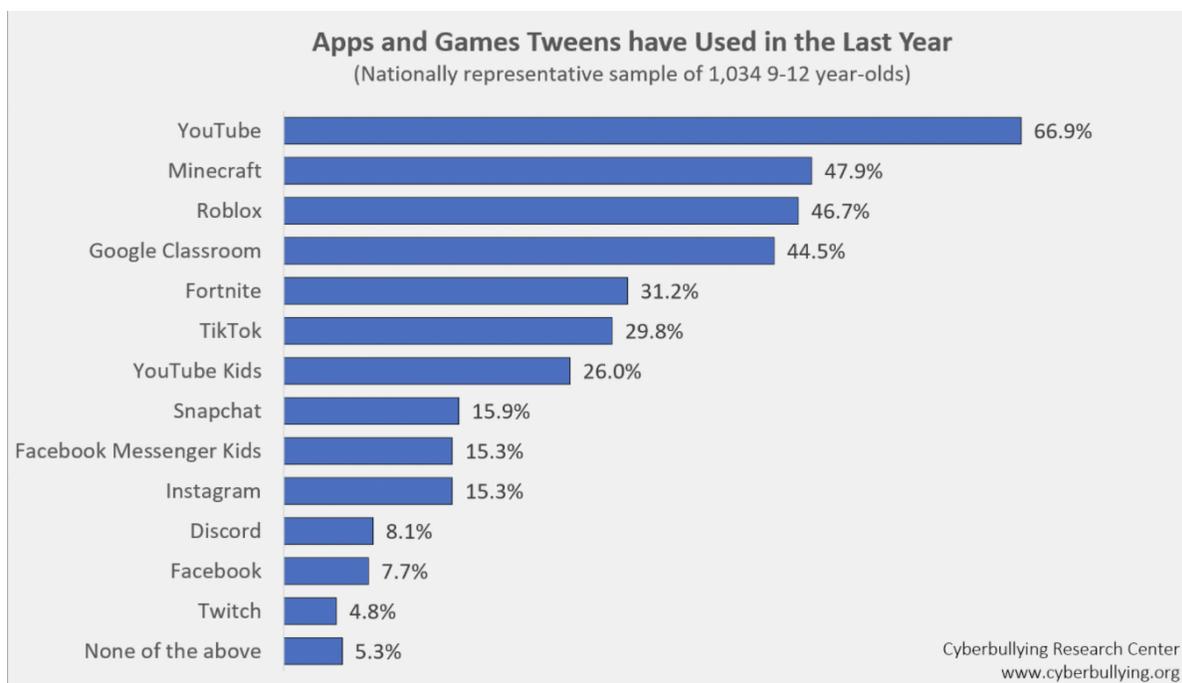
TABLE 27. SOCIAL MEDIA ENJOYMENT AND USE, BY AGE AND GENDER

Social Media Habits/Opinions	Among Tweens			Among Teens		
	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 <i>among those who use</i>	1:43	1:09	1:57	2:04	1:42 ^a	2:22 ^b
Average time <i>among all</i>	: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.

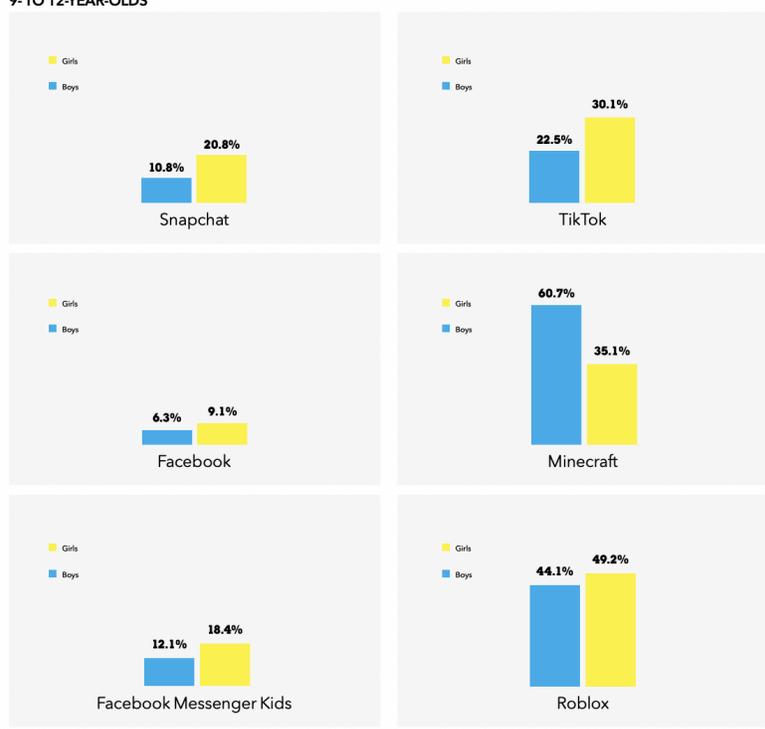
1.2.10 [Cyberbullying Research Center \(2020\)](#). Tween Cyberbullying in 2020.

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 - BY GENDER

9- TO 12-YEAR-OLDS





1.2.11 [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.**

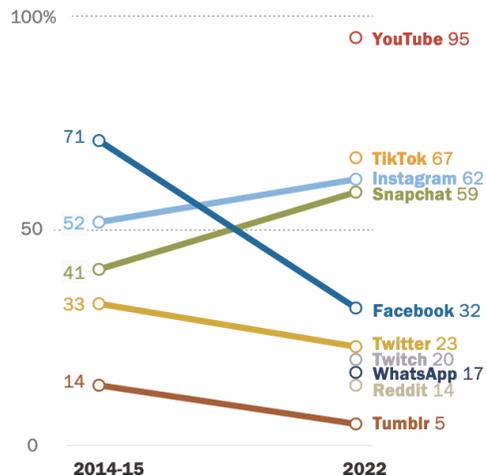
...Across these five platforms, 35% of all U.S. teens say they are on at least one of them almost constantly. While this is not a comprehensive rundown of all teens who use any kind of online platform almost constantly, this 35% of teens represent a group of relatively heavy platform users and they clearly 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



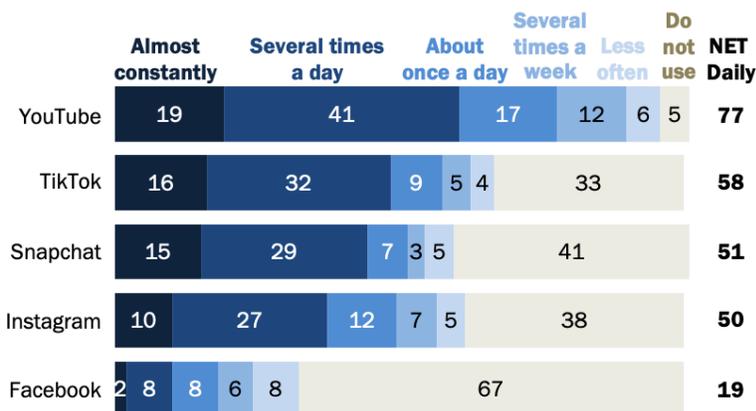
Note: Teens refer to those ages 13 to 17. Those who did not give an answer are not shown. The 2014-15 survey did not ask about YouTube, WhatsApp, Twitch and Reddit. TikTok debuted globally in 2018.

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 ...



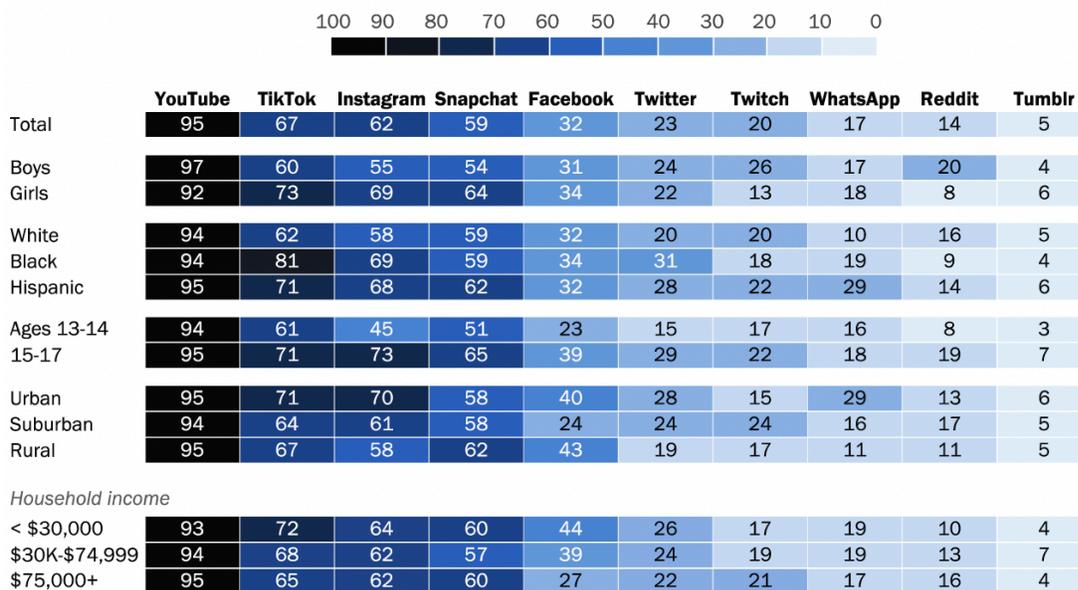
Note: Teens refer to those ages 13 to 17. Those who did not give an answer are not shown. Figures may not add up to the NET values due to rounding.

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



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

1.2.12 [Suciu \(2021\)](#). Americans spent on average more than 1,300 hours on social media last year. *Forbes*.

[What are we missing?]

1.3 VIDEO GAMES

The list of reports and studies addressing this question can be found on our affiliated document: [Video Game Use and Adolescent Health: A Collaborative Review](#), section 1.

A useful stat from that doc is report 1.2, which presents data on video game use among teens. **The report suggests that Gen Z males play an average of 12 hours per week, compared with Gen Z teen females who play an average of 9 hours weekly.**

[What are we missing?]

1.4 PORNOGRAPHY

The list of reports and studies addressing this question can be found on our affiliated document: [Porn Use and Adolescent Health: A Collaborative Review](#), section 1.

A useful stat from that doc is study 1.3, which reports user statistics for Pornhub. In 2021, the average user spent 9 minutes and 55 seconds per session. The average male spent between 40 - 70 min a week, while compulsive users watched about 110 min per week.

To get a better sense of the scale of use worldwide, here's an excerpt from the 2019 Pornhub year-in-review report: "In 2019 there were over 42 Billion visits to Pornhub, which means there was an average of **115 million visits per day**. One-Hundred-Fifteen Million – that's the equivalent of the populations of Canada, Australia, Poland and the Netherlands all visiting in one day... **Every minute, there was an average of 2.8 hours of content uploaded to Pornhub – that means that every 9 minutes or so, an entire days' worth of video was uploaded to Pornhub.**

According to a 2022 [article](#) in the *Archives of Sexual Behavior*, the share of boys who use pornography frequently increased over the three survey cycles; **those who reported using pornography daily increased from 11% in 2004 to 24% in 2014. In contrast, there was no change in girls who reported using pornography daily, while the proportion who never used pornography increased from 40% in 2004 to 51% in 2014.**

And according to a separate 2016 [report](#), young adults 18-24 were the most frequent porn users. Almost six in 10 young adults (57%) sought out porn either daily, weekly or monthly. This was compared to a little over one-third of teens (37%), and almost 3 in 10 adults 25+ (29%).

Finally, according to *Common Sense Media's 2022 Teens and Pornography report*, 41% boys aged 13-14 reported to have watched pornography at least 3 different days in the last week.

1.5 DATING APPS

The list of studies addressing this question can be found on our affiliated document: [Dating App Use and Adolescent Health: A Collaborative Review](#), section 1.

A few useful stats from that doc are from studies 1.1 and 1.2, which reports user statistics for Tinder and dating apps more generally. According to the report, Tinder has a gender imbalance, with 75% of its user-base being male. 35% of Tinder users are between 18-24 years old, and just about half (48%) of 18- to 29-year-olds say they have ever used a dating site or app,

And according to study 1.4 on Badoo users, men were found to spend 85 minutes a day on dating apps, averaging 9.7 minutes each session (and about 10 hrs per week). whereas women spent 79 minutes a day on dating apps, typically browsing for 7.6 minutes each session.

1.6 ILLUSTRATIONS

Some of the best illustrations come from a discord server called NoSurf, designed for people who swear off social media and other parts of the internet. Mostly, it is full of people who are confused about how to use their time meaningfully, now that they don't have social media to fill their days. Their expressions of confusion are very telling (and show how much social media had once dominated their lives):



IMAGE: [NoSurf Bingo](#) (1/13/2023)

1.6.1 TYPICAL DISCUSSIONS

- <https://discord.com/channels/402109355035459585/402109355035459587/1064980878217990164>
- <https://discord.com/channels/402109355035459585/849113865371254834/1010078308928585738>
- <https://discord.com/channels/402109355035459585/402109355035459587/774554735256272897>
- https://www.reddit.com/r/nosurf/comments/ob42us/youre_gonna_be_bored_suck_it_up/
- [As someone with commorbid mental illnesses: My average screen time for the week is 14h 18m \(per day, I assume\)](#)

SOURCE:

https://www.reddit.com/r/nosurf/comments/ob42us/youre_gonna_be_bored_suck_it_up/

EXCERPT: **You're gonna be bored. Suck it up!**

Imagine what your life looks like to aliens right now. Pathetically slumped sideways in bed, holding a little glowing screen inches from your bland, expressionless face, as you make tiny repetitive movements with your hands. Isn't that fucking gross?? Wouldn't you rather be doing ANYTHING ELSE?

Doesn't it piss you off that huge swaths of your life have been ruined - missed opportunities, wasted time, fucked-up memory and attention span, bitter and anxious from chronic sleep deprivation - all because some morally bankrupt psychologists decided to help line the pockets of a select few Silicon Valley assholes?

Beating yourself up for being "weak" and having this problem does you no favors. It only gets you further hooked, because you binge more to numb yourself from having to realize that you have wandered freely into this cage and enthusiastically turned the key yourself.

So no more beating yourself up. That's just a cheap way to let yourself off the hook - your addicted brain is saying, "if I make myself feel really bad about this, then I've atoned for my sin and I don't have to change." That's bullshit and we both know it. Instead, grow up and realize that you still have a chance to do something. Yup, we're going to be bored. We're going to have moments of rage, of anxiety, of loneliness, of feeling like it's not worth it. So fucking what? If you're here, you're probably already in pain - you can handle this.

1.6.2 ARTICLES ABOUT SCREEN TIME:

1.6.2.1 [Haft \(2021\)](#). Long Covid Ruined Screen Time Rules. *Greenwich Time*.

1.6.2.2 [Jacobson](#). How the iPad Almost Ruined My Son's Life. *HerViewFromHome*.

1.6.2.3 [AHOLL2012](#). I've Ruined my Child With Screentime. *The Wholesome Road*.

SECTION 2: ADDICTION

This section collects research on whether smartphones in general, or social media in particular, cause users to be addicted in a meaningful sense. Does the language and psychology of addiction apply, or is it just a metaphor? Evidence of addiction to pornography is covered in the complementary [Pornography Document](#). Evidence of addiction to video games is covered in the complementary [video games section](#).

2.1 EVIDENCE AND ESSAYS INDICATING ADDICTION

2.1.1 [Sun & Zhang \(2021\)](#). A review of theories and models applied in studies of social media addiction and implications for future research. *Addictive Behaviors*.

ABSTRACT: With the increasing use of social media, the addictive use of this new technology also grows. **Previous studies found that addictive social media use is associated with negative consequences such as reduced productivity, unhealthy social relationships, and reduced life-satisfaction.** However, a holistic theoretical understanding of how social media addiction develops is still lacking, which impedes practical research that aims at designing educational and other intervention programs to prevent social media addiction. In this study, we reviewed 25 distinct theories/models that guided the research design of 55 empirical studies of social media addiction to identify theoretical perspectives and constructs that have been examined to explain the development of social media addiction. Limitations of the existing theoretical frameworks were identified, and future research areas are proposed.

2.1.2 [Hou, Xiong, Jiang, Song, & Wang \(2019\)](#). Social media addiction: Its impact, mediation, and intervention. *Cyberpsychology: Journal of Psychosocial Research on Cyberspace*.

ABSTRACT: This research examined the relations of social media addiction to college students' mental health and academic performance, investigated the role of self-esteem as a mediator for the relations, and further tested the effectiveness of an intervention in reducing social media addiction and its potential adverse outcomes. In Study 1, we used a survey method with a sample of college students (N = 232) and **found that social media addiction was negatively associated with the students' mental health and academic performance and that the relation between social media addiction and mental health was mediated by self-esteem**. In Study 2, we developed and tested a two-stage self-help intervention program. We recruited a sample of college students (N = 38) who met criteria for social media addiction to receive the intervention. Results showed that the intervention was **effective in reducing the students' social media addiction and improving their mental health and academic efficiency**. The current studies yielded original findings that contribute to the empirical database on social media addiction and that have important theoretical and practical implications.

2.1.3 [Cheng, Lau, Chan, & Luk \(2021\)](#). Prevalence of social media addiction across 32 nations: Meta-analysis with subgroup analysis of classification schemes and cultural values. *Addictive Behaviors*.

ABSTRACT: In the cyber era, people interact with others not only face-to-face but also through social media platforms such as Facebook and Instagram. Social media addiction has emerged as a problem of global concern, with researchers all over the world conducting studies to evaluate how pervasive the problem is. However, the prevalence rates of social media addiction reported in the literature vary dramatically. The present meta-analysis aimed to systematically synthesize the extant research on social media addiction prevalence. Subgroup analysis and meta-regression were conducted to investigate whether the prevalence rates would differ by classification schemes, cultural values, and demographic factors. The meta-analysis involved 63 independent samples with 34,798 respondents from 32 nations spanning seven world regions. The random-effects meta-analytic findings revealed variations in prevalence among studies adopting distinct classification schemes. **The pooled prevalence estimate was 5%** (95% CI: 3%–7%) for studies adopting monothetic or strict monothetic classifications. **A higher pooled prevalence estimate (13%; 95% CI: 8%–19%) was found for studies adopting a cutoff for severe level or strict**

polythetic classifications, and that **estimate was even higher (25%; 95% CI: 21%–29%) for studies adopting a cutoff for moderate level or polythetic classifications.** Moreover, cross-cultural comparisons revealed the pooled prevalence estimate obtained in collectivist nations (31%; 95% CI: 26%–36%) to be twofold higher than that obtained in individualist nations (14%; 95% CI: 9%–19%). This meta-analysis indicates that both the classification scheme used and cultural factors should be considered when interpreting the prevalence findings on social media addiction.

2.1.4 [Hawi, & Samaha \(2017\)](#). The Relations Among Social Media Addiction, Self-Esteem, and Life Satisfaction in University Students. *Social Science Computer Review*.

ABSTRACT: The use of social media has grown exponentially to the extent of engaging close to one third of the world's population as of January 2016. Actually, social media statistics have been reporting an average annual increase of 10% in total number of users. These extremely impressive statistics have been triggering researchers' interest in investigating this phenomenon and its impact on every aspect of users' lives. Our study is an attempt to contribute to the knowledge that is building up in relation to this phenomenon by examining the relationships between the addictive use of social media, self-esteem, and satisfaction with life. To achieve this purpose, a generic questionnaire, the Social Media Addiction Questionnaire (SMAQ), was used stemming from the Facebook Intrusion Questionnaire. Respondents completed an online survey questionnaire which collected demographic information and responses to SMAQ, Rosenberg's Self-Esteem Scale, and the Satisfaction with Life Scale. In addition to assessing SMAQ's psychometric properties, data analyses included Pearson correlations between the variables, regression analysis, and structural equation modeling. Results showed that a one-factor model of SMAQ had good psychometric properties and had high internal consistency. As for relations, **addictive use of social media had a negative association with self-esteem, and the latter had a positive association with satisfaction with life. Furthermore, path analysis showed that self-esteem mediated the effect of social media addiction on satisfaction with life.**

2.1.5 [Chen, Zhang, Gong, Zhao, Lee, & Liang \(2017\)](#). Understanding compulsive smartphone use: An empirical test of a flow-based model. *International Journal of Information Management*.

ABSTRACT: Smartphones have gained significant popularity. With the rising concerns of compulsive smartphone use, understanding how smartphone users develop compulsive behaviors is crucial. In this study, we aim to investigate the role of flow in the formation of compulsive smartphone use. **Drawing upon the flow theory, we**

incorporate the psychological state of flow as a key factor in our research model. We identify its determinants based on the desirability–feasibility perspective and [reinforcement sensitivity theory](#). We empirically test our model by conducting an online survey with 384 valid responses. We expect that our findings can provide noteworthy insights on the formation of compulsive smartphone use.

EXCERPT: This study confirms that the positive flow experience can indeed become a critical precursor stage to problematic smartphone behaviors. That is, if people find using smartphones is intrinsically rewarding, i.e., highly enjoyable and concentrative, then they are likely to develop compulsive use behaviors. This finding provides additional empirical evidence regarding the danger of flow in IT contexts. In addition, we successfully identify three categories (i.e., desirability, feasibility factors, and BAS personal trait) of determinants of flow by adopting the desirability–feasibility perspective and reinforcement sensitivity theory. We find that desirability factors including instant gratification and mood regulation are important reinforcement motives (positive and negative) that drive users to develop flow experience. Mood regulation further demonstrates the most significant effect among the determinants in the research model. This implies that it is important to shed light on negative reinforcement motives in the formation of compulsive smartphone use. We also find that convenience is a key feasibility factor that contributes to the development of users’ flow state. It shows that it is important to consider the level of difficulty or convenience in the process of attaining this intrinsic reward. The more users find using smartphone is convenient, the more likely they will use the devices to attain the intrinsic reward of flow.

2.1.6 [Lembke \(2021\)](#). Dopamine nation: Finding balance in the age of indulgence.
Penguin Random House.

SUMMARY: This book is about pleasure. It’s also about pain. Most important, it’s about how to find the delicate balance between the two, and why now more than ever finding balance is essential. **We’re living in a time of unprecedented access to high-reward, high-dopamine stimuli: drugs, food, news, gambling, shopping, gaming, texting, sexting, Facebooking, Instagramming, YouTubing, tweeting . . .** The increased numbers, variety, and potency is staggering. **The smartphone is the modern-day hypodermic needle, delivering digital dopamine 24/7 for a wired generation.** As such we’ve all become vulnerable to compulsive overconsumption.

In Dopamine Nation, Dr. Anna Lembke, psychiatrist and author, explores the exciting new scientific discoveries that explain why the relentless pursuit of pleasure leads to

pain . . . and what to do about it. Condensing complex neuroscience into easy-to-understand metaphors, Lembke illustrates how finding contentment and connectedness means keeping dopamine in check. The lived experiences of her patients are the gripping fabric of her narrative. Their riveting stories of suffering and redemption give us all hope for managing our consumption and transforming our lives. In essence, *Dopamine Nation* shows that the secret to finding balance is combining the science of desire with the wisdom of recovery.

2.1.7 [Lembke \(2021\)](#). Digital Addictions Are Drowning Us in Dopamine. *WSJ*.

EXCERPT: Over the course of my career as a psychiatrist, **I have seen more and more patients who suffer from depression and anxiety, including otherwise healthy young people with loving families, elite education and relative wealth. Their problem isn't trauma, social dislocation or poverty. It's too much dopamine**, a chemical produced in the brain that functions as a neurotransmitter, associated with feelings of pleasure and reward.

...When we do something we enjoy—like playing videogames, for my patient—the **brain releases a little bit of dopamine and we feel good. But one of the most important discoveries in the field of neuroscience in the past 75 years is that pleasure and pain are processed in the same parts of the brain and that the brain tries hard to keep them in balance. Whenever it tips in one direction it will try hard to restore the balance, which neuroscientists call homeostasis, by tipping in the other.**

...As soon as dopamine is released, **the brain adapts to it by reducing or “downregulating” the number of dopamine receptors that are stimulated. This causes the brain to level out by tipping to the side of pain, which is why pleasure is usually followed by a feeling of hangover or comedown.** If we can wait long enough, that feeling passes and neutrality is restored. But there's a natural tendency to counteract it by going back to the source of pleasure for another dose.

If we keep up this pattern for hours every day, over weeks or months, the brain's set-point for pleasure changes. Now we need to keep playing games, not to feel pleasure but just to feel normal. As soon as we stop, we experience the universal symptoms of withdrawal from any addictive substance: anxiety, irritability, insomnia, dysphoria and mental preoccupation with using, otherwise known as craving.

Our brains evolved this fine-tuned balance over millions of years in which pleasures were scarce and dangers ever-present. The problem today is that we no longer live in that world. Instead, we now live in a world of overwhelming abundance. The quantity, variety and potency of highly reinforcing drugs and behaviors has never been greater. In addition to addictive substances like sugar and opioids, **there is also a whole new class of electronic addictions that didn't exist until about 20 years ago: texting, tweeting, surfing the web, online shopping and gambling. These digital products are engineered to be addictive, using flashing lights, celebratory sounds and "likes" to promise ever-greater rewards just a click away,**

...Not everyone plays videogames, but just about all of us have a digital drug of choice, and it probably involves using a smartphone—the equivalent of the hypodermic needle for a wired generation. **Reducing phone use is notoriously difficult, because at first it causes the brain's pleasure-pain balance to tilt to the side of pain, making us feel restless and ranky. But if we can keep it up long enough, the benefits of a healthier dopamine balance are worth it. Our minds are less preoccupied with craving, we are more able to be present in the moment, and life's little unexpected joys are rewarding again.**

2.1.8 [Lembke \(2021\)](#). The smartphone has become the modern-day hypodermic needle. *The Journal*.

EXCERPT: We're wired to connect. It's what has kept us alive for millions of years in a world of scarcity and ever-present danger. Moving in tribes safeguards against predators optimises scarce resources and facilitates pair bonding.

Our brains release dopamine when we make human connections, which incentivises us to do it again. Dopamine is our reward neurotransmitter, and also the main chemical involved in addiction.

But today, social connection has become druggified by social media apps, making us all vulnerable to compulsive overconsumption. Instead of releasing a little bit of dopamine in our brain's reward pathway, social media apps have the potential to release much larger quantities all at once, just like heroin or meth or alcohol.

Increased access is obvious. The smartphone has become the modern-day hypodermic needle, delivering digital dopamine for a wired generation. The quantity is endless. Instagram never runs out.

Social media apps become drugs by augmenting the features of human connection that make any substance or behaviour addictive: Access, quantity, potency, and novelty.

Potency is created by increasing the feel-good properties that attract humans to each other in the first place. Beautiful faces are made more beautiful, and even not-so-beautiful ones can be enhanced with filters.

'Followers' and 'leaders' in vast numbers, all sharing the same emotional experience at the same time, is a potent source of dopamine. For reasons we don't yet fully understand, enumeration is linked to reward.

With rankings and numbers of likes, we're easily hooked, tracking our numeric success like dope fiends. (I can personally attest to this as I tracked the rankings of my book sales on Amazon when it first came out until I was able to snap out of it and stop ... sort of.).

And potency is enhanced by combining drugs together. Like mixing heroin with a little Xanax, social media apps **combine** beautiful faces with stories with games with sex with money ... the list goes on.

Finally, there's **novelty**. Dopamine is triggered by our brain's search-and-explore functions, the part that says 'hey pay attention to this, something new has come along.' Add to that the AI algorithms that learn what we've liked before and suggest new things that are similar but not exactly the same, and we're off and running.

At the end of the day, social media feels good while we're doing it and horrible as soon as we stop. It makes us feel crappy because it plunges us into a dopamine deficit state as our brains attempt to adapt to the unnaturally high levels of dopamine it releases.

2.1.9 [Brooks \(2019\)](#). The "Vegas Effect" of Our Screens. *Psychology Today*.

EXCERPT: Why do we have such a curiously difficult time resisting our screens? In previous blogs, I discussed how both [classical conditioning](#) and [supernormal stimuli](#) are mechanisms that can, in part, explain their virtually irresistible pull. There's another mechanism that hooks us into compulsively checking our screens for the latest news feed, text, social media post, or email. It is also the draw of "[loot boxes](#)" within many

video games, such as Counterstrike and Star Wars Battlefront II. This mechanism is known as a variable ratio reinforcement schedule.

A variable ratio reinforcement schedule occurs when, after X number of actions, a certain reward is achieved. Using the rat example, the rat doesn't know how many presses of the lever produces the food pellet. Sometimes it is one, others it is five, or 15. The researcher randomizes the distribution so that the rat never knows how many pushes will yield the food pellet. It soon learns that the faster it pushes the lever though, the sooner it will receive the pellet.

Researchers have found that variable ratio schedules tend to result in a high rate of responding. Also, variable ratios are extremely resistant to extinction. In the case of the rat, **if the researchers stops giving pellets of food after lever presses, the rat will push the lever frequently for a very long time until it finally gives up (which is the extinction part).** Slot machines, as well as most games of chance, are a real world examples of a variable ratio schedule.

...Variable reinforcement schedules are not bad. They are an important part of the motivation and learning systems within our brains. We learn casual relationships from “connecting the dots.” From an evolutionary perspective, learning causal connections enhances our chances of survival. For instance, if I do “Action A” then it can be important that I learn whether “Outcome B” is the likely result. When there is a variable relationship, that means when we perform “Action A” then “Outcome B” might be the result. The reward system in the brain releases [dopamine](#) in variable situations to motivate the organism to pay attention so that it might learn the causal connection. This is sometimes referred to as [incentive salience](#). In essence, the brain is motivating the organism to “crack the code.”

Importantly, this dopamine reward system tends to be more involved in [wanting versus liking](#). It's released more often in anticipation that something might happen.

...It is easy to see how technologies such as social media, texting, and gaming work on a variable reinforcement schedule (Sidebar: Some screens might pull on us more through variable interval versus variable ratio schedules, but it's likely the same result). Like a box of chocolate, we never know what we are going to get. Who posted to Facebook? What did they post? Who commented on my post? What did they say? I need to check my email—something important might have come in! My cell is buzzing—what could this be about? What's the latest on Trump? Let me check my news feed just one more time...

The moment our smartphones buzz or chime, this dopamine reward system is activated. Again, **it is the anticipation phase that is key to the activation of this reward system.** We just HAVE to find out this information, whatever it is. It feels like an itch that needs to be scratched or a thirst that needs to be quenched. Like the rat pushing the lever in hopes of getting a food pellet, we keep checking our phones. As much as we'd like to believe we are above getting hooked into such [compulsive behaviors](#), we often behave like these rats in a cage.

2.1.10 [Eyal \(2014\)](#). *Hooked: How to Build Habit-Forming Products*. Penguin Press.

SUMMARY: Why do some products capture widespread attention while others flop? What makes us engage with certain products out of sheer habit? Is there a pattern underlying how technologies hook us?

Nir Eyal answers these questions (and many more) by explaining the Hook Model—a four-step process embedded into the products of many successful companies to subtly encourage customer behavior. **Through consecutive “hook cycles,” these products reach their ultimate goal of bringing users back again and again without depending on costly advertising or aggressive messaging.**

Hooked is based on Eyal’s years of research, consulting, and practical experience. He wrote the book he wished had been available to him as a start-up founder—not abstract theory, but a how-to guide for building better products. Hooked is written for product managers, designers, marketers, start-up founders, and anyone who seeks to understand how products influence our behavior.

2.1.11 [Wacks, & Weinstein \(2021\)](#). Excessive Smartphone Use Is Associated With Health Problems in Adolescents and Young Adults. *Frontiers in Psychiatry*.

AbSTRACT: BACKGROUND: This present paper will review the existing evidence on the effects of excessive smartphone use on physical and mental health.

RESULTS: Comorbidity with depression, anxiety, OCD, ADHD and alcohol use disorder.

Excessive smartphone use is associated with difficulties in cognitive-emotion regulation, impulsivity, impaired cognitive function, addiction to social networking, shyness and low self-esteem. Medical problems include sleep problems, reduced physical fitness, unhealthy eating habits, pain and migraines, reduced cognitive control and changes in the brain’s gray matter volume.

CONCLUSIONS: Excessive smartphone use is associated with psychiatric, cognitive, emotional, medical and brain changes that should be considered by health and education professionals.'

2.1.12 [Sunday, Adesope, & Maarhuis \(2021\)](#). The effects of smartphone addiction on learning: A meta-analysis. *Computers in Human Behavior Reports*.

ABSTRACT: Research on [smartphone](#) use among college students is extensive. Although numerous studies have examined the relationships between mobile phone use and academic achievements, many such studies have yielded mixed findings. Hence, the overarching goal of this meta-analysis was to comprehensively synthesize existing research to investigate the effects of [smartphone addiction](#) on learning. The authors included 44 studies (45 effects) in the analysis yielding a sample size of $N = 147,943$ college students from 16 countries. **The results show that smartphone addiction negatively impacts students' learning and overall academic performance ($Q(43) = 711.87, p < .001, r = -0.12$). Further, findings suggest that the greater the use of a phone while studying, the greater the negative impact on learning and academic achievement.** Additionally, the results suggest that skills and cognitive abilities needed for students' academic success and learning are negatively impacted. Implications of these findings are discussed, and recommendations for future research are delineated.

2.1.13 [Olson, Sandra, Colucci, Al Bikaii, Chmoulevitch, Nahas, Raz, & Veissière \(2022\)](#). Smartphone addiction is increasing across the world: A meta-analysis of 24 countries. *Computers in Human Behavior*.

ABSTRACT: [Smartphone](#) ownership and screen time are increasing across the world, but there have been few attempts to quantify [smartphone addiction](#) on a global scale. We conducted a meta-analysis of studies published between 2014 and 2020 that used the [Smartphone](#) Addiction Scale, the most common measure of problematic smartphone use. We focused on adolescents and young adults (aged 15 to 35) since they tend to have the highest screen time and smartphone ownership rates. **Across 24 countries, 83 samples, and 33,831 participants, we demonstrate that problematic smartphone use is increasing across the world. China, Saudi Arabia, and Malaysia had the highest scores while Germany and France had the lowest.** We suggest that the clinical interpretation of these scores should be updated given current global trends.

2.1.14 [Endert \(2021\)](#). Addictive use of digital devices in young children: Associations with delay discounting, self-control and academic performance. *PLOS ONE*.

ABSTRACT: The use of smartphones, tablets and laptops/PCs has become ingrained in adults' and increasingly in children's lives, which has sparked a debate about the risk of addiction to digital devices. Previous research has linked specific use of digital devices (e.g. online gaming, smartphone screen time) with impulsive behavior in the context of intertemporal choice among adolescents and adults. However, not much is known about children's addictive behavior towards digital devices and its relationship to personality factors and academic performance. This study investigated the associations between addictive use of digital devices, self-reported usage duration, delay discounting, self-control and academic success in children aged 10 to 13. **Addictive use of digital devices was positively related to delay discounting, but self-control confounded the relationship between the two variables. Furthermore, self-control and self-reported usage duration but not the degree of addictive use predicted the most recent grade average.** These findings indicate that children's problematic behavior towards digital devices compares to other maladaptive behaviors (e.g. substance abuse, pathological gambling) in terms of impulsive choice and point towards the key role self-control seems to play in lowering a potential risk of digital addiction.

2.1.15 [Rocha. & Nunes \(2020\)](#). Benefits and damages of the use of touchscreen devices for the development and behavior of children under 5 years old—A systematic review. *Psicologia: Reflexão e Crítica*.

ABSTRACT: AIM: Several health organizations have been expressing concern about the amount of time children spend using electronic devices and about the benefits and damages of the use of touchscreen devices, such as smartphones or tablets, for the development and behavior of children under the age of 5. A systematic review was carried out in order to understand the impact of touchscreen device usage toward children's development and behavior under the age of 5.

METHODS: Using the PRISMA method, from a total of 6314 studies found in online databases, searched in English, between 01/01/2000 and 01/10/2018, 11 studies were selected for analysis.

RESULTS: **The results revealed that, in children under the age of 5, the damages of the use of touchscreen devices are superior to the benefits that may result, especially when there are more hours of screen time.** More importance is given to the **quality of the child-adult relationship and not to the use of touchscreen devices.** Nevertheless, some studies emphasize some aspects that may reduce the

negative effects, such as moderate use, less screen time, parental monitoring, and viewing educational programs in an academic environment.

CONCLUSIONS: Guidelines that should be given to parents about the use of touchscreen devices by children are discussed. The limitation of this study was the difficulty in finding studies directed to the desired age and type of electronic device. This may be taken as a potential cause of bias.

2.1.16 [El-Sayed Desouky & Abu-Zaid \(2020\)](#). Mobile phone use pattern and addiction in relation to depression and anxiety. *Eastern Mediterranean Health Journal*.

ABSTRACT: BACKGROUND: University students with heavy smartphone use are vulnerable to smartphone addiction that could be related to depression and trait anxiety.

AIMS: To assess gender differences in patterns of smartphone use and addiction in relation to depression and trait anxiety among Saudi university students.

METHODS: This was a cross-sectional study of 1513 students of Taif University, Saudi Arabia. A self-reported questionnaire was used to collect demographic data and data on pattern of smartphone use. The Problematic Use of Mobile Phones (PUMP) scale was used to determine smartphone addiction. The Arabic validated version of the Taylor Manifest Anxiety Scale and Beck Depression Inventory were used to assess trait anxiety and depression, respectively.

RESULTS: A female predominance was found for: prevalence of depression and trait anxiety, PUMP scores, duration of daily mobile use and number of daily calls. **A significant positive correlation was found between PUMP score and depression and trait anxiety scores, duration of owning a smartphone, and average duration of each daily call.** The PUMP scores were significantly higher in 6th year students, those from the theoretical college, single students, and students who used a smartphone for > 4 hours/day.

CONCLUSIONS: Smartphone addiction is a major problem among Saudi university students, and it is associated with depression and trait anxiety. Future studies should aim to establish the best interventions to protect university students from the negative effects of smartphones.

2.1.17 [Ran, Li, Zhang, & Niu \(2022\)](#). The association between social anxiety and mobile phone addiction: A three-level meta-analysis. *Computers in Human Behavior*.

Social anxiety is considered an important factor in the emergence of symptoms of mobile phone addiction. Although numerous studies have shown a significant positive correlation between social anxiety and mobile phone addiction, others confirm that there

is non-prominent correlation between these two variables. Further, the magnitudes and directions of the association between social anxiety and mobile phone addiction in previous empirical studies are inconclusive. Based on the [PRISMA](#) method, a three-level meta-analytic model was applied to quantitatively synthesize relevant findings to obtain reliable estimates of effect sizes and conduct moderator analyses. In total, 82 studies involving 48,880 participants and 254 effect sizes were identified by a systematic literature search. **A significant positive correlation was found between social anxiety and mobile phone addiction.** Moreover, the present meta-analysis observed significant moderating effects of participants' age, culture, and publication year on the association between social anxiety and mobile phone addiction. This study suggests that social anxiety is a predictor of the development of mobile phone addiction in adolescents and adults. Social anxiety should be taken into account when designing prevention and intervention measures for mobile phone addiction in adolescents and adults.

2.1.18 [Stieger & Lewetz \(2018\)](#). A Week Without Using Social Media: Results from an Ecological Momentary Intervention Study Using Smartphones. *Cyberpsychology, Behavior, and Social Networking*.

ABSTRACT: Online social media is now omnipresent in many people's daily lives. Much research has been conducted on how and why we use social media, but little is known about the impact of social media abstinence. Therefore, we designed an ecological momentary intervention study using smartphones. Participants were instructed not to use social media for 7 days (4 days baseline, 7 days intervention, and 4 days postintervention; N = 152). We assessed affect (positive and negative), boredom, and craving thrice a day (time-contingent sampling), as well as social media usage frequency, usage duration, and social pressure to be on social media at the end of each day (7,000+ single assessments). **We found withdrawal symptoms, such as significantly heightened craving ($\beta = 0.10$) and boredom ($\beta = 0.12$), as well as reduced positive and negative affect (only descriptively). Social pressure to be on social media was significantly heightened during social media abstinence ($\beta = 0.19$) and a substantial number of participants (59 percent) relapsed at least once during the intervention phase.** We could not find any substantial rebound effect after the end of the intervention. Taken together, communicating through online social media is evidently such an integral part of everyday life that being without it leads to withdrawal symptoms (craving, boredom), relapses, and social pressure to get back on social media.

ADDITIONAL EXCERPTS: Being abstinent led to significantly elevated boredom during everyday life in the intervention phase, but again, the effect diminished in the postintervention phase as expected (Table 2). Feelings of craving were significantly higher in the intervention phase (compared to the baseline) and, interestingly, a small effect remained in the postintervention phase (although of borderline significance; Table 2). This means that although participants could use social media without limitations, participants still described slightly higher feelings of craving compared to the baseline.

...Withdrawal symptoms should affect one's mood, leading to reduced positive affect and heightened negative affect. Although we found these effects for positive affect (at least descriptively), the pattern for negative affect was counterintuitive because in the intervention phase, negative affect was reduced compared to the baseline (again only descriptively). Interestingly, this is in line with past research, despite the underlying mechanism being currently poorly understood. **It could be that there are two (perhaps cognitive) processes involved in how we feel when not using social media. During nonuse, one process brings to our mind that the usual negative outcomes of social media use are now gone (e.g., constant daily interruptions and shallow conversations), leading to reduced negative affect. The other process prompts the missing positive outcomes of use (e.g., possibilities to communicate and being connected with friends and possibilities to present oneself online), leading to reduced positive affect (for another dual-process view example, see Sheldon et al.14).** Because effects of positive and negative affect were not significant, firm conclusions cannot be drawn and results should be replicated on a larger sample. Another observed withdrawal symptom was craving. As expected, **during the intervention phase, participants stated significantly stronger craving effects compared to the baseline. Interestingly, this effect persisted into the postintervention phase, where participants could use social media as they used to before the intervention phase, but the effect only approached statistical significance.** This might be interpreted as reflecting the dynamics behind dose increase (tolerance/resistance building, i.e., increase in use over time), which is very common in addictions. To analyze this in more detail, a replication study would be necessary, with a longer postintervention phase to see how long this heightened craving persists and if this postintervention craving, in the long run, leads to an increase of social media use later on.

2.1.19 [Clayton, Leshner, & Almond \(2015\)](#). The Extended iSelf: The Impact of iPhone Separation on Cognition, Emotion, and Physiology. *Journal of Computer-Mediated Communication*.

ABSTRACT: This study uniquely examined the effects on self, cognition, anxiety, and physiology when iPhone users are unable to answer their iPhone while performing cognitive tasks. A 2 x 2 within-subjects experiment was conducted. Participants (N = 40 iPhone users) completed 2 word search puzzles. Among the key findings from this study were that when iPhone users were unable to answer their ringing iPhone during a word search puzzle, heart rate and blood pressure increased, self-reported feelings of anxiety and unpleasantness increased, and self-reported extended self and cognition decreased. These findings suggest that negative psychological and physiological outcomes are associated with iPhone separation and the inability to answer one's ringing iPhone during cognitive tasks. Implications of these findings are discussed.

2.1.20 [Su, Han, Yu, Wu, & Potenza \(2020\)](#). Do men become addicted to internet gaming and women to social media? A meta-analysis examining gender-related differences in specific internet addiction. *Computers in Human Behavior*.

ABSTRACT: Males have been proposed to be more vulnerable to [internet addiction](#) (IA) than females. However, males and females may differ with respect to specific patterns and types of internet usage and related IA. To investigate further, a meta-analysis was conducted to investigate gender-related differences in internet gaming disorder (IGD) and social media addiction (SMA). The current meta-analysis aimed to quantify gender-related effect sizes relating to IGD and SMA, examine potential moderating influences of regions and other possible confounds, and compare the findings with generalized IA at the country level. The meta-analysis comprised 53 effect sizes with 82,440 individuals from 21 countries/regions for IGD, and 41 effect sizes with 58,336 individuals from 22 countries/regions for SMA. **A random-effects model confirmed important gender-specific distinctions as men were more likely to exhibit IGD than women ($g = 0.479$) and less likely to exhibit SMA than women ($g = -0.202$). Additional moderator analyses revealed that effect sizes of IGD and SMA were larger in Europe and the Americas than in Asia.** Further analyses indicated that the effect sizes of gender-related differences in IGD and SMA at the country-level were significantly larger than those in generalized IA, which suggests that gender-related differences in specific IAs may be underestimated in the “umbrella” of generalized IA. Results have implications for explaining why males and females may become addicted to internet use through different pathways.

2.1.21 [Oldemburgo de Mello, Cheung and Inzlicht \(2024\)](#). Twitter (X) use predicts substantial changes in well-being, polarization, sense of belonging, and outrage. *Communications Psychology*

In public debate, Twitter (now X) is often said to cause detrimental effects on users and society. Here we address this research question by querying 252 participants from a representative sample of U.S. Twitter users 5 times per day over 7 days (6,218 observations). Results revealed that **Twitter use is related to decreases in well-being, and increases in political polarization, outrage, and sense of belonging over the course of the following 30 minutes. Effect sizes were comparable to the effect of social interactions on well-being.** These effects remained consistent even when accounting for demographic and personality traits. Different inferred uses of Twitter were linked to different outcomes: passive usage was associated with lower well-being, social usage with a higher sense of belonging, and information-seeking usage with increased outrage and most effects were driven by within-person changes.

2.1.22 [Weinstein, Lejoyeux \(2022\)](#). Neurobiological mechanisms underlying internet gaming disorder. *Dialogues Clinical Neuroscience*.

This review summarizes studies on the neurobiological correlates of **internet gaming disorder (IGD)**, presently the most direct approach to analyzing the impact of digital technology and the internet on brain mechanisms. Brain imaging studies have shown that **IGD shares, to a large extent, neurobiological alterations that are typical for other addictions**, such as: (i) activation in brain regions associated with reward, as evident from cue exposure and craving studies and neurotransmitter systems studies that indicate an involvement of dopamine-mediated reward mechanisms; (ii) reduced activity in impulse control areas and impaired decision making; and (iii) reduced functional connectivity in brain networks that are involved in cognitive control, executive function, motivation, and reward. Moreover, there are structural changes, mainly reduction in gray-matter volume and white-matter density. Comorbidity studies indicate that executive control networks in attention deficit-hyperactivity disorder (ADHD) may increase the susceptibility to develop IGD. Most importantly, this review also outlines **findings that show the effects of excessive use of screens**, here referring to the playing of computer games, **which activate many brain regions associated with cognitive, motor, and sensory function and not directly involved in other forms of addiction.** This review describes and summarizes comprehensively the neurobiological correlates of addictive internet use in adolescents and young adults.

2.1.23 [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*.

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.

2.1.24 [Maza, Fox, Kwon, Flannery, Lindquist, Prinstein and Telzer \(2023\)](#). Association of Habitual Checking Behaviors on Social Media With Longitudinal Functional Brain Development. *JAMA Pediatrics*.

ABSTRACT: OBJECTIVE: To explore how adolescents' frequency of checking behaviors on social media platforms is associated with longitudinal changes in functional brain development across adolescence.

DESIGN: A **3-year longitudinal cohort study** of functional magnetic resonance imaging (fMRI) among sixth- and seventh-grade students recruited from 3 public middle schools in rural North Carolina. At wave 1, participants reported the frequency at which they checked Facebook, Instagram, and Snapchat.

OUTCOMES: Neural responses to the Social Incentive Delay task when anticipating receiving social feedback, measured annually using fMRI for 3 years. Participants saw a cue that indicated whether the social feedback (adolescent faces with emotional expressions) would be a reward, punishment, or neutral; after a delay, a target appeared and students responded by pressing a button as quickly as possible; a display of social feedback depended on trial type and reaction time.

RESULTS: Of 178 participants recruited at age 12 years, 169 participants (mean [SD] age, 12.89 [0.58] years; range, 11.93-14.52 years; 91 [53.8%] female; 38 [22.5%] Black, 60 [35.5%] Latinx, 50 [29.6%] White, 15 [8.9%] multiracial) met the inclusion criteria.

Participants with habitual social media checking behaviors showed lower neural sensitivity to social anticipation at age 12 years compared with those with nonhabitual checking behaviors in the left amygdala, posterior insula (PI), and ventral striatum (VS; β , -0.22; 95% CI, -0.33 to -0.11), right amygdala (β , -0.19; 95% CI, -0.30 to -0.08), right anterior insula (AI; β , -0.23; 95% CI, -0.37 to -0.09), and left dorsolateral prefrontal cortex (DLPFC; β , -0.29; 95% CI, -0.44 to -0.14). Among those with habitual checking behaviors, there were longitudinal increases in the left amygdala/PI/VS (β , 0.11; 95% CI, 0.04 to 0.18), right amygdala (β , 0.09; 95% CI, 0.02 to 0.16), right AI (β , 0.15; 95% CI, 0.02 to 0.20), and left DLPFC (β , 0.19; 95% CI, 0.05 to 0.25) during social anticipation, whereas among those with nonhabitual checking behaviors, longitudinal decreases were seen in the left amygdala/PI/VS (β , -0.12; 95% CI, -0.19 to -0.06), right amygdala (β , -0.10; 95% CI, -0.17 to -0.03), right AI (β , -0.13; 95% CI, -0.22 to -0.04), and left DLPFC (β , -0.10, 95% CI, -0.22 to -0.03).

CONCLUSION: The results of this cohort study suggest that **social media checking behaviors in early adolescence may be associated with changes in the brain's sensitivity to social rewards and punishments**. Further research examining long-term associations between social media use, adolescent neural development, and psychological adjustment is needed to understand the effects of a ubiquitous influence on development for today's adolescents

2.1.25 [Sherman, Payton, Hernandez, Greenfield and Dapretto \(2016\)](#). The Power of the Like in Adolescence: Effects of Peer Influence on Neural and Behavioral Responses to Social Media. *Psychology Science*.

We investigated a unique way in which adolescent peer influence occurs on social media. We developed a novel functional MRI (fMRI) paradigm to simulate Instagram, a popular social photo-sharing tool, and measured adolescents' behavioral and neural responses to likes, a quantifiable form of social endorsement and potential source of peer influence. Adolescents underwent fMRI while viewing photos ostensibly submitted to Instagram. They were more likely to like photos depicted with many likes than photos with few likes; this **finding showed the influence of virtual peer endorsement and held for both neutral photos and photos of risky behaviors** (e.g., drinking, smoking). Viewing photos with many (compared with few) likes was associated with greater activity in neural regions implicated in reward processing, social cognition, imitation, and attention. Furthermore, when adolescents viewed risky photos (as opposed to neutral photos), activation in the cognitive-control network decreased.

These findings highlight possible mechanisms underlying peer influence during adolescence.

2.1.1 REVIEW ARTICLES ON DOPAMINE AND ADDICTION

2.1.1.1 [Wise & Robble \(2020\)](#). Dopamine and Addiction. *Annual Review of Psychology*.

ABSTRACT: Addiction is commonly identified with habitual nonmedical self-administration of drugs. It is usually defined by characteristics of intoxication or by characteristics of withdrawal symptoms. Such addictions can also be defined in terms of the brain mechanisms they activate; most addictive drugs cause elevations in extracellular levels of the neurotransmitter dopamine. Animals unable to synthesize or use dopamine lack the conditioned reflexes discussed by Pavlov or the appetitive behavior discussed by Craig; they have only unconditioned consummatory reflexes. Burst discharges (phasic firing) of dopamine-containing neurons are necessary to establish long-term memories associating predictive stimuli with rewards and punishers. Independent discharges of dopamine neurons (tonic or pacemaker firing) determine the motivation to respond to such cues. As a result of habitual intake of addictive drugs, dopamine receptors expressed in the brain are decreased, thereby reducing interest in activities not already stamped in by habitual rewards.

2.1.1.2 [Volkow, Wang, Fowler, Tomasi, Telang, & Baler \(2010\)](#). Addiction: Decreased reward sensitivity and increased expectation sensitivity conspire to overwhelm the brain's control circuit. *BioEssays : News and Reviews in Molecular, Cellular and Developmental Biology*.

ABSTRACT: Based on brain imaging findings, we present a model according to which addiction emerges as an imbalance in the information processing and integration among various brain circuits and functions. **The dysfunctions reflect (a) decreased sensitivity of reward circuits, (b) enhanced sensitivity of memory circuits to conditioned expectations to drugs and drug cues, stress reactivity, and (c) negative mood, and a weakened control circuit.** Although initial experimentation with a drug of abuse is largely a voluntary behavior, continued drug use can eventually impair neuronal circuits in the brain that are involved in free will, turning drug use into an automatic compulsive behavior. **The ability of addictive drugs to co-opt neuro-transmitter signals between neurons (including dopamine, glutamate, and GABA) modifies the function of different neuronal circuits, which begin to falter at**

different stages of an addiction trajectory. Upon exposure to the drug, drug cues or stress this results in unrestrained hyperactivation of the motivation/drive circuit that results in the compulsive drug intake that characterizes addiction.

2.1.1.3 [Kim, Baik, Park, Kim, Choi, & Kim \(2011\)](#). Reduced striatal dopamine D2 receptors in people with Internet addiction. *Neuroreport*.

ABSTRACT: An increasing amount of research has suggested that Internet addiction is associated with abnormalities in the dopaminergic brain system. We hypothesized that Internet addiction would be associated with reduced levels of dopaminergic receptor availability in the striatum compared with controls. To test this hypothesis, a radiolabeled ligand [¹¹C]raclopride and positron emission tomography was used to assess dopamine D2 receptor binding potential in men with and without Internet addiction. Consistent with our prediction, **individuals with Internet addiction showed reduced levels of dopamine D2 receptor availability in subdivisions of the striatum including the bilateral dorsal caudate and right putamen. This finding contributes to the understanding of neurobiological mechanism of Internet addiction.**

2.1.1.4 [Liu, & Luo \(2015\)](#). Relationship between peripheral blood dopamine level and internet addiction disorder in adolescents: A pilot study. *International Journal of Clinical and Experimental Medicine*.

ABSTRACT: Objectives: To explore the association between peripheral blood dopamine level and internet addiction disorder (IAD) in adolescents, this could be used to explain the neurobiological mechanism of Internet addiction disorder. Methods: 33 adolescents with IAD diagnosed by Young's Internet Addiction Test (IAT) and 33 healthy controls matched by gender and age were investigated in the present study. Peripheral blood dopamine levels of the all subjects were determined by Enzyme Linked Immunosorbent Assay (ELISA).

RESULTS: The difference of peripheral blood dopamine level between adolescents with IAD and their controls had reached significant level ($t = 2.722, P < 0.05$). Furthermore, the plasma dopamine level was significantly correlated with the Internet Addiction Test score ($r = 0.457, P < 0.001$). **The result of rank correlation analysis showed a significant positive correlation between the plasma dopamine level and the weekly online time ($r = 0.380, P < 0.01$) and there was no significant correlation between the duration of Internet use and the plasma dopamine level ($r = 0.222, P > 0.05$).** Binary logistic regression analysis showed that DA level and weekly online time were significant variables which contribute to internet addiction.

CONCLUSIONS: The peripheral blood dopamine level is associated with adolescents' internet addiction. The present study provided new evidence in favor of the hypothesis that dopamine played an important role in IAD.

2.1.1.5 [Haynes \(2018\)](#). Dopamine, Smartphones & You: A battle for your time. *Science in the News*.

EXCERPT: Dopamine is a chemical produced by our brains that plays a starring role in motivating behavior. It gets released when we take a bite of delicious food, when we have sex, after we exercise, and, importantly, when we have [successful social interactions](#). In an evolutionary context, it rewards us for beneficial behaviors and motivates us to repeat them.

The human brain contains [four major dopamine “pathways.”](#) or connections between different parts of the brain that act as highways for chemical messages called neurotransmitters. Each pathway has its own associated cognitive and motor (movement) processes. Three of these pathways—the mesocortical, mesolimbic, and nigrostriatal pathways—are considered our “reward pathways” and [have been shown](#) to be dysfunctional in most cases of addiction. They are responsible for the release of dopamine in various parts of the brain, which shapes the activity of those areas. The fourth, the tuberoinfundibular pathway, regulates the release of a hormone called [prolactin](#) that is required for milk production.

While the reward pathways (Figure 1) are distinct in their anatomical organization, all three become active when anticipating or experiencing rewarding events. In particular, they reinforce the association between a particular stimulus or sequence of behaviors and the feel-good reward that follows. Every time a response to a stimulus results in a reward, these associations become stronger through a process called long-term potentiation. This process strengthens [frequently used connections](#) between brain cells called neurons by increasing the intensity at which they respond to particular stimuli. Although not as intense as hit of cocaine, positive social stimuli will similarly result in a release of dopamine, reinforcing whatever behavior preceded it. Cognitive neuroscientists [have shown](#) that rewarding social stimuli—laughing faces, positive recognition by our peers, messages from loved ones—activate the same dopaminergic reward pathways. **Smartphones have provided us with a virtually unlimited supply of social stimuli, both positive and negative. Every notification, whether it’s a text message, a “like” on Instagram, or a Facebook notification, has the potential to be a positive social stimulus and dopamine influx.**

[What are we missing?]

2.2 EVIDENCE AND ESSAYS INDICATING THAT THERE IS LITTLE OR NO ADDICTION

2.2.1 [Thomson, Hunter, Butler, & Robertson \(2021\)](#). Social media ‘addiction’: The absence of an attentional bias to social media stimuli. *Journal of Behavioral Addictions*.

ABSTRACT: BACKGROUND: Social media use has become a ubiquitous part of society, with 3.8 billion users worldwide. While research has shown that there are positive aspects to social media engagement (e.g. feelings of social connectedness and wellbeing), much of the focus has been on the negative mental health outcomes which are associated with excessive use (e.g. higher levels of depression/anxiety). While the evidence to support such negative associations is mixed, there is a growing debate within the literature as to whether excessive levels of social media use should become a clinically defined addictive behaviour.

METHODS: Here we assess whether one hallmark of addiction, the priority processing of addiction related stimuli known as an ‘attentional bias’, is evident in a group of social media users (N = 100). Using mock iPhone displays, we test whether social media stimuli preferentially capture users’ attention and whether the level of bias can be predicted by platform use (self-report, objective smartphone usage data), and whether it is associated with scores on established measures of social media engagement (SMES) and social media ‘addiction’ severity scales (BSNAS, SMAQ).

RESULTS: Our findings do not provide support for a social media specific attentional bias. While there was a large range of individual differences in our measures of use, engagement, and ‘addictive’ severity, these were not predictive of, or associated with, individual differences in the magnitude of attentional capture by social media stimuli.

CONCLUSIONS: More research is required before social media use can be definitively placed within an addiction framework.

2.2.2 [Anderson, & Wood \(2021\)](#). Habits and the electronic herd: The psychology behind social media’s successes and failures. *Consumer Psychology Review*.

ABSTRACT: If platforms such as Facebook, Instagram, and Twitter are the engines of social media use, what is the gasoline? The answer can be found in the psychological dynamics behind consumer habit formation and performance. In fact, the financial success of different social media sites is closely tied to the daily-use habits they create among users. We explain how the rewards of social media sites motivate user habit formation, how social media design provides cues that automatically activate habits and nudge continued use, and how strong habits hinder quitting social media.

Demonstrating that use habits are tied to cues, we report a novel test of a 2008 change in Facebook design, showing that it impeded posting only of frequent, habitual users, suggesting that the change disrupted habit automaticity. Finally, we offer predictions about the future of social media sites, highlighting the features most likely to promote user habits.

2.2.3 [Anderson & Wood \(2021\)](#). No, you are not addicted to your digital device, but you may have a habit you want to break. *USC Dornsife*.

EXCERPT: Apparently, for youth, being connected online is akin to an addictive substance: “There are only two industries that call their customers ‘users’: illegal drugs and [software](#),” as information design expert Edward Tufte has put it.

Popular media [fuels this portrait](#), with [testimonials](#) from [extreme users](#) and highlights of their [behavior](#). So-called [addicts](#) who [changed their lives](#) through [digital detox](#) confess that social media was [killing](#) them. The [health care industry](#) has capitalized on this [digital detox](#) trend, depicting extreme use as the norm. Scholars, too, debate ways to define and prevent addiction to digital media.

It’s a mistake, however, to equate frequent social media use with addiction. Just the label carries stigma – a personal failing or pathology that has significant negative outcomes to the user and their family, such as lost jobs and destroyed relationships. **[As researchers who study habits and social media use, we have found that excessive social media use can be a very strong habit. But that doesn’t make it an addiction.](#)**

The upside of social media

Unlike addiction, frequent social media users sometimes [benefit](#) and sometimes [suffer](#). That’s why a more accurate description is “[habit](#).”

Habits form naturally through repeated use. Use any site or app enough, and you’ll form associations in memory between cues, such as site alerts and your smartphone, and

responses, such as logging on. Once habits have formed, perception of cues automatically makes you think of logging on.

Creating user habits is central to the business of social media platforms like Facebook, TikTok and Twitter. [Their revenue rises from high-frequency users](#). Lots of infrequent users either have no effect on revenue or are a drag on the bottom line. User habits are integral to the success and design of social media platforms.

Most of us start using social media because it is rewarding. The likes, follows and friends we accumulate are all rewards. Take Instagram: Almost 70% of user postings can be explained by a [reward-learning model](#) in which likes are analogous to the food pellets that teach rats to pull a lever in a [Skinner box](#). Get enough likes on your posts, and you will start to post more often and create an Instagram posting habit.

Social media platforms have figured out how to make pallid [online rewards](#) as real to humans as food pellets are to rats. Likes and followers gain fuel when they become public. Users then engage in social comparisons, feeling good when they [gain social recognition and bad when others' accomplishments diminish their own](#). Social pressure is part of the experience.

Even more rewards come from the algorithms that curate our social media sites to appeal to our personal interests. This is the source of [echo chambers](#), creating a cheering crowd for most everyone.

...Once habits have formed, recurring cues – like notifications and the usual places and times that we use the app – trigger social media use. If you repeatedly scroll your Twitter feed while riding the bus, for example, then you may find that your Twitter habit is activated merely by sitting down on the seat.

Habits function largely outside of our conscious awareness and your intentions. But once in a while, you come up against your habits and realize they are there. Frequent social media users might experience habits like this during a phishing attack. Frequent users should be most knowledgeable about security risks and how to avoid them, but acting habitually and responding without thinking made these users [vulnerable to responding automatically to phishing attacks](#). These moments allow us to “see” our habits up close.

A more empowering narrative for social media users

Habits also explain why the addiction model, though inaccurate, is pervasive. Habits keep people automatically using social media [even when intending to do otherwise](#). When users find it hard to quit, they may feel addicted. Users adopt narratives validating feelings of addiction and share these widely. However, these narratives actually disempower users. They inhibit our understanding of how to stop or control social media use.

Understanding habits allows us to [reverse engineer our way out of social media's behavioral traps](#). In other words, we can change the cues that activate our habits. Without those cues, habits are simply not activated. But cues that trigger habits are also their Achilles' heel.

Consider the findings from our [analysis](#) of more than 9,000 Facebook users. After a change in site design, those with strong habits immediately reduced their posting rates. The changes in platform cues appeared to disrupt habitual users. They didn't show the cravings you'd expect with addiction. They just used it less. In contrast, the design change – which was implemented to increase posting – did just that for occasional users.

You can take advantage of this Achilles' heel yourself. Try modifying or eliminating cues from your smartphone and apps, including turning the phone screen face down, putting it on airplane mode or turning off notifications.

It can also help to add friction so that you have to think before you log on. Students in a [recent study](#) were able to decrease social media use by simply putting their phone charger farther away or making their phone less accessible by putting it in their purse rather than pants pocket.

So, that hated lock-box for smartphones during family dinners might actually work. By understanding habits, we all can stop worrying about digital detox and start reengineering apps and websites to meet our own needs as opposed to the sites' needs – which is to build a habitual user base. And we can get on with ameliorating the real challenges of social media: [misinformation](#), [biased algorithms](#) and the [destructions they create](#).

2.2.4 [Robertson, Hunter, & Butler \(2021\)](#). Why your social media habit is probably not an addiction – new research. *The Conversation*.

EXCERPT: Addictive behaviours for both chemical substances (such as alcohol) and non-chemical substances (such as gambling) give rise to similar symptoms and behaviours. One of the most prominent of these addictive characteristics is an

“[attentional bias](#)” to addiction related objects, images, and paraphernalia. Those addicted to smoking, for example, are more likely to have their attention captured by cigarettes and other smoking related stimuli.

In our new research, led by University of Strathclyde student Katie Thomson, we sought to assess whether this kind of attentional bias was evident in social media users. We presented 100 participants with mock iPhone displays, and asked them to detect a target app (Siri or camera) as quickly and as accurately as they could, while trying hard to ignore the other apps in the display.

On some of the experimental trials, the “distractor apps” were not social media apps at all. In others, one of the distractors was the social media app icon of one of the main platforms – Facebook, Twitter, Instagram, Snapchat. In another condition, we overlaid these social media distractors with the red notification symbol.

The purpose of this was to assess whether users who reported the greatest level of use and engagement with social media were more likely to have their attention captured by the social media distractor apps – with or without notifications – compared to those who displayed more typical levels of use. This would have demonstrated an attentional bias to social media related stimuli.

However, our findings didn’t support the presence of an attentional bias – a key characteristic of addictive behaviour. We did not find, for example, that those who checked and posted on Facebook ten times a day were any more likely to have their attention captured by the Facebook distractor app – with notifications or not – than someone who only posted and checked their Facebook account once a week.

2.2.5 [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.

2.2.6 [Panova, & Carbonell \(2018\)](#). Is smartphone addiction really an addiction?
Journal of Behavioral Addictions.

ABSTRACT: AIMS: In light of the rise in research on technological addictions and smartphone addiction in particular, the aim of this paper was to review the relevant literature on the topic of smartphone addiction and determine whether this disorder exists or if it does not adequately satisfy the criteria for addiction.

METHODS: We reviewed quantitative and qualitative studies on smartphone addiction and analyzed their methods and conclusions to make a determination on the suitability of the diagnosis “addiction” to excessive and problematic smartphone use.

RESULTS: **Although the majority of research in the field declares that smartphones are addictive or takes the existence of smartphone addiction as granted, we did not find sufficient support from the addiction perspective to confirm the existence of smartphone addiction at this time. The behaviors observed in the research could be better labeled as problematic or maladaptive smartphone use and their consequences do not meet the severity levels of those caused by addiction.**

DISCUSSION: Addiction is a disorder with severe effects on physical and psychological health. A behavior may have a similar presentation as addiction in terms of excessive use, impulse control problems, and negative consequences, but that does not mean that it should be considered an addiction. We propose moving away from the addiction framework when studying technological behaviors and using other terms such as “problematic use” to describe them. We recommend that problematic technology use is to be studied in its sociocultural context with an increased focus on its compensatory functions, motivations, and gratifications.

TO ADD:

+social media apps are addictive, causing a loss of short-term attention

CHT: “30% of 18-44 year olds feel anxious if they haven’t checked Facebook in the last 2 hours, according to a recent survey of over 2,000 American adults that indicates a high incidence of potential Facebook addiction warning signs. In fact, many are so hooked that 31% report checking it while driving and 16% while making love.”

[Source: . 2020. Honest Data ↗](#)

[What are we missing?]

2.3 ILLUSTRATIONS

2.3.1

https://www.reddit.com/r/nosurf/comments/wp5ifd/the_hold_social_media_has_on_gen_z_is_terrifying/

EXCERPT: But the way I used to be addicted to instagram and other things like that in high school is very disturbing to me. It scares me that my generation lives their lives online getting superficial validation from likes, and wasting their lives away scrolling. It scares me how much *I* did that, and still do it. I had a crippling internet addiction for a long time, and I still do.

2.3.2

<https://www.dukechronicle.com/article/2020/10/deleting-the-twitter-app-saved-my-mental-health>

EXCERPT: Most of us are quite literally addicted to social media. This addiction manifests in the same way as any other addiction, **controlling our moods, creating withdrawals, shaping our mental health.** For people my age, we were the **trial generation for this new invention.** When I got my first taste of virality, I could not stop checking my notifications. Favorite after favorite, retweet after retweet, quote after quote. I personally did not even find that tweet to be my funniest, but I was thoroughly entertained by the validation and attention I was receiving. I experienced on a larger scale the feeling we all get when someone likes or comments on our posts. We may feel heard, proud of our words or validated by strangers who relate to us. There are so many drivers to the psychological forces of social media, but most center around being perceived by others in a positive light.

2.3.3

<https://www.buzzfeed.com/cameronwilson/tiktok-eating-disorder-videos-algorithm-for-you-page>

EXCERPT: "The nature of any [eating disorder] is just very competitive," Lily said to BuzzFeed News in a message. "You always want to be the skinniest, you always want to lose even more weight, you're always comparing yourself."

2.3.4

<https://www.walesonline.co.uk/news/uk-news/i-addicted-tiktok-ruined-life-23923749>

EXCERPT: She said: "I had used social media quite intensively in the past, like most members of my generation. I had a Facebook page, a Twitter account but was most active on Instagram, where I would post regular updates which eventually attracted thousands of followers. I suppose I found Instagram quite addictive but it never became a problem in my life. Then along came TikTok."

Before long, Rebecca said, she was spending "every free minute" on TikTok. She would upload and watch videos during university sessions when she should have been paying attention.

She added: "When these were streamed during lockdown, that became even easier. I withdrew from social engagements to spend time alone devouring TikTok content."

Doesn't it piss you off that huge swaths of your life have been ruined - missed opportunities, wasted time, fucked-up memory and attention span, bitter and anxious from chronic sleep deprivation - all because some morally bankrupt psychologists decided to help line the pockets of a select few Silicon Valley assholes?

Beating yourself up for being "weak" and having this problem does you no favors. It only gets you further hooked, because you binge more to numb yourself from having to realize that you have wandered freely into this cage and enthusiastically turned the key yourself.

--[Post on Reddit](#), in the /nosurf community, for people who are "focused on becoming more productive and wasting less time mindlessly surviving the internet"

SECTION 3: THE EFFECTS OF DIGITAL MEDIA USE ON PHYSICAL HEALTH AND DEVELOPMENT

This section collects essays and research on whether smartphones in general, or social media in particular, cause users to develop physical health issues, including sleep disorders, eyesight damage, weight gain, disruptions in anatomical development, and early-onset puberty. We do not include studies that focus on video games or porn. You can find studies on the effects of video game use in sections 6 and 7 of our Video Game Collaborative Review doc, and you can find studies on the effects of pornography in section 4 and 5 of our Online Porn Collaborative Review doc.

3.1 SLEEP DEPRIVATION

3.1.1 EVIDENCE AND ESSAYS SHOWING HARMS

3.1.1.1 [Lemola, Perkinson-Gloor, Brand, & Dewald-Kaufman \(2014\)](#). Adolescents' Electronic Media Use at Night, Sleep Disturbance, and Depressive Symptoms in the Smartphone Age. *Journal of Youth and Adolescence*.

ABSTRACT: Adolescence is a time of increasing vulnerability for poor mental health, including depression. Sleep disturbance is an important risk factor for the development of depression during adolescence. Excessive electronic media use at night is a risk factor for both adolescents' sleep disturbance and depression. To better understand the interplay between sleep, depressive symptoms, and electronic media use at night, this study examined changes in adolescents' electronic media use at night and sleep associated with smartphone ownership. Also examined was whether sleep disturbance mediated the relationship between electronic media use at night and depressive symptoms. 362 adolescents (12-17 year olds, M = 14.8, SD = 1.3; 44.8 % female) were included and completed questionnaires assessing sleep disturbance (short sleep duration and sleep difficulties) and depressive symptoms. Further, participants reported on their electronic media use in bed before sleep such as frequency of watching TV or movies, playing video games, talking or text messaging on the mobile phone, and spending time online. **Smartphone ownership was related to more electronic media use in bed before sleep, particularly calling/sending messages and spending time online compared to adolescents with a conventional mobile phone. Smartphone ownership was also related to later bedtimes while it was unrelated to sleep disturbance and symptoms of depression. Sleep disturbance partially mediated the relationship**

between electronic media use in bed before sleep and symptoms of depression. Electronic media use was negatively related with sleep duration and positively with sleep difficulties, which in turn were related to depressive symptoms. Sleep difficulties were the more important mediator than sleep duration. The results of this study suggest that adolescents might benefit from education regarding sleep hygiene and the risks of electronic media use at night.

EXTRACT: “The level of electronic media use before bedtime is significantly correlated with depression in adolescence. **Measurements from several hundred teenagers indicate that this is primarily due to the impact on sleep: compared to video game players, teens with high levels of social media use experienced greater sleep difficulties, which in turn strongly correlated with higher levels of depression.**”

--With regard to their electronic media consumption in general, they spent more time on the Internet and on Facebook, and they sent several times more text messages per day, while they did not spend more time watching TV or playing video games. Regarding their electronic media use in bed before sleep, they more often watched videos, communicated by phone or text message, more often spent time online, and more often had their phones switched on during the night, while they did not significantly differ regarding video game playing in the bed. Furthermore, **smartphone owners switched off the lights later at night than their peers with conventional mobile phones, while they did not differ significantly regarding sleep duration, sleep difficulties, and symptoms of depression.** [for all kids, all apps]

3.1.1.2 [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.

3.1.1.3 [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.

3.1.1.4 [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.

3.1.1.5 [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 them weekly surveys on sleep quality. **Tweeting more frequently on weekday late nights was associated with lower sleep quality ($\beta = -0.937$, SE = 0.352); tweeting more frequently on weekday evenings was associated with better quality sleep ($\beta = 0.189$, SE = 0.097).** Tweets during the weekday that were labeled related to the emotion of fear were associated with lower sleep quality ($\beta = -0.302$, 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.

3.1.1.6 [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.

TABLES:

Table 2. Summary of findings

Author	Sleep measures	Mental health measures	Social media use measures	Main Findings
Adams and Kislir, 2013 ⁴⁶	Sleep quality ^a (Pittsburgh sleep quality index, PSQI), sleep patterns ^a (sleep diaries)	Depressive ^a symptoms (Beck depression index, BDI), anxiety (Adult manifest anxiety scale)	Technology use: number of times awakened to answer calls/texts, ^a time awake after each occurrence ^a (sleep diaries)	Associations between frequent technology with depressive and anxiety symptoms (sleep quality may mediate relationship), total awake time with poor sleep quality and depression and anxiety with poor sleep quality
Belanger et al, 2011 ⁴⁷	Sleep quantity ^b (self-reported)	Presence of depression ^b (Depressive tendencies scale)	Intensity of Internet use ^a (self-reported)	Females: High internet users associated with higher depressive scores and poor sleep Males: High internet users associated with higher depressive scores
Bhandjari et al, 2017 ⁴⁸	Sleep quality ^{a,c} (PSQI)	Depressive symptoms ^a (Patient health questionnaire-9, PHQ-9)	Internet use ^{a,d} (Young's internet addiction test, YIAT)	Associations between high internet use with depressive symptoms (30.9% mediated by sleep quality) and poor sleep quality with depressive symptoms (16.3% mediated by internet addiction)
Brunborg et al, 2011 ⁴⁹	Sleep habits ^b (self-reported sleep time and duration), insomnia (Bergen insomnia scale)	Symptoms of anxiety ^a and depression ^a (Hospital anxiety and depression Scales, HADS)	Media use ^a (self-reported mobile and other device use frequency)	Positive association between anxiety and media use. Negative association between anxiety and depression with sleep habits
Chen et al, 2017 ⁵⁰	Sleep quality ^{a,c} (PSQI)	Anxiety symptoms ^{a,d} (Zung self-rating anxiety scale, SAS), depressive symptoms ^{a,b} (Center of epidemiological studies-depression scale, CES-D)	Smartphone addiction ^{a,b} (Smartphone addiction scale, SAS- short version)	Females: Smartphone addiction associated with anxiety, depression and poor sleep quality Males: Smartphone addiction associated with anxiety and poor sleep quality
Cheung and Wong, 2011 ⁵¹	Insomnia ^{a,d} (PSQI)	Depression ^a (General health questionnaire, GHQ-12)	Internet addiction ^a (Chinese internet addiction scale)	Associations between internet use with depression (sleep quality may mediate relationship) and sleep quality and insomnia with depression.
Demirci et al, 2015 ⁵²	Sleep quality ^{a,c} (PSQI)	Depression ^{a,d} (BDI), anxiety ^{a,b} (Beck anxiety inventory)	Smartphone use ^a (Smartphone addiction scale, SAS ⁹)	Associations between high smartphone use with depressive and anxiety symptoms and with poor sleep quality
Dewi et al, 2018 ⁵³	Sleep disturbance ^a (Insomnia severity index, ISI)	Depressive symptoms ^a (Kutcher adolescent depression scale)	Duration of smartphone use at night ^a (self-reported)	Positive association between smartphone use with depressive symptoms and sleep problems
Do et al, 2013 ⁵⁴	Sleep duration on weekday ^a (self-reported)	Depressive symptoms ^a (self-reported)	Time (in minutes) spent on internet ^a (self-reported)	Association between shorter sleep duration with increased depressive symptoms among high internet user
Eyvazlou et al, 2016 ⁵⁵	Sleep quality ^a (PSQI)	Anxiety, ^{a,b} severe depression ^{a,b} (GHQ-12)	Overuse of mobile phones ^{a,b} (Cell phone overuse scale)	Associations between high mobile phone use with greater sleep problems and poor sleep quality with depression and anxiety
Hokby et al, 2016 ⁵⁶	Sleep loss ^{a,c} (self-reported)	Depression, ^a stress, ^a anxiety ^a (Depression anxiety stress scale-42, DASS-42)	Internet use and behavior (self-reported)	Associations between internet use with increased sleep loss and sleep loss from internet use with changes in mental health over time
Ikeda and Nakamura, 2014 ⁵⁷	Hours sleeping ^a (self-reported)	Depressed ^a and anxious mood ^a (Mood inventory)	Hours of mobile phone use ^a (self-reported)	Associations between high mobile phone use with increased depression after adjusting for covariates (males and females) and high mobile phone use with increased depressed mood and anxious mood (among males but not females)
Islam and Hossin, 2016 ⁵⁸	Sleep duration ^a (self-reported)	Psychological distress ^a (GHQ-12)	Problematic internet use ^a (YIAT)	Association between high problematic internet use with psychological distress
Kadam et al, 2016 ⁵⁹	Sleep quality ^a (PSQI)	Depressed feelings ^a (self-reported)	Mobile messaging applications measured as lifestyle factors ^a (self-reported)	Associations between sleep disturbances with higher frequency of mobile messaging and increased feelings of depression
Kilazgwa et al, 2018 ⁶⁰	Sleep quality ^a (PSQI)	Depressive Symptoms ^a (CES-D), anxiety (Trait subscale of state-trait anxiety inventory)	Internet use ^a (YIAT)	Associations between depressive state, anxiety tendencies and poor sleep quality with problematic internet use

Kojima et al, 2019 ³⁸	Degree of sleepiness upon awakening, ^a bedtime ^c (self-reported)	Depressive symptoms ^a (Birlleson depression self-rating scale)	Internet use ^{bc} (YIAT)	Positive associations between depressive symptoms, late bedtime and daytime sleepiness are positively associated with problematic internet use
Kooteh et al, 2016 ³⁷	Sleep quality ^{ao} (PSQI)	Anxiety ^{ao} (Mental health checklist)	Internet addiction ^{ao} (YIAT)	High internet use is positively associated with anxiety and poor sleep quality
Lam and Peng, 2010 ^{39d}	Sleeping hours ^e (self-reported)	Anxiety ^f (SAS), depression ^g (Zung Self-rating Depression Scale, SDS)	Internet use ^h (YIAT)	Positive association between pathological internet use and depression. No relationship between internet use and anxiety
Lange et al, 2017 ³⁸	Insomnia ⁱ (self-reported)	Anxiety, ⁱ depressive symptoms ^c (Emotional problems subscale of strengths and difficulties questionnaire)	Mobile phone and computer/internet use ^d (self-reported)	Increased computer/internet use associated with insomnia complaints among males
Lemola et al, 2014 ³⁹	Sleep duration ^f (self-reported), sleep difficulties (ISI)	Depressive symptoms ^h (CES-D-German)	Electronic media use ^f (before bedtime), general daily duration of electronic media use ^f (self-reported)	Associations between media use with depressive symptoms (sleep may mediate relationship) and sleep difficulties
Li et al, 2017 ³⁷	Insomnia ^o (PSQI)	Depression ^o (CES-D)	Internet addiction ^l (Younes's diagnostic questionnaire), social networking addiction ^l (Online social networking addiction scale)	Associations between internet addiction and online social networking with depression (insomnia may mediate this relationship) and insomnia with depression
Liu et al, 2019 ⁴⁰	Sleep quality ^o (PSQI), weekday/weekend sleep patterns (self-reported)	Depressive symptoms ^o (BDI), anxiety (SAS)	Duration of mobile phone use per day ^o (self-reported)	Long-time mobile phone use at baseline is associated with depressive and anxiety symptoms at follow-up. Long-time mobile phone use is negatively and bidirectionally associated with weekday sleep duration; positively and bidirectionally associated with weekend sleep duration and compensation
Mamun and Griffiths, 2019 ⁴³	Sleep duration per day ^o (self-reported)	Depressive symptoms ^o (PHQ-9)	Facebook addiction risk ^o (Bergen facebook addiction scale), amount of time spent on Facebook (self-reported)	Associations between increased depressive symptoms and sleep disturbances with Facebook Addiction
Mamun et al, 2019 ⁴²	Sleep duration ^o (self-reported)	Depression, ^o anxiety, ^o stress ^o (DAAS-21)	Problematic internet use ^o (YIAT)	Associations between problematic internet use with depression, anxiety and stress. No relationship between sleep duration and internet use
Nishida et al, 2019 ³⁹	Hours sleeping ^e (self-reported)	Depression ^o (CES-D)	Hours of smartphone use ^e (self-reported)	Associations between high smartphone use with depression among females but not males. No relationship between smartphone use and sleep
Park et al, 2018 ³⁷	Sleep problems ^o (ISI), sleep-wake patterns (School sleep habits survey, School-SHS)	Depressive symptoms ^o (Children's depression inventory)	Internet use ^o (YIAT)	Depressed group: decrease in sleep problems are associated with increased internet use (depression may moderate this relationship) Non-depressed group: increase in sleep problems are associated with increase in internet use
Peltzer and Pengpid, 2015 ³⁷	Sleep duration ^o (self-reported)	Depressive symptoms (CES-D)	Time of internet use ^o (self-reported)	Associations between high internet use with severe depressive symptoms and irregular sleep duration with depressive symptoms
Rod et al, 2018 ⁴⁰	Sleep duration, ^o sleeping problems, ^o tiredness ^o (self-reported), sleep disturbances (Karolinska sleep questionnaire)	Anxiety, ^o depressive state ^o (self-reported), depressive symptoms ^o (Major depression inventory)	Smartphone activity during sleep ^o (smartphone use data), smartphone-interrupted sleep ^o (self-reported)	Associations between more frequent smartphone-interrupted sleep with shorter sleep duration. No differences in mental health symptoms between those with and without smartphone-interrupted sleep
Rosen et al, 2016 ³⁹	Sleep problems ^o (Medical problems study sleep measure)	Anxiety, ^o dependence related to being without phone ^o (Media and technology usage and attitudes scale)	Daily smartphone usage ^o (subscale of media and technology usage and attitudes scale)	Associations between higher anxiety/dependence with higher daily smartphone usage and increased sleep problems.
Seo et al, 2017 ⁴⁰	Sleep habits, ^o duration, weekday and weekend bedtime ^o (self-reported), sleep disturbances ^o (Global sleep assessment questionnaire)	Depression ^o (BDI)	Media use-related variables, use of media on weekdays and before sleep, ^o types of media used ^o (self-reported)	Associations between later media use with increased depression (sleep may mediate this relationship) and increased sleep duration and increased sleep duration with decreased depression

Soni et al, 2017 ⁷⁷	Sleep quality ^{a,c} (PSQI)	Psychological distress ^{a,c} (GHQ-12), depression, ^{a,b} anxiety, ^{a,b} stress ^{a,b} (DASS-21)	Smartphone use ^{a,c} (SAS ^a)	Associations between increased smartphone use with increased depression, anxiety and poor sleep quality
Tamura et al, 2017 ⁷²	Insomnia ^a (Athens Insomnia Scale)	Depression ^a (CES-D)	Mobile phone use ^a (self-reported)	Associations between increased mobile phone use with social networking sites, online chat and insomnia
Tan et al, 2016 ⁶⁹	Sleep quality ^a (PSQI)	Depressive symptoms ^{a,c} (CES-D)	Problematic internet use ^{a,c} (YIAT), duration and impact of internet use (self-reported)	Associations between problematic internet use with increased depressive symptoms and sleep disturbance (depression may mediate this relationship) and depressive symptoms with sleep disturbance (internet use may mediate this relationship)
Tao et al, 2017 ⁸⁶	Sleep quality ^{a,c} (PSQI)	Anxiety symptoms ^a (SAS), depressive symptoms ^a (CES-D)	Mobile phone use ^{a,c} (Self-rating questionnaire for adolescent problematic mobile phone use)	Associations between problematic phone use with anxiety and depressive symptoms (sleep may moderate this relationship) and poor sleep quality.
Thomé et al, 2012 ⁵³	Sleep disturbances ^a (self-reported difficulties falling asleep, fragmented sleep, premature awakenings) – adapted from Karolinska sleep questionnaire	Depressive symptoms ^a and current stress ^a (adapted from Prime-MD)	Computer ^a and mobile phone use ^a (self-reported)	Females: computer use is positively associated with current stress, depressive symptoms, and sleep disturbances. Computer use causing sleep lost is associated with sleep disturbances, current stress and depression Males: computer use is positively associated with sleep disturbances. Computer use causing sleep lost associated with current stress
Vernon et al, 2018 ⁸⁹	Sleep behavior ^a (SSHS)	Depressed mood ^a (Questionnaire from Michigan life transitions)	Mobile phone use at night-time ^a (self-reported)	No association between changes in night-time mobile phone use with changes in depressed mood. Associations between higher mobile phone use at baseline is associated with poorer sleep behavior at follow up and poor sleep behavior with depressed mood
Visnjic et al, 2018 ⁸⁷	Sleep duration ^a (self-reported)	Depression, ^a anxiety, ^a stress ^a (DASS-42)	Manner and intensity of mobile phone use ^a (self-reported)	Associations between increased texting and less internet browsing with anxiety and depression and keeping the phone < 1 m away with increased stress and later bedtime with more internet browsing and texting
Volungis et al, 2019 ⁸⁸	Sleep quality ^a (PSQI)	Social Emotional Distress ^{a,c} (Outcome questionnaire-45.2, symptom distress subscale emphasizes depression and anxiety)	Smartphone use ^a (SAS ^a)	Associations between high smartphone use with increased depression, anxiety and poor sleep quality
Woods and Scott, 2016 ⁶¹	Sleep quality ^a (PSQI)	Anxiety ^a and depressive ^a symptoms (HADS)	Overall and night-time social media use ^a (self-reported)	Associations between high anxiety and depressive symptoms with increased social media use and poor sleep quality and night-time media use with poor sleep quality
Wu et al, 2015 ⁸⁴	Sleep quality ^a (self-reported)	Anxiety ^a (SAS) and Depression ^a (CES-D)	Hours of computer screen time ^a (self-reported)	Associations between high screen time with increased depressive and anxiety symptoms and poor sleep quality
Ye et al, 2016 ⁶²	Sleep quality ^a (PSQI)	Depression ^a (SDS), anxiety ^a (SAS)	Internet addiction ^a (YIAT)	Associations between internet addiction with anxiety and depression and sleep disturbance with anxiety and depression

Analysis of variables legend:

^a = Exposure, ^b = Outcome, ^c = Confounder, ^d = Mediator, ^e = Moderator

Abbreviations and acronyms:

BDI: Beck depression inventory, CES-D: Center of epidemiological studies-depression scale, DASS-42 (-21): Depression anxiety stress scale - 42 item (- 21 item), GHQ-12: General health questionnaire-12 item, HADS: Hospital anxiety and depression scale, ISI: Insomnia severity index, PHQ-9: Patient health questionnaire-9 item, PSQI: Pittsburgh sleep quality index, SAS: Zung self-rating anxiety scale, SAS^a: Smartphone addiction scale, SDS: Zung self-rating depression scale, SHS: Sleep habits survey (School), YIAT: Young's internet addiction test

3.1.1.7 [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.

3.1.1.8 [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.

3.1.1.9 [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.

3.1.1.10 [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.

3.1.1.11 [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 within person 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.

3.1.1.12 [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 discretionary 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:

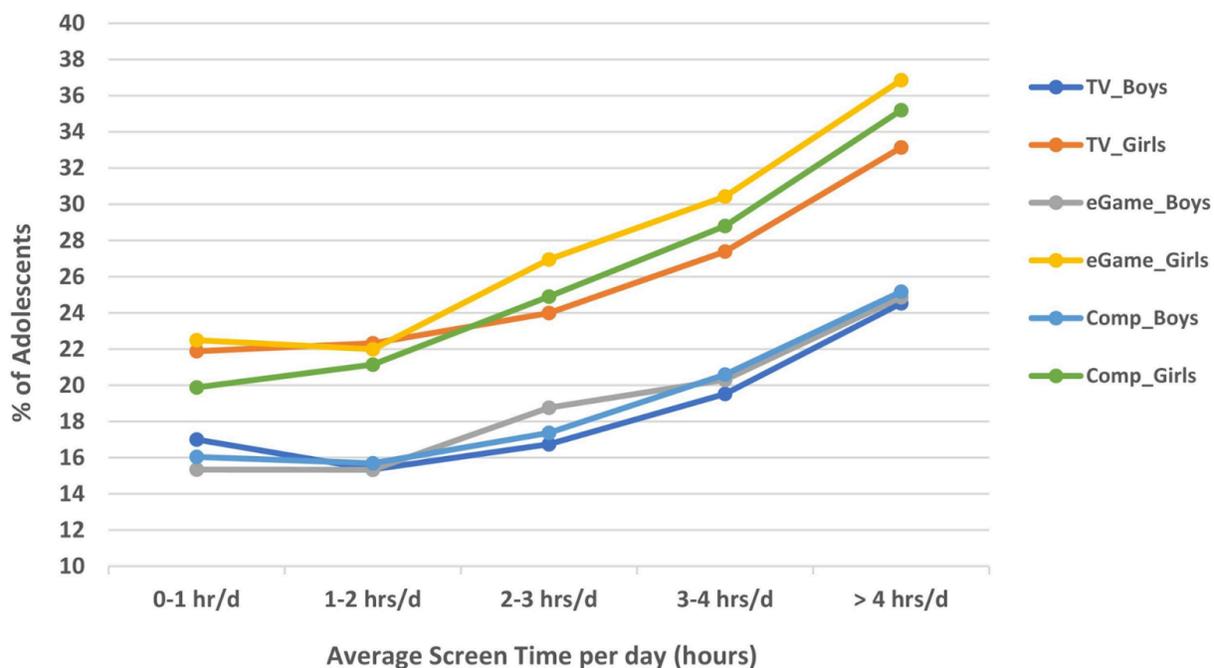


Fig. 1. Percent distribution of adolescents reporting sleep difficulties by different types of screen uses across gender, HBSC 2014.

3.1.1.13 [World Health Organization \(2019\)](#). Spotlight on adolescent health and well-being: Findings from the 2017/2018 health in school age children survey in Europe and Canada. Graphs created by Zach Rausch (see [spreadsheet](#)).

EXCERPT: This collection of key data is the second volume of the international report from the 2017/2018 Health Behaviour in School-aged Children (HBSC) study. It presents the data that underpin the summary of scientific findings presented in Volume 1, key findings (Inchley et al., 2020). HBSC is a WHO collaborative cross-national study of adolescent health and well-being (HBSC, 2020) which focuses on understanding young people's health in their social context – at home, at school, and with family and friends. The HBSC cross-national survey has been conducted every four years since 1983/1984 and has grown to include 50 member countries and regions across Europe and North America, and over 400 network members. Member countries and regions are responsible for funding and conducting the study at national level and contribute to the development of the international study through a network of topic focus groups and strategic development groups.

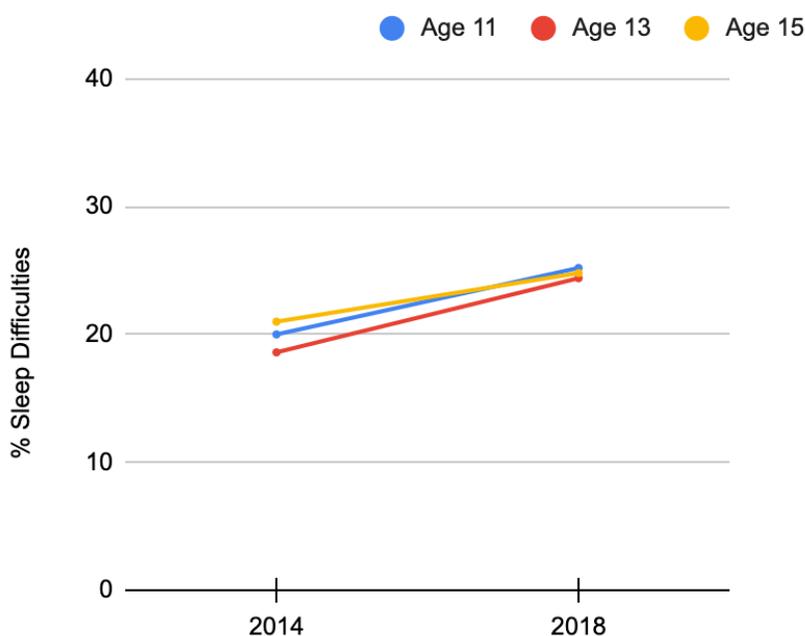
...Key data are presented in this collection disaggregated by country and region, age group, gender and family affluence for the **222,441 young people aged 11, 13 and 15 years from 45 countries and regions that participated in the 2017/2018 HBSC**

cross-national survey. Data from the previous international HBSC survey, carried out in 2013/2014, have also been included, when available, for easy assessment of key changes in young people's well-being and social circumstances. Four countries and regions did not participate in the 2013/2014 HBSC survey (Azerbaijan, Georgia, Kazakhstan and Serbia), so no data are presented for these countries for 2013/2014.

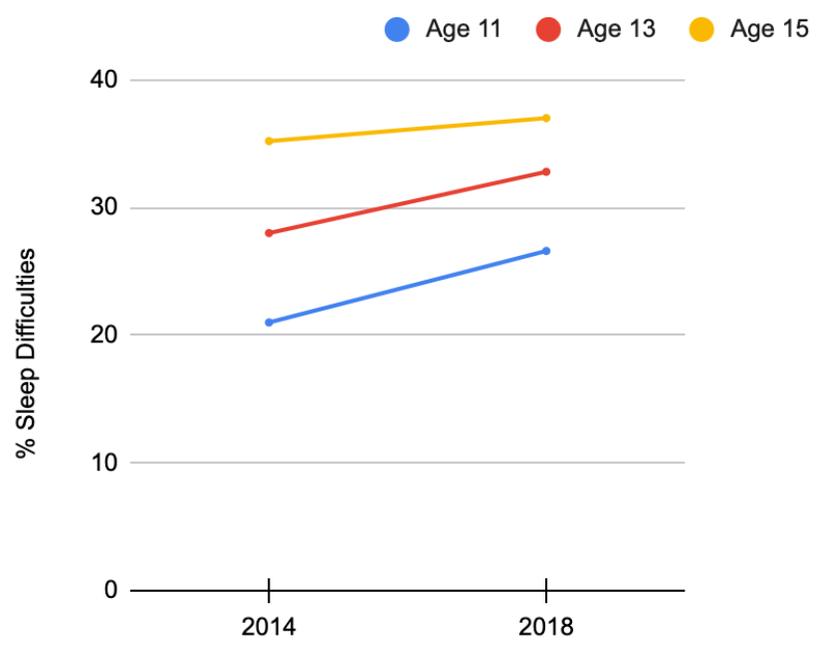
NOTE: The report collects data on many aspects of adolescent health. Below, we focus on reported data on sleep difficulties in adolescents who live in the Anglo-Saxon countries which were part of the study (For sleep measures, this includes England, Wales, Scotland, Canada, and Ireland).

MEASURE: Young people were asked how often they had experienced difficulties in getting to sleep in the last six months. Response options ranged from about every day to rarely or never. Findings presented here show the proportions who reported experiencing difficulties getting to sleep more than once a week.

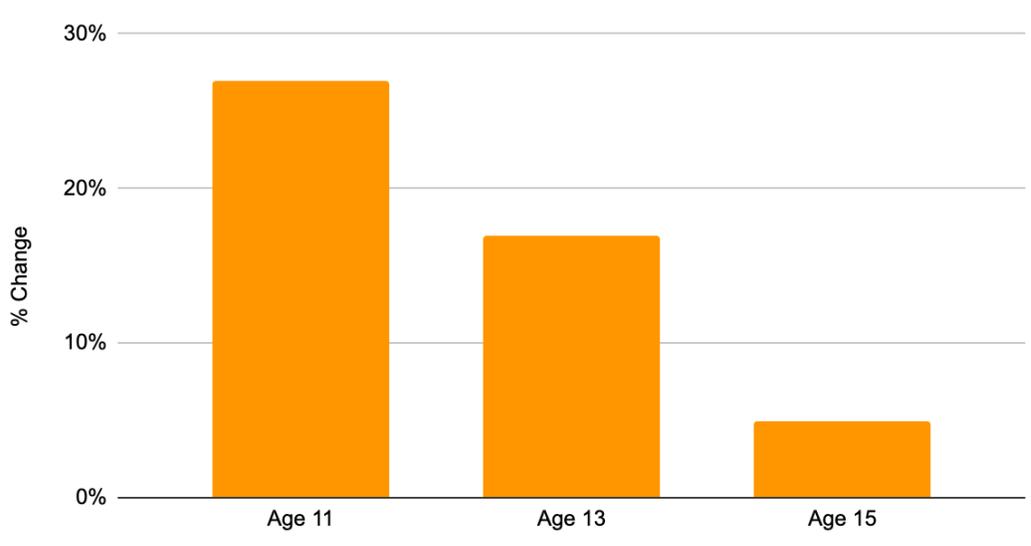
% of Anglo Boys With Sleep Difficulties at Least Once a Week



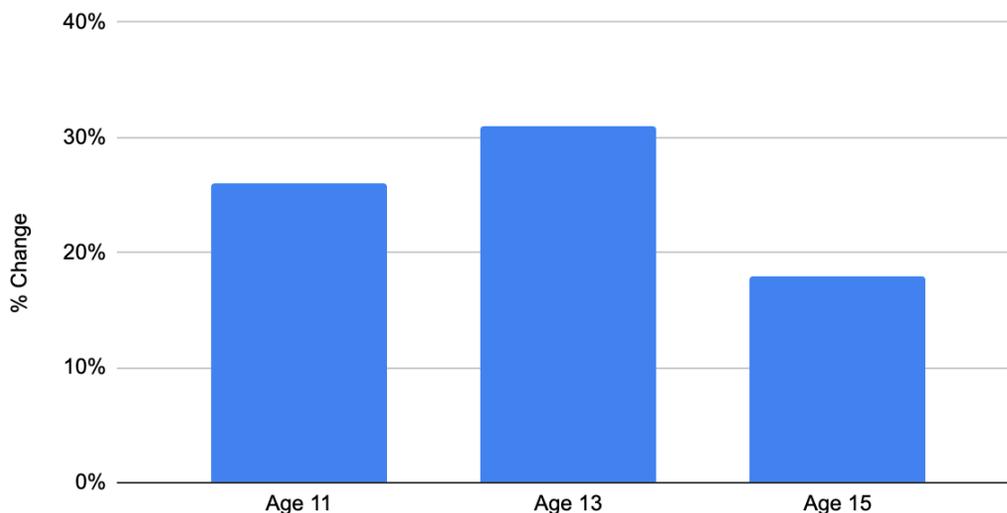
% of Anglo Girls With Sleep Difficulties at Least Once a Week



% Change In Female Sleep Problems (2014-2018), Anglo Countries



% Change In Male Sleep Problems (2014-2018), Anglo Countries



3.1.1.14 [Buda, Lukoševičiūtė, Šalčiūnaitė, & Šmigelskas \(2021\)](#). Possible Effects of Social Media Use on Adolescent Health Behaviors and Perceptions. *Psychological Reports*.

ABSTRACT: Social media use is one of the most popular leisure activities among adolescents. Concomitant to this is a growing concern regarding problematic social media use and its relationship with health behaviors. To further increase the body of research into this phenomenon, our study explored the relationship between problematic social media use and physical activity levels, sleep peculiarities, and life satisfaction in Lithuanian children and adolescents. The study was conducted in April to June 2018 during the Health Behaviour in School-aged Children survey in Lithuania, a collaborative project of the World Health Organization. The sample comprised 4,191 school children (mean age 13.9 ± 1.69 years). **The findings show that problematic social media use associates with about two times higher odds for worse sleep quality and lower life satisfaction. Problematic social media use was related to lower levels of vigorous physical activity in girls, but the possible effect on moderate physical activity was in boys and was inverse—boys with problematic social media use reported higher levels of moderate physical activity. Overall, in our study, girls with problematic social media use tended to have more negative health perceptions than boys.** The results suggest that problematic social media use is an independent risk factor for negative health behaviors. This study adds to the accumulating knowledge that problematic social media use among adolescents may lead to worse health perceptions and, likely, further negative health outcomes.

3.1.1.15 [Ozcan, & Acimis \(2021\)](#). Sleep Quality in Pamukkale University Students and its relationship with smartphone addiction. *Pakistan Journal of Medical Sciences*.

ABSTRACT: OBJECTIVES: Research shows that poor sleep quality and smartphone addiction are common problems among university students. This study was planned to evaluate the quality of sleep in students at Pamukkale University and to investigate its relationship with smartphone addiction.

METHODS: This cross-sectional study was carried out at the university campus in 2017-2018. Its dependent variable was low sleep quality. Independent variables were smartphone addiction, features related to smartphone addiction, socio-demographic features and other questioned features. The total number of students attending normal education in seven faculties and two colleges for four years was 20862. The minimum sample size of the study was calculated as 1088. Smartphone Addiction Scale-Short Version (SAS-SV) and Pittsburgh Sleep Quality Index (PSQI) were used. The data were analyzed with the SPSS program.

RESULTS: The mean age was of the participants 21.39 ± 2.21 . The sleep quality of students with a PSQI total score of more than five was defined as 'poor'. The frequency of poor sleep quality was 52.4%. The frequency of smartphone addiction was 34.6% according to the SAS-SV scale. **It was found that the frequency of poor sleep quality was significantly higher in students with smartphone addiction compared to others.**

CONCLUSION: Smartphone addiction was found as one of the risk factors for poor sleep quality.

3.1.1.16 [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.

[What are we missing?]

3.1.2 EVIDENCE AND ESSAYS SHOWING BENEFITS OR NO HARMS

3.1.2.1 [Orben, & Przybylski \(2020\)](#). 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 $\beta_{\text{weekday}} = -0.06$ and $\beta_{\text{weekend}} = -0.03$)**. There is a more negative association between digital engagement and total sleep time on weekdays compared to weekend days (median standardized $\beta_{\text{weekday}} = -0.08$, median standardized $\beta_{\text{weekend}} = -0.02$), 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.

3.1.2.2 [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.

EXCERPTS: To examine the predictive value of the dependent variables, regression analyses were performed. First, hierarchical multiple regression was conducted to determine whether screen time and pickups (frequency of screen activations) were predictive of sleep quality, while controlling for the confounding effect of age. Although **the results indicated that the model was significant ($F(2, 2025) = 15.14, p < .001$), it explained just 1.5% of the variance in PSQI scores (R^2 change = .015).** While screen time significantly contributed to the model ($\beta = .125, p < .001$), pickups did not ($\beta = -.034, p = .13$).

Second, hierarchical multiple regression was conducted to determine whether smartphone usage metrics (screen time and pickups) were predictive of objective sleep duration, while controlling for the effect of age. **This model, however, did not reach**

statistical significance ($F(2, 604) = 1.97, p = .14$), indicating that neither screen time nor pickups are predictive of objective sleep duration.

...This study has several limitations. **First, while all participants fell within the target age range of 15–24 years, just 11% were under the age of 18.** This skewed distribution resulted from the difficulty in obtaining informed consent from the parent(s) and/or guardian(s) of minors. The findings of the present study, therefore, are less generalisable to those under eighteen. Further research is required with participants under the age of 18. Second, the findings are not necessarily generalisable to any specific country since data were collected from respondents of 73 different nationalities. The third limitation is that the only objective sleep parameter collected in this study was total sleep time. Other parameters, such as sleep staging, sleep onset latency and wake after sleep onset, cannot yet be validly and reliably assessed using commercial sleep trackers (Lee et al. 2019; Liang and Martell 2018). It is plausible that PSU may have more pronounced effects on these sleep parameters. Therefore, future research efforts should explore this possibility with clinical-grade sleep trackers.

FIGURE:

Table 3. Partial correlations for PSQI, SAS-SV, MTQ-4Cs, pickups, screen time and objective sleep duration.

Control variable	Variables	1	2	3	4	5
Age	1. PSQI					
	2. SAS-SV	.21**				
	3. MTQ-4Cs	-.32**	-.37**			
	4. Pickups	-.00	.17**	.05**		
	5. Screen time	.12**	.36**	-.12**	.25**	
	6. Objective sleep duration	-.32**	-.06	.04	.00	-.08*

Note. ** Significant at $p < .01$ * Significant at $p < .05$.

[What are we missing?]

3.1.3 ILLUSTRATIONS

3.1.3.1

https://www.reddit.com/r/nosurf/comments/v2vp8h/im_really_at_my_wits_end_im_so_exhausted_of_this/

EXCERPT: Due to years of chronic sleep deprivation by choice, hardcore gaming addiction, hardcore Social media doom scrolling, hardcore procrastination addiction since age of 10, im now living the consequences of it, i became a textbook loser (literally 0 friends 0 graduation 0 job or gf 0 talent or skill) my brain cant function properly anymore cant focus or think cant process cant memorize anything cant imagine words carry 0 meanings because me and my brain have conflict of interest

[What are we missing?]

3.2 LETHARGY, ANATOMICAL HEALTH, AND EXERCISE DEPRIVATION

3.2.1 EVIDENCE AND ESSAYS SHOWING HARMS

3.2.1.1 [Jung, Lee, Kang, Kim, & Lee \(2016\)](#). The effect of smartphone usage time on posture and respiratory function. *Journal of Physical Therapy Science*.

ABSTRACT: PURPOSE: The aim of this study was to evaluate the changes in posture and respiratory functions depending on the duration of smartphone usage.

SUBJECTS AND METHODS: Participants were randomly allocated to 2 groups: group 1 (subjects who used smartphones for <4 hours/day, n=25) and group 2 (subjects who used smartphones for >4 hours/day, n=25). The craniovertebral angles of all participants were measured and scapular indices were calculated to assess the change in posture and forced vital capacity, forced expiratory volume in 1 second, the ratio of forced expiratory volume in 1 second to forced vital capacity, and peak expiratory flow were measured to assess changes in respiratory function.

RESULTS: **There were significant differences in the craniovertebral angle, scapular index, and peak expiratory flow depending on the duration of smartphone usage.**

CONCLUSION: **The result of this study showed that prolonged use of smartphones could negatively affect both posture and respiratory function.**

3.2.1.2 [Dayton \(2015\)](#). Teens' compulsive texting can cause neck injury, experts warn. *Chicago Tribune*.

EXCERPT: “mobile devices are typically held with the neck flexed forward at 60 degrees or greater” ... “He explains, “When you're eccentrically loading the spine, you're going to get cracks in the disks, slipped disks or herniated disks. This leads to stenosis or blockage of the spine.” ... “In addition, Fishman says, text-neck posture can lead to pinched nerves, arthritis, bone spurs and muscular deformations. “The head and shoulder blades act like a seesaw. When the head goes forward, the shoulder blades will flare out ... and the muscles start to change over time.”

[NOTE FROM HAIDT: THIS IS **ESPECIALLY IMPORTANT DURING PUBERTY** AND THE GROWTH SPURT, WHEN BONES ARE CHANGING RAPIDLY]

3.2.1.3 [Betsch... & Migliorini \(2021\)](#). The influence of smartphone use on spinal posture
– A laboratory study. *Gait & Posture*.

ABSTRACT: BACKGROUND: Smartphones have become increasingly more popular and complicated tasks can be performed with these devices. However, the increasing use is associated with shoulder and neck pain, as well as with psychological addiction. RESEARCH QUESTION: Do different smartphone tasks lead to changes in spinal posture and pelvic position? Is there a relationship between smartphone addiction and changes in posture?

METHODS: A cross-sectional study including 50 participants was performed. Test subjects completed the Smartphone Addiction Scale and the SF-36 health questionnaire. Subjects spinal posture and pelvic position during different smartphone tasks were measured through a surface topography system. The different tasks were: standing in an upright position, simulating a phone call, texting with one or two hands during standing or while walking on a treadmill. Paired T-tests and ANOVA tests were performed to evaluate differences. The Kendall rank test was used to investigate the association between clinical scores and changes in spinal posture.

RESULTS: All smartphone tasks lead to a significant increase in thoracic kyphosis and trunk inclination during standing and while walking. A significant increased lumbar lordosis was also found. Texting with one or two hands correlated with increased surface rotation. No associations between smartphone addiction and changes of the spinal posture were reported.

SIGNIFICANCE: This represents the first surface topography study that investigated the influence of different smartphone tasks on the spinal posture and pelvic position during standing and while walking. With the results of this study we demonstrated that smartphone use leads to significant changes of sagittal and frontal spine parameters. Further research should focus on the evaluation of possible detrimental effects of long-term smartphone use on the spinal posture and on the development of preventive measures.

3.2.1.4 [Lee, Kang, & Shin \(2015\)](#). Head flexion angle while using a smartphone. *Ergonomics*.

ABSTRACT: Repetitive or prolonged head flexion posture while using a smartphone is known as one of **risk factors for pain symptoms in the neck**. To quantitatively assess the amount and range of head flexion of smartphone users, head forward flexion angle was measured from 18 participants when they were conducting three common smartphone tasks (text messaging, web browsing, video watching) while sitting and standing in a laboratory setting. It was found that participants maintained head flexion of 33-45° (50th percentile angle) from vertical when using the smartphone. The head flexion angle was significantly larger ($p < 0.05$) for text messaging than for the other tasks, and significantly larger while sitting than while standing. Study results suggest that text messaging, which is one of the most frequently used app categories of smartphone, could be a main contributing factor to the occurrence of neck pain of heavy smartphone users. Practitioner Summary: In this laboratory study, the severity of head flexion of smartphone users was quantitatively evaluated when conducting text messaging, web browsing and video watching while sitting and standing. **Study results indicate that text messaging while sitting caused the largest head flexion than that of other task conditions.**

3.2.1.5 [Berolo, Wells, & Amick \(2011\)](#). Musculoskeletal symptoms among mobile hand-held device users and their relationship to device use: A preliminary study in a Canadian university population. *Applied Ergonomics*.

ABSTRACT: The study aims were, in a population of university students, staff, and faculty ($n = 140$), to: 1) determine the distribution of seven measures of mobile device use; 2) determine the distribution of musculoskeletal symptoms of the upper extremity, upper back and neck; and 3) assess the relationship between device use and symptoms. 137 of 140 participants (98%) reported using a mobile device. Most participants (84%) reported pain in at least one body part. Right hand pain was most common at the base of the thumb. **Significant associations found included time spent internet browsing and pain in the base of the right thumb (odds ratio 2.21, 95% confidence interval 1.02-4.78), and total time spent using a mobile device and pain in the right shoulder (2.55, 1.25-5.21) and neck (2.72, 1.24-5.96).** Although this research is preliminary, the observed associations, together with the rising use of these devices, raise concern for heavy users.

3.2.1.6 [Barber \(2021\)](#). Texting Thumb, Trigger Finger, Gamer’s Thumb and Other Smartphone Injuries. *Scientific American*.

EXCERPT: “You are not alone,” Jeffrey Stone assures me. Stone, an upper extremity surgeon at the Florida Orthopedic Institute, says he has long seen these injuries from texting, computer work, gaming, doctors recording information online, surgeons holding retractors or forceps, and so on. “But now it’s everybody,” he says, “because people are constantly between their phones, [electronic] pads and computers. They’re constantly banging away.”

“[Texting thumb](#),” which you may also hear called “smartphone thumb,” may not be an official medical diagnosis. But it is a real phenomenon, if somewhat ill-defined, and stems from overuse and subsequent inflammation. [Trigger thumb \(or trigger finger\)](#), which some providers are beginning to associate with phone users who constantly swipe and text, is another real thing. We are dwelling here within the broader category of [repetitive stress injuries](#), which may occur in any body part being asked to do the same thing repeatedly. And when I say “we,” I mean it.

...Multiple studies have shown the cumulative effects of smartphone use on the [musculoskeletal](#) system, with up to two thirds of mobile device users in one study [having such complaints](#), associated with the frequency of making phone calls, texting and gaming. Another study found the highest [prevalence](#) of complaints in the upper neck, back, and wrists and hands.

Let’s face it: [our hands weren’t really made for all of this. Experts describe another painful tendonitis at the thumb base called “gamer’s thumb” or De Quervain’s disease. It seems to be associated with frequent texting on smartphones or gaming, among other causes, though more research is needed. At a more anatomical level, ultrasound studies have shown thickening and changes in thumb tendons of frequent texters—and the thickness paralleled the numbers of messages per day.](#)

3.2.1.7 [Xie., Szeto., & Dai \(2017\)](#). Prevalence and risk factors associated with musculoskeletal complaints among users of mobile handheld devices: [A systematic review](#). *Applied Ergonomics*.

ABSTRACT: This systematic review aimed at evaluating the prevalence and risk factors for musculoskeletal complaints associated with mobile handheld device use. Pubmed,

Medline, Web of Science, CINAHL and Embase were searched. The methodological quality of included studies was assessed. Strength of evidence for risk factors was determined based on study designs, methodological quality and consistency of results. Five high-quality, eight acceptable-quality and two low-quality peer-reviewed articles were included. This review demonstrates that the prevalence of musculoskeletal complaints among [mobile device](#) users ranges from 1.0% to 67.8% and neck complaints have the highest prevalence rates ranging from 17.3% to 67.8%. **This study also finds some evidence for neck flexion, frequency of phone calls, texting and gaming in relation to musculoskeletal complaints among mobile device users. Inconclusive evidence is shown for other risk factors such as duration of use and human-device interaction techniques due to inconsistent results or a limited number of studies.**

3.2.1.8 [Tremblay, Shields, Laviolette, Craig, Janssen, & Connor Gorber \(2010\)](#). Fitness of Canadian children and youth: Results from the 2007-2009 Canadian Health Measures Survey. *Health Reports*.

ABSTRACT: BACKGROUND: The fitness of Canadian children and youth has not been measured in more than two decades, a period during which childhood obesity and sedentary behaviours have increased. This paper provides up-to-date estimates of the fitness of Canadians aged 6 to 19 years.

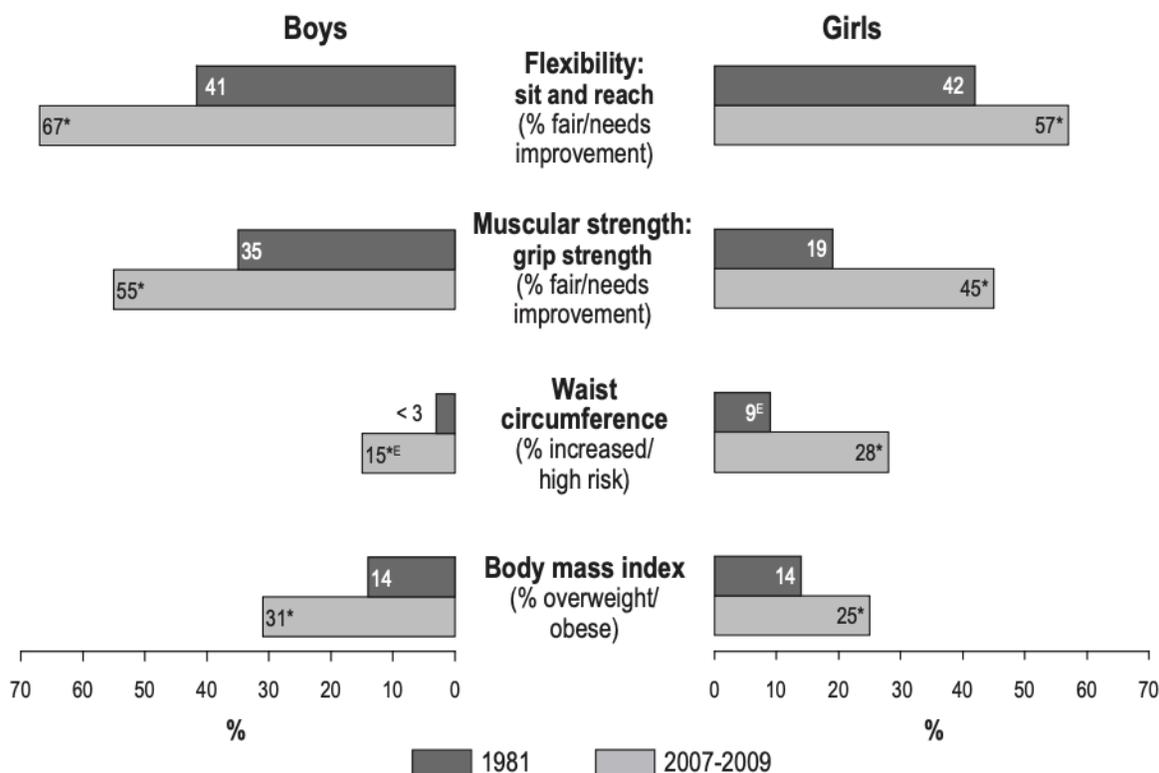
DATA AND METHODS: Data are from the 2007-2009 Canadian Health Measures Survey (CHMS), the most comprehensive direct health measures survey ever conducted on a nationally representative sample of Canadians. Descriptive statistics for indicators of body composition, aerobic fitness and musculoskeletal fitness are provided by sex and age group, and comparisons are made with the 1981 Canada Fitness Survey (CFS).

RESULTS: Fitness levels of children and youth have declined significantly and meaningfully since 1981, regardless of age or sex. Significant sex differences exist for most fitness measures. Fitness levels change substantially between ages 6 and 19 years. Youth aged 15 to 19 years generally have better aerobic fitness and body composition indicators than 20- to 39-year-olds.

INTERPRETATION: This decline in fitness may result in accelerated chronic disease development, higher health care costs, and loss of future productivity.

FIGURE:

Figure 2
Percentage with suboptimal health benefit ratings for selected anthropometric measures, by sex, household population aged 15 to 19 years, Canada, 1981 and 2007-2009



* significantly higher than estimate for 1981 ($p < 0.05$)

^E use with caution (coefficient of variation 16.6% to 33.3%)

Note: To make estimates more comparable, Canadian Health Measures Survey estimates for flexibility and muscular strength exclude respondents screened out of aerobic fitness test (see *Methods*). If coefficient of variation of estimate is greater than 33.3%, estimate is indicated as being less than upper limit of 95% confidence interval

Sources: 1981 Canada Fitness Survey; 2007-2009 Canadian Health Measures Survey.

3.2.1.9 [Zhuang, Wang, Xu, Wang, & Liang \(2021\)](#). Association between excessive smartphone use and cervical disc degeneration in young patients suffering from chronic neck pain. *Journal of Orthopaedic Science: Official Journal of the Japanese Orthopaedic Association*.

ABSTRACT: BACKGROUND: With the popularity of smartphones, cervical spondylosis is becoming more and more common among young people. The aim of this study was

to investigate the association between excessive smartphone use and cervical disc degeneration in young patients suffering from chronic neck pain.

METHODS: A total of 2438 young patients suffering from chronic neck pain were included into this study. All patients underwent the Magnetic Resonance Imaging (MRI) examination of the cervical spine. The degree of cervical disc degeneration, the dependent variable, was evaluated by Cervical Disc Degeneration Scale (CDDS) which was developed from Pfirrmann classification. Smartphone use, the primary independent variable, was assessed by Smartphone Addiction Scale (SAS).

RESULTS: In all, **52.9% patients were categorized as smartphone overuse.**

Patients with overuse of smartphones had higher CDDS scores than those who did not use smartphone excessively.

CONCLUSIONS: The results indicate that cervical disc degeneration may be associated with excessive smartphone use, such use may lead to cervical spondylosis.

EXCERPT: Excessive smartphone use is a risk factor for cervical disc degeneration, the possible mechanisms were as follows: While using a smartphone, the patient has to keep the cervical spine in flexion position, if this posture is kept for a long time, it will cause cervical muscle fatigue and increase the load of the cervical intervertebral discs, and then accelerate the degeneration of the cervical intervertebral discs.

[What are we missing?]

3.2.2 EVIDENCE AND ESSAYS SHOWING BENEFITS OR NO HARMS

3.2.2.1 [Toh, Coenen, Howie, & Straker \(2017\)](#). The associations of mobile touch screen device use with musculoskeletal symptoms and exposures: A systematic review. *PLOS ONE*.

ABSTRACT: BACKGROUND: The use of **mobile touch screen devices (MTSDs)** has increased rapidly over the last decade, and there are concerns that their use may have negative musculoskeletal consequences; yet evidence on the association of MTSD use with musculoskeletal symptoms and exposures is currently dispersed. The aim of this study was to systematically review available literature on musculoskeletal symptoms and exposures associated with MTSD use. The synthesised information may facilitate wise use of MTSDs and may identify areas in need of further research.

METHODS: EMBASE, Medline, Scopus, PsycINFO and Proquest electronic databases were searched for articles published up to June 2016, using keywords describing

MTSD, musculoskeletal symptoms (e.g. pain, discomfort) and musculoskeletal exposures (e.g. posture, muscle activity). Two reviewers independently screened the articles, extracted relevant data and assessed methodological quality of included studies. Due to heterogeneity in the studies, a meta-analysis was not possible and a structured narrative synthesis of the findings was undertaken.

RESULTS: A total of 9,908 articles were screened for eligibility with **45 articles finally included for review**. Included articles were of cross-sectional, case-control or experimental laboratory study designs. No longitudinal studies were identified. Findings were presented and discussed in terms of the amount, features, tasks and positions of MTSD use and its association with musculoskeletal symptoms and musculoskeletal exposures.

CONCLUSIONS: **There is limited evidence that MTSD use, and various aspects of its use (i.e. amount of usage, features, tasks and positions) are associated with musculoskeletal symptoms and exposures. This is due to mainly low quality experimental and case-control laboratory studies, with few cross-sectional and no longitudinal studies.** Further research is warranted in order to develop guidelines for wise use of MTSDs.

3.2.2.2 [Bertozzi... & Pillastrini \(2021\)](#). Posture and time spent using a smartphone are not correlated with neck pain and disability in young adults: A cross-sectional study. *Journal of Bodywork and Movement Therapies*.

ABSTRACT: PURPOSE: To determine the impact of smartphone use on neck impairment and functional limitation in university students.

METHODS: A cross-sectional correlational study was conducted in a sample of students selected through convenience sampling between September 2016 and March 2017. The inclusion criteria were university students at the School of Medicine and Surgery, routine/daily use of mobile devices with advanced computing and connectivity capability built on an operating system, and aged 18–30 years. Participants completed questionnaires that measured general characteristics of smartphone use and demographic characteristics. Neck pain was assessed using a visual analogue pain score (VAS) and a pain drawing (PD); disability status was measured using the [Neck Disability Index](#) (NDI-I); and cervical postures while using the phone were captured using the Deluxe Cervical Range of Motion (CROM) device.

RESULTS: A total of **238 volunteers were recruited** (22.4 ± 2.2 years of age, 53.4% males), 35.9% of whom were overweight (>25 BMI). Regarding neck pain, 42.4% reported mild pain, 8.4% had moderate pain, and the remaining 49.2% had no pain. NDI-I and VAS were 3.8 ± 3.8 and 13.6 ± 18.4 mm, respectively. The pain categories did not influence the variables. **No significant correlations were observed between the**

number of hours spent and posture (CROM) while using a smartphone and neck pain and NDI-I.

CONCLUSION: While half of young medical students reported neck pain, the use of smartphones was not correlated with neck pain and disability. While we wait for future prospective studies, there is no reason to recommend a change in smartphone use habits among young adults in the meantime.

[NOTE FROM HAIDT: THIS IS A VERY SMALL STUDY, N=238, COMPARED TO THE STUDIES THAT FIND CORRELATIONS]

[What are we missing?]

3.2.3 ILLUSTRATIONS

3.2.3.1 Anyone else notice a huge energy boost with exercise once quitting screens?

https://www.reddit.com/r/nosurf/comments/yu4Int/anyone_else_notice_a_huge_energy_boost_with/

EXCERPT: i had crazy fatigue from doing exercise, even the short workouts would leave me physically and mentally drained for days, moody, couldnt concentrate, totally exhausted. but now i recover much better, i think because i was hooked on screens like 24/7 for years on end i had high stress hormones making me sensitive to stress from exercise which is natural.

3.2.3.2 Do you start feeling lethargic after a while?

https://www.reddit.com/r/nosurf/comments/yw8tfc/do_you_start_feeling_lethargic_after_a_while/

EXCERPT: Like when you've been scrolling for a while. I start to feel real sluggish, brain fog, and a "closed-in" feeling. It's hard to describe. Some kind of mental internet induced claustrophobia thing.

[What are we missing?]

3.3 EYESIGHT DAMAGE

3.3.1 EVIDENCE AND ESSAYS SHOWING HARMS

3.3.1.1 [American Optometric Association \(2022\)](#). Computer Vision Syndrome.

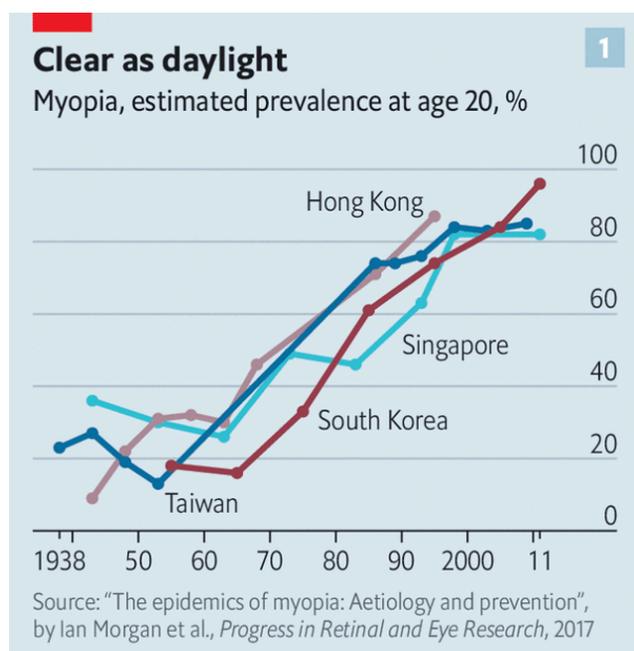
EXCERPT: Viewing a computer or digital screen often makes the eyes work harder. As a result, the unique characteristics and high visual demands of computer and digital screen viewing make many individuals susceptible to the development of vision-related symptoms. Uncorrected vision problems can increase the severity of computer vision syndrome (CVS) or digital eyestrain symptoms. **Viewing a computer or digital screen is different than reading a printed page. Often the letters on the computer or handheld device are not as precise or sharply defined, the level of contrast of the letters to the background is reduced, and the presence of glare and reflections on the screen may make viewing difficult.**

The extent to which individuals experience visual symptoms often depends on the level of their visual abilities and the amount of time spent looking at a digital screen. Uncorrected vision problems like farsightedness and astigmatism, inadequate eye focusing or eye coordination abilities, and aging changes of the eyes, such as presbyopia, can all contribute to the development of visual symptoms when using a computer or digital screen device.

Many of the visual symptoms experienced by users are only temporary and will decline after stopping computer work or use of the digital device. However, some individuals may experience continued reduced visual abilities, such as blurred distance vision, even after stopping work at a computer. If nothing is done to address the cause of the problem, the symptoms will continue to recur and perhaps worsen with future digital screen use.

3.3.1.2 [Short-sightedness was rare. In Asia, it is becoming ubiquitous \(2022\).](#) *The Economist.*

FIGURE:



The Economist

3.3.1.3 [Wang, ... & Qian \(2021\)](#). Progression of Myopia in School-Aged Children After COVID-19 Home Confinement. *JAMA Ophthalmology*.

ABSTRACT: IMPORTANCE: Time spent in outdoor activities has decreased owing to home confinement for the coronavirus disease 2019 (COVID-19) pandemic. Concerns have been raised about whether home confinement may have worsened the burden of myopia owing to substantially decreased time spent outdoors and increased screen time at home.

OBJECTIVE: To investigate the refractive changes and prevalence of myopia in school-aged children during the COVID-19 home confinement.

DESIGN & PARTICIPANTS: A prospective cross-sectional study using school-based photoscreenings in 123 535 children aged 6 to 13 years from 10 elementary schools in Feicheng, China, was conducted. The study was performed during 6 consecutive years (2015-2020). Data were analyzed in July 2020.

Exposures Noncycloplegic photorefractive was examined using a photoscreener device.

OUTCOMES AND MEASURES: The spherical equivalent refraction was recorded for each child and the prevalence of myopia for each age group during each year was calculated. The mean spherical equivalent refraction and prevalence of myopia were compared between 2020 (after home confinement) and the previous 5 years for each age group.

RESULTS: Of the 123 535 children included in the study, 64 335 (52.1%) were boys. A total of 194 904 test results (389 808 eyes) were included in the analysis. **A substantial myopic shift (approximately -0.3 diopters [D]) was found in the 2020 school-based photoscreenings compared with previous years (2015-2019) for younger children aged 6 (-0.32 D), 7 (-0.28 D), and 8 (-0.29 D) years. The prevalence of myopia in the 2020 photoscreenings was higher than the highest prevalence of myopia within 2015-2019 for children aged 6 (21.5% vs 5.7%), 7 (26.2% vs 16.2%), and 8 (37.2% vs 27.7%) years.** The differences in spherical equivalent refraction and the prevalence of myopia between 2020 and previous years were minimal in children aged 9 to 13 years.

CONCLUSIONS: **Home confinement during the COVID-19 pandemic appeared to be associated with a significant myopic shift for children aged 6 to 8 years according to 2020 school-based photoscreenings.** However, numerous limitations warrant caution in the interpretation of these associations, including use of noncycloplegic refractions and lack of orthokeratology history or ocular biometry data. Younger children's refractive status may be more sensitive to environmental changes than older ages, given the younger children are in a critical period for the development of myopia.

3.3.1.4 [Huang, Chang, & Wu \(2015\)](#). The **Association between Near Work Activities and Myopia in Children**—A Systematic Review and Meta-Analysis. *PLOS ONE*.

ABSTRACT: Myopia has a multifactorial etiology, although environmental factors are predominant in determining its current patterns. Currently, associations between near work activities and myopia have not been consistently observed. Therefore, we performed a systematic review to quantify the effect of near work activities on myopia in children. Relevant articles published between 1989 and 2014 were identified in MEDLINE, Embase, and the Cochrane Library, and the citation lists were reviewed. Twelve cohort studies and 15 cross-sectional studies were included (25,025 children aged between 6 and 18 years). The I² statistic was used to assess heterogeneity. Study-level data were pooled using a random-effects model or a fixed-effects model (when less than 5 studies were included). **We found that more time spent on near work activities was associated with higher odds of myopia (odds ratio [OR] = 1.14; 95% confidence interval [CI] = 1.08–1.20) and that the odds of myopia increased by 2% (OR:1.02; 95% CI = 1.01–1.03) for every one diopter-hour (hr) more of near work per week. Therefore, the development of a strategy to reduce the impact of near work on myopia would be important for preventing myopia in children.** [Note from Haidt: an OR of 1.14 is not large]

3.3.1.5 He... & Morgan (2015). Effect of **Time Spent Outdoors at School** on the Development of Myopia Among Children in China: A Randomized Clinical Trial. *JAMA*.

ABSTRACT: IMPORTANCE: Myopia has reached epidemic levels in parts of East and Southeast Asia. However, there is no effective intervention to prevent the development of myopia.

OBJECTIVE: To assess the efficacy of increasing time spent outdoors at school in preventing incident myopia.

DESIGN & PARTICIPANTS: Cluster randomized trial of children in grade 1 from 12 primary schools in Guangzhou, China, conducted between October 2010 and October 2013.

INTERVENTIONS: For 6 intervention schools (n = 952 students), **1 additional 40-minute class of outdoor activities was added to each school day, and parents were encouraged to engage their children in outdoor activities** after school hours, especially during weekends and holidays. Children and parents in the 6 control schools (n = 951 students) continued their usual pattern of activity.

OUTCOMES AND MEASURES: The primary outcome measure was the 3-year cumulative incidence rate of myopia (defined using the Refractive Error Study in Children spherical equivalent refractive error standard of ≤ -0.5 diopters [D]) among the students without established myopia at baseline. Secondary outcome measures were changes in spherical equivalent refraction and axial length among all students, analyzed using mixed linear models and intention-to-treat principles. Data from the right eyes were used for the analysis.

RESULTS: There were 952 children in the intervention group and 951 in the control group with a mean (SD) age of 6.6 (0.34) years. The cumulative incidence rate of myopia was 30.4% in the intervention group (259 incident cases among 853 eligible participants) and 39.5% (287 incident cases among 726 eligible participants) in the control group (difference of -9.1% [95% CI, -14.1% to -4.1%]; $P < .001$). There was also a significant difference in the 3-year change in spherical equivalent refraction for the intervention group (-1.42 D) compared with the control group (-1.59 D) (difference of 0.17 D [95% CI, 0.01 to 0.33 D]; $P = .04$). Elongation of axial length was not significantly different between the intervention group (0.95 mm) and the control group (0.98 mm) (difference of -0.03 mm [95% CI, -0.07 to 0.003 mm]; $P = .07$).

CONCLUSIONS: **Among 6-year-old children in Guangzhou, China, the addition of 40 minutes of outdoor activity at school compared with usual activity resulted in a reduced incidence rate of myopia over the next 3 years.** Further studies are needed to assess long-term follow-up of these children and the generalizability of these findings.

3.3.1.6 [Lu \(2021\)](#). Computer screen time is damaging eyes—Especially for children.
Washington Post.

EXCERPT: In the United States and other countries, monitoring eye health isn't a major public health priority, particularly when in the grips of a pandemic. This isn't the case in China, where I spend a lot of my time — there, eye health is more closely watched, particularly in children. And troubling trends are emerging: A January study of more than 120,000 children in China found that [the rate of myopia \(nearsightedness, or trouble seeing things at a distance\) among children ages 6 to 8 increased markedly during a home confinement period, when schools closed](#) from January through May because of covid-19, the disease caused by the coronavirus. Among 6-year-olds, the rate of myopia following lockdown was 21.5 percent; before covid-19, the highest yearly rate in that age group since 2015 was 5.7 percent.

These data aren't surprising to me. Several aspects of screen reading make it taxing on our eyes. Although it's unclear whether screen time itself is a risk factor for myopia, [close-up work definitely is](#) — and online school requires far more of this.

There also is the problem of viewing angles, since people may look at digital displays at unusual angles, such as while in bed, with a smartphone or laptop on their laps. The screen often offers [less contrast between letters and the background than the printed page](#), and glare and reflections from the screen may also force the eyes to work harder. Reading on a screen can exacerbate existing eye problems, as eyeglass and contact lens prescriptions for page reading may not work as well.

I suspect that myopia rates are increasing in other countries that don't monitor eye health as closely as China does. [It's a particular issue for elementary-school-aged children, whose eyes may be especially susceptible to developing myopia.](#) Myopia is more than an inconvenience: It can be costly to correct (requiring regular eye exams and glasses or contact lenses), and [people with severe nearsightedness are at higher risk for additional conditions](#) such as retinal tears, cataracts and macular degeneration, which may threaten their eyesight altogether.

If uncorrected, myopia (or its cousin, farsightedness) can contribute to another eye problem directly related to screen time: [computer vision syndrome](#), also known as digital eyestrain, marked by blurred vision, dry eyes and neck and shoulder pain. [The more time you spend reading on a screen, the more at risk you are.](#) Not surprisingly, the spike in screen time we have seen with covid-19 is accompanied by [reports of more digital](#)

[eyestrain around the world](#). One survey by researchers in India found that 50 percent of children taking online classes had digital eyestrain.

3.3.1.7 [Ratnayake, Payton, Lakmal, & Karunaratne \(2018\)](#). Blue light excited retinal intercepts cellular signaling. *Scientific Reports*.

ABSTRACT: Photoreceptor chromophore, 11-cis retinal (11CR) and the photoproduct, all-trans retinal (ATR), are present in the retina at higher concentrations and interact with the visual cells. Non-visual cells in the body are also exposed to retinal that enters the circulation. Although the cornea and the lens of the eye are transparent to the blue light region where retinal can absorb and undergo excitation, the reported phototoxicity in the eye has been assigned to lipophilic non-degradable materials known as lipofuscins, which also includes retinal condensation products. The possibility of blue light excited retinal interacting with cells; intercepting signaling in the presence or absence of light has not been explored. Using live cell imaging and optogenetic signaling control, we uncovered that blue light-excited ATR and 11CR irreversibly change/distort plasma membrane (PM) bound phospholipid; phosphatidylinositol 4,5 bisphosphate (PIP2) and disrupt its function. This distortion in PIP2 was independent of visual or non-visual G-protein coupled receptor activation. The change in PIP2 was followed by an increase in the cytosolic calcium, excessive cell shape change, and cell death. Blue light alone or retinal alone did not perturb PIP2 or elicit cytosolic calcium increase. Our data also suggest that photoexcited retinal-induced PIP2 distortion and subsequent oxidative damage incur in the core of the PM. These findings suggest that retinal exerts light sensitivity to both photoreceptor and non-photoreceptor cells, and intercepts crucial signaling events, altering the cellular fate.

[Related article on this study](#): “Blue light from digital devices and the sun transforms vital molecules in the eye’s retina into cell killers, according to optical chemistry research at The University of Toledo.”

3.3.1.8 [Jaiswal, Asper., Long, Lee, Harrison, & Golebiowski \(2019\)](#). Ocular and visual discomfort associated with smartphones, tablets and computers: What we do and do not know. *Clinical and Experimental Optometry*.

ABSTRACT: Smartphone and tablet use in Australia and worldwide is reaching saturation levels and associated visual and ocular discomfort such as headaches, eyestrain, dry eyes and sore eyes are widespread. This review synthesises the available literature and considers these symptoms in the context of a binocular vision

and/or ocular surface aetiology. Eye discomfort with smartphones and tablets is discussed alongside similar symptoms reported with desktop computer use. **Handheld devices differ from computers in viewing position and distance, screen size and luminance, and patterns of use.** Accommodation is altered with handheld device use, with increased lag and decreased amplitude. Smartphone and tablet use results in reduced fusional convergence and possibly a receded near point of convergence. This is similar to what happens with computer use. **Findings related to blink rate with smartphone and tablet use are contradictory, perhaps due to the influence of task difficulty, and there is limited evidence related to blink amplitude. Reduced blink rate and amplitude are consistently reported with computer use. Use of handheld digital devices, like computers, may adversely impact tear stability. There is insufficient evidence to support the impact of handheld devices on tear volume, although this is reduced with computer use.** The available literature does not conclusively link eye and visual discomfort symptoms reported with handheld digital devices, with changes in binocular vision, blinking or ocular surface. However, there is a gap in our understanding of symptoms which occur with smartphone and tablet use in the context of how these devices are used. In addition, studies are required in high users such as teenagers, and in patients with dry eye or accommodative/binocular vision anomalies, all of whom may have a higher risk of symptoms. A better understanding of symptom aetiology can guide clinical advice to minimise adverse impacts on visual and ocular surface health and discomfort.

3.3.1.9 [Computer Vision Syndrome.](#) **American Optometric Association.**

EXCERPT: Viewing a computer or digital screen often makes the eyes work harder. As a result, the unique characteristics and high visual demands of computer and digital screen viewing make many individuals susceptible to the development of vision-related symptoms. Uncorrected vision problems can increase the severity of **computer vision syndrome (CVS) or digital eyestrain symptoms.** Viewing a computer or digital screen is different than reading a printed page. Often the letters on the computer or handheld device are not as precise or sharply defined, the level of contrast of the letters to the background is reduced, and the presence of glare and reflections on the screen may make viewing difficult.

Viewing distances and angles used for this type of work are also often different from those commonly used for other reading or writing tasks. As a result, the eye focusing and eye movement requirements for digital screen viewing can place additional demands on the visual system. In addition, the presence of even minor vision problems can often significantly affect comfort and performance at a computer or while using

other digital screen devices. Uncorrected or under corrected vision problems can be major contributing factors to computer-related eyestrain. Even people who have an eyeglass or contact lens prescription may find it's not suitable for the specific viewing distances of their computer screen. Some people tilt their heads at odd angles because their glasses aren't designed for looking at a computer or they bend toward the screen in order to see it clearly. Their postures can result in muscle spasms or pain in the neck, shoulder or back.

In most cases, symptoms of CVS occur because the visual demands of the task exceed the visual abilities of the individual to comfortably perform them. **At greatest risk for developing CVS are those persons who spend two or more continuous hours at a computer or using a digital screen device every day.**

The most common symptoms associated with CVS or digital eyestrain are:

- Eyestrain.
- Headaches.
- Blurred vision.
- Dry eyes.
- Neck and shoulder pain.

These symptoms may be caused by:

- Poor lighting.
- Glare on a digital screen.
- Improper viewing distances.
- Poor seating posture.
- Uncorrected vision problems.
- A combination of these factors.

3.3.1.10 [Wang, Li, Zhu, & Cao \(2020\)](#). Smartphone Overuse and Visual Impairment in Children and Young Adults: Systematic Review and Meta-Analysis. *Journal of Medical Internet Research*.

ABSTRACT: BACKGROUND: Smartphone overuse has been cited as a potentially modifiable risk factor that can result in visual impairment. However, reported associations between smartphone overuse and visual impairment have been inconsistent.

OBJECTIVE: The aim of this systematic review was to determine the association between smartphone overuse and visual impairment, including myopia, blurred vision, and poor vision, in children and young adults.

METHODS: We conducted a systematic search in the Cochrane Library, PubMed, EMBASE, Web of Science Core Collection, and ScienceDirect databases since the beginning of the databases up to June 2020. **Fourteen eligible studies (10 cross-sectional studies and 4 controlled trials)** were identified, which included a total of 27,110 subjects with a mean age ranging from 9.5 to 26.0 years. We used a random-effects model for meta-analysis of the 10 cross-sectional studies (26,962 subjects) and a fixed-effects model for meta-analysis of the 4 controlled trials (148 subjects) to combine odds ratios (ORs) and effect sizes (ES). The I² statistic was used to assess heterogeneity.

RESULTS: A pooled OR of **1.05 (95% CI 0.98-1.13, P=.16)** was obtained from the **cross-sectional studies, suggesting that smartphone overuse is not significantly associated with myopia, poor vision, or blurred vision; however, these visual impairments together were more apparent in children** (OR 1.06, 95% CI 0.99-1.14, P=.09) than in young adults (OR 0.91, 95% CI 0.57-1.46, P=.71). **For the 4 controlled trials, the smartphone overuse groups showed worse visual function scores compared with the reduced-use groups.** The pooled ES was **0.76 (95% CI 0.53-0.99)**, which was statistically significant (P<.001).

CONCLUSIONS: **Longer smartphone use may increase the likelihood of ocular symptoms, including myopia, asthenopia, and ocular surface disease, especially in children.** Thus, regulating use time and restricting the prolonged use of smartphones may prevent ocular and visual symptoms. Further research on the patterns of use, with longer follow up on the longitudinal associations, will help to inform detailed guidelines and recommendations for smartphone use in children and young adults.

[NOTE: the effects found here are very small.... A 6% increase]

[What are we missing?]

3.3.2 EVIDENCE AND ESSAYS SHOWING BENEFITS OR NO HARMS

[What are we missing?]

3.3.3 ILLUSTRATIONS

3.3.3.1

https://www.reddit.com/r/nosurf/comments/qvvdof/does_anyone_have_eye_problems_from_screen_use/

EXCERPT: Is there anyone here struggling with eye strain and migraines from prolonged screen use? I swear my eyesight has deteriorated after we first got the Internet at home to the point I developed short-sightedness. But the worst are all the migraine pains I get on screens. Night light helps a bit but at the end of the day even that is not enough.

3.3.3.2 https://www.reddit.com/r/nosurf/comments/oiu3zr/addicto_mode

EXCERPT: I continue watching the screen even if my eyes pain and literally beg me to stop or start tearing up.

[What are we missing?]

3.4 EARLY PUBERTY FOR GIRLS

3.4.1 EVIDENCE AND ESSAYS SHOWING HARMS

3.4.1.1 [Winter \(2022\)](#). Why more and more girls are hitting puberty early. *New Yorker*.

EXCERPT: **A crucial, perhaps overlooked link between early puberty and the youth mental-health crisis is sleep.** Marlon Goering, a doctoral student in psychology at the University of Alabama at Birmingham, studies the relationship between pubertal timing and behavioral challenges in young people. **He told me that melatonin, the sleep-regulating hormone that the brain produces in response to darkness, may have contributed to the pandemic-era jump in early puberty. During the lockdowns, many children got less sleep and more irregular sleep, and they spent vastly more time in front of the blue light of screens, which inhibited their ability to secrete melatonin. A drop in melatonin can contribute to symptoms of anxiety and depression; it also activates an increase in a protein called kisspeptin, which is another of the trigger hormones for puberty.** The melatonin-disrupting effects of blue light may have persisted long past the acute phase of the pandemic: many schools and students have continued using the iPads and Chromebooks that they acquired to facilitate remote learning, and many households never reset the screen-time rules that they had in place before lockdown obliterated them.

3.4.1.2 [Mikhail \(2022\)](#). Kids are spending more time on devices. Now experts say **excessive screen time may lead to early puberty.** *FortuneWell. (Here is the [News Release](#) from the European Society for Pediatric Endocrinology)*

EXCERPT: In a study of rats, higher levels of blue light exposure were associated with an earlier onset of puberty for females, according to new research presented Friday at the [60th Annual European Society for Paediatric Endocrinology Meeting](#). The study also noted the exposure was associated with lower levels of melatonin, higher levels of some reproductive hormones, and changes in the physical makeup of the ovaries.

In the study, different groups of rats were exposed to a normal light amount, six hours of blue light, and 12 hours of blue light per day. The rats exposed to the longest duration of blue light experienced puberty the earliest. The rats exposed to blue light also had reduced levels of melatonin, which is the hormone that affects sleep, and the rats exposed to blue light for the longest had cell damage and inflammation in their ovaries. Melatonin levels are at their highest [during prepuberty](#), compared with during puberty, which “which is an inhibitory factor in the onset of puberty,” Dr. Aylin Kiliç Uğurlu, the study’s author, tells Fortune.

NOTE: [Here’s a critique of the study and the media frenzy around it.](#)

EXCERPT: According to the conference abstract, the only data available from the unpublished research, six control group rats (treated to standard 12 hour light / 12 hour dark lab conditions) entered puberty on the 38th day of the experiment, while the six rats exposed to an additional six hours of blue light every day entered puberty on the 32nd day of the experiment and the 12-hour blue light exposed group hit puberty on day 30.

A number of metabolic markers were also tracked in the rats, but they were all the same regardless of any blue light exposure. The only hormonal marker the researchers could report linked to blue light exposure was a reduction in melatonin levels.

That’s it. That’s the research. As the University of Cambridge’s **Amy Orben** explained, this kind of blue light exposure is in no way analogous to exposure from smartphone or tablet screens. So any translation to humans falls apart right here.

[What are we missing?]

3.4.2 EVIDENCE AND ESSAYS SHOWING BENEFITS OR NO HARMS

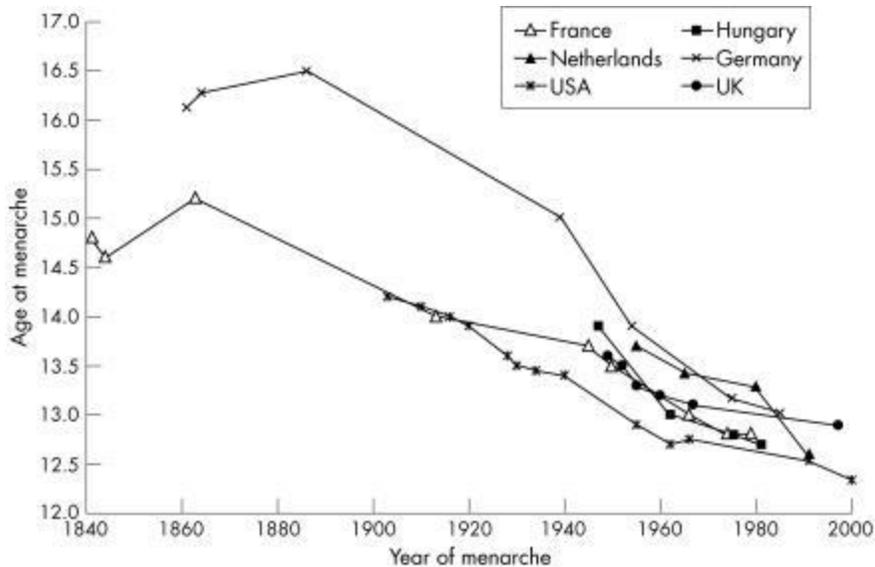
[What are we missing?]

3.4.3 STUDIES ON EARLY ONSET PUBERTY (NOT NECESSARILY CONNECTED TO DIGITAL MEDIA)

3.4.3.12 [Bellis, Downing, & Ashton, \(2006\)](#). Adults at 12? Trends in puberty and their public health consequences. *Journal of Epidemiology and Community Health*.

EXCERPT: Over the past 150 years, the age of puberty onset has fallen substantially across many developed countries. Although trends are apparent in both sexes, the evidence in females (where biological markers are clearer) suggests that, for instance, in northern Europe the age at menarche (first menstruation) fell during the 1800s, then further reduced by up to 3 years over the last century. Factors contributing to this fall include a combination of public health successes and changes in social structures. Thus, successes such as improved childhood nutrition and health status through reduction in childhood infections have been major factors accelerating the onset of puberty.

FIGURE:



...Socially, however, stress is also a puberty accelerator, with familial disruption, including father absenteeism, being one of the most effective stressors, and levels of divorce as well as single-parent families have rapidly escalated in many countries (eg, England, 2005). The sum effect of these changes has been relatively recent reductions in the age of puberty onset. However, these have not been matched by efforts to socially develop young people at an equally accelerated rate, leaving an increasing gap **between physical puberty and social puberty (the age at which people are mentally, educationally and legally equipped to function as adults in modern societies)**. Here, we propose that this disparity may underpin many of the major public health challenges associated with young people today.

Puberty is a physical preparation for adulthood that, along with bodily changes, promotes interest in sexual activity, increases aggression in adolescents, encourages curiosity and can escalate risk-taking behaviours as people compete for social status and attempt to conform to perceived peer norms. Increasingly, however, as social puberty lags behind physical puberty, the results can be ill-informed health-damaging behaviour. Thus, early sexual activity is associated with unprotected sex and, consequently, sexually transmitted infections and teenage pregnancies. Moreover, adolescent stresses resulting from mismatches in physical and social development may also promote substance use (including alcohol, tobacco and drug use) as ways of both self-medicating and trying to conform to peer pressures. Further, a lack of knowledge of how to adapt to changes in physical, mental and social status may lead to self-harm, violence and bullying. Attributing all recent changes in sexual health, substance use and violence to earlier puberty (on a population basis) is oversimplistic, but disregarding the role of earlier physical maturation in these major health trends is equally inappropriate.

...The continued reduction in the age of onset of puberty should not be treated as a biological anomaly. It is likely that some 20 000 years ago, humans had already evolved to experience menarche at around 12 years and at present many countries are moving back to this position. However, for young people, although physical development has reverted to this earlier age, understanding their role in society is becoming substantially more complicated. Further, political, educational and even parental attitudes can often ignore earlier puberty, preferring to leave important lessons about sex, risk-taking and social behaviour until later in life. In the meantime, the earlier physical development of children has not been ignored by commercial sectors. Magazines, television and radio are increasingly using sexual imagery for marketing and storylines aimed at younger people while versions of adult make-up and fashion lines are now specifically developed for the pubescent. Sales of computer games that include fighting and risk-taking rely on people developing interests in these behaviours early in life. Such marketing is more likely to reinforce the confusion caused by separated physical and social puberty rather than providing the information necessary to deal with it.

3.4.3.2 [Eckert-Lind, Busch, Petersen, Biro, Butler, Bräuner, & Juul \(2020\)](#). Worldwide Secular Trends in Age at Pubertal Onset Assessed by Breast Development Among Girls: A Systematic Review and Meta-analysis. *JAMA Pediatrics*.

ABSTRACT: IMPORTANCE: The initial clinical sign of pubertal onset in girls is breast gland development (thelarche). Although numerous studies have used recalled age at menarche (first menstruation) to assess secular trends of pubertal timing, no systematic review has been conducted of secular trends of thelarche.

OBJECTIVES: To systematically evaluate published data on pubertal timing based on age at thelarche and evaluate the change in pubertal onset in healthy girls around the world.

DATA SOURCES: A systematic literature search was performed in PubMed and Embase of all original peer-reviewed articles published in English before June 20, 2019. **Study Selection** Included studies used clinical assessment of breast development in healthy girls and used adequate statistical methods, including the reporting of SEs or CIs. The quality of the articles was evaluated by assessing study design, potential sources of bias, main characteristics of the study population, and methods of statistical analysis.

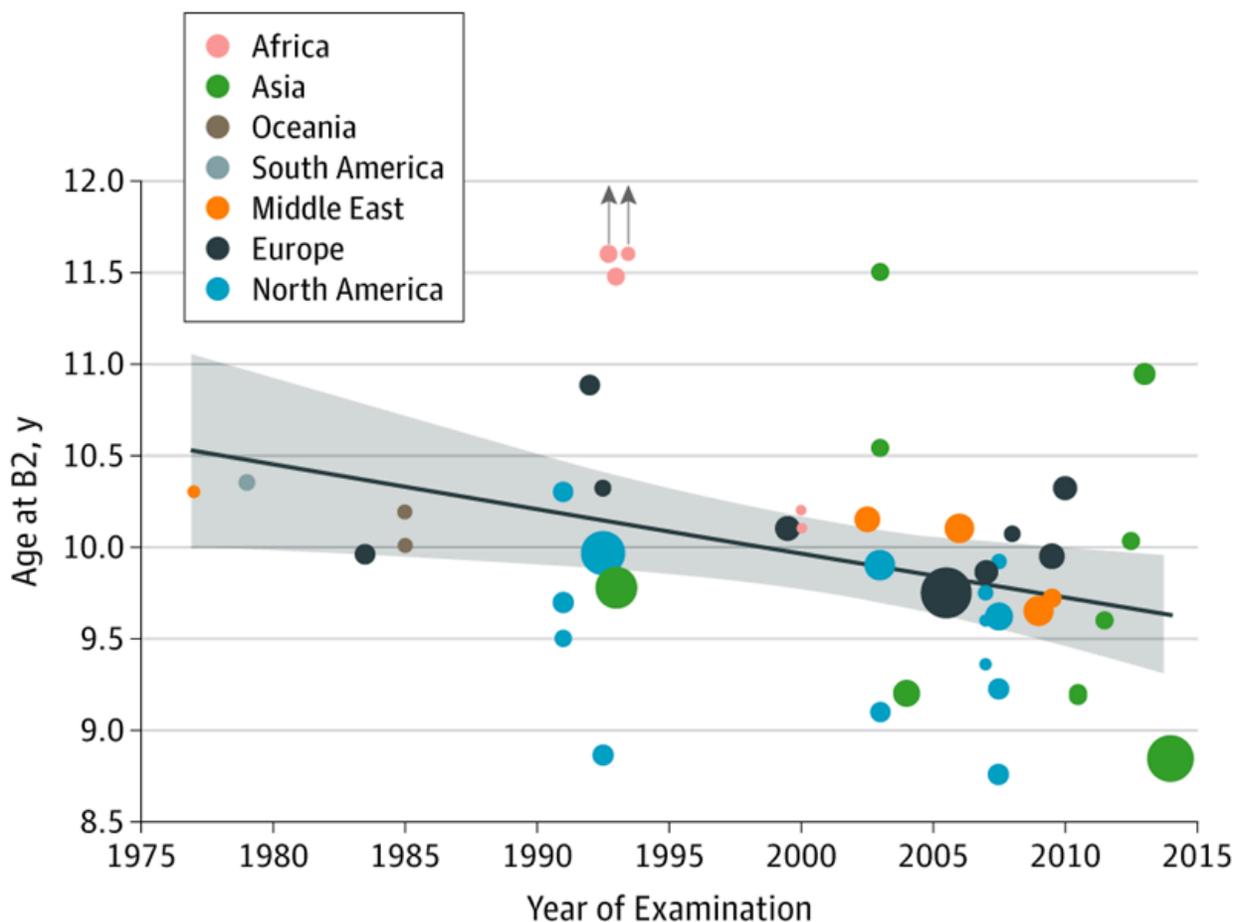
DATA EXTRACTION: In accordance with PRISMA guidelines, all articles were assessed for eligibility independently by 2 authors. Weighted regression analysis was performed using a random-effects model.

OUTCOMES: Studies examining age at thelarche (development of Tanner breast stage 2) in healthy girls.

RESULTS: The literature search resulted in a total of 3602 studies, of which 30 studies fulfilled the eligibility criteria. **There was a secular trend in ages at thelarche according to race/ethnicity and geography. Overall, the age at thelarche decreased 0.24 years (95% CI, -0.44 to -0.04) (almost 3 months) per decade from 1977 to 2013 (P = .02).**

CONCLUSIONS: The age at thelarche has decreased a mean of almost 3 months per decade from 1977 to 2013. A younger age at pubertal onset may change current diagnostic decision-making. The medical community needs current and relevant data to redefine “precocious puberty,” because the traditional definition may be outdated, at least in some regions of the world.

FIGURE:



3.4.3.3 [Cheng, Ong, & Biro \(2022\)](#). Trends Toward Earlier Puberty Timing in Girls and Its Likely Mechanisms. *Journal of Pediatric and Adolescent Gynecology*.

EXCERPT: Is puberty occurring earlier in girls? In a word, yes. An expert panel reviewed studies from 1940 to 1994 and concluded that the data supported trends toward earlier age of [breast development](#), and data were consistent with earlier age at [menarche](#). Subsequent to that consensus, several longitudinal studies have been published, with the Breast Cancer and the Environment Research Program (BCERP) noting a further decrease in age of breast development and a smaller decrease in age at menarche. **More recently, a group reviewed international studies from 1977 to 2013, initially incorporating 3602 studies. They reported an ongoing trend toward earlier age of breast development, decreasing approximately 3 months per decade during that time span.**

This monograph will examine the potential reasons driving the trend toward earlier maturation, as well as the likely underlying mechanisms. Our accompanying article discusses the impacts of earlier maturation on adolescent behavior and outcomes, as well as on adult health, and suggests changes in clinical assessment and management in response to these secular changes and emerging evidence on the underlying drivers.

3.4.3.4 [Bräuner, Busch, Eckert-Lind, Koch, Hickey, & Juul \(2020\)](#). Trends in the Incidence of Central Precocious Puberty and Normal Variant Puberty Among Children in Denmark, 1998 to 2017. *JAMA Network Open*.

ABSTRACT: IMPORTANCE: There has been a worldwide secular trend toward earlier onset of puberty in the general population. However, it remains uncertain if these changes are paralleled with increased incidence of central precocious puberty (CPP) and normal variant puberty (ie, premature thelarche [PT] and premature adrenarche [PA]) because epidemiological evidence on the time trends in the incidence of these puberty disorders is scarce.

OBJECTIVE: To provide valid epidemiological data on the 20-year secular trend in the incidence rates of CPP and normal variant puberty.

DESIGN: This population-based, 20-year cohort study used national registry data for all youth in Denmark registered with an incident diagnosis of CPP, PT, or PA in the Danish National Patient Registry from 1998 to 2017 (N = 8596) using the International Statistical Classification of Diseases and Related Health Problems, Tenth Revision (ICD-10). We applied the maximum diagnostic age limit for precocious puberty (ie, onset of puberty before age 8 years for girls and age 9 years for boys) with and without a 12-month lag to address time from first contact to final registration in the Danish National Patient Registry. Data analysis was conducted in 2019.

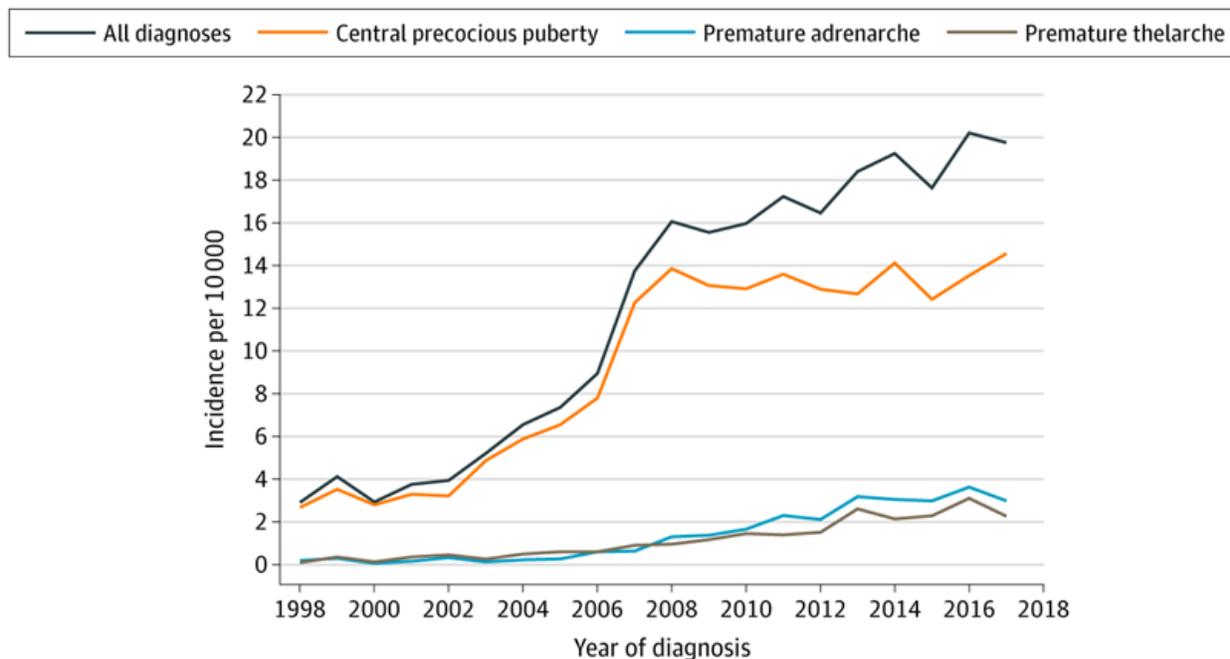
Exposures Diagnosis of CPP, PT, or PA.

OUTCOMES AND MEASURES: The age-specific and sex-specific incidence rates of first-time diagnosis of CPP, PT, and PA were estimated using data from the Danish National Patient Registry from 1998 to 2017, and information about the total number of children at risk within the same age groups and sex from Statistics Denmark. Incidences were stratified according to immigration group (Danish origin, first-generation immigrant, second-generation immigrant).

RESULTS: Overall a total 8596 children (7770 [90.4%] girls; median [interquartile] age at diagnosis for boys, 8.0 [7.1-9.0] years; for girls, 8.0 [7.6-8.5] years) were registered with an incident diagnosis of CPP, PT, or PA, of whom 7391 (86.0%) had Danish origin (6671 [90.3%] girls), corresponding to 370 new cases in children with Danish origin per year. The 20-year mean annual incidence rates of CPP, PT, PA, and all 3 conditions per 10 000 girls with Danish origin were 9.2 (95% CI, 8.0 to 10.3), 1.1 (95% CI, 0.7 to 1.5), 1.3 (95% CI, 0.9 to 1.7), and 11.5 (95% CI, 10.3 to 12.8), respectively. For boys with Danish origin, the 20-year mean annual incidence rates per 10 000 boys were lower: 0.9 (95% CI, 0.6 to 1.2), 0.2 (95% CI, 0.1 to 0.4), and 1.1 (95% CI, 0.7 to 1.4) for CPP, PA, and the sum, respectively. There was a 6-fold increase in incidence for girls with Danish origin (from 2.6 per 10 000 to 14.6 per 10 000) and a 15-fold increase for boys with Danish origin (from 0.1 per 10 000 to 2.1 per 10 000). The 20-year mean incidence of CPP and PA among girls in the first-generation and second-generation immigrant groups were greater than that of girls with Danish origin. The incidence rate for CPP per 10 000 girls in the first-generation and second-generation groups were 13.7 (95% CI, 9.3 to 18.2) and 14.2 (95% CI, 4.6 to 23.9), respectively; the incidence rate for PA per 10 000 girls in the first-generation and second-generation groups were 2.0 (95% CI, 0.3 to 3.6) and 1.5 (95% CI, -1.6 to 4.7), respectively. No differences associated with immigration status were observed among boys.

CONCLUSIONS: Our findings suggest that the annual incidence of CPP and normal variant puberty has substantially increased in Denmark during the last 20 years. These findings have implications for short-term and long-term health and potentially for the international classification of the reference age of puberty.

Figure 1. Trends in the Annual Incidence Among Girls With Danish Origin by Year of Incident Diagnosis, 1998 to 2017



3.4.3.5 [Kim, Huh, Won, Lee, & Park \(2015\)](#). A Significant Increase in the Incidence of Central Precocious Puberty among Korean Girls from 2004 to 2010. *PloS One*.

ABSTRACT: BACKGROUND: Few studies have explored the trends in central precocious puberty (CPP) in Asian populations. This study assessed the prevalence and annual incidence of CPP among Korean children.

METHODS: Using data from the Korean Health Insurance Review Agency from 2004 to 2010, we reviewed the records of 21,351 children, including those registered with a diagnosis of CPP for the first time and those diagnosed with CPP who were treated with gonadotropin-releasing hormone analogs.

RESULTS: The prevalence of CPP was 55.9 per 100,000 girls and 1.7 per 100,000 boys, respectively. The overall incidence of CPP was 15.3 per 100,000 girls, and 0.6 per 100,000 boys. The annual incidence of CPP in girls significantly increased from 3.3 to 50.4 per 100,000 girls; whereas in boys, it gradually increased from 0.3 to 1.2 per 100,000 boys. The annual incidence of CPP in girls consistently increased at all ages year by year, with greater increases at older ages (≥ 6 years of age), and smaller increases in girls aged < 6 years. In contrast, the annual incidence remained relatively constant in boys aged < 8 years, while a small increase was observed only in boys aged 8 years. The increase of annual incidence showed significant differences depending on age and gender ($P < 0.0001$).

CONCLUSIONS: The annual incidence of CPP has substantially increased among Korean girls over the past 7 years. Continued monitoring of CPP trends among Korean children will be informative.

FIGURE:

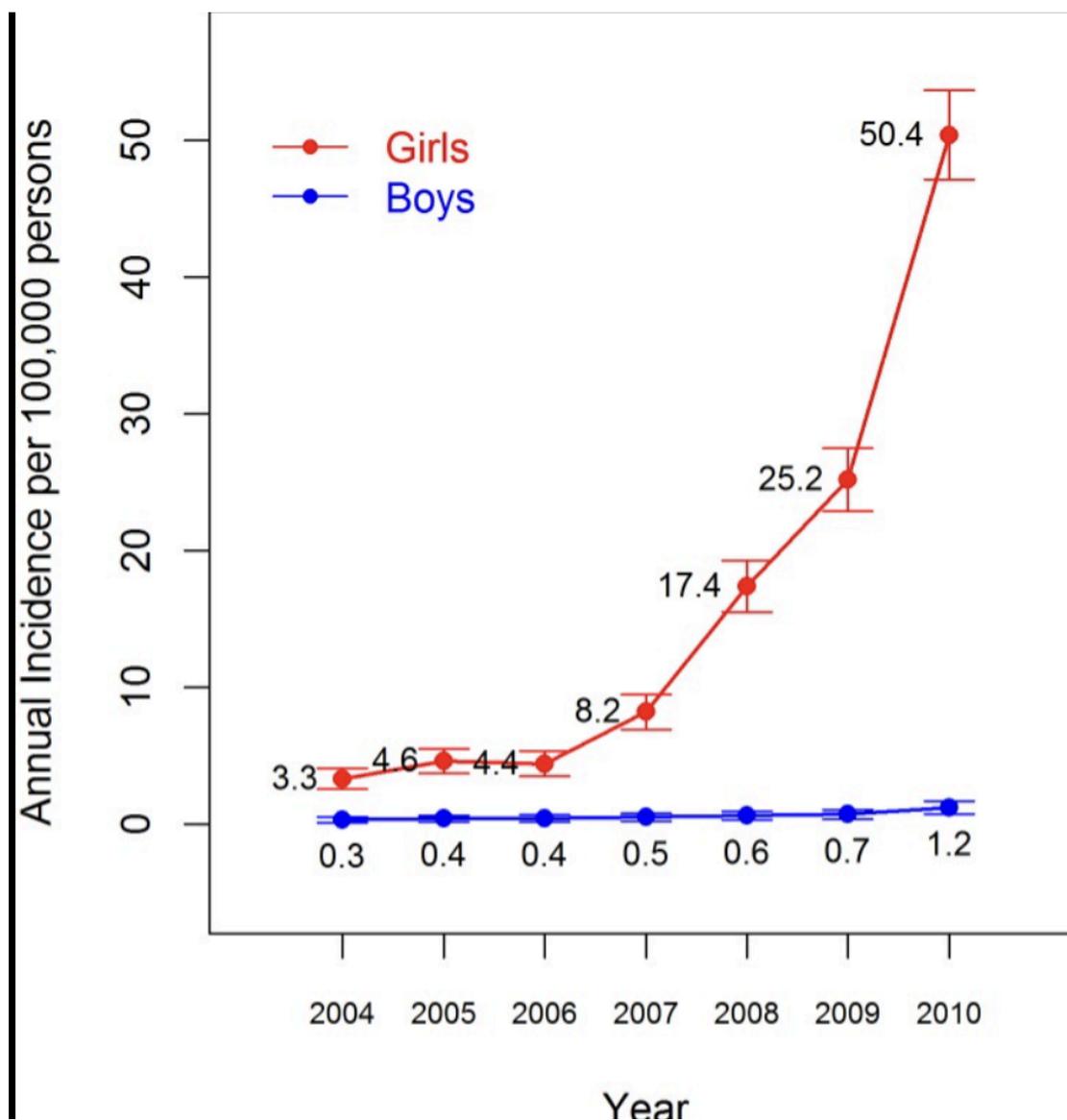


FIGURE: Fig 1. The annual incidence of **central precocious puberty** among Korean children. The error bars represents the 95% confidence intervals of the incidence estimates.

3.4.3.6 [Kim... & Kim \(2019\)](#). Incidence and Prevalence of **Central Precocious Puberty in Korea**: An Epidemiologic Study Based on a National Database. *The Journal of Pediatrics*.

FIGURE:

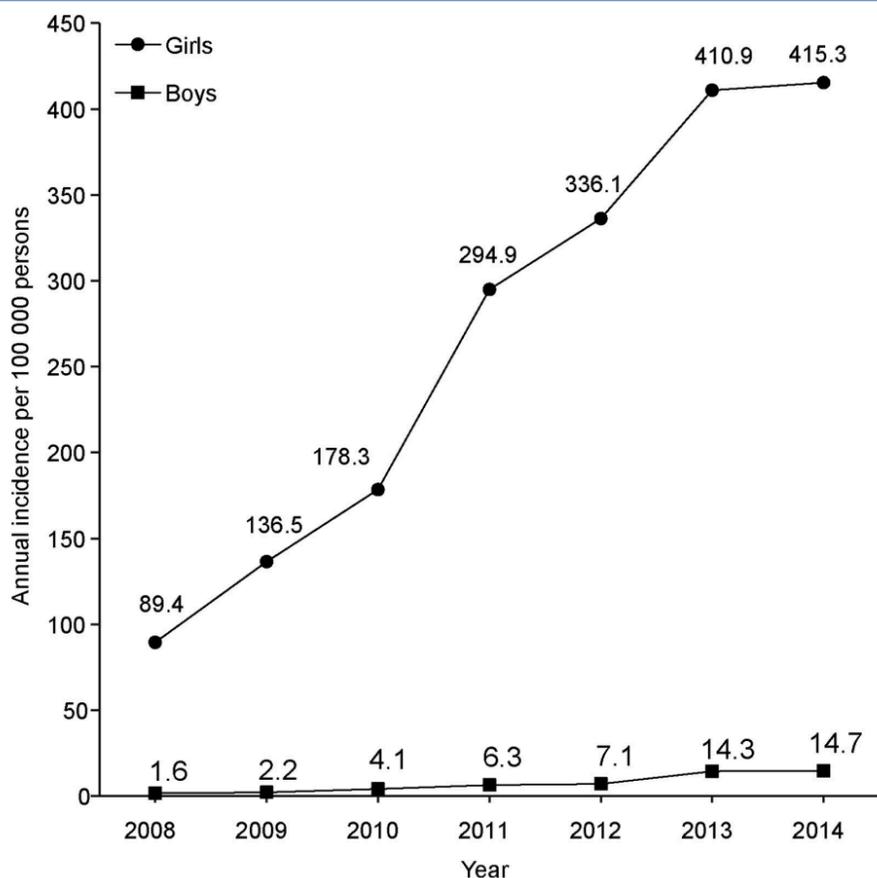


Figure 1. Annual incidence of central precocious puberty in Korean children from 2008 to 2014.

Incidence and Prevalence of Central Precocious Puberty in Korea: An Epidemiologic Study Based on a National Database **3**

3.4.3.7 [Soriano-Guillén, Corripio, Labarta, Cañete, Castro-Feijóo, Espino & Argente \(2010\)](#). Central precocious puberty in children living in Spain: Incidence, prevalence, and influence of adoption and immigration. *The Journal of Clinical Endocrinology and Metabolism*.

FIGURE:

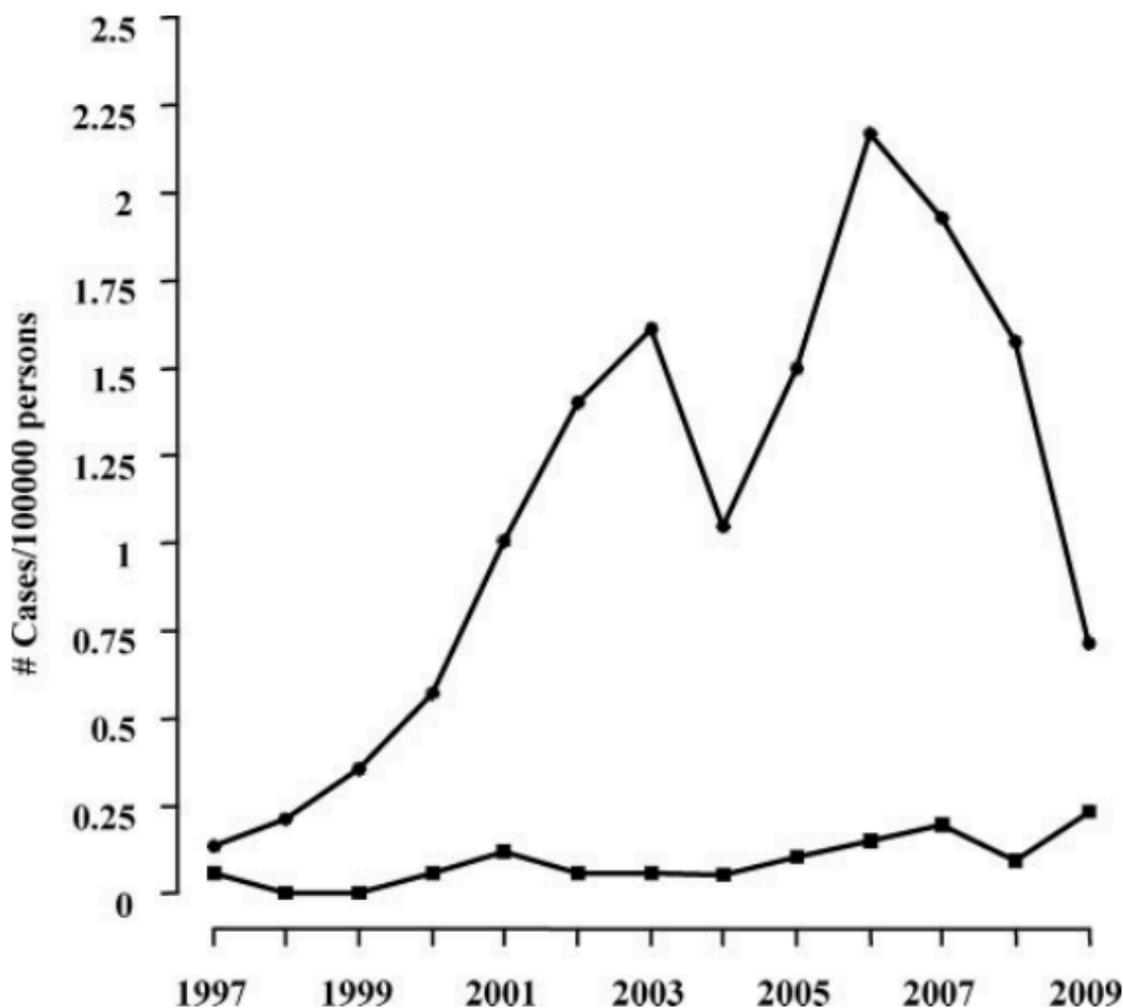


FIG. 1. Annual incidence of CPP by sex. ○, Female; ■, male.

3.4.3.8 [Kaltiala-Heino, Marttunen, Rantanen, & Rimpelä \(2003\)](#). Early puberty is associated with mental health problems in middle adolescence. *Social Science & Medicine*.

ABSTRACT: This study set out to assess the relationship between pubertal timing and emotional and behavioural problems in middle adolescence. The study involved a school based survey of health, health behaviour and behaviour in school as well as questions about emotional and behavioural problems (the School Health Promotion Study). Secondary schools in four regions and 13 towns in Finland participated in the study in 1998. The respondents were 36,549 adolescents aged 14–16. The study

included questions on depression, [bulimia nervosa](#), [psychosomatic](#) symptoms, anxiety, drinking, substance use, smoking, bullying and truancy. **Among girls, both internalising and externalising symptoms were more common the earlier puberty occurred. Among boys, externalising symptoms only were associated with early puberty. It is concluded that early pubertal timing is associated with increased mental health problems.** Professionals working with adolescents should consider the mental health needs of early maturing adolescents.

3.4.3.9 [Kaltiala-Heino, Rimpel, Rissanen, & Rantanen \(2001\)](#). Early puberty and early sexual activity are associated with bulimic-type eating pathology in middle adolescence. *Journal of Adolescent Health*.

ABSTRACT: PURPOSE: To examine the associations between early pubertal timing and early advanced sexual development with bulimic-type eating pathology in middle adolescents.

METHODS: A total of 19,321 boys and 19,196 girls aged 14–16 years (mean age 15.3 years, standard deviation 0.59) responded to the School Health Promotion Study, a class-room survey among Finnish adolescents about health, health behavior, and school experiences. Bulimic-type eating pathology was assessed with a questionnaire formulated according to the fourth edition of the Diagnostic and Statistical Manual for Mental Disorders IV (DSM-IV) criteria. Pubertal timing was assessed by self-reported age at [menarche](#) or oigarche. Statistical methods were used chi-square and [logistic regression](#).

RESULTS: **Bulimic-type eating pathology among girls was associated with early menarche, early sexual experiences, and increasing age.** Among boys, onset of ejaculations at the normative age was protective for bulimic-type eating pathology, and the risk was elevated among very early and late maturers. Early sexual experience was associated with bulimic-type eating pathology.

CONCLUSION: To prevent [bulimia nervosa](#) and to create opportunities for early intervention, attention should be paid to early maturing girls and off-time maturing boys, as well as those with early onset of sexual activity.

3.4.3.10 [Wichstrøm \(2000\)](#). Predictors of Adolescent Suicide Attempts: A Nationally Representative Longitudinal Study of Norwegian Adolescents. *Journal of the American Academy of Child & Adolescent Psychiatry*.

ABSTRACT OBJECTIVE: To investigate the risk and protective factors for previous and future suicide attempts among adolescents.

METHOD: A representative sample of high school students (N = 9,679) in grades 7 through 12 (aged 12-20 years) were followed from 1992 to 1994. Response rate was 97% at initial testing and 80% at follow-up. Measures of psychiatric symptoms (depressed mood, eating problems, conduct problems), substance use, self-worth, pubertal timing, social network, and social integration were included.

RESULTS: A total of 8.2% had ever attempted suicide and 2.7% reported an attempt during the 2-year study period. **Logistic regression analysis showed that future attempts were predicted by previous attempt, female gender, young age, perceived early pubertal development (stronger among girls), suicidal ideation, alcohol intoxication, not living with both parents, and poor self-worth.**

CONCLUSIONS: The importance that the clinician ask about previous suicidal behaviors is underscored. Early pubertal timing (particularly among girls), loss of self-worth, and alcohol intoxication may serve as risk factors for future suicide attempts.

3.4.3.11 Viner (2015). Puberty, the Brain and Mental Health in Adolescence. In J.-P. Bourguignon, J.-C. Carel, & Y. Christen (Eds.), *Brain Crosstalk in Puberty and Adolescence* (pp. 57–73). Springer International Publishing.

ABSTRACT: There is increasing evidence that puberty influences mental health and emotional well-being in humans in multiple ways. These effects begin with adrenarche in late childhood and continue with gonadarche in early adolescence.

Puberty itself is associated with increased behavioral problems in boys and increased social anxiety, depression and self-harm in girls. It is also associated with a lower sense of well-being and with increased reports of fatigue, irritability and somatic complaints. The mechanisms by which puberty influences mental health are unclear, and likely encompass biological and sociological pathways. Pubertal timing appears to have effects that are separate from the processes of puberty itself, although it is uncertain whether those with earlier puberty simply enter this risk period earlier than peers. Developmental mismatch may be a key mechanism for the effects of early puberty, i.e., a mismatch between emotional challenges and the cognitive capacities of young adolescents. Hyperactivation of HPA stress responses with puberty may play a role in mediating these associations.

However, it is also possible that early puberty and adolescent mental health problems share a range of common risk factors. These may include stressful family environments, early childhood adversity, sexual abuse and lack of parental investment or warmth. In support of this possibility are recent findings that children with early puberty can be identified as having increased psychosocial problems in early childhood before puberty

(Mensah et al. *J Adolesc Health* 53:118–124, 2013). Others have found that higher levels of mental health problems are associated with early puberty only in those with high family risk. This finding has led to hypotheses that early puberty may be an evolutionary response to early-life adversities and, in turn, may be linked to a suite of risk-taking behaviors linked with early reproduction.

Life-course studies of the associations of early puberty and mental health have not been undertaken. I present findings from two British Birth Cohort studies (1958 and 1970 birth cohorts) that examined the associations between childhood adversity and mental health in adult life. I also discuss a new Australian cohort study, the Childhood to Adolescence Transition Study (CATS; Mundy et al. *BMC Pediatr* 13:160, 2013) that was set up to examine the effects of early life experience and the earliest changes of adrenarche and gonadarche on mental health, behavior and well-being in Australian children.

3.4.3.12 [Graber, Lewinsohn, Seeley, & Brooks-gunn \(1997\)](#). Is Psychopathology Associated With the Timing of Pubertal Development? *Journal of the American Academy of Child & Adolescent Psychiatry*.

ABSTRACT: OBJECTIVE: This investigation tested whether the timing of pubertal development was associated with concurrent and prior experiences of psychopathology (symptoms and disorders) in adolescent boys and girls.

METHOD: A large (N = 1,709) community sample of high school students were interviewed using the Schedule for Affective Disorders and Schizophrenia for School-Age Children as adapted for use in epidemiological studies. Adolescents also completed a questionnaire battery covering a range of psychosocial variables.

RESULTS: Analyses tested whether pubertal timing was associated with present and lifetime history of mental disorders, psychological symptoms, and psychosocial functioning. **As hypothesized, early-maturing girls and late-maturing boys showed more evidence of psychopathology than other same-gender adolescents.**

CONCLUSIONS: Early-maturing girls had the poorest current and lifetime history of adjustment problems, indicating that this pattern of pubertal development merits attention by mental health providers and researchers.

3.4.3.13 OTHER RELEVANT ARTICLES:

- [Changoiwala \(2022\)](#). Early puberty cases in girls are surging in pandemic, doctors say. *The Washington Post*.
- [Ghorayshi \(2022\)](#). Puberty Starts Earlier Than It Used To. No One Knows Why. *The New York Times*.
- [Mouzo \(2022\)](#). Girls are entering puberty a year earlier than their mothers' generation. *El Pais*.

3.4.4 ILLUSTRATIONS

3.4.4.1 [Why More and More Girls Are Hitting Puberty Early](#)

[What are we missing?]

SECTION 4: THE EFFECTS OF DIGITAL MEDIA USE ON SOCIAL DEVELOPMENT

This section collects essays and research on whether smartphones in general, or social media in particular, cause users to develop delayed or defective social skills and relationships. Areas of focus include eye-contact, loneliness and isolation, friendship development, self-esteem, empathy and morality, courage and cowardice, and cyberbullying.

4.1 SOCIAL SKILLS

4.1.1 EVIDENCE AND ESSAYS SHOWING HARMS

- 4.1.1.1 [Chan \(2014\)](#). Facebook and its Effects on Users' Empathic Social Skills and Life Satisfaction: A Double-Edged Sword Effect. *Cyberpsychology, Behavior, and Social Networking*,

ABSTRACT: This study examines how Facebook usage affects individual's empathic social skills and life satisfaction. Following the self-presentational theory, the study explores a key component of the Internet paradox—whether Facebook suppresses or enhances users' interpersonal competence (specifically empathic social skills), given their respective personality makeup. Going further, the study assesses these events' subsequent impacts on users' psychological well-being. Analogous to a double-edged sword, Facebook activities are hypothesized to suppress the positive effect of a user's extraversion orientation on empathic social skills but lessen the negative effect of neuroticism on these skills. The study examines a sample of college-aged Facebook users (n=515), who responded to a large-scale online survey. The findings from a structural equation modeling analysis indicate that while empathic social skills are positively associated with life satisfaction, **Facebook activities mainly exert suppression effects. Only upon low usage can Facebook activities lessen the negative effect of neuroticism on empathic social skills, suggesting that Facebook may appear as a less threatening platform for social interactions among neurotics. Yet, results in general suggest that undesirable effects may occur at high levels of Facebook usage whereby both extroverted and neurotic users displace real world social ties to online ones.** The findings point to the complex ways in which social media usage may impact the livelihood of users.

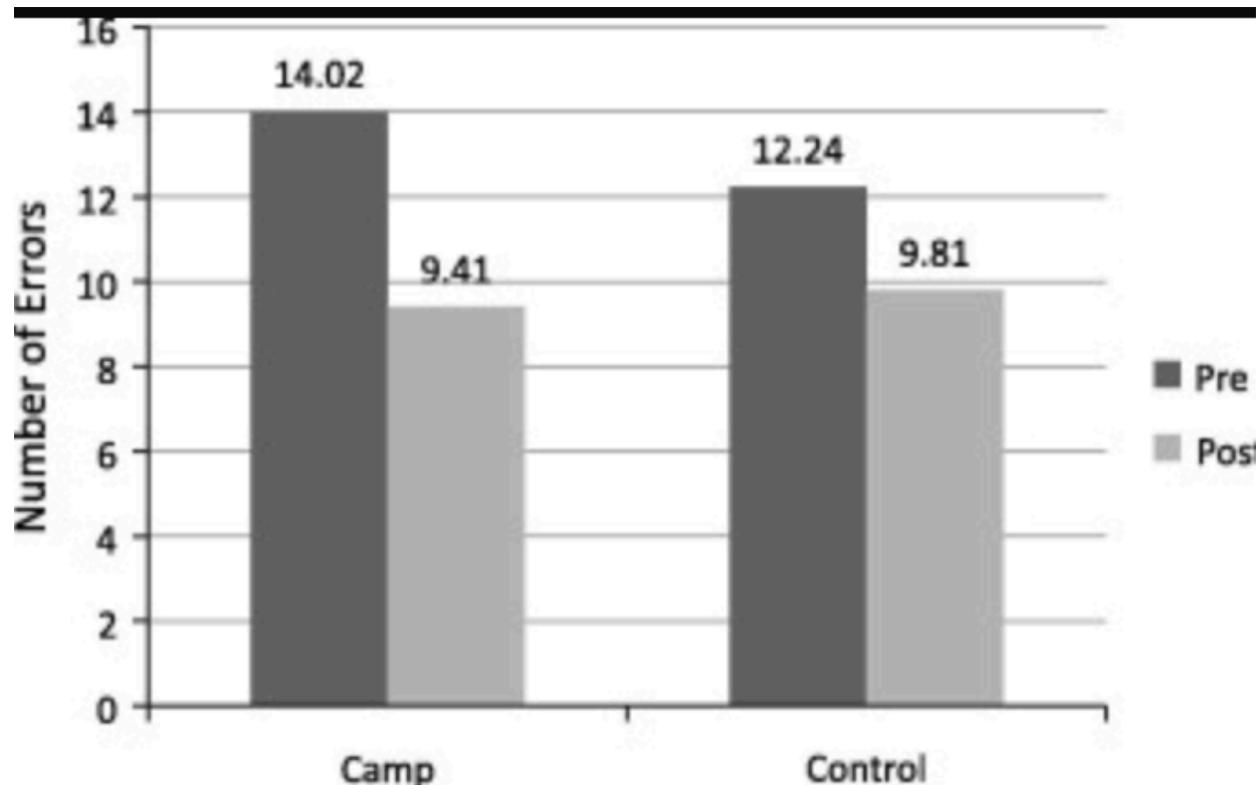
4.1.1.2 [Uhs, Michikyan, Morris, Garcia, Small, Zgourou, & Greenfield \(2014\)](#). Five days at outdoor education camp without screens **improves preteen skills with nonverbal emotion cues.** *Computers in Human Behavior*.

ABSTRACT: A field experiment examined whether increasing opportunities for face-to-face interaction while eliminating the use of screen-based media and communication tools improved nonverbal emotion–cue recognition in preteens. Fifty-one preteens spent five days at an overnight nature camp where television, computers and mobile phones were not allowed; this group was compared with school-based matched controls (n = 54) that retained usual media practices. Both groups took pre- and post-tests that required participants to infer emotional states from photographs of facial expressions and videotaped scenes with verbal cues removed. Change scores for the two groups were compared using gender, ethnicity, media use, and age as covariates. **After five days interacting face-to-face without the use of any screen-based media, preteens' recognition of nonverbal emotion cues improved significantly more than that of the control group for both facial expressions and videotaped scenes.** Implications are that the short-term effects of increased opportunities for social interaction, combined with time away from

screen-based media and digital communication tools, improves a preteen's understanding of nonverbal emotional cues.

EXCERPT: We found that children who were away from screens for five days with many opportunities for in-person interaction improved significantly in reading facial emotion (DANVA 2), compared to those in the control group, who experienced their normal media exposure during an equivalent five-day period ($F_{5,88} = 4.06, p < .05, d = .33$). In the experimental condition, participants went from an average of 14.02 errors in the Faces pretest (including both child and adult faces) to an average of 9.41 errors in the posttest (a reduction of 4.61 errors), while the control group went from an average of 12.24 to 9.81, which was a reduction of 2.43 errors (we attribute this change to a practice effect). Thus, the group that attended camp without access to any screen-based media improved significantly more than the control group, who experienced their usual amount of screen time. Fig. 1 illustrates these change scores.

FIGURE:



4.1.1.3 [Pea. & Zhou \(2012\)](#). Media use, face-to-face communication, media multitasking, and social well-being among 8- to 12-year-old girls. *Developmental Psychology*.

ABSTRACT: An online survey of 3,461 North American girls ages 8–12 conducted in the summer of 2010 through Discovery Girls magazine examined the relationships between social well-being and young girls' media use—including video, video games, music listening, reading/homework, e-mailing/posting on social media sites, texting/instant messaging, and talking on phones/video chatting—and face-to-face communication. This study introduced both a more granular measure of media multitasking and a new comparative measure of media use versus time spent in face-to-face communication. **Regression analyses indicated that negative social well-being was positively associated with levels of uses of media that are centrally about interpersonal interaction (e.g., phone, online communication) as well as uses of media that are not (e.g., video, music, and reading). Video use was particularly strongly associated with negative social well-being indicators. Media multitasking was also associated with negative social indicators. Conversely, face-to-face communication was strongly associated with positive social well-being. Cell phone ownership and having a television or computer in one's room had little direct association with children's socioemotional well-being.** We hypothesize possible causes for these relationships, call for research designs to address causality, and outline possible implications of such findings for the social well-being of younger adolescents. (PsycINFO Database Record (c) 2016 APA, all rights reserved)

4.1.1.4 [Feiler \(2015\)](#). Hey, Kids, Look at Me When We're Talking. *New York Times*.

EXCERPT: Patricia M. Greenfield, distinguished professor of psychology at the University of California, Los Angeles, and the director of the [Children's Digital Media Center, Los Angeles](#) (and the editor of the original piece), told me that despite this lack of evidence, in the more than four decades she has been examining young people and technology, **she has seen a rapid escalation in disturbing habits. "It used to be we went into communities every 20 years looking for change," she said. "Now, I can see changes even between my 14-year-old grandson and my 8-year-old grandson."**

In 2012, Dr. Greenfield and her colleague Yalda T. Uhls performed a study of their own. They invited 51 preteens to spend [five days at an overnight camp](#) without television, computers or mobile phones. These students were compared to a control group that retained usual media practices. All participants took before and after tests that required them to infer emotional states from photographs and videos. After five days without screens, the children at the camp were significantly better at reading nonverbal emotional cues.

4.1.1.5 [Shellenbarger \(2013\)](#). Just look me in the eye already. *The Wall Street Journal*.

EXCERPT: Adults make eye contact between 30% and 60% of the time in an average conversation, says the communications-analytics company Quantified Impressions. But the Austin, Texas, company says people should be making eye contact 60% to 70% of the time to create a sense of emotional connection, according to its analysis of 3,000 people speaking to individuals and groups.

One barrier to contact is the use of mobile devices for multitasking. Among twentysomethings, "it's almost become culturally acceptable to answer that phone at dinner, or to glance down at the baseball scores," says Noah Zandan, president of Quantified Impressions. (A common feint, texting while maintaining eye contact, not only is difficult but also comes off as phony.)

4.1.1.6 [Duch, Fisher, Ensari, Font, Harrington, Taromino, Yip, & Rodriguez \(2013\)](#). Association of Screen Time Use and Language Development in Hispanic Toddlers: A Cross-Sectional and Longitudinal Study. *Clinical Pediatrics*.

ABSTRACT: This study examined the association between screen media use, media content, and language development among 119 Hispanic infants and toddlers. Children and their caregivers were recruited through an urban, Early Head Start program. Duration and content of screen media exposure was measured through a 24-hour recall questionnaire, and language development was measured at baseline and at 1-year follow up. Children in the sample spent an average of 3.29 hours engaged with screen media (median 2.5 hours per day). **In both cross-sectional and longitudinal analyses, children who watched over 2 hours of television per day had increased odds of low communication scores. Whereas child-directed media was associated with low language scores, adult-directed media was not.** Our findings support the mounting literature on the deleterious impacts of screen media in toddler's language development. Guidance and alternatives to screen media use should be available to families in pediatric practices and early childhood centers.

4.1.1.7 [Chonchaiya, & Pruksananonda \(2008\)](#). Television viewing associates with delayed language development. *Acta Paediatrica*.

ABSTRACT: AIM: To identify impact of television viewing on language development.

Methods: The case-control study included 56 new patients with language delay and 110 normal children, aged 15–48 months. Language delay was diagnosed by reviewing language milestones and Denver-II. Television viewing variables and child/parental characteristics between both groups were interviewed. The data were analyzed by ANOVA and chi-square test. Adjusted odds ratios and 95% confidence intervals were calculated from multivariate logistic regression model.

RESULTS: Forty-six boys and 10 girls; mean [\pm SD] age, 2.11 ± 0.47 years of the case group and 59 boys and 51 girls; mean [\pm SD] age, 2.23 ± 0.80 years of the control group were enrolled. Children who had language delay usually started watching television earlier at age 7.22 ± 5.52 months vs. 11.92 ± 5.86 months, p -value < 0.001 and also spent more time watching television than normal children (3.05 ± 1.90 h/day vs. 1.85 ± 1.18 h/day; p -value < 0.001). **Children who started watching television at <12 months of age and watched television >2 h/day were approximately six times more likely to have language delays.**

CONCLUSIONS: There is a relationship between early onset and high frequency of TV viewing and language delay.

4.1.1.8 [Christakis \(2009\)](#). The effects of infant media usage: What do we know and what should we learn? *Acta Paediatrica*.

ABSTRACT: The rise of infant TV viewing began in the late 1990s and has become an increasingly common occurrence. Today, over 90% of children begin watching TV regularly before the age of 2 years in spite of recommendations to the contrary. This article reviews what is known about the effects of infant TV viewing on multiple domains of child development including language, cognition and attentional capacity as well as directions for future research.

CONCLUSIONS: **No studies to date have demonstrated benefits associated with early infant TV viewing. The preponderance of existing evidence suggests the potential for harm.** Parents should exercise due caution in exposing infants to excessive media.

4.1.1.9 [Handheld screen time linked with speech delays in young children \(2017\)](#). *American Academy of Pediatrics*.

EXCERPT: By their 18-month checkups, 20% of the children had daily average handheld device use of 28 minutes, according to their parents. **Based on a screening tool for language delay, researchers found that the more handheld screen time a**

child's parent reported, the more likely the child was to have delays in expressive speech. For each 30-minute increase in handheld screen time, researchers found a 49% increased risk of expressive speech delay. There was no apparent link between handheld device screen time and other communications delays, such as social interactions, body language or gestures.

4.1.1.10 [Zimmerman, Christakis, & Meltzoff \(2007\)](#). Associations between media viewing and language development in children under age 2 years. *The Journal of Pediatrics*.

ABSTRACT: OBJECTIVE: To test the association of media exposure with language development in children under age 2 years.

DESIGN: A total of 1008 parents of children age 2 to 24 months, identified by birth certificates, were surveyed by telephone in February 2006. Questions were asked about child and parent demographics, child-parent interactions, and child's viewing of several content types of television and DVDs/videos. Parents were also asked to complete the short form of the MacArthur-Bates Communicative Development Inventory (CDI). The associations between normed CDI scores and media exposure were evaluated using multivariate regression, controlling for parent and child demographics and parent-child interactions.

RESULTS: **Among infants (age 8 to 16 months), each hour per day of viewing baby DVDs/videos was associated with a 16.99-point decrement in CDI score in a fully adjusted model (95% confidence interval = -26.20 to -7.77). Among toddlers (age 17 to 24 months), there were no significant associations between any type of media exposure and CDI scores.** Amount of parental viewing with the child was not significantly associated with CDI scores in either infants or toddlers.

CONCLUSIONS: Further research is required to determine the reasons for an association between early viewing of baby DVDs/videos and poor language development.

HYPOTHESIS FROM [THIS ARTICLE](#)

- The explosion of screen time over the last decade is happening simultaneously as [nearly 8% of children are experiencing speech or language disorders](#).

4.1.1.11 [Madigan, Browne, Racine, Mori, & Tough \(2019\)](#). 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.

OUTCOMES 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, 1227 (50.2%) 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 , -0.06; 95% CI, -0.10 to -0.01) and 60 months (β , -0.08; 95% CI, -0.13 to -0.02), respectively.** These **within-person (time-varying) associations statistically controlled for between-person (stable) differences.**

CONCLUSIONS: 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.

4.1.1.12 [Dunckley \(2012\)](#). Electronic screen syndrome: An unrecognized disorder? *Psychology Today*.

EXCERPT:

"He's revved up all the time."

"He can't focus at all and is totally defiant. Getting ready for school or bedtime is a daily nightmare."

"She's exhausted and has meltdowns even when she's slept enough."

"He flies into a rage over the slightest thing. The other kids don't want to play with him anymore."

"Her grades have gone downhill this year and we don't know why."

The above symptoms or complaints are so common nearly every parent will relate to one or more of them. [Psychiatric](#) symptoms from various disorders can have a lot of overlap, and this is especially true when it comes to children. This overlapping nature coupled with today's overstimulating high-tech environment has led to an epidemic of misdiagnosed mental disorders, which in turn lends itself to inappropriate psychotropic medication prescribing and misuse of precious resources.

The two most overdiagnosed disorders in the pediatric population that I've encountered over the last 10 years are (by far and away) [childhood bipolar disorder](#) and [attention deficit hyperactivity disorder](#) (ADHD or ADD)—both of which can lead to taking medication with significant side effects. Visits for youths diagnosed with pediatric bipolar disorder increased 40-fold from 1994 to 2003. Between 1980 and 2007 the diagnosis of ADHD has increased by nearly 800 percent. And there have been sharp rises in psychotropic prescribing in children over the past two decades, including [antipsychotics](#) and stimulants.

I don't (completely) blame the drug companies for these trends, nor do I feel parents are looking for an "easy fix." I think there really are more kids with serious mental health issues. And because distressed parents are coming through their doctor's door desperate for an answer, physicians and other clinicians feel pressure to provide relief. Might something environmental be to blame?

Electronic Screen Syndrome: An Unrecognized, Modern-Day Disorder

If you follow my other posts, you may know that I blame a lot of mental health woes on the effects of electronic screen media. I firmly believe that the unnaturally stimulating nature of an electronic screen—irrespective of the content it brings—has ill effects on our mental and physical health at multiple levels.

Screen-related effects can present in many shapes and forms. Although varied, many of the effects can be grouped into symptoms related to mood, cognition, and behavior. The root of these symptoms appears to be linked to repeated stress on the nervous system, making self-regulation and stress management less efficient.

Because of the complicated and varied nature of screens' effects, I've found it helpful to conceptualize the phenomena in terms of a syndrome—what I call Electronic Screen Syndrome (ESS). ESS can occur in the absence of a psychiatric disorder and mimic it, or it can occur in the face of an underlying disorder, exacerbating it.

ESS is essentially a disorder of dysregulation. Dysregulation can be defined as an inability to modulate one's mood, attention, or level of arousal in a manner appropriate to one's environment.

Interacting with screens shifts the nervous system into fight-or-flight mode which leads to dysregulation and disorganization of various biological systems. Sometimes this stress response is immediate and pronounced (say while playing an action video game), and other times the response is more subtle and may happen only after a certain amount of repetition (say while texting). The mechanisms for screens causing a stress response are varied and are a topic for another day. In short, though, interacting with screen devices causes a child to become overstimulated and “revved up.”

4.1.1.13 [Kushlev, Hunter, Proulx, Pressman, & Dunn \(2019\)](#). Smartphones reduce smiles between strangers. *Computers in Human Behavior*.

ABSTRACT: New developments in technology—from the printing press to television—have long facilitated our capacity for “absent presence,” enabling us to escape the limits of our immediate environment. Does being constantly connected to other people and activities through our smartphones diminish the need to engage with others in the immediate social world, reducing the likelihood of approach behavior such as smiling? In a [preregistered](#) experiment, strangers waited together with or without their smartphones; their smiling was later coded by trained assistants. **Compared to participants without smartphones, participants with smartphones exhibited significantly fewer smiles of any kind and fewer genuine (Duchenne) smiles.** These findings are based on objective behavioral coding rather than self-report and provide clear evidence that being constantly connected to the digital world may undermine important approach behavior.

4.1.1.14 [Epley \(2019\)](#). Big Brains podcast: Why Talking to Strangers Will Make You Happier with Nicholas Epley. *University of Chicago News*.

EXCERPT: We got lots of comments from people who say that it was really hard to get somebody to talk to them because everybody has their earbuds in now. Everybody's looking at their phones now. One person wrote "nobody looks out the window or talks to people on the train anymore, what a shame." And I do think that technology can bring us together in some ways, right? Social media can connect people through the technology, in some ways, but also disconnects you from the people sitting around you nearby that could be meaningful sources of connection. The fact that we increasingly

interact with other people through our fingers over text and email, typing to each other, rather than what we're doing right now talking to each other concerns me. It turns out a person's mind really comes through their mouth, both in terms of conveying accurate information, but also just conveying the presence of an actual human-like mind. I can't see you thinking, I often can't see you feeling and I can't see your attitude, but I can hear it. That is, your voice contains lots of cues to the presence of a mind that I don't get when we're interacting over text, which is increasingly common in the modern world. The voice contains all kinds of para-linguistic cues, intonation your voice goes up and down. It varies in its pace, right, I speed up and I slow down when I'm speaking. It varies in its inflection. And all of those give us cues that you are a sentient, thoughtful being who's connecting with me. We find that people think others are more mindful, more thoughtful, more intelligent, more rational, when you hear what they have to say than when you read exactly the same content. Or even when you read what somebody else has written to convey the same kinds of ideas. **So a lot of the technological tools that make interpersonal connection easy and efficient also cut out some of the most essential ingredients for actual interpersonal understanding and connection and that concerns me.**

EXCERPT FROM [RELATED PIECE](#): **A generation ago, before we could use smartphones to order takeout meals delivered by a robot and arrange to have our prescriptions, dry cleaning and other essentials dropped off at our doors, we had no choice but to interact with strangers on a regular basis. Now it's the kind of thing that makes some people uncomfortable, said Nicholas Epley, a professor of behavioral science at the University of Chicago's Booth School of Business."**

4.1.1.15 [Anderson, Faverio and Park \(2024\)](#). How Teens and Parents Approach Screen Time. *Pew Research Center*.

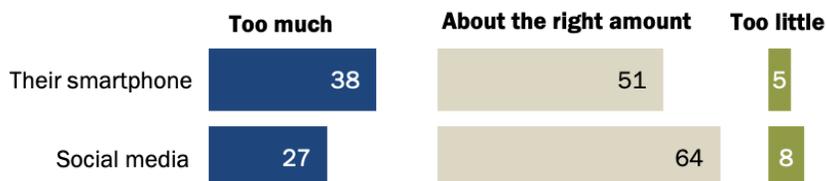
Key findings from the survey:

- Phone-less: 72% of U.S. teens say they often or sometimes feel peaceful when they don't have their smartphone; 44% say it makes them feel anxious.
- Good for hobbies, less so for socialization: 69% of teens say smartphones make it easier for youth to pursue hobbies and interests; fewer (30%) say it helps people their age learn good social skills.
- Parental snooping: Half of parents say they have looked through their teen's phone.
- Smartphone standoffs: About four-in-ten parents *and* teens report regularly arguing with one another about time spent on their phone.

- Distracted parenting: Nearly half of teens (46%) say their parent is at least sometimes distracted by their phone when they're trying to talk to them.

About 4 in 10 teens say they spend too much time on their phone

% of U.S. teens ages 13 to 17 who say they spend ___ (of) time on the following



Note: Those who did not give an answer are not shown.

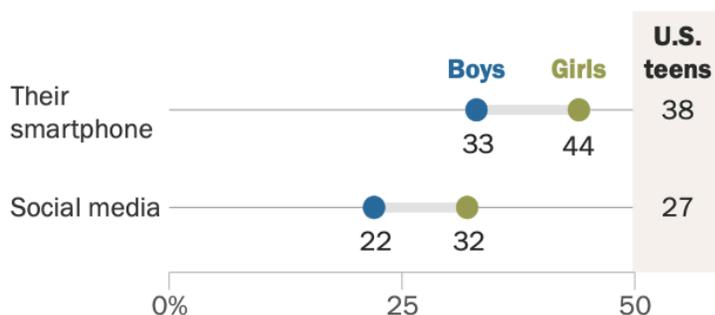
Source: Survey conducted Sept. 26-Oct. 23, 2023.

"How Teens and Parents Approach Screen Time"

PEW RESEARCH CENTER

Teen girls are more likely than boys to say they spend too much time on their phone and social media

% of U.S. teens ages 13 to 17 who say they spend **too much** time on the following



Note: Those who did not give an answer or gave other responses are not shown.

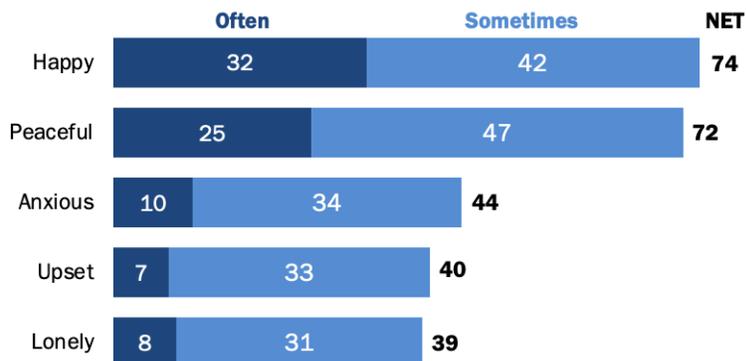
Source: Survey conducted Sept. 26-Oct. 23, 2023.

"How Teens and Parents Approach Screen Time"

PEW RESEARCH CENTER

Roughly three-quarters of teens at least sometimes feel happy or peaceful when they don't have their phone; 44% feel anxious

% of U.S. teens ages 13 to 17 who say they feel the following ___ when they do not have their smartphone with them



Note: Those who did not give an answer or gave other responses are not shown.
Source: Survey conducted Sept. 26-Oct. 23, 2023.
"How Teens and Parents Approach Screen Time"

PEW RESEARCH CENTER

Most teens say the benefits of smartphones outweigh the harms for people their age

% of U.S. teens ages 13 to 17 who say, when it comes to people their age using a smartphone, there are generally ...

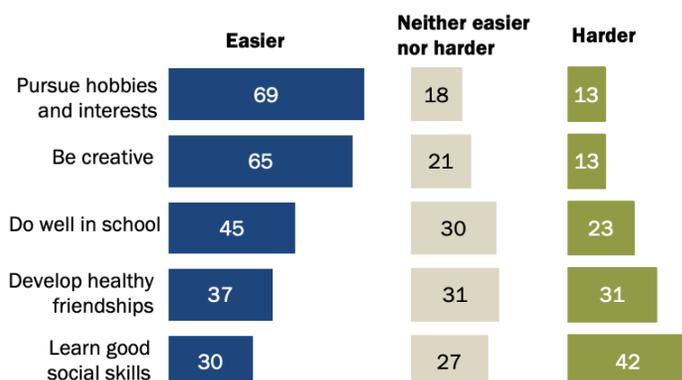


Note: Those who did not give an answer are not shown.
Source: Survey conducted Sept. 26-Oct. 23, 2023.
"How Teens and Parents Approach Screen Time"

PEW RESEARCH CENTER

About two-thirds of teens say phones make it easier for youth to pursue interests, be creative; fewer think it helps peers learn good social skills

% of U.S. teens ages 13 to 17 who say that using smartphones make it ___ for people their age to do the following



Note: Those who did not give an answer are not shown.
Source: Survey conducted Sept. 26-Oct. 23, 2023.
"How Teens and Parents Approach Screen Time"

PEW RESEARCH CENTER

[What are we missing?]

4.1.2 EVIDENCE AND ESSAYS SHOWING BENEFITS OR NO HARMS

4.1.2.1 [Bohn \(2021\)](#). How social media is changing the way people get to know each other. *Penn State Research*.

This is an interview with the author of ["Social Media Communications: Trends and Theories"](#)

EXCERPT: DO-IT-YOURSELF BACKGROUND CHECKS: When most people meet someone new for the first time, the book explains, they often feel a need to "reduce uncertainty" about that person — or learn more about them when deciding whether to form a friendship.

This is usually done in three ways: by interacting directly with the person, asking others about the individual, or by observing the person interact with others. But now, research has shown that social media has introduced a fourth strategy.

"Platforms like Twitter and Facebook are particularly rife with uncertainty-reducing information such as personal beliefs, friends and

acquaintances, and photographs,” Zhong said. “This could be useful information to people forming any kind of relationship, but potential employers especially tend to do routine social media searches for job applicants before scheduling a face-to-face interview.”

BLIND COMMUNICATION: Speaking to someone face to face allows a person to pick up nonverbal cues — such as smiling, arm crossing and body positioning — that help people communicate. But because social media lacks this face-to-face contact, research has found that people have adapted to compensate when communicating online.

“People may ask more direct questions and disclose more information about themselves when communicating with a stranger through a computer than when interacting face to face,” Zhong said. “Uncertainty might decrease more slowly when communicating online, but this strategy is still effective.”

TAKING A STAND: According to Zhong, group communication was often difficult prior to the Internet. But now, social media and other online platforms have made collaborating with large groups of other people much easier.

One of the ways this has manifested is through social movements, both positive — like campaigns to engage voters — and negative, such as recruitment by terrorist organizations. And, in countries without a free media, it can act as a way to get important information to citizens.

“In some countries, where anti-government demonstrations erupted and turned into mass protests lasting for months, platforms like Twitter and Facebook became a crucial source of information for protestors and activists,” Zhong said. “In this way, social media can often serve as a citizen-powered version of CNN during a social crisis, where people can seek real-time information that the news media are unwilling or unable to cover.”

[What are we missing?]

4.1.3 ILLUSTRATIONS

4.1.3.1

https://www.reddit.com/r/nosurf/comments/uxtrbh/mindless_scrolling_has_made_me_du/ll_awkward_help/

EXCERPT: Before my 12th grade year my phone broke (and I lost my iPad) and while that raised my grades up and I came to the realization that there isn't really much to me. I don't have any projects or any "deep" thoughts about any of my supposed interests (writing, reading, history, film, philosophy). I'm very very dry in conversations so many times my internal response to what someone says to me is...What do I say to that? I go quiet a lot and I'm not good at riffing so, often I feel like I lose connection to few people I befriend because they slowly realize there isn't much more to me.

6 years since I've graduated high school, and nothing has changed,

4.1.3.2 [My social skills actually improved after quitting social media.](#)

EXCERPT: Quitting means uninstalling apps. And not actually deleting my account 😊

The thing is social media gives us everything at the tip of our fingers. And deprives us of the actual effort that we should put in order to communicate with others.

I kept instagram and reddit uninstalled for a quite long time. And sometimes when it's someone's birthday or any other reasons I'd install it.

And as soon as I feel that I'm getting distracted. I delete it immediately. At first I felt a bit difficult to uninstall it. But eventually I became the one who controlled instagram. And not instagram controlling me.

Benefits.. words started flowing through my mouth like a river 🤪🔥. I mean I really had to stop then think and yet unable to speak what I thought. Which led to me being ignored most of the time by my friends and family.

But now things have changed. My speaking has improved so much that I feel I have unlocked a different version of me.

4.1.3.3

https://www.reddit.com/r/nosurf/comments/102usil/gaming_and_scrolling_destroyed_my_life/

EXCERPT: I am constantly ruminating on the horror my parents had to go through of trying desperately to get me to go to school and failing. They have let me leech off them for the past 4 years and all I've done with the time is mindlessly scroll, not giving fuck about hurting them/costing money. I feel so overwhelming horrible and to top it off my

brain is fried and I have zero social skills. I went from being the one if not the most popular, good looking, and intelligent person in my class to being a 5/10 at best shut-in for years.

[What are we missing?]

4.2 SOCIAL RELATIONSHIPS

This includes studies on friendships, loneliness, and time spent with others. Does social media use lead to fewer or weaker good friends? How does it impact relationships with parents and other family members?

4.2.1 EVIDENCE AND ESSAYS SHOWING HARMS

4.2.1.1 [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.

4.2.1.2 [Primack... & Miller, E. \(2017\)](#). Social Media Use and Perceived Social Isolation Among Young Adults in the U.S. *American Journal of Preventive Medicine*.

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.

4.2.1.3 [Ryan, Allen, Gray, & McInerney \(2017\)](#). How Social Are Social Media? A Review of Online Social Behaviour and Connectedness. *Journal of Relationships Research*.

ABSTRACT: The use of social media is rapidly increasing, and one of the major discussions of the 21st century revolves around how the use of these applications will impact on the social relationships of users. To contribute to this discussion, we present a brief narrative review highlighting the advantages and disadvantages of social media use on three key aspects of social connectedness: **social capital, sense of community, and loneliness**. The results indicate that using **social media can increase social capital, lead to the formation of friendships and communities, and reduce loneliness**. However, some social media site users may experience **weakening friendships, online ostracism, and heightened loneliness**. Therefore, we argue that the use of social media has contradictory effects on social connectedness. Moreover, the direction of these outcomes is **contingent upon who is using the site and how they are using it**. Based on these arguments, possible directions for future research are discussed. It is recommended that discourse be continued relating to the association between online social behaviour and

connectedness, as this will enable researchers to establish whether the positive outcomes of social media use outweigh the negative.

4.2.1.3 [Dwyer, Kushlev, & Dunn \(2018\)](#). Smartphone use undermines enjoyment of face-to-face social interactions. *Journal of Experimental Social Psychology*.

ABSTRACT: Using a field experiment and experience sampling, we found the first evidence that phone use may undermine the enjoyment people derive from real world social interactions. In Study 1, we recruited over 300 community members and students to share a meal at a restaurant with friends or family. Participants were randomly assigned to keep their phones on the table or to put their phones away during the meal. **When phones were present (vs. absent), participants felt more distracted, which reduced how much they enjoyed spending time with their friends/family. We found consistent results using experience sampling in Study 2; during in-person interactions, participants felt more distracted and reported lower enjoyment if they used their phones than if they did not.** This research suggests that despite their ability to connect us to others across the globe, phones may undermine the benefits we derive from interacting with those across the table.

4.2.1.4 [Kushlev & Dunn \(2019\)](#). Smartphones distract parents from cultivating feelings of connection when spending time with their children. *Journal of Social and Personal Relationships*.

ABSTRACT: In the U.S., 95% of smartphone users admit to having used their smartphones during their latest social gathering. Although smartphones are designed to connect us with others, such smartphone use may create a source of distraction that disconnects us from the people in our immediate social environment. Focusing on one fundamental social relationship—between parents and their children—we examined whether smartphones made parents feel distracted, thereby undermining key benefits parents reap when spending time with their children. In a field experiment at a science museum (Study 1), we randomly assigned parents to use their phones frequently or infrequently. **Frequent phone use led parents to feel more distracted, which in turn impaired feelings of social connection and the meaning that parents derived when spending time with their children. In an additional weeklong diary study (Study 2), we found further evidence that smartphones can distract parents from reaping a sense of social connection when spending time with their children.** These studies suggest that being constantly connected to the Internet may carry subtle costs for the fabric of social life.

4.2.1.5 [Misra, Cheng, Genevie, & Yuan \(2016\)](#). The iPhone Effect: The Quality of In-Person Social Interactions in the Presence of Mobile Devices. *Environment and Behavior*.

ABSTRACT: This study examined the relationship between the presence of mobile devices and the quality of real-life in-person social interactions. In a naturalistic field experiment, 100 dyads were randomly assigned to discuss either a casual or meaningful topic together. A trained research assistant observed the participants unobtrusively from a distance during the course of a 10-min conversation noting whether either participant placed a mobile device on the table or held it in his or her hand. Using Hierarchical Linear Modeling, **it was found that conversations in the absence of mobile communication technologies were rated as significantly superior compared with those in the presence of a mobile device, above and beyond the effects of age, gender, ethnicity, and mood.** People who had conversations in the absence of mobile devices reported **higher levels of empathetic concern.** **Participants conversing in the presence of a mobile device who also had a close relationship with each other reported lower levels of empathy compared with dyads who were less friendly with each other.** Implications for the nature of social life in ubiquitous computing environments are discussed.

[What are we missing?]

4.2.2 EVIDENCE AND ESSAYS SHOWING BENEFITS OR NO HARMS

4.2.2.1 [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.

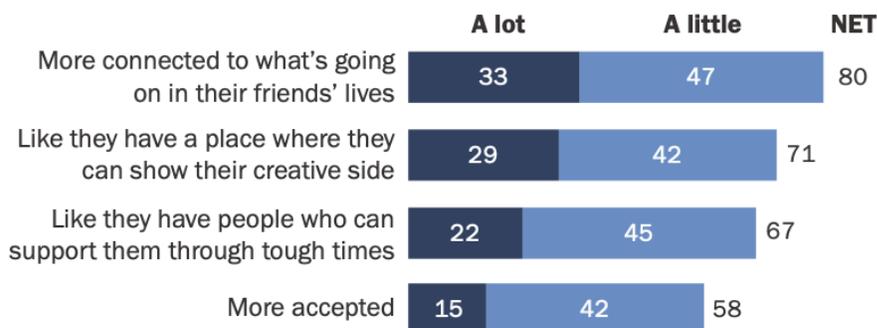
Teen girls report encountering some of these pressures at higher rates. Some 45% of girls say they feel overwhelmed because of all the drama on social media, compared with 32% of boys. Girls are also more likely than boys to say social media has made them feel like their friends are leaving them out 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 ...

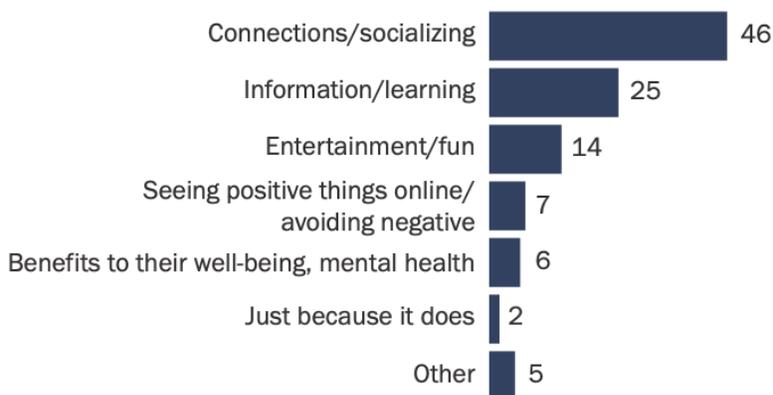


... and are more likely to say these sites have had a positive rather than negative impact on them, with many citing friendships, connections as reasons why

% of U.S. teens who say social media has had a ___ effect on them, personally



Among those who say mostly positive, % who give each of the following as the main reasons why



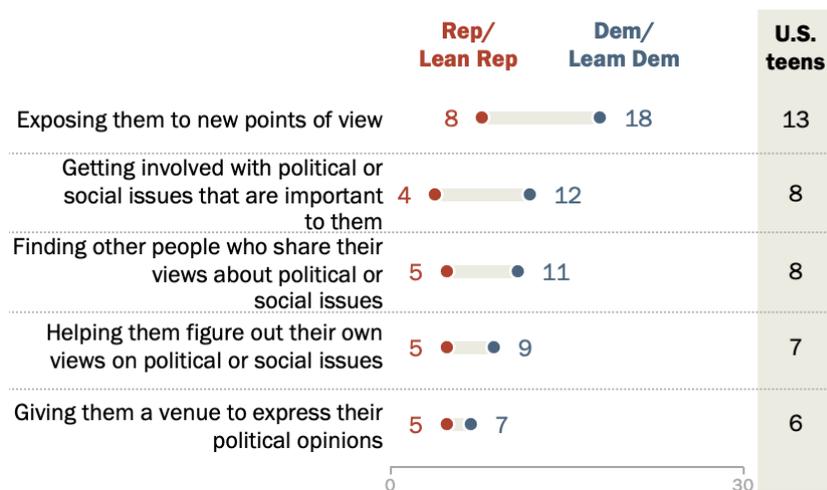
Note: Teens are those ages 13 to 17. Verbatim responses have been coded into categories. The 13% who received this question but did not give an answer are not shown. Including this group, figures may add up to more than 100% because multiple responses were allowed.

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.

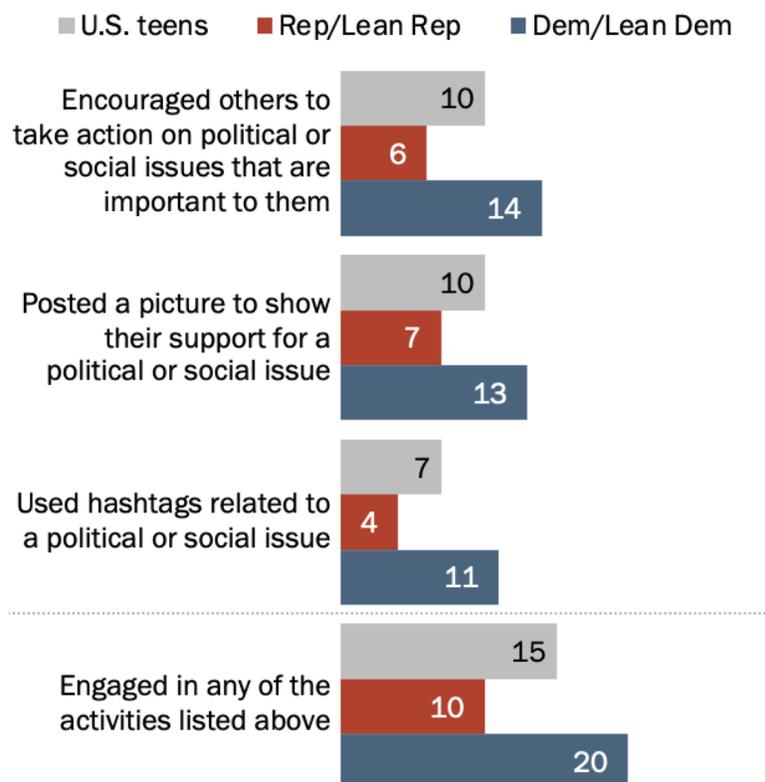
Source: Survey conducted April 14-May 4, 2022.

"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.

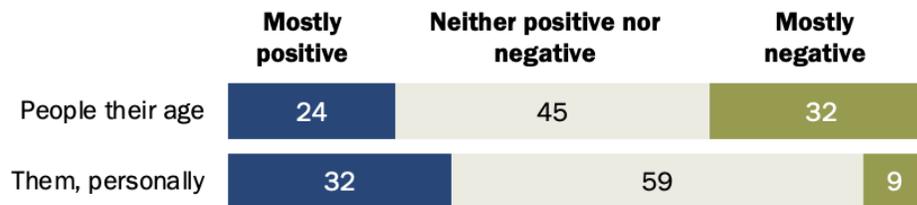
"Connection, Creativity and Drama: Teen Life on Social Media in 2022"

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[I wish we could get this broken out by sex and politics. What % of democrat girls have done this?

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.

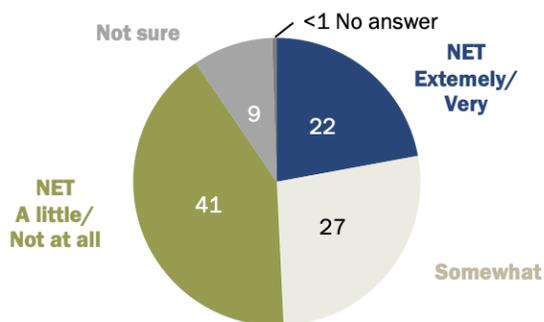
Source: Survey conducted April 14-May 4, 2022.

"Connection, Creativity and Drama: Teen Life on Social Media in 2022"

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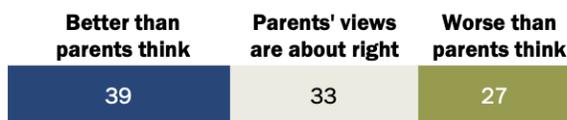
Only a minority of teens say their parents are extremely or very worried about their social media use

% 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

4.2.2.2 Chambers (2013). Introduction. In D. Chambers (Ed.), *Social Media and Personal Relationships: Online Intimacies and Networked Friendship* (pp. 1–20). Palgrave Macmillan UK.

ABSTRACT: One of the most striking changes in personal life during late modernity is the use of social media for conducting personal relationships. These changes entail a growing significance in the public display of personal connectedness and the importance of the term ‘friendship’ in managing these connections. Digital communication technologies are contributing to new ideas and experiences of intimacy, friendship and identity through new forms of social interaction and new techniques of public display, particularly on social network sites. This book explores the ways people engage with social media to build, maintain and exhibit personal networks. The aim is to provide an understanding of the mediated nature of personal relationships by developing a theory of ‘mediated intimacies’. **The dramatic changes in rituals of connection brought about by the explosion in use of social network sites compel us to reconsider the concept of ‘intimacy’ and extend it beyond its former, narrow focus on family life.** This book therefore enquires whether digital modes of communication are generating new intimacies and new meanings of ‘friendship’ as features of a networked society. Key debates and research evidence are assessed about emerging ways that people share their lives with each other in a digital environment and the motives for doing so. New opportunities being offered by social media to transform identities and generate new modes of self-presentation, interaction and etiquette are identified.

ADDITIONAL EXCERPTS: Although social critics fear that technologically mediated communication is eroding ‘genuine’ face-to-face relationships, **several studies indicate that communication technologies are capable of fostering rich, deeper connections by extending intimate contacts across barriers of distance and time. Media richness theorists have compared ‘rich’ and ‘lean’ media (Daft and Lengel 1984) and highlighted the richness and speed of certain communication technologies as mediums for carrying information and conveying emotions (Fulk and Collin-Jarvis 2001).** Mediated communication is considered to be ‘lean’ rather than ‘rich’ and impedes people’s ability to handle interpersonal dimensions of interaction (Walther et al. 1994). Yet some of the ‘leanest’ text messages can cement intimacies (Baym 2010). The rise of the Internet has therefore also generated optimism about the recovery of a sense of ‘community’ in an electronic form through social network sites such as Facebook and Twitter. As highlighted in the previous chapter, today’s social media are facilitating the informal qualities of interactions involving personal ties of friendship and intimacy. This and the following chapters demonstrate the ways in which

greater possibilities are opening up for more diverse intimate contacts and leading to a re-appropriation of newly emerging media technologies for personal (rather than specialist and professional) ends.

...The relationships being negotiated through today's social media are forcing us to rethink and re-envisage the nature of intimacy, personal connections and wider issues of relatedness. **Personal bonds appear to be developing or sustained on new virtual frontiers, no longer originating solely from domestic and familial settings or exclusively located in spatial community boundaries.** A reconsideration of debates about intimacy is required in order to understand the mediated nature of today's personal relationships. As Chapter 2 explains, a key change is the shift towards **a polymediated environment in which digitalised technologies of communication are becoming more diversified and being combined in various ways to sustain social ties of a personal nature.** The emergence of new technologies for connecting people has led to key changes in informal rules and norms governing social contact and encounters. A further trend is the increasingly informal and casual nature of the discourse being used across all types of connections to manage contemporary interaction. Whether they are strong, intense and intimate ties or weak ties of acquaintanceship, an informal style is being adopted in many mediated contexts.

...The previous chapter suggests that friendship has become a powerful emblem of interpersonal democratisation during late modernity. 'Friendship', as an idea and set of practices, is used to navigate both intimate and casual ties in the framework of increasingly diverse channels of communication. **Social network sites have further reconfigured the apparent flexibility, informality and conviviality of friendship through the public display of personal connections. The type of social media engagement articulated on social network sites promotes a new form of friendship administration (Ellison et al. 2011b).** This chapter explores the ways people are managing their personal connections online within personalised networked publics by investigating the ways in which sites are used by participants to present the self. It considers the techniques available to users for managing the public display of the personal and to navigate the uncertain and often risky boundaries between 'personal' and 'public'.

...Social network sites are said to have the potential to create virtual communities. In this respect, the medium's particular affordances and patterns of engagement have been viewed both optimistically and pessimistically. **On the one hand, online social networks have been described as 'virtual communities' to highlight their socially beneficial qualities and as an indicator of renewed 'community'.** The rise of digital media has therefore generated hope about the recovery of community in an electronic

form through social network sites such as Facebook and Twitter. On the other hand, **negative claims have been made that heavy social network site users are more likely to be socially isolated than occasional users and that new technology leads to a breakdown of traditional community.** This negative account views online networking as a sign of a fragmentation of identities and the disintegration of community. This chapter addresses debates about the qualities of remote and face-to-face interaction, the relationship between the two and how the societal disadvantages and benefits of these connections have been described and assessed. It explores the ways that these online associations are thought to affect social cohesion, participation and the generation of social capital. The concept of 'community', 'virtual community' and 'social capital' is therefore examined in relation to the idea of the 'personal' and 'network' to consider the role of social network sites in fostering social cohesion online.

4.2.2.3 [van Schalkwyk... & Silverman \(2017\)](#). Social Media Use, Friendship Quality, and the Moderating Role of Anxiety in Adolescents with Autism Spectrum Disorder. *Journal of Autism and Developmental Disorders*.

ABSTRACT: Social media holds promise as a technology to facilitate social engagement, but may displace offline social activities. Adolescents with ASD are well suited to capitalize on the unique features of social media, which requires less decoding of complex social information. In this cross-sectional study, we assessed social media use, anxiety and friendship quality in 44 adolescents with ASD, and 56 clinical comparison controls. **Social media use was significantly associated with high friendship quality in adolescents with ASD, which was moderated by the adolescents' anxiety levels. No associations were founds between social media use, anxiety and friendship quality in the controls.** Social media may be a way for adolescents with ASD without significant anxiety to improve the quality of their friendships.

[NOTE from JH: this suggests that SM may be useful for kids with autism, especially those anxious about talking to others in person]

4.2.2.4 [Liu, Ainsworth, & Baumeister \(2016\)](#). A meta-analysis of social networking online and social capital. *Review of General Psychology*.

ABSTRACT: Social networking sites offer new avenues for interpersonal communication that may enable people to build social capital. The meta-analyses reported in this paper evaluated the relationship between social network site (SNS) use and 2 types of social capital: bridging social capital and bonding social capital. The meta-analyses included

data from 58 articles gathered through scholarly databases and a hand search of the early publications of relevant journals. Using a random effects model, the overall effect size of the relationship between SNS use and bridging social capital based on $k = 50$ studies and $N = 22,290$ participants was $r = .32$ (95% CI [.27, .37]), and the overall effect size between SNS use and bonding social capital based on $k = 43$ studies and $N = 19,439$ participants was $r = .26$ (95% CI [.22, .31]). **The relationships between SNS use and both types of social capital were stronger in men than in women, and the relationship between SNS use and bridging capital was stronger in Western, individualistic countries than Eastern, collectivistic countries. Additional analyses of specific SNS activities indicated that SNS use promotes social capital by facilitating contact and interaction among people who already know each other offline rather than contact with people who were met online.** The implication is that SNSs offer a platform to strengthen existing relationships.

4.2.2.5 Domahidi (2018). The associations between online media use and users' perceived social resources: A meta-analysis. *Journal of Computer-Mediated Communication*.

ABSTRACT: Conflicting findings have emerged from the large number of studies on the relationship of online media use (OMU) and users' perceived social resources (PSR). In contrast to the numerous primary studies, a comprehensive meta-analysis on the relationship between the use of different online media and PSR has been lacking to date. The findings presented are based on 342 effect sizes from 63 studies and represent data from over 35,500 individuals. The results reveal a small and positive relationship between the two variables. Detailed analyses suggest that the use of different online media, as well as the measurement of OMU and PSR, might affect the relationships obtained. Implications and directions for theoretical development and empirical research are also discussed.

EXCERPT: To sum up, **the small positive relationship between OMU and PSR indicates that the use of online media is, in general, beneficial for users' PSR.** The individual studies on the topic are heterogeneous and the obtained results depend on the applications investigated and measures employed by the researchers. It is crucial for the research field to rethink the relationship under investigation and to include new technological and societal developments in a thorough theoretical framework on the social implications of OMU. Additionally, a standardization and careful evaluation of the different measures is needed.

4.2.2.6 [Liu, Wright, & Hu \(2018\)](#). A meta-analysis of Social Network Site use and social support. *Computers & Education*.

ABSTRACT: Current scholarship knows little about what forms of social support are the major benefits of Social Network Sites (SNSs) use. To solve this problem, this study examined the association of SNSs use and social support by meta-analyzing 73 effects from 31 studies. We also examined several important moderators such as age, gender, and culture. **The findings revealed that generic SNS use may be helpful for informational and emotional support, but not for tangible and esteem support.** Further moderation analysis demonstrated that SNSs are better set up for online social support, but it also provides offline support benefits. The analyses also showed differences between users who engage in active SNS activities and those who passively consume online content. Moreover, Asians were found to receive more social support via SNS presentation than Europeans and Americans. **Older and female students were found to be able to acquire more social support from SNS use.**

4.2.2.7 [Yau, & Reich \(2018\)](#). Are the Qualities of Adolescents' Offline Friendships Present in Digital Interactions? *Adolescent Research Review*.

ABSTRACT: Today's youth often connect with friends online. Although decades of research have explored the core qualities of face-to-face friendships, less is known about how these qualities differ when friends interact via technology. Through a synthesis of research on friendship in digital spaces, we examine whether the core qualities of face-to-face friendships are evident in cyberspace. Six key components of friendships were identified from the large canon of research on friendships and studies that addressed these topics (i.e., self-disclosure, validation, companionship, instrumental support, conflict, and conflict resolution) were reviewed. **The findings suggest that, while peer interactions in online spaces may be novel, the core qualities of friendships identified in research on offline spaces persist.** Future research directions are identified.

4.2.2.8 [Taylor, Zhao, & Bazarova \(2022\)](#). Social media and close relationships: A puzzle of connection and disconnection. *Current Opinion in Psychology*. [Mixed conclusions]

ABSTRACT: Social media and well-being have been a subject of intense debate in research, policy, and the popular press. In this review, we discuss social media use and well-being in the context of close relationships, including romantic partners, friends, and family, by drawing on research that connects social media use to both relational

connection and relational disconnection. In an effort to disentangle a puzzle of connection and disconnection, we argue for the duality of social media effects in close relationships in which behaviors that facilitate connection and disconnection are intertwined. We call for research to develop frameworks that focus on (1) the interplay of social media behaviors and (2) the relational processes that underlie the twists and turns of social media connection.

[What are we missing?]

4.2.3 ILLUSTRATIONS

4.2.3.1

https://www.reddit.com/r/nosurf/comments/vzwkd9/how_many_of_you_realised_that_you_have_no_friends/

EXCERPT: How many of you realised that you have no friends after deleting social media?

People stopped texting. Everyone kind of forgot about me. If I'm not constantly reminding them of my presence by posting, I might as well not exist. I thought I had friends. Guess not. I know literally no one at my new college and I'm already in my 4th semester now. All of these people are "friends" on social media. The online world stands between me and new relationships like an unconquerable hurdle. Or perhaps I'm just an unpleasant person. I never get calls or texts. I'm not lonely dw. Its just something I noticed. I have so much peace of mind and don't feel the need to please people just to feel like I belong.

4.2.3.2

<https://www.dailyeasternnews.com/2022/01/11/column-dear-instagram-thank-you-for-ruining-my-mental-health/>

EXCERPT: I've noticed that while I'm happy for these people, all I want is to have their life. It felt like I was missing out on something really special, even though I'm nowhere near ready to be engaged.

4.2.3.3

https://www.reddit.com/r/nosurf/comments/10ioh80/i_like_the_person_i_become_when_i_read_a_lot_of/

[What are we missing?]

4.3 SELF-ESTEEM

4.3.1 EVIDENCE AND ESSAYS SHOWING HARMS

4.3.1.1 [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.**

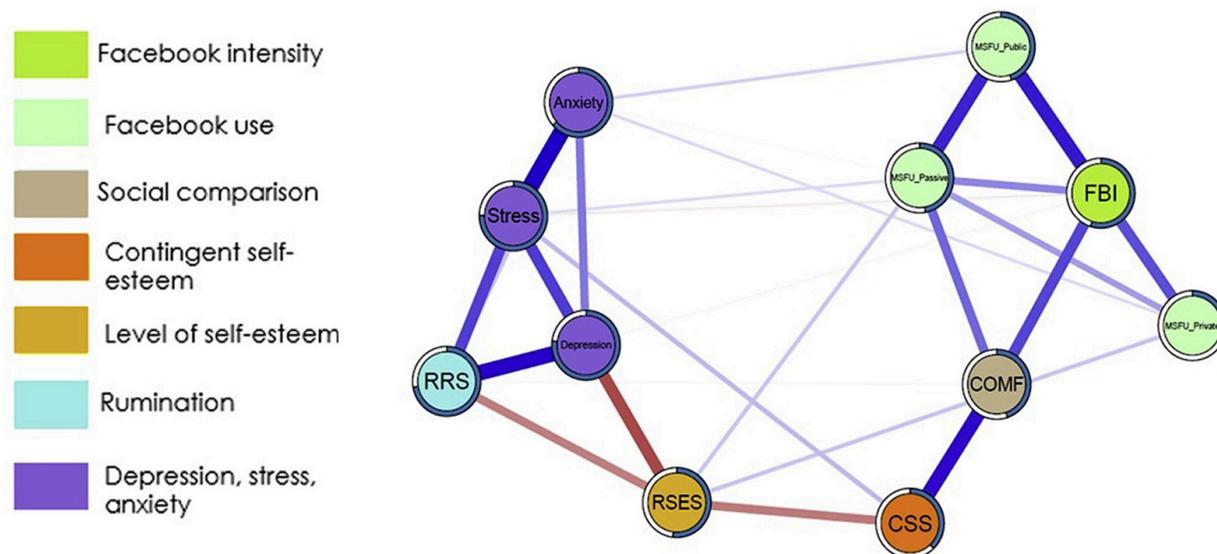
INTERPRETATION: Our findings highlight the potential pitfalls of lengthy social media use for young people's mental health. Findings are highly relevant for the development of guidelines for the safe use of social media and calls on industry to more tightly regulate hours of social media use.

4.3.1.2 [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.

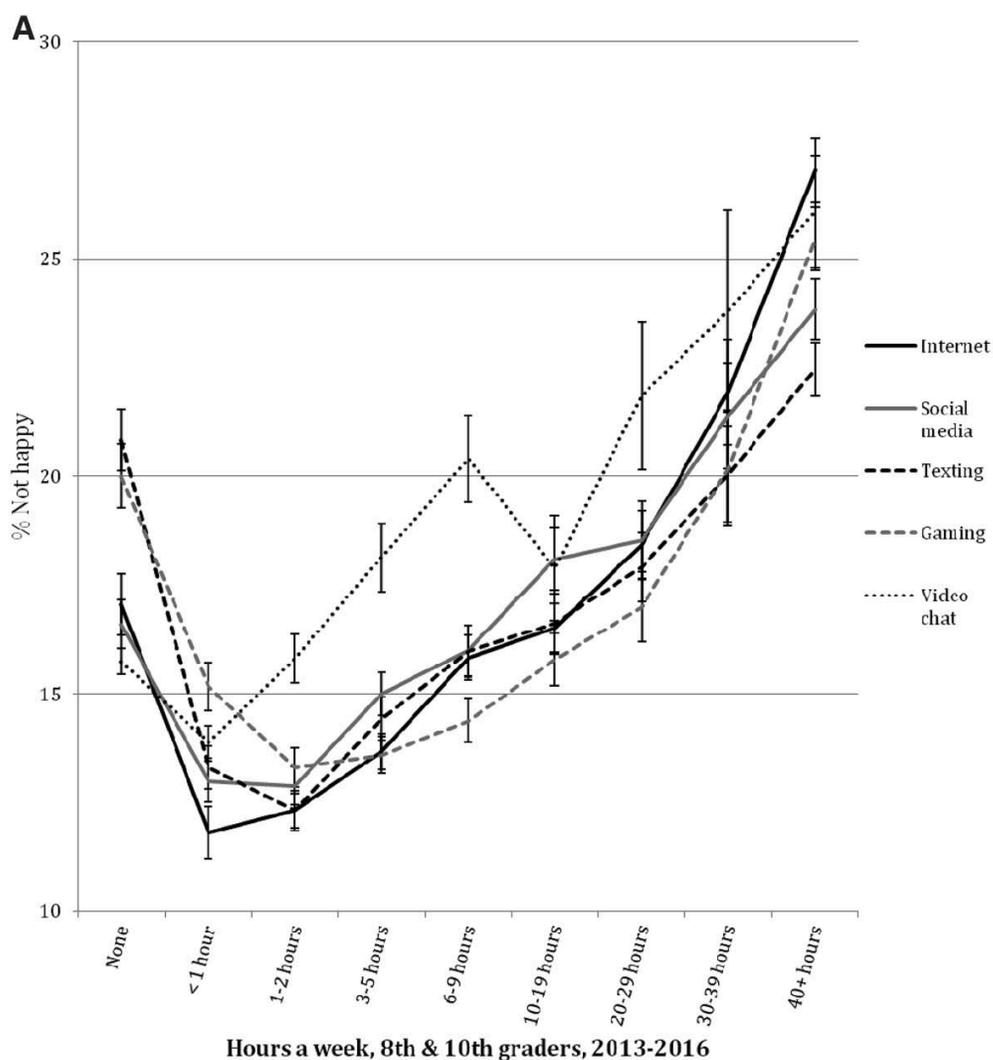
FIGURE (described as a “graphical abstract”):



4.3.1.3 [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.

4.3.1.5 [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.

4.3.1.6 [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.

4.3.1.7 [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.

4.3.1.8 [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.

4.3.1.9 [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.**

4.3.1.10 [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).

4.3.1.11 [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.

4.3.1.12 [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.

4.3.1.12 [Wolfe & Yakobovits \(2022\)](#). I'll see your beautified photo and raise you one: An experimental investigation of the effect of edited social media photo exposure. *Psychology of Popular Media*.

ABSTRACT: Social networking sites (SNSs) provide users with the opportunity to view photos and posts shared by celebrities and friends as well as share their own images. These unique aspects of SNSs may increase the risk of negative psychological effects of social comparisons. Upward social comparisons on SNSs are particularly likely, given the use of photo editing to create "beautified" images before posting. Although relatively new as an area of experimental investigation, there is indication that exposure to edited SNS photos harms women's body image. The findings from experimental studies on the effect of editing photos of one's self have been more inconclusive. This experimental study of 95 undergraduate women examined both the effect of exposure to edited photos of women embedded within an SNS mock-up and the subsequent effect on their photo taking and editing. The effect of photo editing on perceived physical attractiveness and mood was also assessed. **Although type of SNS exposure did not affect perceived physical attractiveness, mood, or number of photos taken, participants who viewed an SNS page with edited photos were significantly more likely to edit their photos after being asked to take a selfie than participants who viewed an SNS page with unedited photos of the same women and a control group. Across conditions, photo editing was associated with adverse changes in perceived attractiveness and mood.** It is recommended that future research continues to examine experimental manipulations of SNS exposure and SNS activity that more closely reflect the interactive ways that people engage with SNSs.

4.3.1.13 [Curran & Hill \(2019\)](#). Perfectionism is increasing over time: A meta-analysis of birth cohort differences from 1989 to 2016. *Psychological Bulletin*.

ABSTRACT: From the 1980s onward, neoliberal governance in the United States, Canada, and the United Kingdom has emphasized competitive individualism and people have seemingly responded, in kind, by agitating to perfect themselves and their lifestyles. In this study, the authors examine whether cultural changes have coincided with an increase in multidimensional perfectionism in college students over the last 27 years. Their analyses are based on 164 samples and 41,641 American, Canadian, and British college students, who completed the Multidimensional Perfectionism Scale (Hewitt & Flett, 1991) **between 1989 and 2016 (70.92% female, Mage = 20.66)**. **Cross-temporal meta-analysis revealed that levels of self-oriented perfectionism, socially prescribed perfectionism, and other-oriented perfectionism have linearly increased.** These trends remained when controlling for gender and between-country differences in perfectionism scores. Overall, in order of magnitude of the observed increase, the findings indicate that recent generations of young people perceive that others are more demanding of them, are more demanding of others, and are more demanding of themselves.

[Note that this article does not directly implicate social media. It is included here because perfectionism is often said to be one of the effects that Instagram has on girls, and it is interesting that it is the “socially prescribed perfectionism” that has increased most rapidly in recent years. We should try to graph trends for boys and girls separately]

ADDITIONAL EXCERPTS: “Perhaps the most important finding from this research is **that more recent generations of college students are reporting higher levels of socially prescribed perfectionism than previous generations. This finding suggests that young people are perceiving that their social context is increasingly demanding, that others judge them more harshly, and that they are increasingly inclined to display perfection as a means of securing approval.** We highlight the salience of this finding because of the size of the comparative increase, twice that of the other two dimensions, and the larger association between socially prescribed perfectionism and psychopathology (Limburg, Watson, Hagger, & Egan, 2017). Rising socially prescribed perfectionism dovetails with observations of rising externality of control, anxiety, and neurosis among young people, in addition to a rising sense of social disconnection (e.g., Paik & Sanchagrin, 2013; Twenge, 2000; Twenge, Zhang, & Im, 2004). These are worrying trends and suggest that young people may be increasingly more sensitive to perceived external pressures and are finding it more difficult than previous generations to cope with them.

...Socially prescribed perfectionism is the most debilitating of the three dimensions of perfectionism. This is because the perceived expectations of others are experienced as excessive, uncontrollable, and unfair, making failure experiences and negative emotional states common (Hewitt & Flett, 1991). The debilitating nature of socially prescribed perfectionism is evident in research on college students, which has found this dimension of perfectionism to be positively associated with major psychopathology (e.g., anxiety, depressive symptoms, and suicide ideation; Martin, Flett, Hewitt, Krames, & Szanto, 1996; Hewitt, Flett, & Weber, 1994; Sherry, Hewitt, Flett, & Harvey, 2003). These relationships have been replicated in longitudinal and experimental studies (e.g., Flett, Endler, Tassone, & Hewitt, 1995; Hewitt, Flett, & Ediger, 1995; O'Connor, O'Connor, O'Connor, Smallwood, & Miles, 2004). Like self-oriented perfectionism, the reviews of Smith et al. (2016, 2017) showed that socially prescribed perfectionism predicted increases in depressive symptoms and suicide ideation over time, but to a much greater degree.”

FIGURE:

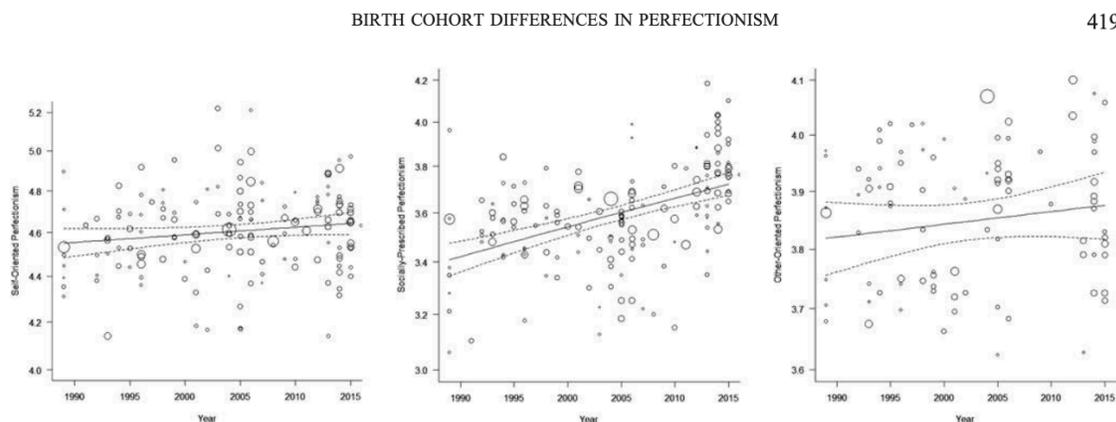


Figure 2. Multidimensional Perfectionism Scale subscale scores plotted against year of data collection. The solid regression line is plotted through the predicted perfectionism values from the metaregression equation in Model 1. Data-points represent study means and the size of the data-point is proportional to study (inverse variance) weighting. The dashed lines depict the upper and lower limits of the 95% confidence interval for the predicted values.

4.3.1.14 [Curran, & Hill \(2022\)](#). Young people’s perceptions of their parents’ expectations and criticism are increasing over time: Implications for perfectionism. *Psychological Bulletin*.

ABSTRACT: Recent evidence demonstrates rising self-oriented, other-oriented, and socially prescribed perfectionism among young people from the United States, United Kingdom, and Canada (Curran & Hill, 2019). One reason why perfectionism is increasing may be that rising competitiveness and individualism are requiring parents to

engage in anxious, overly involved, and/or overly controlling forms of parenting. Yet, data to support this claim are limited and contested. In two meta-analyses, we expanded upon and tested this claim by examining whether excessive parental expectations and harsh parental criticism are correlated with perfectionism (Study 1) and whether these perceived practices are changing over time among American, Canadian, and British college students (Study 2). In Study 1, meta-analyses found small-to-moderate positive mean weighted effects of parental expectations and parental criticism on self-oriented and other-oriented perfectionism, and large positive mean weighted effects of parental expectations and parental criticism on socially prescribed perfectionism. In Study 2, using cross-temporal meta-analysis, we found that mean levels of parental expectations and parental criticism had linearly increased between 1989 and 2019 among college students. With rising competitiveness, individualism, economic inequality, and pressure to excel at school and college as the societal background, increases in parental expectations and parental criticism offer the most plausible explanation for rising perfectionism to date. (PsycInfo Database Record (c) 2022 APA, all rights reserved)

Impact Statement

Public Significance Statement Two meta-analyses support a possible explanation for rising perfectionism among young people: changing parenting practices. Parental expectations and criticism were positively correlated with perfectionism in a first meta-analysis (Study 1), and these practices were found to be increasing over time in a second meta-analysis (Study 2). The latter finding has special public significance. Rising expectations and criticism likely reflect one response parents are making to escalating societal competitiveness, individualism, inequality, and pressures to excel at school and college.

4.3.1.15 [Sand, Bøe, Shafran, Stormark, & Hysing \(2021\)](#). Perfectionism in Adolescence: Associations With Gender, Age, and Socioeconomic Status in a Norwegian Sample. *Frontiers in Public Health*.

ABSTRACT: BACKGROUND: Perfectionism in adolescence has received increased attention, but few studies have examined this in non-clinical samples. This study investigated perfectionism among adolescents from the general population in relation to demographic factors.

METHODS: The present study is cross-sectional and draws on the epidemiological study. The sample consisted of 10,217 adolescents aged 16–19 years (52.9% girls). Self-reported perfectionism was assessed by the EDI-P scale from the Eating Disorder Inventory with two dimensions of perfectionism, namely self-oriented (SOP) and

socially prescribed (SPP) perfectionism, and a total score. Perfectionism was analyzed in relation to age, gender, and socioeconomic status (SES) by perceived economic well-being and parental education level. Chi-squared tests, t-tests, and regression analyses were performed.

RESULTS: There were few gender differences on the mean scores on perfectionism, with similar levels on the total score of EDI-P and SOP, while girls scored slightly higher on SPP ($p < 0.001$). The latter gender difference represented a small effect size (Cohen's $d = 0.053$). **Chi-square analyses with perfectionism split at the 90th percentile across gender showed that there were significantly more girls than boys among the high scorers both for EDI-P, EDI-SOP, and EDI-SPP.** There were no significant differences between levels of perfectionism between the three age groups. The logistic regression analyses adjusted by age and gender showed that adolescents with a better perceived economic well-being had increased odds of high perfectionism. This was evident for overall EDI-P (OR = 1.760, 95% CI = 1.493–2.076), SOP (OR = 1.543, 95% CI = 1.292–1.843), and SPP (OR = 1.836, 95% CI = 1.559–2.163). Parental education was not significantly associated with perfectionism scores among the adolescents.

CONCLUSIONS: **The levels of perfectionism were relatively similar between the genders in the present study, besides slightly higher SPP among girls than boys.** There were also significantly more girls than boys among the high scorers on overall perfectionism, SOP, and SPP, respectively. High perfectionism was related to SES for perceived economic well-being, but not for parental education level. Implications for further research and clinical interventions were suggested.

4.3.1.16 [Smith, Sherry, Vidovic, Saklofske, Stoeber, & Benoit \(2019\)](#). Perfectionism and the Five-Factor Model of Personality: A Meta-Analytic Review. *Personality and Social Psychology Review*.

EXCERPT: **Additionally, gender moderated the perfectionistic strivings–neuroticism link ($\beta = .12$, $p = .018$, $R^2 = .07$), the other-oriented perfectionism–neuroticism link ($\beta = .44$, $p = .001$, $R^2 = .39$), the discrepancy–conscientiousness link ($\beta = -.30$, $p = .005$, $R^2 = .68$), the socially prescribed perfectionism–agreeableness link ($\beta = .85$, $p = .033$, $R^2 = .27$), and the self-oriented perfectionism–agreeableness link ($\beta = .68$, $p = .002$, $R^2 = .76$).**

Notably, perfectionistic strivings' positive relationship with neuroticism increased as the percentage of females increased (Supplemental Figure L5). The implied disattenuated correlations between perfectionistic strivings and neuroticism for an all-male, a 50% female, and an all-female sample were $r_{c+} = .04$, $r_{c+} = .10$, and $r_{c+} = .16$. Likewise,

other-oriented perfectionism's positive relationship with neuroticism increased as the percentage of females increased. The implied disattenuated correlations for other-oriented perfectionism and neuroticism were $r_{c+} = -.20$, $r_{c+} = .02$, and $r_{c+} = .24$.

Similarly, the negative relationship between discrepancy and conscientiousness increased as the percentage of females increased. The implied disattenuated correlations between discrepancy and conscientiousness for an all-male, a 50% female, and an all-female sample were $r_{c+} = -.04$, $r_{c+} = -.20$, and $r_{c+} = -.34$. Also, socially prescribed perfectionism's and self-oriented perfectionism's negative relationships with agreeableness decreased as the percentage of females increased (Supplemental Figure L6).

The implied disattenuated correlations between socially prescribed perfectionism and agreeableness for an all-male, a 50% female, and an all-female sample were $r_{c+} = -.72$, $r_{c+} = -.45$, and $r_{c+} = -.06$; the corresponding implied disattenuated correlations for self-oriented perfectionism and agreeableness were $r_{c+} = -.53$, $r_{c+} = -.24$, and $r_{c+} = .14$.

Furthermore, the moderating effect of gender on perfectionistic strivings and neuroticism, other-oriented perfectionism and neuroticism, discrepancy and conscientiousness, socially prescribed perfectionism and agreeableness, and self-oriented perfectionism and agreeableness remained significant ($p < .05$) after controlling for age, year of data collection, perfectionism subscale, and FFM versus non-FFM measure. However, inspection of funnel plots suggested that the moderating effect of gender on the other-oriented perfectionism–neuroticism link and the discrepancy–conscientiousness link was driven by outliers (Supplemental Figures L8 and L9) and therefore should be interpreted with caution.

4.3.1.17 [Uz Baş \(2011\)](#). Dimensions of Perfectionism in Elementary School-Aged Children: Associations with Anxiety, Life Satisfaction, and Academic Achievement. *Eğitim ve Bilim*.

ABSTRACT:The main purpose of the study was to examine the relationship of the dimensions of perfectionism with anxiety, life satisfaction, and academic achievement, and to determine whether dimensions of perfectionism significantly predict anxiety, overall life satisfaction, and academic achievement in elementary school-aged children. Differences in the level of the dimensions of perfectionism according to gender and grade level were also investigated. Four hundred and eighteen children (198 girls and 220 boys) completed the Adaptive-Maladaptive Perfectionism Scale, Trait Anxiety

Inventory for Children, and The Brief Multidimensional Students' Life Satisfaction Scale. Results revealed that sensitivity to mistakes and need for admiration were significantly and positively correlated with anxiety, while contingent self-esteem and compulsiveness were significantly and positively correlated with all life satisfaction domains, overall life satisfaction, and academic achievement. **Sensitivity to mistakes was found as a significant predictor of anxiety, while contingent self-esteem and compulsiveness were found as significant predictors of both life satisfaction and academic achievement. Findings also indicated that there were significant effects of gender on sensitivity to mistakes, contingent self-esteem, and compulsiveness, and that there were significant grade level effects on compulsiveness and need for admiration.**

4.3.1.18 [Stornelli, Flett, & Hewitt \(2009\)](#). Perfectionism, Achievement, and Affect in Children: A Comparison of Students From Gifted, Arts, and Regular Programs. *Canadian Journal of School Psychology*.

EXCERPT: Analyses of variance were conducted on levels of self-oriented and socially prescribed perfectionism. The between-subjects variables were program type and gender. **There were no significant differences for levels of socially prescribed perfectionism. Analyses of the self-oriented perfectionism data yielded no significant main effects, but there was an interaction effect, $F(1, 281) = 5.36, p < .01$. Post hoc analyses found that female students in the arts program had substantially elevated levels of self-oriented perfectionism relative to the male arts students and students in the other programs.** There was no evidence indicating that levels of perfectionism were elevated among students in the gifted program.

4.3.1.19 [Hewitt, Caelian, Flett, Sherry, Collins, & Flynn \(2002\)](#). Perfectionism in children: Associations with depression, anxiety, and anger. *Personality and Individual Differences*.

EXCERPT: **In terms of gender differences, there were no differences in mean levels of the variables for boys versus girls. There were also no differences between boys and girls in the magnitude of correlations, although there was a trend for the relationship between socially prescribed perfectionism and anger suppression to be greater for boys ($r=0.40$) than girls ($r=0.05, Z=1.89$).**

[What are we missing?]

4.3.2 EVIDENCE AND ESSAYS SHOWING BENEFITS OR NO HARMS

4.3.2.1 [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, and in this research literature the correlations for girls are usually larger than those for boys. There is a [growing](#) recognition that public health issues are generally in this ballpark; they are rarely in the ballpark of $r = .30$]

4.3.2.2 [Appel, Marker, & Gnamb \(2020\)](#). 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. Also note that the correlation for girls is usually higher than the correlation reported for all teens]

[What are we missing?]

4.3.3 ILLUSTRATIONS

4.3.3.1

https://www.reddit.com/r/offmychest/comments/p22en4/suicidal_because_of_my_looks/

EXCERPT: i cant stop comparing myself. it came to a point where i wanna kill myself cause u dont want to look like this and no matter what i try im still ugly/feel ugly. i constantly cry about this. it probably startrd when i was 10, im now 13. back when i was 10 i found a girl on tiktok and basically became obsessed with her. she was literally perfect and i remember being unimaginably envious of her. throughout my pre-teen years, i became "obsessed" with other pretty girls

4.3.3.2 https://www.reddit.com/r/nosurf/comments/lyazwd/self_esteem/

Has anyone noticed their self esteem improve after leaving (either all together, or drastically cutting back) social media? I have anxiety and self esteem issues that I feel are going to benefit from being less present on the internet and not looking at everyone's posts CONSTANTLY

[What are we missing?]

4.4 EMPATHY AND MORALITY

4.4.1 EVIDENCE AND ESSAYS SHOWING HARMS

4.4.1.1 [Samuel \(2021\)](#). It's hard to be a moral person. Technology is making it harder. Vox.

EXCERPT: In 2014, a team of psychologists in California authored a [study](#) exploring technology's impact from a different direction: They studied kids at a device-free outdoor camp. **After five days without their phones, the kids were accurately reading people's facial expressions and emotions much better than a control group of kids.** Talking to one another face to face, it seemed, had enhanced their attentional and emotional capacities. Sherry Turkle, who researches technology's adverse effects on social behavior, has [noted](#): **"Studies of conversation, both in the laboratory and in natural settings, show that when two people are talking, the mere presence of a phone on a table between them or in the periphery of their vision changes both what they talk about and the degree of connection they feel.** People keep the conversation on topics where they won't mind being interrupted. They don't feel as invested in each other."

...Digital distractions such as social media and smartphones wreak havoc on our attention spans. Could they also be making us less ethical? Think of the [countless stories](#) of [camera phones short-circuiting human decency](#). Many a bystander has witnessed a car accident or a fist-fight and taken out their phone to film the drama rather than rushing over to see if the victim needs help. [Multiple studies](#) have suggested that digital technology is shortening our attention spans and making us more distracted. What if it's also making us less empathetic, less prone to ethical action? What if it's degrading our capacity for moral attention — the capacity to notice the morally salient features of a given situation so that we can respond appropriately? A lot of these tricks can be traced back to [BJ Fogg](#), a social scientist who in 1998 founded the Stanford Persuasive Technology Lab to teach budding entrepreneurs how to modify human behavior through tech. A lot of designers who went on to hold leadership positions at companies like Facebook, Instagram, and Google (including Harris) passed through Fogg's [famous classes](#). More recently, technologists have codified these lessons in books like *Hooked* by Nir Eyal, which offers instructions on how to make a product addictive. The result of all this is what Harris calls "[human downgrading](#)": A decade of evidence now suggests that digital tech is eroding our attention, which is eroding our moral attention, which is eroding our empathy. In 2010, psychologists at the University of Michigan analyzed the findings of 72 studies of American college students' empathy levels conducted over three decades. They [discovered](#) something startling: There had been a more than 40 percent drop in empathy among students. Most of that decline happened after 2000 — the decade that Facebook, Twitter, and YouTube took off — leading to the hypothesis that digital tech was largely to blame.

4.4.1.2 [Alloway, Runac, Quershi, & Kemp \(2014\)](#). Is Facebook Linked to Selfishness? Investigating the Relationships among Social Media Use, Empathy, and Narcissism. *Social Networking*.

ABSTRACT: The rise of social networking sites have led to changes in the nature of our social relationships, as well as how we present and perceive ourselves. The aim of the present study was to investigate the relationship among the following in adults: use of a highly popular social networking site—Facebook, empathy, and narcissism. **The findings indicated that some Facebook activities, such as chatting, were linked to aspects of empathic concern, such as higher levels of Perspective Taking in males. The Photo feature in Facebook was also linked to better ability to place themselves in fictional situations. For only the females, viewing videos was associated with the extent to which they could identify with someone's distress.**

The data also indicated that **certain aspects of Facebook use, such as the photo feature, were linked to narcissism**. However, the **overall pattern of findings suggests that social media is primarily a tool for staying connected, than for self-promotion**.

4.4.1.3 [McCain, & Campbell \(2018\)](#). Narcissism and social media use: A meta-analytic review. *Psychology of Popular Media Culture*.

ABSTRACT: The relationship between narcissism and social media use has been a topic of study since the advent of the first social media websites. In the present manuscript, the authors review the literature published to date on the topic and outline 2 potential models to explain the pattern of findings. Data from 62 samples of published and unpublished research (N = 13,430) are meta-analyzed with respect to the relationships between grandiose and vulnerable narcissism and (a) time spent on social media, (b) frequency of status updates/tweets on social media, (c) number of friends/followers on social media, and (d) frequency of posting pictures of self or selfies on social media. **Findings suggest that grandiose narcissism is positively related to all 4 indices (rs = .11–.20), although culture and social media platform significantly moderated the results.** Vulnerable narcissism was not significantly related to social media use (rs = .05–.42), although smaller samples make these effects less certain. Limitations of the current literature and recommendations for future research are discussed.

4.4.1.4 [Boursier, Gioia, & Griffiths \(2020\)](#). Selfie-engagement on social media: Pathological narcissism, positive expectation, and body objectification – Which is more influential? *Addictive Behaviors Reports*.

ABSTRACT: The current use of social media platforms by active young users/creators of visual content provides an easy medium to achieve narcissistic goals of self-promotion and attention-seeking, and to socialize with self-objectification experiences. One of the most popular activities associated with social media use is selfie-sharing. Consequently, the global focus on online physical appearance approval could reinforce selfie-engagement as a specific body image-related behavior, potentially associated with selfie-marketing strategies for self-improvement, and problematic social media use. The present study evaluated the main direct effect of pathological narcissism, objectified body consciousness, and expectations toward selfies on young women's and men's selfie-engagement. A total of 570 young adults (66.8% females; mean age = 24.4 years, SD = 3.6) participated in an online survey study. Variables were

assessed using the Pathological Narcissism Inventory (Fossati, Feeney, Pincus, Borroni, & Maffei, 2015), Objectified Body Consciousness Scale (Dakanalis et al., 2015), Selfie-expectancies Scale (Boursier & Manna, 2018), and a measure of selfie-engagement. Hierarchical regression analyses were performed on independent male and female subsamples. **Results showed that body surveillance and positive selfie-expectancies are consistent selfie-behavior predictors, among both men ($R^2 = 0.227$; $p < .001$) and women ($R^2 = 0.332$; $p < .001$).** Furthermore, findings confirm women's involvement in appearance concerns and body-image related practices, even though men's engagement in body-objectification deserve attention. The study provides novel findings in the field of self-objectification research as well as contributing to the ongoing debate concerning which psychological factors can be predictive of males' and females' selfie-engagement. The implications of these findings are also discussed in light of the debate on social media use and misuse.

4.4.1.5 Casale & Banchi (2020). Narcissism and problematic social media use: **A systematic literature review.** *Addictive Behaviors Reports.*

ABSTRACT: INTRODUCTION: The relationship between narcissism and social media use has been a topic of research since the advent of the first social media website. While numerous meta-analyses have been conducted to synthesize empirical evidence on the association between narcissism and typical online behaviors (e.g., uploading photos and usage frequency), evidence on the association between narcissism and Problematic Social Media Use (PSMU) has not yet been systematized. The current study represents the first systematic review on this topic.

METHODS: Electronic literature databases, including the Web of Science, MEDLINE, PsychINFO, and EMBASE, were searched to identify studies that examined the relationship between narcissism and PSMU. We found 14 empirical studies on narcissism and PSMU. Additionally, seven studies focused on the association with Problematic Facebook Use (PFU).

RESULTS: **Consistent results were reported regarding the positive and significant association between grandiose narcissism and PFU ($0.13 < r < 0.32$).** The only two studies that included a vulnerable narcissism measure reported a positive and significant correlation with PFU as well. Studies that did not distinguish between different online platforms (i.e., those measuring PSMU) reported less consistent results.

CONCLUSIONS: The results generally revealed that narcissism might be involved in PFU, but it might not have consistent effects across social media platforms. The assessment of problematic social media use without distinguishing different platforms might not individuate narcissists' preferences and risks. However, our findings need to

be interpreted with caution not only due to the relatively small number of studies on this topic but also because 19 studies out of 21 used a cross-sectional design.

4.4.1.6 [Panek, Nardis, & Konrath \(2013\)](#). Mirror or Megaphone?: How relationships between narcissism and social networking site use differ on Facebook and Twitter. *Computers in Human Behavior*.

ABSTRACT: As research on the connection between narcissism and social networking site (SNS) use grows, definitions of SNS and measurements of their use continue to vary, leading to conflicting results. To improve understanding of the relationship between narcissism and SNS use, as well as the implications of differences in definition and measurement, we examine two ways of measuring Facebook and Twitter use by testing the hypothesis that SNS use is positively associated with narcissism. We also explore the relation between these types of SNS use and different components of narcissism within college students and general adult samples. Our findings suggest that **for college students, posting on Twitter is associated with the Superiority component of narcissistic personality while Facebook posting is associated with the Exhibitionism component. Conversely, adults high in Superiority post on Facebook more rather than Twitter. For adults, Facebook and Twitter are both used more by those focused on their own appearances but not as a means of showing off, as is the case with college students.** Given these differences, it is essential for future studies of SNS use and personality traits to distinguish between different types of SNS, different populations, and different types of use.

4.4.1.7 [Gnambs, & Appel \(2018\)](#). Narcissism and Social Networking Behavior: A Meta-Analysis. *Journal of Personality*.

ABSTRACT: OBJECTIVE: The increasing popularity of social networking sites (SNS) such as Facebook and Twitter has given rise to speculations that the intensity of using these platforms is associated with narcissistic tendencies. However, recent research on this issue has been all but conclusive.

METHOD: We present a three-level, random effects meta-analysis including 289 effect sizes from 57 studies (total N = 25,631) on the association between trait narcissism and social networking behavior.

RESULTS: **The meta-analysis identified a small to moderate effect of $\rho = .17$ ($\tau = .11$), 95% CI [.13, .21], for grandiose narcissism that replicated across different social networking platforms, respondent characteristics, and time. Moderator analyses revealed pronounced cultural differences, with stronger associations in power-distant cultures. Moreover, social networking behaviors geared toward**

self-presentation and the number of SNS friends exhibited stronger effects than usage durations.

CONCLUSIONS: Overall, the study not only supported but also refined the notion of a relationship between engaging in social networking sites and narcissistic personality traits.

[What are we missing?]

4.4.2 EVIDENCE AND ESSAYS SHOWING BENEFITS OR NO HARMS

4.4.2.1 [Vossen, & Valkenburg \(2016\)](#). Do social media foster or curtail adolescents' empathy? A longitudinal study. *Computers in Human Behavior*.

ABSTRACT: Recently, concerns have been raised that adolescents' prolific social media use may cause them to become less empathic. However, direct empirical evidence is missing and research suggests that social media use can also be beneficial for adolescents' psychosocial development. The present study aims to investigate whether and how social media use influences empathy. We surveyed 942 Dutch adolescents (10–14 years) twice, with a one-year interval. **The results showed that social media use is related to an increase in cognitive and affective empathy over time. Specifically, adolescents' social media use improved both their ability to understand (cognitive empathy) and share the feelings of their peers (affective empathy).**

4.4.2.2 [Guan, Hain, Cabrera, & Rodarte \(2019\)](#). Social Media Use and Empathy: A Mini Meta-Analysis. *Social Networking*.

ABSTRACT: Concerns about the effects of social media or social networking site (SNS) use on prosocial development are increasing. The aim of the current study is to meta-analytically summarize the research to date ($k = 5$) about the relationship between general SNS use and two components of empathy (i.e., empathic concern and perspective-taking). **Random effects meta-analyses showed that SNS use was significantly and positively related to affective empathy though only marginally related to cognitive empathy.** These effects were generally small in size and do not

establish causality. Future research should explore how specific behaviors are related to different forms of empathy.

4.4.2.3 [Riley, Thompson, Howard, Lorenzo-Luaces, & Rutter \(2022\)](#). Seeking connectedness through social media use: Associations with adolescent empathic understanding and perspective-taking. *Current Psychology*.

ABSTRACT: Adolescence is a significant developmental period for building social connections. Technology has provided new ways to engage with others, particularly through social media. The current study examines developmental characteristics that support seeking connection through social media and considers how the parent–child relationship influences adolescents. Within a nationally representative sample of adolescents (N = 4952, Mage = 14.62), **adolescent-report of greater empathic concern (feeling similar emotions to others) and perspective-taking (ability to understand others' emotions) were associated with using social media for social connectedness**. Furthermore, the parent–child relationship moderated these associations such that associations were no longer significant among adolescents who reported stronger parent–child relationships. While adolescents are drawn online for social connection, the family remains an important context.

[What are we missing?]

4.4.3 ILLUSTRATIONS

4.4.3.1

https://www.reddit.com/r/nosurf/comments/w3zutu/the_story_of_how_the_internet_pretty_much_ruined/

EXCERPT: This went even darker, paired with OCD. As many of you know, OCD as its core, is a need for perfection. For some it's about cleanliness, for others about checking. For many, including me, it's **moral perfection**. At that time, I started to get a lot into left-leaning spaces. **With the rise of brigading and cancel culture, I started to become terrified of doing the wrong thing, saying something racist, misogynistic, transphobic etc. I started to fear that, if I stopped using socials, I would not have known what was right to do.**

Just imagine how much that can fuck up a 18 year old's mind, the moment where you form your identity on a deeper level. It didn't stop with myself, I started to worry that if my friend did something "cancel-worthy" I'd have to stay away from them or I would become an enabler. I felt like I needed to stay up to date with all of these accounts, subs, pages I followed to know what was right and what was not. I started to have an extreme mindset of "us vs them", if someone didn't agree on a very specific matter with me I wouldn't interact with them anymore or I'd feel guilty about it. I felt incredibly guilty about things I said when I was younger, like 10 to 11 years old, because I saw so many influencers being absolutely destroyed for the same dynamic.

The moral obsession then became outrage. I realized just how every fucking corner of the internet, no matter the political / moral /whatever stance was just a big hive mind. But that didn't make me stop and think "*hey, maybe this is just overall toxic. Maybe we should ditch socials*", no. I started to lurk through subs or accounts just to get filled with hate. I did so on tiktok, on subs of every kind: incels, gendercritical (ironic how I got brainwashed into believing them a few years before lol), thedonald, other subs made of terfs, redpills, **feminist I didn't agree with for one minuscule little reasons so now they're my enemies etc. I would just spend my day hating on them, rarely acting on it, just seething with poison.** I often scrolled through some mysoginist post history just to rage internally.

[What are we missing?]

4.5 COURAGE AND COWARDICE

4.5.1 EVIDENCE AND ESSAYS SHOWING HARMS

4.5.1.1 [Ronson \(2015\)](#). *So You've Been Publicly Shamed*. Riverhead Books.

SUMMARY:

'It's about the terror, isn't it?'

'The terror of what?' I said.

'The terror of being found out.'

For the past three years, Jon Ronson has travelled the world meeting recipients of high-profile public shamings. The shamed are people like us - people who, say, made a

joke on social media that came out badly, or made a mistake at work. Once their transgression is revealed, collective outrage circles with the force of a hurricane and the next thing they know they're being torn apart by an angry mob, jeered at, demonized, sometimes even fired from their job.

A great renaissance of public shaming is sweeping our land. Justice has been democratized. The silent majority are getting a voice. But what are we doing with our voice? We are mercilessly finding people's faults. We are defining the boundaries of normality by ruining the lives of those outside it. We are using shame as a form of social control.

Simultaneously powerful and hilarious in the way only Jon Ronson can be, *So You've Been Publicly Shamed* is a deeply honest book about modern life, full of eye-opening truths about the escalating war on human flaws - and the very scary part we all play in it.

4.5.1.2 [Wintour \(2009\)](#). Facebook and Bebo risk “infantilising” the human mind. *The Guardian*.

EXCERPT: Social network sites risk infantilising the mid-21st century mind, leaving it characterised by short attention spans, sensationalism, inability to empathise and a shaky sense of identity, according to a leading neuroscientist.

...She told the House of Lords that children's experiences on social networking sites "are devoid of cohesive narrative and long-term significance. As a consequence, the mid-21st century mind might almost be infantilised, characterised by short attention spans, sensationalism, inability to empathise and a shaky sense of identity".

Arguing that social network sites are putting attention span in jeopardy, she said: "If the young brain is exposed from the outset to a world of fast action and reaction, of instant new screen images flashing up with the press of a key, such rapid interchange might accustom the brain to operate over such timescales. Perhaps when in the real world such responses are not immediately forthcoming, we will see such behaviours and call them attention-deficit disorder.

"It might be helpful to investigate whether the near total submersion of our culture in screen technologies over the last decade might in some way be linked to the threefold

increase over this period in prescriptions for methylphenidate, the drug prescribed for attention-deficit hyperactivity disorder."

She also warned against "a much more marked preference for the here-and-now, where the immediacy of an experience trumps any regard for the consequences. **After all, whenever you play a computer game, you can always just play it again; everything you do is reversible. The emphasis is on the thrill of the moment, the buzz of rescuing the princess in the game. No care is given for the princess herself, for the content or for any long-term significance, because there is none.** This type of activity, a disregard for consequence, can be compared with the thrill of compulsive gambling or compulsive eating.

[Note from JH: This 2009 essay is earlier than our focus on the 2010s, but it is included here because it offers a chilling prophecy, from a neuroscientist, of what was coming for kids]

4.5.1.3 [McDonald \(2011\)](#). The Six Attitudes Leaders Take Towards Social Media. *Harvard Business Review*.

EXCERPT: FEARFUL: Fearful leaders see social media as a threat to productivity, [intellectual capital](#), privacy, management authority, regulatory compliance and a host of other things, and often discourage and even prohibit its use. This attitude can reduce the potential risk, but it also stifles any possible business value. To counteract fear, the strategic approach should focus on relatively low-risk initiatives, even if other, higher-risk opportunities might offer greater business value.

FLIPPANT: These leaders may not ignore or fear social media, but they don't take it seriously, either. This typically leads to a technology-centric approach where the company simply provides access to social media and hopes that business value will spontaneously emerge. This rarely bears fruit. Important in countering this attitude is convincing leadership that purpose matters, and that they should progress beyond the technology and identify good purposes for social media — causes that are strong enough to catalyze and mobilize communities of people to act in a way that delivers value to the community and the organization.

FORMULATING: Formulating leaders recognize both the potential value of social media as well as the need to be more organized and strategic in its use. The right approach here should build on this positive foundation, emphasizing the broader strategic value of social media and [mass collaboration](#), with a succinctly expressed set of business opportunities that (1) demonstrates social media's potential impact across many areas of the business, and (2) is strong enough to capture the attention of the most senior leaders.

FORGING: In companies where leaders have a forging attitude, the whole organization is starting to develop competence in using social media to assemble, nurture and gain business value from communities. To keep progressing, leaders should recognize previous successes, capitalize on growing momentum, advocate continued evolution and increase investments. They should also promote additional grassroots social media efforts as critical in becoming a highly collaborative [social organization](#).

FUSING: This is the most advanced attitude, and still rare. Fusing leaders treat community collaboration as an integral part of the organization's work, ingrained in how people think and behave. This is a description of a social organization, and in such organizations the need for an explicit vision and strategy subsides — all business strategy and execution already include community collaboration where it's appropriate. How do most leaders shape up? Right now, our analysis indicates that leaders of most organizations have yet to progress to the Formulating stage, which accounts for the high social media failure rate. We know treating social media as strategic can lead to tangible business value and competitive advantage, so the goal is for business leaders to move quickly past the Folly, Fearful, and Flippant stages and get right to Formulating. Ignoring social media, or throwing it over the fence to Marketing or IT could create serious business risk.

4.5.1.4 [Shim & Oh \(2018\)](#). Who creates the bandwagon? The dynamics of fear of isolation, opinion congruency and anonymity-preference on social media in the 2017 South Korean presidential election. *Computers in Human Behavior*.

ABSTRACT: This paper proposes a new approach to study **fear of isolation (FOI)**, with special attention to psychological motivations/gratifications sought in the online sphere (opinion congruency-seeking and anonymity-preference), which may lead to political expression via social media. We posit that individuals with FOI will display a tendency to want to match their opinions with the majority and will also actively utilize online platforms as they offer anonymity. This empirical study collected data from a random sample of 1107 participants in South Korea, a frontrunner in terms of political expression on social media. The results demonstrated that **FOI is associated with opinion congruency as well as anonymity-preference and further, political use of social media which prompts offline political engagement**. Findings of this paper goes beyond conventional paradigms on [political psychology](#) (selective exposure based on partisanship or ideology) and contribute to a better understanding of how anonymous, online behaviors generate political engagement.

4.5.1.5 [Xiaodong \(2016\)](#). Will the Spiral of Silence Spin on Social Networking Sites? An Experiment on Opinion Climate, Fear of Isolation and Outspokenness. *China Media Research*.

ABSTRACT: An experiment was conducted to examine the relationships between opinion climate, fear of isolation and outspokenness in the context of a discussion of a controversial social issue on a social networking site (SNS). Participants were asked to indicate their willingness to express opinions on the issue after being exposed to one of two treatment conditions: dominant opinion climate and non-dominant opinion climate. Opinion climate was found to significantly influence individuals' willingness to speak out. **Participants in the non-dominant opinion climate condition reported greater outspokenness than participants in the dominant opinion climate condition. The main effect of fear of isolation, and the interaction effect of the fear of isolation and opinion climate were non-significant. Findings suggest that the spiral of silence may have a unique mechanism in discussions on SNS platforms.**

4.5.1.6 [Matthes, Knoll, & von Sikorski \(2018\)](#). The “Spiral of Silence” Revisited: A Meta-Analysis on the Relationship Between Perceptions of Opinion Support and Political Opinion Expression. *Communication Research*.

ABSTRACT: The key assumption of spiral of silence theory is that opinion climate perceptions affect political opinion expression. We meta-analyzed the strength of this relationship and clarified the impact of theoretically relevant moderators. Sixty-six studies collectively including more than 27,000 participants were located. We observed a significant positive relationship ($r = .10$; $Zr = .10$) between opinion climate and opinion expression. **This relationship was not weaker in online as compared with offline opinion expression environments.** Also, the relationship did not vary by the number of the targets of opinion expression, the opinion of the targets, the opinion climate characteristics, and the design, measurement, and sample characteristics. The largest silencing effect ($r = .34$), however, was observed when participants talk to their family, friends, or neighbors about obtrusive issues. Overall, **our findings suggest that the relationship between opinion climate perception and political opinion expression is stronger and more robust than previously thought.**

4.5.1.7 [Gearhart, & Zhang \(2015\)](#). “Was It Something I Said?” “No, It Was Something You Posted!” A Study of the Spiral of Silence Theory in Social Media Contexts. *Cyberpsychology, Behavior, and Social Networking*.

ABSTRACT: New media technologies make it necessary for scholars to reassess mass communication theories developed among legacy media. One such theory is the spiral of silence theory originally proposed by Noelle-Neumann in the 1970s. Increasing diversity of media content, selectivity, social networking site (SNS) interactivity, and the potential for anonymity have posed various challenges to its theoretical assumptions. While application of the spiral of silence in SNS contexts has been theorized, its empirical testing is scarce. To fill this void, the Pew 2012 Search, Social Networks, and Politics survey is used to test the theory. **Results reveal that encountering agreeable political content predicts speaking out, while encountering disagreeable postings stifles opinion expression, supporting the spiral of silence theory in the SNS environment. However, certain uses of SNSs and psychological factors demonstrate a liberating effect on opinion expression.**

4.5.1.8 [Gearhart, & Zhang \(2014\)](#). Gay Bullying and Online Opinion Expression: Testing Spiral of Silence in the Social Media Environment. *Social Science Computer Review*.

ABSTRACT: Social network sites (SNSs) such as Facebook, Twitter, YouTube, and LinkedIn have recently attracted the attention of public opinion scholars. However, research testing existing public opinion theories in a social media context is scarce. This study represents arguably the first empirical examination of the spiral of silence theory in the social media environment. Through an experimental manipulation embedded in an Internet survey, respondents (N = 760) were presented with a hypothetical scenario (i.e., friendly or hostile) concerning gay bullying, an issue suited for investigation due to its moral components. **Willingness to self-censor and to some extent, congruency with the national opinion climate were significant predictors of various online opinion response strategies, indicating the presence of the spiral of silence phenomenon in the social media environment. However, individual characteristics such as issue importance were related to willingness to communicate about the issue, suggesting a liberating effect on opinion expression.**

4.5.1.9 [Mohammed \(2018\)](#). *The Danger of Public Shaming in the Internet Age*. JSTOR Daily.

EXCERPT: The ritual of public shaming is nothing new. And the desire to conform to norms has a significant role in guiding cohesive societies. But today's brand of mass humiliation is more public, more widespread, more scarring, and potentially more

dangerous. In a review of journalist Jon Ronson's book *So You've Been Publicly Shamed*, Rita Koganzon examines why [the long-established social ritual of punishment-by-shame has become especially problematic](#).

...In the online world, everyone is a public figure and everyone is a target. As Koganzon says, the conversations that used to be reserved for our friends, family members, and communities are now open for scrutiny, criticism and even persecution of anyone with a wifi connection and a temper. **This takes the fear of ostracism outside of the public sphere and places it squarely in our homes.** Koganzon writes, "The problem with joining gangs in order not to be defenseless against them is not that it's a wrong calculation about one's own safety, but that when everyone is forced into this choice, the neighborhood tends to become unlivable pretty quickly."

...The lasting damaging effects of public shaming, and the fear it spreads, might do more harm than the sense of justice does us good.

4.5.1.10 [Koganzon \(2015\)](#). The politics of digital shaming. *The New Atlantis*.

EXCERPT: Celebrities are under greater scrutiny than the Facebooking masses, of course, **but anyone can become a celebrity for a few days by making a bad joke. And then he can find himself unemployed.** Consider the following examples from the past few years. Justine Sacco was the communications director of an Internet company until she tweeted a poorly phrased joke about AIDS. It was retweeted by the editor of Valleywag, part of the Gawker Media empire. After that, she was toast. Lindsey Stone worked as an aide for adults with disabilities until she posted on Facebook a tasteless photo of herself at Arlington National Cemetery; the picture was widely re-shared, and she too found herself quickly unemployed. At a programming conference, an attendee named Adria Richards overheard "Hank" in the row behind her make a sexual joke to a friend, took a photo of him, and tweeted it, accusing him of contributing to the misogyny of the tech industry. Hank was promptly fired from his job, which he announced in an apologetic post on a tech-news site. This in turn outraged another Internet mob, including hackers claiming to be part of the group Anonymous, who demanded that Richards be fired from her job for getting Hank fired from his, attacked her employer online, and won her termination. Just about every day brings a new story of Internet ire leveled at someone caught behaving "problematically." Maybe tomorrow will even be your lucky day, the day you discover the usefulness of a backup surname.

Internet mobs have short attention spans and a limitless supply of targets, ensuring that your time in the virtual stocks will be brief. But the infamy will live on forever on Google, where the first thing that prospective friends and employers will learn about you is that the entire Internet has deemed you an irredeemable bigot and a toxic liability to the species. In his new book, [So You've Been Publicly Shamed](#), veteran journalist Jon Ronson explores this new frontier of public humiliation. He discusses social media pile-ons, tabloid sex scandals, the publication of prostitution client lists, humiliation as a form of alternative criminal sentencing, even humiliation pornography. Ronson's strength is victim collection. He managed to secure interviews with Sacco, Stone, Richards, and Hank — as well as the more high-profile Jonah Lehrer and Mike Daisey — in the immediate aftermath of their shamings, a time when they were more inclined to hide out in their basements than speak to a journalist, and to elicit thoughtful comments from them about their experiences.

[What are we missing?]

4.5.2 EVIDENCE AND ESSAYS SHOWING BENEFITS OR NO HARMS

4.5.2.1 [Kinnunen, Lindeman, & Verkasalo \(2016\)](#). Help-giving and moral courage on the Internet. *Cyberpsychology: Journal of Psychosocial Research on Cyberspace*.

ABSTRACT: The study addressed individual differences on two types of prosocial behavior on the Internet: help-giving/sharing and moral courage. A questionnaire to measure these behaviors was developed. We investigated the effects of the Big Five personality traits, sadistic traits, and values on help-giving and moral courage. **We found that the willingness to help on the Internet was promoted by open personality, and the relationship was partly moderated by high weekly use of social media. The willingness to act morally courageous was promoted by open personality, inclination toward sadism, and self-transcendence values.** Surprisingly, the relationship between moral courage and sadistic traits was not moderated by the time spent online. Willingness to donate to a charity was fostered by benevolence and universalism values. Future studies will need to replicate the results with behavioral observations.

4.5.2.2 [Tufekci, & Wilson \(2012\)](#). Social Media and the Decision to Participate in Political Protest: Observations From Tahrir Square. *Journal of Communication*.

ABSTRACT: Based on a survey of participants in Egypt's Tahrir Square protests, we demonstrate that social media in general, and Facebook in particular, provided new sources of information the regime could not easily control and were crucial in shaping how citizens made individual decisions about participating in protests, the logistics of protest, and the likelihood of success. We demonstrate that people learned about the protests primarily through interpersonal communication using Facebook, phone contact, or face-to-face conversation. **Controlling for other factors, social media use greatly increased the odds that a respondent attended protests on the first day.** Half of those surveyed produced and disseminated visuals from the demonstrations, mainly through Facebook.

4.5.2.3 [Gerbaudo \(2012\)](#). *Tweets and the Streets: Social Media and Contemporary Activism*. Pluto Press.

ABSTRACT: *Tweets and the Streets* analyses the culture of the new protest movements of the 21st century. From the Arab Spring to the 'indignados' protests in Spain and the Occupy movement, Paolo Gerbaudo examines the relationship between the rise of social media and the emergence of new forms of protest. Gerbaudo argues that activists' use of Twitter and Facebook does not fit with the image of a 'cyberspace' detached from physical reality. Instead, **social media is used as part of a project of re-appropriation of public space, which involves the assembling of different groups around 'occupied' places such as Cairo's Tahrir Square or New York's Zuccotti Park. An exciting and invigorating journey through the new politics of dissent, *Tweets and the Streets* points both to the creative possibilities and to the risks of political evanescence which new media brings to the contemporary protest experience.**

[What are we missing?]

4.5.3 ILLUSTRATIONS

<https://www.reddit.com/user/Brigand92g>

https://www.reddit.com/r/nosurf/comments/q2lp7s/i_fear_social_media_has_ruined_the_social_fabric/

I fear Social Media has ruined the social fabric of connection.

Imagine meeting someone in person, you've had such a great interaction with them, the energy you shared — the conversation, it all was beautiful. You exchange numbers or an email. You come home, you contemplate how good the day and how weirdly, somewhere in October, you've bumped into someone and it went well. You sleep.

This was the 90s.

In the 90s, when you met someone, you exchanged contact, not social profiles, so to contact them, or they contact you, both parties had to make a deliberate effort.

Technology back then, was a tool to connect and hear me out, connect to the same interaction — the same medium, in-person talking. Sure you shared a few emails, but ultimately you wanted to get back together to the old cafe where you left.

No ambiguity. Space to grow.

Fast forward to today, you meet, you exchange social profiles — let's take Instagram for example.

In my life, whoever I have met through Instagram has always ended up in an ambiguous and awkward friendship, and ultimately becoming a poison.

You meet them, they meet you. Exchange socials. Hit follow on profiles. Come back home, sleep.

And from there, everything is downhill.

You see their stories, they see your stories. It continues. Days. Weeks. No interaction, no energy. Never get to know each other. The awesome interaction you both had, what went wrong?

2 months later with no messages exchanged, both are silently watching stories and posts of each other, and ultimately, you hit unfollow. The person you met was lost.

And believe me when I say this, this is a pattern I noticed and almost all the people I exchanged my social with (especially IG) when I first met them, and followed ended up just placeholders, not friends.

What social media seems to ruin, is that it takes the connection, and makes the connection poisonous by constantly exposing each other to the point the connection that was once a beauty of the offline, goes online, killing the mystique and killing empathy.

In the first timeline, you weren't exposed, there was distance, there was anticipation. No ambiguity. No interaction override.

I feel truly sad writing this but lost many good people by just following them, wish I had gotten to know them before subscribing to their life that I never wanted to be the audience of, but a part of.

[What are we missing?]

4.6 CYBERBULLYING

4.6.1 EVIDENCE AND ESSAYS SHOWING HARMS

4.6.1.1 [van Geel, Vedder, & Tanilon \(2014\)](#). Relationship Between Peer Victimization, Cyberbullying, and Suicide in Children and Adolescents: A Meta-analysis. *JAMA Pediatrics*.

ABSTRACT: IMPORTANCE: Peer victimization is related to an increased chance of suicidal ideation and suicide attempts among children and adolescents.

OBJECTIVE: To examine the relationship between peer victimization and suicidal ideation or suicide attempts using meta-analysis.

DATA SOURCES: Ovid MEDLINE, PsycINFO, and Web of Science were searched for articles from 1910 to 2013. The search terms were bully*, teas*, victim*, mobbing, ragging, and harassment in combination with the term suic*. Of the 491 studies identified, 34 reported on the relationship between peer victimization and suicidal ideation, with a total of 284 375 participants. Nine studies reported on the relationship between peer victimization and suicide attempts, with a total of 70 102 participants.

STUDY SELECTION: Studies were eligible for inclusion if they reported an effect size on the relationship between peer victimization and suicidal ideation or suicide attempt in children or adolescents.

DATA EXTRACTION AND SYNTHESIS: Two observers independently coded the effect sizes from the articles. Data were pooled using a random effects model.

MAIN OUTCOMES AND MEASURES: This study focused on suicidal ideation and suicide attempts. Peer victimization was hypothesized to be related to suicidal ideation and suicide attempts.

RESULTS: **Peer victimization was found to be related to both suicidal ideation (odds ratio, 2.23 [95% CI, 2.10-2.37]) and suicide attempts (2.55 [1.95 -3.34]) among children and adolescents.** Analyses indicated that these results were not attributable to publication bias. Results were not moderated by sex, age, or study quality. **Cyberbullying was more strongly related to suicidal ideation compared with traditional bullying.**

CONCLUSIONS: Peer victimization is a risk factor for child and adolescent suicidal ideation and attempts. Schools should use evidence-based practices to reduce bullying.

4.6.1.2 [Mantey, Yockey, & Springer \(2022\)](#). Digital screen time and suicidality during high school: How important is cyberbullying? A mediation analysis using the youth risk behavioral surveillance survey, 2011–2019. *Preventive Medicine*.

ABSTRACT: Elevated digital screen time (i.e., 2+ hours per day) is associated with suicidal ideations, planning, and attempts during adolescence. Recent studies suggest quality, rather than duration, of digital screen time is most impactful on adolescent mental health. We investigate the role of cyberbullying victimization on the relationship between elevated digital screen time and risk factors for completed suicide. We pooled five years of biennial Youth Risk Behavioral Surveillance (YRBS) survey data (2011–2019). Participants were n = 73,011 high school students in the United States (US). Elevated digital screen time reflected spending 3 h (or more) per day on leisure, digital media. Outcome variables were: (1) feeling sad/hopeless; (2) suicidal ideation; (3) suicidal planning; and (4) suicide attempt. Structural equation models (SEMs) tested the mediating effects of self-reported online bullying victimization (i.e., cyberbullying) on the effect of elevated digital screen time on suicidality. We controlled for age, sex, race/ethnicity, and survey year. Subsample analyses stratified by sex were also conducted. Overall, 40.5% of high school students reported elevated digital screen time and 15.4% reported cyberbullying. **Cyberbullying mediated a substantial proportion of the relationship between digital screen time and feeling sad/hopeless (16%), suicidal ideation (18%), planned suicide attempt (18%), and past suicide attempt (26%), among high school students, controlling for covariates.** Similar mediating

effects were observed in models stratified by sex. Findings reinforce prior research demonstrating that the quality of leisure, digital media strongly influences the relationship between digital screen time and mental health during adolescence. Findings need replication via longitudinal designs.

4.6.1.3 [Giumetti, & Kowalski \(2022\)](#). Cyberbullying via social media and well-being. *Current Opinion in Psychology*.

ABSTRACT: In this article, we review research examining cyberbullying via social media among youth and adults and the relationship such behavior has with well-being. We report on several possible predictors of cyberbullying via social media, including **indiscreet posting, time spent on social media, and personality traits. We also highlight possible negative effects on well-being that may be linked with cyberbullying via social media, including psychological distress, decreased life satisfaction, and suicidal ideation.** We conclude the review with ideas for prevention and intervention, including the use of cyberbullying detection software to encourage users to think twice before posting a cyberbullying message. We also highlight several limitations with the existing research and provide some suggestions for future research opportunities.

4.6.1.4 [Hoff & Mitchell \(2009\)](#). Cyberbullying: Causes, effects, and remedies. *Journal of Educational Administration*.

ABSTRACT: PURPOSE: The purpose of this paper is to present research exploring the pervasiveness and causes of cyberbullying, the psychological impact on students, and the responses to cyberbullying from students and administrators. The goal is to give school leaders a greater understanding of this phenomenon and suggest steps to deal with this challenging issue.

DESIGN: The data are collected from 351 students using a survey, which contains limited choice, scaled response, and open-ended questions. This qualitative/quantitative design enables collection of data from a large population along with rich qualitative data that expand and explain students' experiences.

FINDINGS: **The paper reveals that cyberbullying emerges most commonly from relationship problems (break-ups, envy, intolerance, and ganging up); victims experience powerfully negative effects (especially on their social well-being);** and the reactive behavior from schools and students is generally inappropriate, absent, or ineffective.

LIMITATIONS: This is self-reported data collected from a group of students in one institution, who are asked to recall instances from their pre-college experience.

Additional research on from a variety of age groups and cross-culturally would add another layer of understanding about cyberbullying among teens.

IMPLICATIONS: Technological advances have created new challenges for schools in keeping students safe. This paper has implications for educational policy and practice, including steps school leaders can take to curtail cyberbullying.

4.6.1.5 [Sabella, Patchin, & Hinduja \(2013\)](#). Cyberbullying myths and realities.
Computers in Human Behavior.

ABSTRACT: Bullying has long been a concern of youth advocates (e.g., educators, counselors, researchers, policy makers). Recently, cyberbullying (bullying perpetrated through online technology) has dominated the headlines as a major current-day adolescent challenge. This article reviews available empirical research to examine the accuracy of commonly-perpetuated claims about cyberbullying. The analysis revealed several myths about the nature and extent of cyberbullying that are being fueled by media headlines and unsubstantiated public declarations. **These myths include that (a) everyone knows what cyberbullying is; (b) cyberbullying is occurring at epidemic levels; (c) cyberbullying causes suicide; (d) cyberbullying occurs more often now than [traditional bullying](#); (e) like traditional bullying, cyberbullying is a rite of passage; (f) cyberbullies are outcasts or just mean kids; and (g) to stop cyberbullying, just turn off your computer or cell phone.** These assertions are clarified using data that are currently available so that adults who work with youth will have an accurate understanding of cyberbullying to better assist them in effective prevention and response. Implications for prevention efforts in education in light of these revelations are also discussed and include effective school policies, educating students and stakeholders, the role of peer helper programs, and responsive services (e.g., counseling).

EXCERPT: A precise measure of the prevalence of cyberbullying among teens is impossible to determine, partly related to Myth #1 (inconsistent definitions) but also due to varied methodological approaches. Some studies ask their teen participants about any experience with cyberbullying, while others focus on “online youth” who experience specific types of high-tech harm within the previous 30 days. One published study found that 72% of youth have experienced cyberbullying (Juvonen & Gross, 2008) whereas other published research has put this number at less than 7% (Ybarra, 2004; Ybarra & Mitchell, 2004a). The majority of studies estimate that anywhere from 6% to 30% of teens have experienced some form of cyberbullying, while the number of youth who admit to cyberbullying others at some point in their lives ranges from about 4% to 20% (Patchin & Hinduja, 2012). Of course this means that 70–80% of youth have not been cyberbullied, and have not cyberbullied others.

...Given all of this research, one might ask: Why is it a myth that “cyberbullying causes suicide?” The answer to this question lies in the important difference between the nature of correlation and causation. **While it is true that there exists a relationship between bullying and suicide (a connection or correlation), no conclusive statistical evidence has shown that a cyberbullying experience directly “leads to” or causes suicide.** As previously stated, most youth who are cyberbullied do not take their own lives. So, the best that we can confidently say is that, among some young people, cyberbullying and suicide may be co-occurring (or are “co-related”) with at least one of many other factors such as depression, social withdrawal, disability, social hopelessness, or other psychiatric morbidity (Skapinakis et al., 2011).

...It seems that many cyberbullies who retaliate are often angry, frustrated, or otherwise emotionally distraught and are simply acting out using the technology that is readily at their fingertips. **Others participate in cyberbullying because they want retribution by returning a hurt or injury or to seek justice and teach a lesson. Still others casually dismiss the gravity of their cyberbullying behaviors because they do not make the connection between their online behavior and the offline consequences. These aggressors have also been referred to as “inadvertent” cyberbullies (Willard, 2007c) because, although their postings were intentional, they intended no harm.** At the time, inadvertent cyberbullies believed that what they were doing was benign, and they were just “having fun” or “messing around.” Although those who are mean to others in real life often behave similarly online, this is not always the case. **Instead, some cyberbullies may be perceived among teachers and peers as kind and responsible students while in school, even when they could be actively involved in bullying others outside the purview of adults.** For example, Hinduja and Patchin (2012b) found that those students who reported earning grades of mostly A's were just as likely to be involved in cyberbullying (both as a target and a bully) as those students who reported that they typically earned C's or D's. Just because certain students do well academically does not mean they are less likely to mistreat others. Those who subscribe to this myth may also mistakenly conclude that cyberbullies are easily identified and generally known among students and teachers. In fact, some parents and teachers would be shocked to know that some “good” students are also involved in the problem behavior.

4.6.1.6 [Bates \(2017\)](#). Revenge Porn and Mental Health: A Qualitative Analysis of the Mental Health Effects of Revenge Porn on Female Survivors. *Feminist Criminology*.

ABSTRACT: This study examines the emotional and mental health effects revenge porn has on female survivors. To date, no other academic studies have exclusively focused on mental health effects in revenge porn cases. In-depth qualitative interviews were conducted between February 2014 and January 2015 with 18 female revenge porn survivors, and **inductive analysis revealed participants' experiences of trust issues, posttraumatic stress disorder (PTSD), anxiety, depression, suicidal thoughts, and several other mental health effects.** These findings reveal the seriousness of revenge porn, the devastating impacts it has on survivors' mental health, and similarities between revenge porn and sexual assault.

4.6.1.7 [Branch, Hilinski-Rosick, Johnson, & Solano \(2017\)](#). Revenge Porn Victimization Of College Students In The United States: *An Exploratory Analysis*. *International Journal of Cyber Criminology*.

ABSTRACT: Over the past several decades, there has been an increased focus on various forms of sexual violence and sexually aggressive behaviors (e.g., stalking, harassment). Technology has provided new opportunities for sexually aggressive behavior and involvement in sexting and revenge porn. To date, there is limited empirical research that exists on revenge porn- sending or posting sexually suggestive or explicit materials of a former lover, without the subject's consent, in an attempt to humiliate, harass, or punish the victim. In the present exploratory study, we surveyed 470 college freshmen about their practices and perceptions about revenge porn. **Findings revealed that approximately 10% of the current sample had a private photo shared beyond the intended recipient and those male students and female students had different experiences. Specifically, victims of revenge porn were predominantly female, freshman, and 18 years of age and the majority of private pictures that were forwarded to others beyond the intended recipient were sent by a current or former boyfriend.** Implications of these findings for the college community are discussed.

4.6.1.8 [Machimbarrena... & González-Cabrera \(2018\)](#). Internet Risks: An Overview of Victimization in Cyberbullying, Cyber Dating Abuse, Sexting, Online Grooming and Problematic Internet Use. *International Journal of Environmental Research and Public Health*.

ABSTRACT: The advance of digital media has created risks that affect the bio-psycho-social well-being of adolescents. Some of these risks are cyberbullying, cyber dating abuse, sexting, online grooming and problematic Internet use. These risks have been studied individually or through associations of some of them but they have

not been explored conjointly. The main objective is to determine the comorbidity between the described Internet risks and to identify the profiles of victimized adolescents. An analytical and cross-sectional study with 3212 participants (46.3% males) from 22 Spanish schools was carried out. Mean age was 13.92 ± 1.44 years (range 11–21). Assessment tools with adequate standards of reliability and validity were used. **The main results indicate that the most prevalent single risk is cyberbullying victimization (30.27%). The most prevalent two-risk associations are cyberbullying-online grooming (12.61%) and cyberbullying-sexting (5.79%).** The three-risk combination of cyberbullying-sexting-grooming (7.12%) is highlighted, while 5.49% of the adolescents present all the risks. In addition, four profiles are distinguished, with the profile Sexualized risk behaviour standing out, with high scores in grooming and sexting and low scores in the rest of the risks. Determining the comorbidity of risks is useful for clinical and educational interventions, as it can provide information about additional risks.

4.6.1.9 [Connell, Schell-Busey, Pearce, & Negro \(2014\)](#). Badgrlz? Exploring Sex Differences in Cyberbullying Behaviors. *Youth Violence and Juvenile Justice*.

ABSTRACT: Research on bullying suggests that traditional bullying is gendered such that males participate in physical acts while females engage in relational attacks, but the nature of the relationship between gender and cyberbullying is less defined. Because the Internet is an ideal environment for the relational forms of bullying favored by females, we hypothesize that females engage in more cyberbullying than males. We also hypothesize that there are gender differences in predictors of cyberbullying and cybervictimization. In order to better understand these gender dynamics, we examine self-reported bullying and victimization experiences in a sample of 3,867 middle school students in a northeastern state. **Contrary to recent findings, our results show support for the gendered nature of cyberbullying and suggest that females engage in more cyberbullying than males.** We also find gender variation in predictors of cybervictimization. We discuss the implication of these findings, especially in light of prevention and intervention needs.

4.6.1.10 [Li \(2006\)](#). Cyberbullying in Schools: A Research of Gender Differences. *School Psychology International*.

ABSTRACT: This study investigates the nature and the extent of adolescences' experience of cyberbullying. A survey study of 264 students from three junior high schools was conducted. In this article, 'cyberbullying' refers to bullying via electronic

communication tools. The results show that close to half of the students were bully victims and about one in four had been cyber-bullied. Over half of the students reported that they knew someone being cyberbullied. Almost half of the cyberbullies used electronic means to harass others more than three times. **The majority of the cyber-bully victims and bystanders did not report the incidents to adults. When gender was considered, significant differences were identified in terms of bullying and cyberbullying. Males were more likely to be bullies and cyberbullies than their female counterparts. In addition, female cyberbully victims were more likely to inform adults than their male counterparts.**

4.6.1.11 [Sun, Fan, & Du \(2016\)](#). Cyberbullying Perpetration: A Meta-Analysis of Gender Differences. *International Journal of Internet Science*.

ABSTRACT: A total of 39 articles, which reported cyberbullying behaviors from both male and female respondents, were meta-analyzed to examine if gender difference existed in cyberbullying perpetration. From these 39 empirical studies, a total of 100 effect sizes were collected, each representing a reported gender difference in certain types of cyberbullying behaviors. Random-effects meta-regression models were used in data analysis. **Despite some inconsistencies across the individual empirical studies, a statistically significant gender difference emerged, indicating that more males were involved in cyberbullying perpetration behaviors than females. Moderator analysis showed that the gender difference was not consistent across the levels of several study features (e.g., modality of cyberbullying, regions of samples).** It was also revealed that some methodological issues (e.g., measurement of cyberbullying behaviors, self-report rather than behavioral data) remain obvious challenges for researchers in this area. Caution is warranted, because those studies that were rated as having poor study quality showed a larger than average effect size for gender difference in cyberbullying behaviors. Implications and future research directions are discussed.

4.6.1.12 [Evangelio, Rodríguez-González, Fernández-Río, & Gonzalez-Villora \(2022\)](#). Cyberbullying in elementary and middle school students: A systematic review. *Computers & Education*.

ABSTRACT: The goal of the present study was to extend the scope of previous reviews on cyberbullying to focus on elementary and middle school students, ages when research indicates that children begin to use mobile phones and social media. From 2016 to 2020, a total of 43 articles were included in the final selection, and purpose/s,

sample, design/instruments, and main findings/conclusions were assessed on each one. The following topics emerged from the results and were discussed: cyberbullying/cybervictimization and psychosocial variables, students' sociodemographic variables, connections between bullying and cyberbullying, students' roles related to cyberbullying, external factors and students' responses, and effectiveness of cyberbullying programs. **Students experiencing cyberbullying at an early school age reported negative feelings, such as depression or anxiety. They are often linked to bullying scenarios and even to the same role (cyberbully, cybervictim or cyberwitness).** Different programs have been shown to positively influence cyberbullying from a young age, important to prevent it, when children begin to use mobile phones and social media. Protective factors, such as specific pedagogical approaches (e.g. Cooperative Learning or Teaching for Personal and Social Responsibility) or programs, as well as the joined work of different agents (e.g. psychologists, teachers, parents, peers), should be considered to promote a positive evolution on CB prevention. Nevertheless, more studies are needed at these grades, as well as qualitative research designs, to deepen on the students' feelings on cyberbullying.

4.6.1.13 [Doumas & Midgett \(2020\)](#). Witnessing Cyberbullying and Internalizing Symptoms among Middle School Students. *European Journal of Investigation in Health, Psychology and Education*.

ABSTRACT: Cyberbullying is a significant problem among school-aged youth. **Cyberbullying peaks in middle school with 33% of middle school students reporting cyberbullying victimization and more than 50% reporting witnessing cyberbullying as bystanders.** Although the association between cyberbullying victimization and internalizing symptoms is well documented, there is limited research examining the impact of witnessing cyberbullying on bystanders. To assess differences in internalizing symptoms between cyberbullying bystanders and non-bystanders, a school-based cross-sectional study was conducted among middle school students (6th–8th grade) in the United States (N = 130; 57.4% female; 42.6% male). Questionnaire data were analyzed using multivariate analysis of co-variance (MANCOVA) with three outcome variables (depression, anxiety, somatic symptoms) and the between-subject factor bystander status (bystander, non-bystander). We controlled for witnessing school bullying to examine the unique effect of witnessing cyberbullying on internalizing symptoms. Results of the MANCOVA indicated a significant effect for cyberbullying bystander status ($p < 0.04$). Post hoc analyses demonstrated that **bystanders reported significantly higher levels of depression ($p < 0.05$), anxiety ($p < 0.02$), and somatic symptoms ($p < 0.01$) than non-bystanders.** Findings suggest

that programs to support students who witness cyberbullying are needed to reduce the mental health risks associated with being a cyberbullying bystander.

4.6.1.14 [Zhu, Huang, Evans, & Zhang \(2021\)](#). Cyberbullying Among Adolescents and Children: A Comprehensive Review of the Global Situation, Risk Factors, and Preventive Measures. *Frontiers in Public Health*.

ABSTRACT: BACKGROUND: Cyberbullying is well-recognized as a severe public health issue which affects both adolescents and children. Most extant studies have focused on national and regional effects of cyberbullying, with few examining the global perspective of cyberbullying. This systematic review comprehensively examines the global situation, risk factors, and preventive measures taken worldwide to fight cyberbullying among adolescents and children.

METHODS: A systematic review of available literature was completed following PRISMA guidelines using the search themes “cyberbullying” and “adolescent or children”; the time frame was from January 1st, 2015 to December 31st, 2019. Eight academic databases pertaining to public health, and communication and psychology were consulted, namely: Web of Science, Science Direct, PubMed, Google Scholar, ProQuest, Communication & Mass Media Complete, CINAHL, and PsycArticles. Additional records identified through other sources included the references of reviews and two websites, Cyberbullying Research Center and United Nations Children's Fund. A total of 63 studies out of 2070 were included in our final review focusing on cyberbullying prevalence and risk factors.

RESULTS: The prevalence rates of **cyberbullying preparation ranged from 6.0 to 46.3%, while the rates of cyberbullying victimization ranged from 13.99 to 57.5%, based on 63 references. Verbal violence was the most common type of cyberbullying.** Fourteen risk factors and three protective factors were revealed in this study. At the personal level, variables associated with cyberbullying including age, gender, online behavior, race, health condition, past experience of victimization, and impulsiveness were reviewed as risk factors. Likewise, at the situational level, parent-child relationship, interpersonal relationships, and geographical location were also reviewed in relation to cyberbullying. As for protective factors, empathy and emotional intelligence, parent-child relationship, and school climate were frequently mentioned.

CONCLUSION: **The prevalence rate of cyberbullying has increased significantly in the observed 5-year period, and it is imperative that researchers from low and middle income countries focus sufficient attention on cyberbullying of children and adolescents.** Despite a lack of scientific intervention research on cyberbullying, the review also identified several promising strategies for its prevention from the

perspectives of youths, parents and schools. More research on cyberbullying is needed, especially on the issue of cross-national cyberbullying. International cooperation, multi-pronged and systematic approaches are highly encouraged to deal with cyberbullying.

4.6.1.15 [Zhao & Yu \(2021\)](#). A Meta-Analytic Review of Moral Disengagement and Cyberbullying. *Frontiers in Psychology*.

ABSTRACT: With the development of technology, cyberbullying prevalence rates are increasing worldwide, and a growing body of the literature has begun to document cyberbullying behavior. Moral disengagement is often considered a key correlate factor in cyberbullying. This article aims to conduct a meta-analysis review of the relationship between moral disengagement and cyberbullying and some psychosocial and cultural variables. Based on the PRISMA method, a random-effects meta-analysis is employed in this study to obtain reliable estimates of effect sizes and examine a range of moderators (age, gender, measure method, and cultural background). Relevant studies, published from 2005 to February 30, 2021, were identified through a systematic search of the Web of Science, ScienceDirect, SpringerLink, Pubmed, EBSCO, and Wiley Online Library. Finally, 38 studies ($N=38,425$) met the inclusion criteria. **The meta-analysis conclusion demonstrated that moral disengagement positively correlated medium intensity with cyberbullying ($r=0.341$). Age, gender, and cultural background had moderated the relationship between moral disengagement and cyberbullying.**

4.6.1.16 [Kennedy \(2021\)](#). Bullying Trends in the United States: A Meta-Regression. *Trauma, Violence, & Abuse*.

ABSTRACT: The current study used meta-regression to establish trends in bullying from 1998 to 2017, to identify factors that help explain variation in bullying trends, and to determine differences in the trends by gender and grade. This study focused on trends of face-to-face (FTF) bullying victimization and perpetration, cyberbullying victimization, relational bullying victimization, verbal bullying victimization, and physical bullying victimization, as well as characteristics of the youth involved. It also explored methodological and survey differences to help determine which factors contribute to variation from study to study. A systematic search found 91 studies reporting trends of bullying, from 1998 to 2017, that met predefined inclusion and exclusion criteria. The findings illustrate no significant time trend when looking at FTF bullying victimization, yet an increasing time trend for cyberbullying victimization. Additional trends begin to emerge when stratifying the findings by grade and gender, with FTF bullying victimization among boys declining, while FTF bullying victimization among girls is

increasing. Across both FTF bullying victimization and cyberbullying victimization, **younger adolescents report significantly more bullying than older adolescents, and this is consistent over time. Verbal and physical bullying victimization as well as FTF bullying perpetration have significantly declined over time.** This study also identified key variables that contribute to the variation from trend study to trend study. The implications of these findings inform both policy and practice and provide insight into the overall scope of bullying within the United States.

EXCERPT: Cyberbullying victimization appears to have significantly increased, from about 10 % in 2000 to just over 16 % in 2017, while other subtypes significantly decreased. FTF bullying perpetration decreased from about 20% in 1998 to 10% in 2017, FTF verbal bullying victimization decreased from about 23 % in 2005 to 9 % in 2017, and FTF physical bullying victimization decreased from 29 % in 2005 to 8 % in 2017.

Since the early 2000s, cyberbullying has increased at a statistically significant rate, which is consistent with previous studies (Kessel Schneider et al., 2015). While this study did explore trends in FTF bullying and cyberbullying separately, emerging research on the overlap between the two suggests that they are not distinct entities (Mitchell et al., 2016; Waasdorp & Bradshaw, 2015). Rather, Mitchell and colleagues (2016) assert bullying (or peer harassment) is one large construct, where online and FTF are both settings in which bullying can occur. One possible explanation for why cyberbullying victimization might be increasing compared to FTF bullying victimization is that youth spend more of their free time online, thus increasing the window in which cyberbullying can occur. However, it is important to note that while cyberbullying victimization is on the rise, it is still affecting a smaller percentage of youth. In 2017, this study found that approximately 16 % of youth reported experiencing cyberbullying victimization, while in the same year 23 % of youth reported experiencing FTF bullying victimization.

...Additional trends emerged when examining FTF victimization by grade and gender. For the gendercombined sample, FTF bullying victimization appears to be decreasing among adolescents in grades ninth and above, down approximately 4% from 1998 to 2017. Among boys, **FTF bullying victimization has significantly decreased since the 1990s, particularly among boys in Grades 9 and above, down 6%. For girls, when grade is held constant, FTF bullying victimization appears to be increasing, from approximately 26% in 1998 to 30% in 2017. It is also increasing among younger adolescent girls, up 13% from 1998 to 2017.** This finding regarding gender differences is consistent with previous research that has found that FTF bullying victimization among boys is declining, while FTF bullying among girls is increasing

(Chester et al., 2015; Kessel Schneider et al., 2015; Molcho et al., 2009). This contrasting findings for boys and girls suggest that there is something different happening for boys compared to girls. There have been several cultural shifts in both opportunities for girls and the way they are perceived in the United States that might help explain the increasing trend in bullying victimization. Over the past few decades, there has been a shift in avenues of achievement and competition for girls. For example, girls are now graduating from high school and college at higher rates than boys (Buchmann, DiPrete, & McDaniel, 2008), and they generally do better in school (Buchmann et al., 2008; Voyer & Voyer, 2014). It is possible that with the increase in avenues and opportunities, girls are experiencing more pressure and stress that has resulted in greater tendencies to denigrate others who they may see as threats. Relatedly, shifts in expectations for girls overall may have paved the way for them to brave more normative disapproval than in past decades, specifically as a way to achieve their goals and develop individuality, which might result in more targeting by peers. Additionally, there has been a rise in the discourse regarding girl aggression and violence (Steffensmeier, Schwartz, Zhong, & Ackerman, 2005), and a reframing of girls from “vulnerable” to more aggressive “mean girls” (Ringrose, 2006). It is possible that this reframing as more aggressive may have led to behavioral shifts in which they are more likely to act out aggressively toward each other.

...Grade. Looking at grade on its own, a pattern emerged for both cyberbullying victimization and FTF bullying victimization: Younger adolescents (eighth grade and below) are significantly more likely to experience bullying than older adolescents (ninth grade and above) across both boys and girls.

FIGURE:

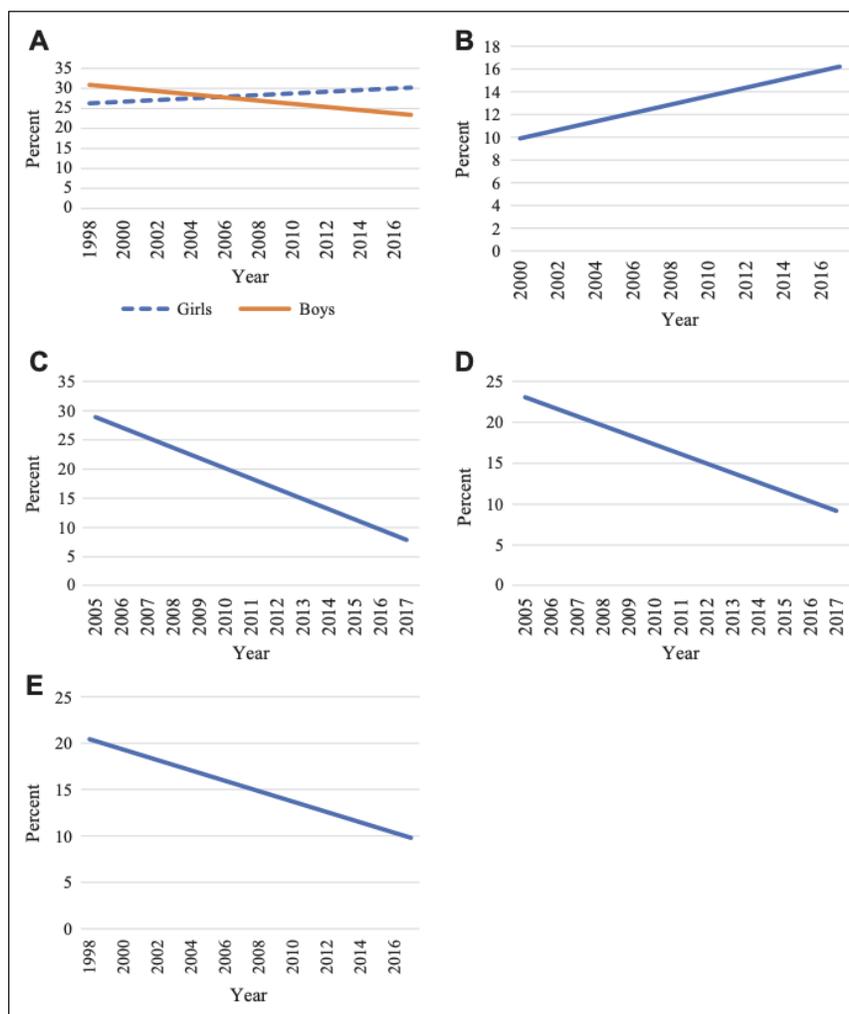


Figure 2. Significant plotted trend lines. (A) Significant bullying trends: Gender differences in face-to-face (FTF) bullying victimization controlling for grade, 1998–2017. (B) Cyberbullying bullying victimization: 2000–2017. (C) FTF physical bullying victimization: 2005–2017. (D) FTF verbal bullying victimization: 2005–2017. (E) Bullying perpetration: 1998–2017.

4.6.1.17 [Pontes, Ayres, Lewandowski, & Pontes \(2018\)](#). Trends in bullying victimization by gender among U.S. high school students. *Research in Nursing & Health*.

ABSTRACT: This research used four consecutive waves of data from the National Youth Risk Behavior Survey (YRBS) conducted by the Centers for Disease Control (CDC), to estimate linear time trends by gender in the prevalence of school and electronic bullying victimization among U.S. high school students (N = 61,042). Dependent variables were student self-reported school bullying victimization and electronic bullying victimization during the previous 12 months. Independent variables used to estimate multiple logistic regression models by gender were survey year, race/ethnicity, and grade level. **Results showed the prevalence of school bullying increased significantly among females**

from 2009 (21.2%) to 2015 (24.8%), linear trend OR = 1.08 [1.04, 1.12]; and decreased significantly among males from 2009 (18.7%) to 2015 (15.8%), linear trend OR = 0.93 [0.89, 0.98]. **Prevalence of electronic bullying was unchanged between 2011 to 2015 among both male and female students.** Asian race, relative to White race, was associated with significantly lower rates of both school and electronic bullying victimization among females, but not males. The incidence of school and electronic bullying victimization was significantly lower among Black and Hispanic students, but not among multiple-race students, regardless of student gender. Healthy People 2020 set a goal to reduce school bullying victimization 10% by 2019. **As of 2015, school bullying victimization decreased significantly among males (16% decrease); it significantly increased among females (17% increase).** Future research should explore underlying factors related to these divergent trends, and develop effective strategies to reverse the alarming rise in female school bullying victimization.

4.6.1.18 [Li, Lian, Su, Li, Xie, & Hu \(2020\)](#). Trends and sex disparities in school bullying victimization among U.S. youth, 2011–2019. *BMC Public Health*.

ABSTRACT: BACKGROUND: The prevalence of being bullied traditionally among U.S. high school students is expected to reduce to 17.9%, according to Healthy People 2020 Initiatives. We examined trends in traditional victimization and cybervictimization with the latest large-scale time-series data in the United States.

METHODS: We analyzed the data from the 2011–2019 national Youth Risk Behavior Survey (YRBS) to access the trends in traditional victimization and cybervictimization among U.S. high school students. We identified the temporal trends using multivariate logistic regression analyses, accounting for survey design features of YRBS.

Participants included 72,605 high school students.

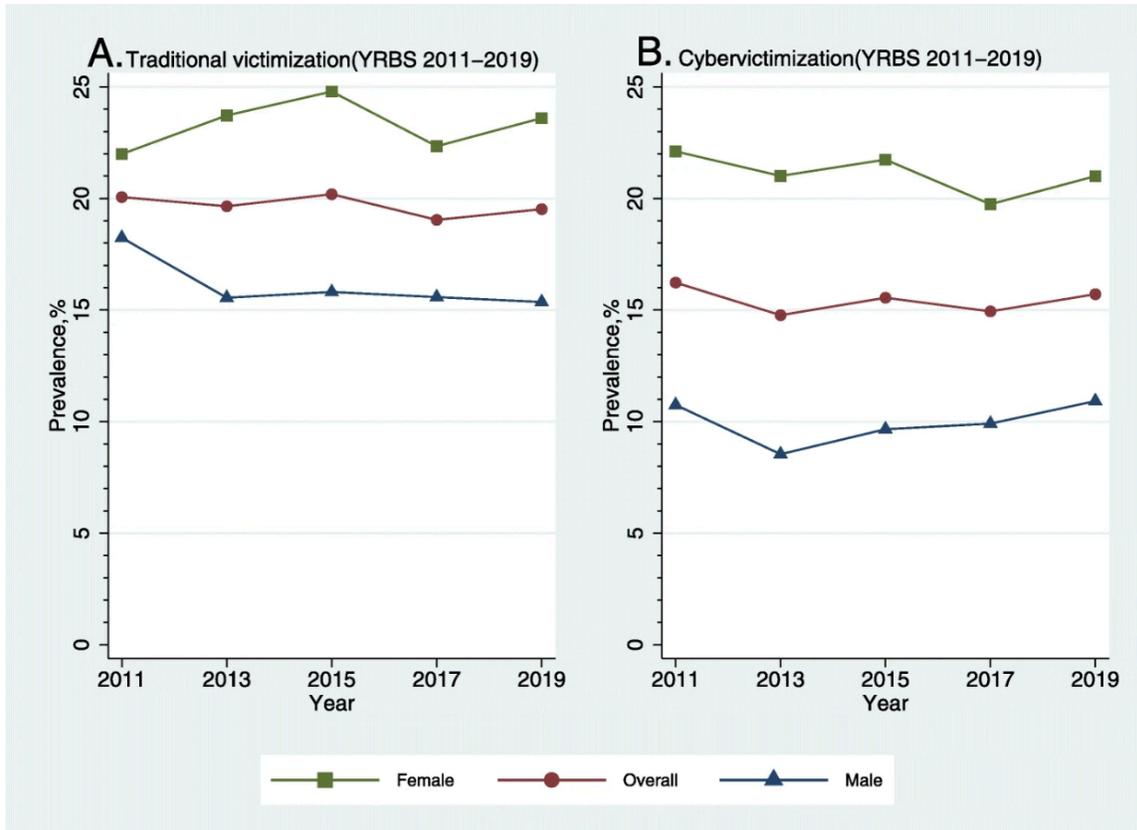
RESULTS: The overall prevalence of victimization was 19.74% for traditional bullying and 15.38% for cyberbullying, suggesting that cyberbullying is not a low frequent phenomenon. The prevalence of victimization ranged from 20.19 to 19.04% for traditional victimization and 16.23 to 14.77% for cybervictimization, and the declined trends for the two kinds of bullying victimization were both statistically non-significant. The degree of overlap between the two kinds of bullying victimization was about 60%. Besides, **female students reported more traditional victimization and cybervictimization than male peers within each survey cycle.**

CONCLUSIONS: No declined trends in traditional victimization and cybervictimization were observed during 2011–2019. Female students are more likely to experience school bullying. To achieve the Healthy People 2020 goal on bullying, more work is needed to explore the underlying reasons behind these unchanging trends.

FIGURE:

Fig. 1

From: [Trends and sex disparities in school bullying victimization among U.S. youth, 2011–2019](#)

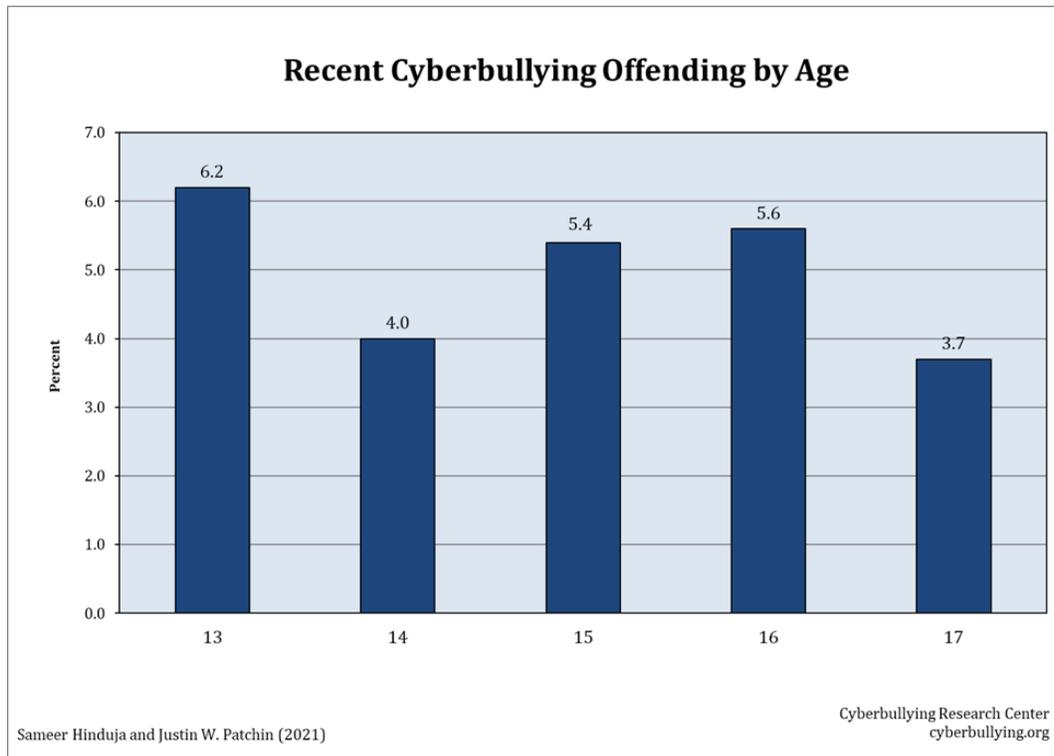


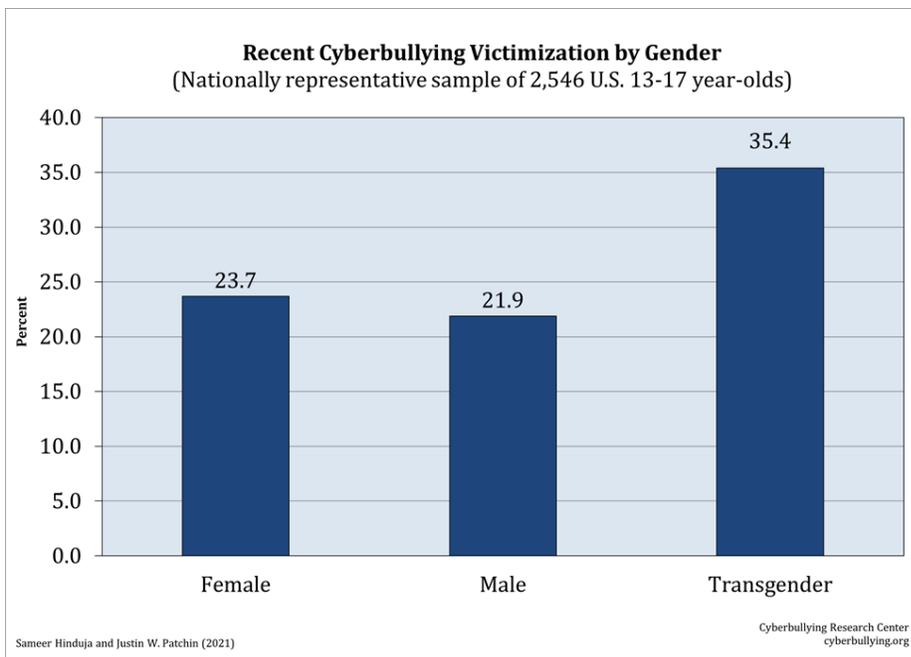
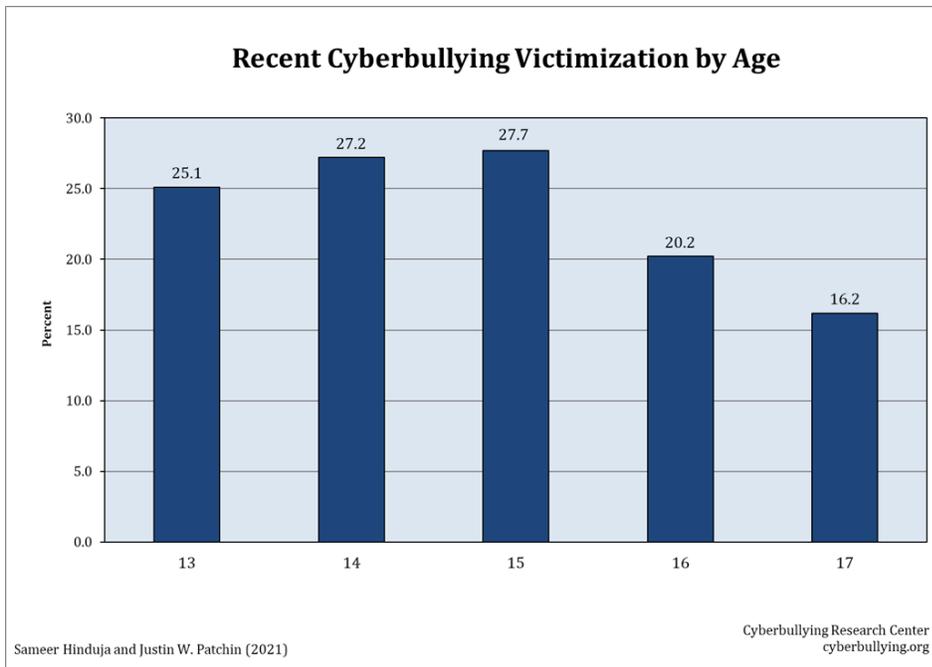
School bullying victimization trends by sex groups: YRBS 2011–2019

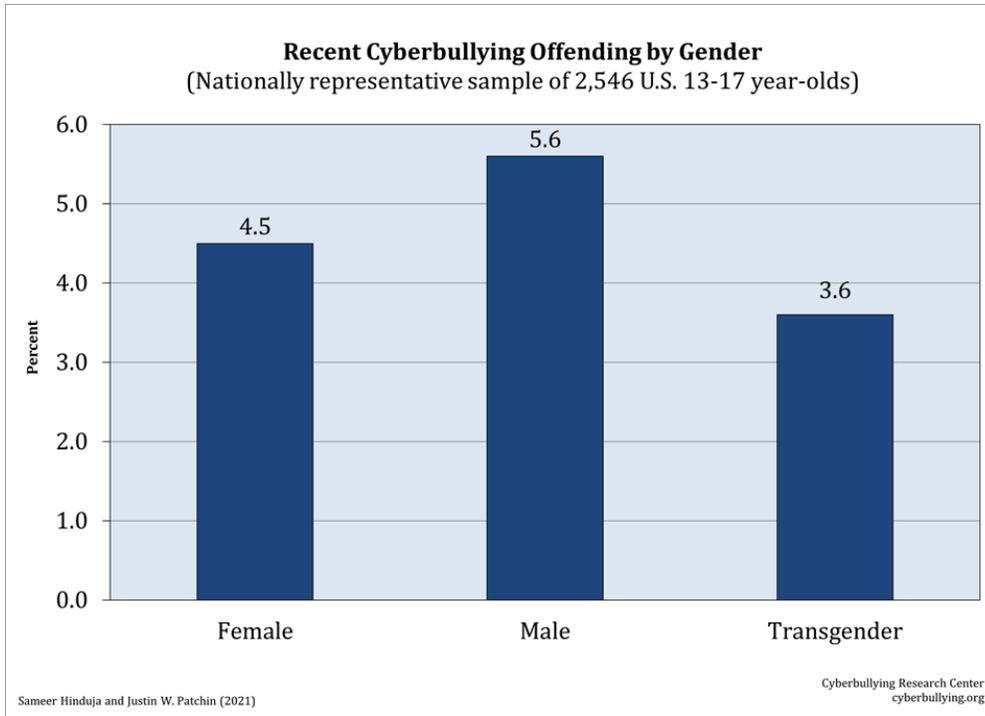
4.6.1.19 [Hinduja \(2021\)](#). Cyberbullying Statistics 2021 | Age, Gender, Sexual Orientation, and Race. *Cyberbullying Research Center*.

ABSTRACT: In May-June 2021, we collected new data from a nationally representative sample of 2,546 US youth between the ages of 13 and 17 to better understand their positive and negative experiences online. This is the type of research we do on a regular basis, and it helps us to keep our finger on the proverbial pulse of what's going on in the lives of American teens. Even though Cyberbullying has remained an all-too familiar social problem in 2021, statistics show that many families, communities, schools, and other youth-serving organizations continue to grapple with. **Indeed, we saw a 40% increase in its incidence [since the start of the COVID-19 pandemic](#).**

FIGURES:







4.6.1.20 [Vogels \(2021\)](#). The state of online harassment. *Pew Research Center*.

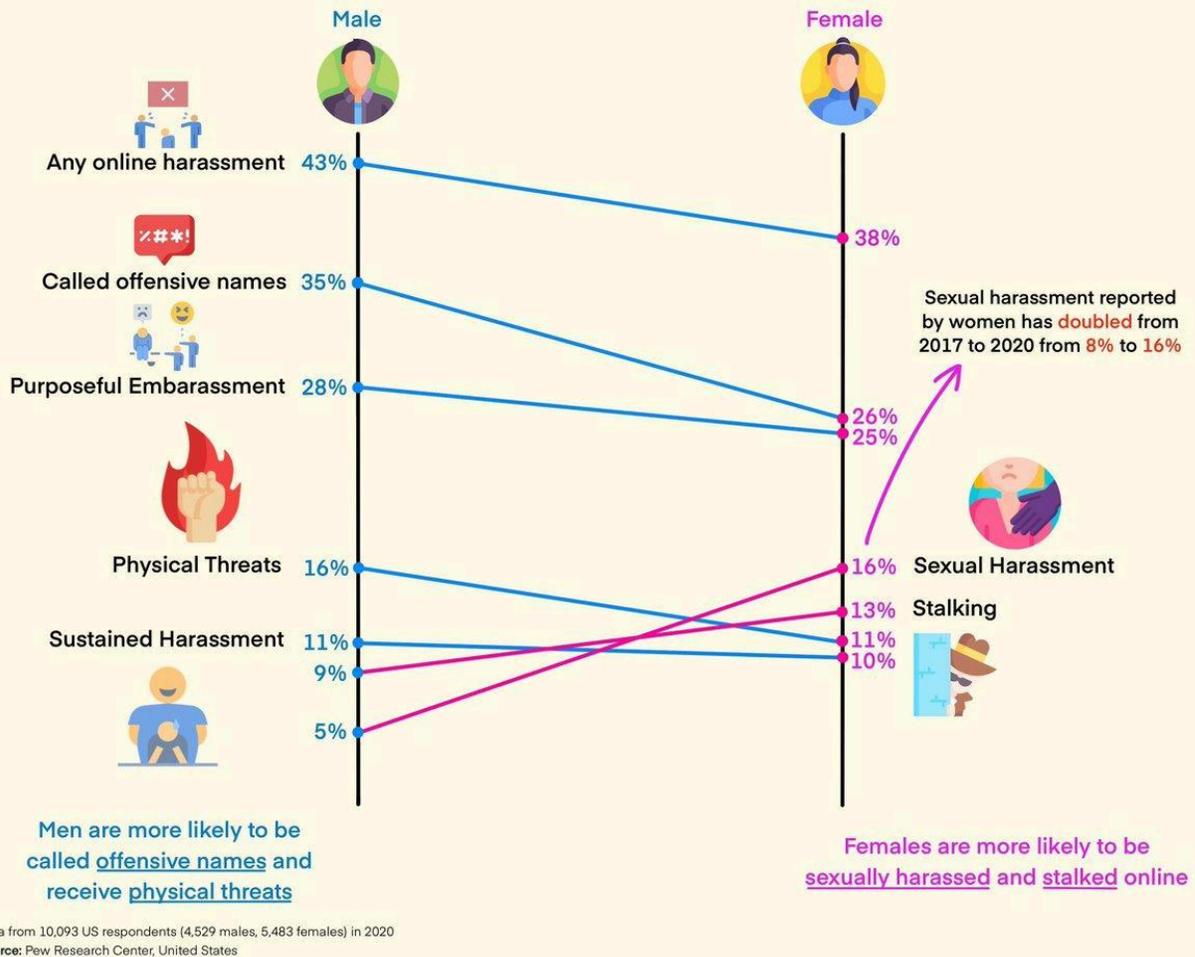
Other Pew studies:

- [Vogels \(2021\)](#). Online harassment occurs most often on social media, but strikes in other places, too. *Pew Research Center*.
- [Anderson & Vogels \(2020\)](#). Young women often face sexual harassment online – including on dating sites and apps. *Pew Research Center*.
- [Anderson \(2018\)](#). A majority of teens have experienced some form of cyberbullying. *Pew Research Center*.

4.6.1.21 The major types of cyberbullying faced by men and women in the US in 2020

What are the major types of cyberbullying faced by men & women?

Data is presented in **percentage (%)** of survey respondents



Credit: [AdamAJY99 on Reddit](#) (Data from Pew Research Center)

4.6.1.21 [Vogels \(2021\)](#). Online harassment occurs most often on social media, but strikes in other places, too. *Pew Research Center*.

EXCEPT: As has been the case since [at least 2014](#), social media sites are the most common place Americans encounter harassment online, according to a September 2020 [Pew Research Center survey](#). But harassment often occurs in other online locations, too.

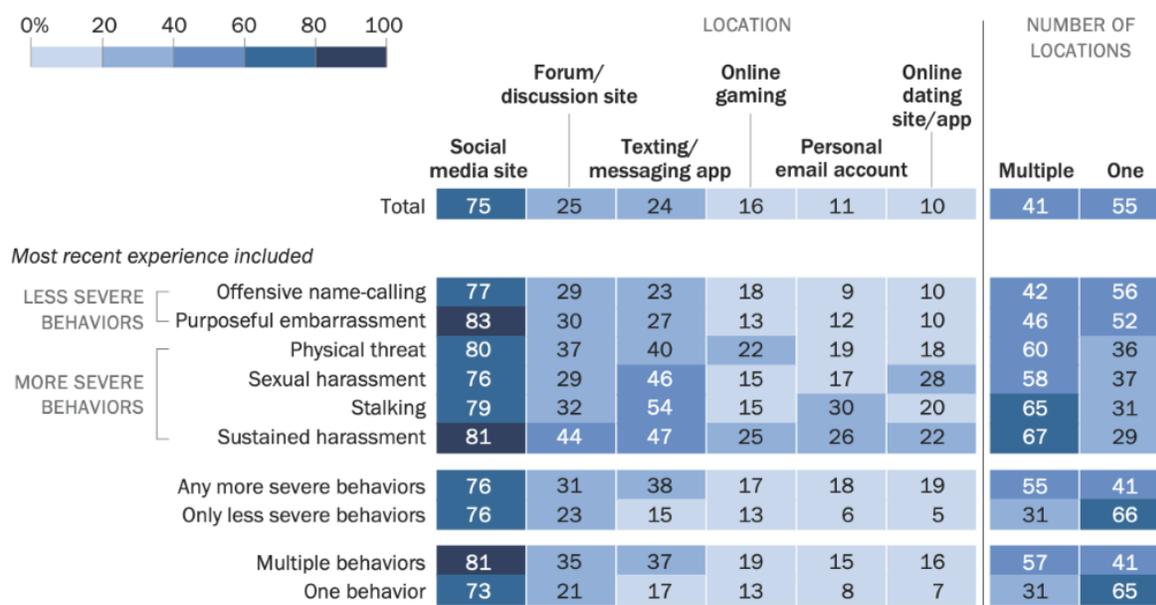
Overall, three-quarters of U.S. adults who have recently faced some kind of online harassment say it happened on social media. But notable shares say their most recent

such experience happened elsewhere, including on forum or discussion sites (25%), texting or messaging apps (24%), online gaming platforms (16%), their personal email account (11%) or online dating sites or apps (10%).

Certain kinds of harassing behavior, meanwhile, are particularly likely to occur in certain locations online, according to a new analysis of the 2020 data. The analysis focuses on respondents' most recent experience with online harassment.

Social media sites are the most commonly reported location for people's most recent online harassment encounter, regardless of the type of behavior

Among the 41% of U.S. adults who have personally experienced online harassment, % who say ___ was where their most recent experience occurred

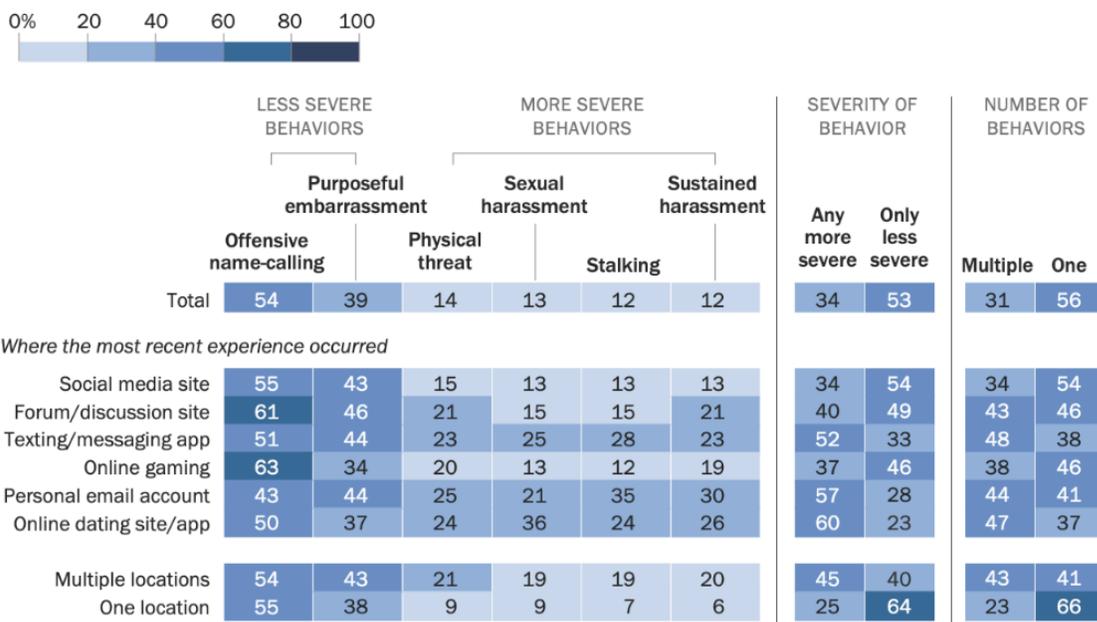


Note: Multiple responses were allowed for the types of harassing behaviors experienced most recently and the locations those behaviors took place in. Some respondents did not indicate what occurred in their most recent incident. Those who did not give an answer are not shown. Source: Survey of U.S. adults conducted Sept. 8-13, 2020.

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More severe forms of harassment are more likely to happen in some online venues, including online dating sites and personal email accounts

Among the 41% of U.S. adults who have personally experienced online harassment, % who say ___ was involved in their most recent experience



Note: Multiple responses were allowed for the types of harassing behaviors experienced most recently and the locations those behaviors took place in. Some respondents did not indicate what occurred in their most recent incident. Those who did not give an answer are not shown.

Source: Survey of U.S. adults conducted Sept. 8-13, 2020.

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[What are we missing?]

4.5.2 EVIDENCE AND ESSAYS SHOWING BENEFITS OR NO HARMS

[What are we missing?]

4.5.3 ILLUSTRATIONS

4.5.3.1

https://www.reddit.com/r/nosurf/comments/z0t1gt/can_going_offline_fix_me_i_feel_broken_completely/

EXCERPT: My brain just feels broken. I've lost the focus I used to have and I can't even read anymore (I used to love reading when I was younger.) I've also consumed a lot of toxic content online that has changed the way I view the world. I also ended up in a toxic spaces online where I was essentially bullied and now I view myself as a disgusting freak both internally and externally.

[What are we missing?]

4.7 PARASOCIAL RELATIONSHIPS

Parasocial relationships are one-sided relationships, where one person extends emotional energy, interest and time, and the other party, the persona, is completely unaware of the other's existence.

4.7.1 EVIDENCE AND ESSAYS SHOWING HARMS

4.7.1.1 [Baek, Bae, & Jang \(2013\)](#). Social and Parasocial Relationships on Social Network Sites and Their Differential Relationships with Users' Psychological Well-Being. *Cyberpsychology, Behavior, and Social Networking*.

ABSTRACT: With the advent of social network sites (SNSs), people can efficiently maintain preexisting social relationships and make online friendships without offline encounters. While such technological features of SNSs hold a variety of potential for individual and collective benefits, some scholars warn that use of SNSs might lead to socially negative consequences, such as social isolation, erosion of social cohesion, or SNS addiction. This study distinguishes types of SNS relationships, and investigates their relationships with social isolation, interpersonal trust, and SNS addiction. We classify SNS relationships into two types: (a) social relationships based on reciprocity between a user and his/her friends, and (b) parasocial relationships in which an ordinary user is aware of activities of a celebrity (e.g., famous actors, athletes, and others) but not vice versa. Based on achievements in studies of media effect and social psychology, we constructed a set of hypotheses, and tested them using a subsample of SNS users drawn from representative survey data in South Korea. We found that **dependency on parasocial relationships is positively related with loneliness but negatively correlated with interpersonal distrust, while dependency on social relationship is negatively correlated with loneliness but positively related with trust. However, more dependency on both social and parasocial relationships are positively related with SNS addiction.** Implications based on findings are also discussed.

4.7.1.2 [Cohen \(2003\)](#). Parasocial Breakups: Measuring Individual Differences in Responses to the Dissolution of Parasocial Relationships. *Mass Communication and Society*.

ABSTRACT: A self-report measure is presented for assessing the expected reactions of television viewers to the loss of parasocial relationships. Based on three separate samples, the measure is validated and used to explore differences in how people react to parasocial breakup. Findings suggest that, although women develop stronger parasocial relationships, they do not react differently than men to expected breakup. Teens, however, expect to be more upset than adults, following parasocial breakup. Results demonstrate the construct validity of the new scale, and its potential contribution is discussed.

4.7.1.3 [Eyal & Cohen \(2010\)](#). When good friends say goodbye: A parasocial breakup study.

ABSTRACT: This study examines viewers' reactions to parasocial breakup with mediated characters in light of interpersonal and mass communication theories. Following the airing of the last episode of the television show *Friends*, 279 students completed surveys assessing their viewing habits, their attitudes toward the show and their favorite character, and their loneliness. **The intensity of the parasocial relationship with the favorite character is the strongest predictor of breakup distress.** Other predictors include commitment and affinity to the show, the character's perceived popularity, and the participant's loneliness. The results shed light on the similarities and differences between parasocial and social relationships.

4.7.1.4 [Chen \(2016\)](#). Forming digital self and parasocial relationships on YouTube. *Journal of Consumer Culture*.

ABSTRACT: The videos on YouTube come either from mass media or are created and uploaded by amateur individuals. This study focused on how amateur individuals explore their digital self and establish parasocial interaction with others via YouTube videos. Drawing upon in-depth interviews with 45 participants (11 females and 34 males), our data demonstrate that YouTube is a consumer narrative where multiple digital selves and parasocial relationships are made comprehensible. It also unfolds the complex process of forming one's digital self and parasocial relationships on YouTube by undergoing three main phases: digital self-construction, digital-self presentation

strategies, and parasocial relationship developments that are managed by digital-self images. The results suggest that YouTube is a set of cultural values in terms of symbolic meanings in everyday life that are essential for consumers to digitally self-construct, self-present, and parasocially interact with online viewers.

4.7.1.5 [Ballantine. & Martin \(2005\)](#). Forming Parasocial Relationships in Online Communities. *ACR North American Advances*.

ABSTRACT: Parasocial interaction theory has been used to describe the one-sided relationships that can occur between a media user and the media being consumed. Used to understand the process by which individuals form attachments to media personae, the theory may also help explain the behavior of those consumers who use Internet-based online communities. This paper provides an overview of parasocial interaction theory, and explores how parasocial interaction can affect the consumption behavior of online community users. Following a review of the extant literature, a number of research questions are outlined to help guide future research in this area.

[What are we missing?]

4.7.2 EVIDENCE AND ESSAYS SHOWING BENEFITS OR NO HARMS

[What are we missing?]

4.7.3 ILLUSTRATIONS

https://www.reddit.com/r/nosurf/comments/lceilh/advice_for_breaking_up_parasocial_relationships/

advice for breaking up parasocial relationships

I have realised that what keeps me stuck on the internet is my desire for intimacy, something which is greatly exacerbated now that we're stuck at home with nothing happening. I have friends but I struggle to be close to them and one of the ways I connect with them is through memes and news, otherwise I feel like I have nothing interesting or entertaining to say about my life.

Instead I substitute a lot of my time watching youtube and through parasocial relationships with people I don't know. I justify this by arguing that it has helped me: I feel

like seeing other social dynamics on screen has helped me emulate it and eventually incorporate good social skills into my real life.

However, **after literally ten years of doing this I realise it's a drain on my time and personal happiness. Like maybe the reason I'm not as close with my friends and struggle to message them is because I'm overstimulated and socially exhausted from parasocial relationships online.** It's not even like I want to meet them or know them, I'm just curious and nosy about the inner-lives of other people. It's quite hard to substitute because even if I spoke to my friends more and went on youtube less all my friends are quite stable people living undramatic lives similar to mine and we have good boundaries with each other (whereas the youtube algorithm doesn't reward boundaries). When I have limited my social media access what draws me back isn't the desire to see more of people I know in real life but my desire to catch up with the soap opera of pop culture and the people I don't know.

I think the solution is to read more fiction books and memoirs that can allow me to have that intimacy in a more ethical, less addictive way. But I struggle to find books that can emulate that feeling. First-person, character-driven books and personal memoirs are what I'm looking for.

Book recommendations? Advice for breaking up parasocial relationships?

https://www.reddit.com/r/nosurf/comments/mzpjik/fandom_is_a_toxic_parasocial_waste_of_time_and/

Fandom is a toxic, parasocial waste of time and energy that comes at the cost of real life
After being seeped in fandom culture for years, I'm starting to realize just how dysfunctional the entire thing is and how no one ever talks about this.

Fandom, fundamentally, is not about anything real, but people get so sucked into it and spend so much time and energy pursuing a fantasy that comes at the very real cost of the time, energy, and attention they could be applying to their own lives. I've spent years still involved in fandom, even though I'm way too old for this now, and I've gotten so caught up in that fantasy that I've neglected to make friends, further my career, and take care of my health.

People get so caught up in shipping or how X is the "problematic" fan because they like Y or feeling bad about themselves because their fanart/fanfiction isn't popular without realizing that NONE OF THIS IS REAL. And I get it, the same thing has happened to me, but when you get obsessive about this stuff, it comes at a very real emotional cost to your real life.

Every friend I have ever met in fandom had some kind of profound mental illness that they were trying to cope with via escapism. I have never met so many maladjusted people in my entire life than I have through fandom. And while I feel bad for these people and wish them the best, hanging out with them has definitely not been good for me. Mental illness is, after all, somewhat contagious. And I have serious doubts that spending all day Rping your favorite ship is going to help with your dissociation. But no one ever points this out!

4.8 “PHUBBING”

4.8.1 EVIDENCE AND ESSAYS SHOWING HARMS

4.8.1.1 [Chotpitayasunondh, & Douglas \(2018\)](#). The effects of “phubbing” on social interaction. *Journal of Applied Social Psychology*.

ABSTRACT: This research experimentally investigated the social consequences of “phubbing” – the act of snubbing someone in a social setting by concentrating on one's mobile phone. Participants viewed a three-minute animation in which they imagined themselves as part of a dyadic conversation. Their communication partner either phubbed them extensively, partially, or not at all. **Results revealed that increased phubbing significantly and negatively affected perceived communication quality and relationship satisfaction. These effects were mediated by reduced feelings of belongingness and both positive and negative affect.** This research underlines the importance of phubbing as a modern social phenomenon to be further investigated.

4.8.1.2 [Chotpitayasunondh, & Douglas \(2016\)](#). How “phubbing” becomes the norm: The antecedents and consequences of snubbing via smartphone. *Computers in Human Behavior*.

ABSTRACT: Smartphones allow people to connect with others from almost anywhere at any time. However, there is growing concern that smartphones may actually sometimes detract, rather than complement, social interactions. The term “phubbing” represents the act of snubbing someone in a social setting by concentrating on one’s phone instead of talking to the person directly. The current study was designed to examine some of the psychological antecedents and consequences of phubbing behavior. We examined the contributing roles of Internet addiction, fear of missing out, self-control, and smartphone addiction, and how the frequency of phubbing behavior and of being phubbed may both lead to the perception that phubbing is normative. **The results revealed that Internet addiction, fear of missing out, and self-control predicted smartphone addiction, which in turn predicted the extent to which people phub. This path also predicted the extent to which people feel that phubbing is normative, both via (a) the extent to which people are phubbed themselves, and (b) independently.** Further, gender moderated the relationship between the extent to which people are phubbed and their perception that phubbing is normative. The present findings suggest that phubbing is an important factor in modern communication that warrants further investigation.

4.8.1.3 [Pancani, Gerosa, Gui, & Riva \(2021\)](#). “Mom, dad, look at me”: The development of the Parental Phubbing Scale. *Journal of Social and Personal Relationships*.

ABSTRACT: The widespread diffusion of smartphones has opened new challenges regarding the psychological consequences of their usage on social relationships. The term phubbing (a combination of phone and snubbing) indicates the act of ignoring someone in a social context by paying attention to the smartphone. The few existing studies show that phubbing is widespread, mutually reinforced, and socially accepted, with possible negative consequences for social and individual well-being. **Phubbing can occur in every social context, including romantic relationships, workplaces, and family. However, to date, minimal attention has been given to the possible impact that phubbing carried out by parents can have on their children.** To start filling this gap, in this paper, we introduced a new scale that measures the perception of being subject to parental phubbing and showed the prevalence of perceived phubbing on a stratified sample of 3,289 adolescents. Firstly, the dimensionality, validity, and invariance of the construct were proven. Moreover, our **results showed a positive relationship between children’s perceived levels of parental phubbing and their feelings of social disconnection with parents**, thus suggesting that the more children felt that one or both of their parents were phubbing them, the less the children felt connected with their parents.

4.8.1.4 [Roberts, & David \(2016\)](#). My life has become a major distraction from my cell phone: Partner phubbing and relationship satisfaction among romantic partners. *Computers in Human Behavior*.

ABSTRACT: Partner phubbing (Pphubbing) can be best understood as the extent to which an individual uses or is distracted by his/her cell phone while in the company of his/her relationship partner. The present study is the first to investigate the oft-occurring behavior of Pphubbing and its impact on relationship satisfaction and personal well-being. In Study 1, a nine-item scale was developed to measure Pphubbing. The scale was found to be highly reliable and valid. Study 2 assessed the study's proposed relationships among a sample of 145 adults. **Results suggest that Pphubbing's impact on relationship satisfaction is mediated by conflict over cell phone use.** One's attachment style was found to moderate the Pphubbing – cell phone conflict relationship. **Those with anxious attachment styles reported higher levels of cell phone conflict than those with less anxious attachment styles. Importantly, Pphubbing was found to indirectly impact depression through relationship satisfaction and ultimately life satisfaction.** Given the ever-increasing use of cell phones to communicate between romantic partners, the present research offers insight

into the process by which such use may impact relationship satisfaction and personal well-being. Directions for future research are discussed.

4.8.1.5 [Wang, Gao, Yang, Zhao, & Wang \(2020\)](#). Parental Phubbing and Adolescents' Depressive Symptoms: Self-Esteem and Perceived Social Support as Moderators. *Journal of Youth and Adolescence*.

ABSTRACT: Parental phubbing refers to the extent to which parents use or are distracted by their cell phone when they interact with their children. There has been growing scholarly interest in understanding the adverse effects of parental phubbing on adolescents' development. However, it is less clear whether parental phubbing potentially increases adolescents' depressive symptoms, to date, and the understanding of the factors which may affect this relationship is also limited. The current study, therefore, examined the relationship between parental phubbing and adolescents' depressive symptoms and sought to determine whether self-esteem and perceived social support simultaneously moderated this relationship. The participants included 2407 students (1202 girls; Mage = 12.75, SD = 0.58) from seven middle schools in China. They completed the questionnaires regarding their experience with parental phubbing, self-esteem, perceived social support, and depressive symptoms. Results indicated that **adolescents with a high level of parental phubbing were likely to have a high level of depressive symptoms, after controlling age, gender, and perceived economic stress. Low self-esteem adolescents who experienced higher levels of parental phubbing were more likely to be depressed than high self-esteem adolescents.** Furthermore, **higher levels of parental phubbing significantly predicted increases in adolescents' depressive symptoms when their self-esteem and perceived social support were both low, or one was low. In contrast, this effect became nonsignificant when adolescents' self-esteem and perceived social support were both high.** Parents who are concerned about adolescents' depressive symptoms should pay closer attention to adolescents' self-esteem, as well as their perceived social support, in order to provide appropriate interventions.

[What are we missing?]

4.8.2 EVIDENCE AND ESSAYS SHOWING BENEFITS OR NO HARMS

[What are we missing?]

4.8.3 ILLUSTRATIONS

[What are we missing?]

4.9 “NOMOPHOBIA”

4.9.1 EVIDENCE AND ESSAYS SHOWING HARMS

4.9.1 [Bhattacharya, Bashar, Srivastava, & Singh \(2019\)](#). NOMOPHOBIA: NO MOBILE PHONE PHOBIA. *Journal of Family Medicine and Primary Care*.

ABSTRACT: The term NOMOPHOBIA or NO MOBILE PHONE PHOBIA is used to describe a psychological condition when people have a fear of being detached from mobile phone connectivity. The term NOMOPHOBIA is constructed on definitions described in the DSM-IV, it has been labelled as a “phobia for a particular/specific things”. Various psychological factors are involved when a person overuses the mobile phone, e.g., low self-esteem, extrovert personality. The burden of this problem is now increasing globally. Other mental disorders like, social phobia or social anxiety, and panic disorder may also precipitate NOMOPHOBIC symptoms. **It is very difficult to differentiate whether the patient become NOMOPHOBIC due to mobile phone addiction or existing anxiety disorders manifest as NOMOPHOBIC symptoms. The signs and symptoms are observed in NOMOPHOBIA cases include- anxiety, respiratory alterations, trembling, perspiration, agitation, disorientation and tachycardia. NOMOPHOBIA may also act as a proxy to other disorders.** So, we have to be very judicious regarding its diagnosis. Some mental disorders can precipitate NOMOPHOBIA also and vice versa. The complexity of this condition is very challenging to the patients’ family members as well as for the physicians as NOMOPHOBIA shares common clinical symptoms with other disorders. That's why NOMOPHOBIA should be diagnosed by exclusion. We have to stay in the real world more than virtual world. We have to re-establish the human-human interactions, face to face connections. So, we need to limit our use of mobile phones rather than banning it because we cannot escape the force of technological advancement.

[What are we missing?]

4.9.2 EVIDENCE AND ESSAYS SHOWING BENEFITS OR NO HARMS

[What are we missing?]

4.9.3 ILLUSTRATIONS

[What are we missing?]

4.10 “CONSTANT CONTACT”

Constant ability to be in contact with parents, friends, etc.

- Ability to develop “safe base” // Coping without parents
- Ability for parents to let go
- Development of deep attachment to phone
- Anxiety around need to stay connected
- Constant monitoring of phone

4.10.1 EVIDENCE AND ESSAYS SHOWING HARMS

4.10.1

[What are we missing?]

4.10.2 EVIDENCE AND ESSAYS SHOWING BENEFITS OR NO HARMS

[What are we missing?]

4.10.3 ILLUSTRATIONS

[What are we missing?]

SECTION 5: THE EFFECTS OF DIGITAL MEDIA USE ON COGNITIVE DEVELOPMENT

This section collects research on whether smartphones in general, or social media in particular, cause users to develop cognitive health issues, including attention and memory deficits, intelligence declines, and a loss of orientation skills.

5.1 ATTENTION AND FOCUS

“Attention is the rarest and purest form of generosity.” -- [Simone Weil](#)

5.1.1 EVIDENCE AND ESSAYS SHOWING HARMS

5.1.1.1 [Boer, Stevens, Finkenauer, & van den Eijnden \(2020\)](#). Attention Deficit Hyperactivity Disorder-Symptoms, Social Media Use Intensity, and Social Media Use Problems in Adolescents: Investigating Directionality. *Child Development*.

ABSTRACT: Cross-sectional research shows that adolescents' social media use (SMU) and attention deficit hyperactivity disorder (ADHD)-symptoms are related, but it is unclear whether this relation is explained by SMU intensity or by addiction-like SMU problems. Also, due to the lack of longitudinal studies, the direction of this relation remains unknown. This study aims to disentangle which type of SMU is related to ADHD-symptoms, and in which direction, using a three-wave longitudinal study among Dutch adolescents aged 11-15 years (n = 543). **Findings suggest a unidirectional relation: SMU problems increased ADHD-symptoms over time, SMU intensity did not. This implies that problematic use, rather than the intensity of use harmfully affects adolescents' ADHD-symptoms.**

5.1.1.2 [Baumgartner, van der Schuur, Lemmens, & te Poel \(2018\)](#). The Relationship Between Media Multitasking and Attention Problems in Adolescents: Results of Two Longitudinal Studies. *Human Communication Research*.

ABSTRACT: The increased prevalence of media multitasking among adolescents has raised concerns that media multitasking may cause attention problems. Despite cross-sectional evidence of the relationship between media multitasking and attention problems, no study has yet investigated this relationship longitudinally. It is therefore unclear how these two variables are related. Two 3-wave longitudinal studies with 3- and 6-month time lags were conducted. In total, 2,390 adolescents aged 11–16 provided data on media multitasking and attention problems. Findings from random intercept autoregressive cross-lagged models suggest that **media multitasking and attention problems were strongly related between individuals. Empirical evidence for a potential detrimental long-term effect of media multitasking on attention problems was only found among early adolescents but not among middle adolescents.**

5.1.1.3 [Uncapher, & Wagner \(2018\)](#). Minds and brains of media multitaskers: Current findings and future directions. *Proceedings of the National Academy of Sciences*.

ABSTRACT: Media and technology are ubiquitous elements of our daily lives, and their use can offer many benefits and rewards. At the same time, decisions about how individuals structure their use of media can be informed by consideration of whether, and if so how, the mind and brain are shaped by different use patterns. Here we review the growing body of research that investigates the cognitive and neural profiles of individuals who differ in the extent to which they simultaneously engage with multiple media streams, or “media multitasking.” **While the literature is still sparse, and is marked by both convergent and divergent findings, the balance of evidence suggests that heavier media multitaskers exhibit poorer performance in a number of cognitive domains, relative to lighter media multitaskers (although many studies find no performance differences between groups).** When evidence points to a relationship between media multitasking level and cognition, it is often on tasks that require or are influenced by **fluctuations in sustained goal-directed attention.** Given the real-world significance of such findings, further research is needed to uncover the mechanistic underpinnings of observed differences, to determine the direction of causality, to understand whether remediation efforts are needed and effective, and to determine how measurement heterogeneity relates to variable outcomes. Such efforts will ultimately inform decisions about how to minimize the potential costs and maximize the many benefits of our ever-evolving media landscape.

—Jaan Aru: 'disruptive habitual smartphone use'. [address the false claim that kids today have the attention span of a goldfish] **We further hypothesize that the main detrimental effect of disruptive habitual smartphone use is on the ability to exert prolonged cognitive effort in tasks that do not involve smartphones.** This ability is required for acquiring domain-specific knowledge and for real-life creativity. **These activities call for a continuous investment of mental effort over weeks, months, and years. Any such detrimental effect would not be revealed in studies that measure attention or working memory, as the person can focus over a short term if they know that their abilities are being tested.** there are reasons why certain smartphone-related activities might have a more favorable cost–benefit ratio than other tasks. For instance, one benefit of digital technologies is that obtaining novelty is a reward in itself [7]: each novel video or image, text, post, or comment might work as a reward. Social media apps further combine this novelty reward with social rewards [8], where feedback in the form of likes, shares, and view counts are obtained. **Recent work [9] showed that smartphone social media use is inversely related to striatal dopamine function, a central neural mechanism implicated in habit formation. Compared to smartphone use, cognitive work is inherently costly [6]. The past decades of research have demonstrated that cognitive work is often aversive and that people choose tasks that are less effortful [6]. Therefore, choosing to engage with social media may be rational to the extent that scrolling social media feed might have a more favorable cost–benefit ratio than doing homework (Figure 1). This possibility requires direct study. Second, our ability to focus and exert effort is compromised because ubiquitous access to smartphones means that there is always something new (text messages, news, social media posts, games) to be expected. Furthermore, many people have push notifications activated, Mental effort is required for learning and real-life creativity**

Which tasks and behaviors are affected if the ability to exert effort is impeded? Acquiring domain-specific knowledge is a prime example of such behavior. For instance, doing schoolwork in the classroom or at home is difficult when there are rewarding action alternatives available through smartphones and engagement in schoolwork is constantly disrupted by habitual smartphone use. |

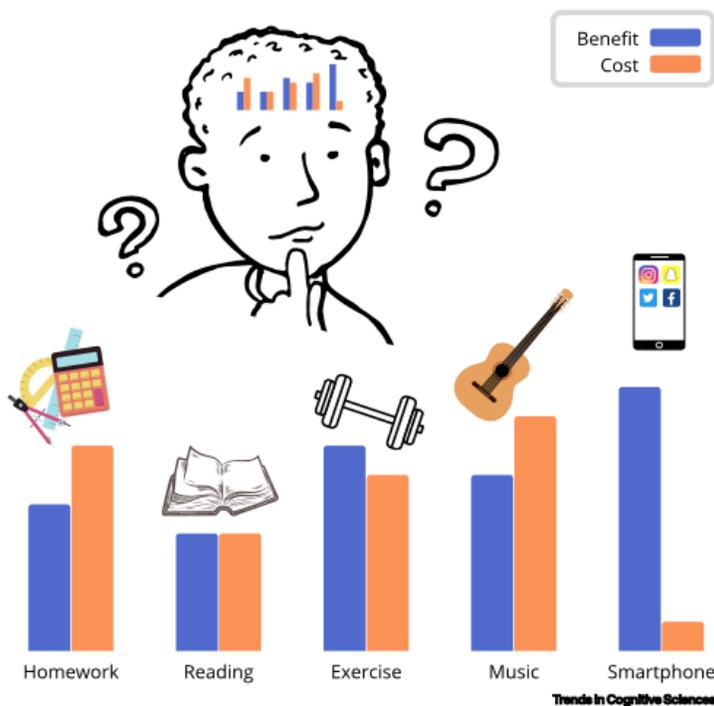


Figure 1. Smartphones habitually bias action selection. Action alternatives are evaluated to select the behavior that presently has the most favorable cost–benefit ratio. One typical cost (orange bars) is mental effort, which is weighed against the benefits (blue bars). The problem with disruptively habitual smartphone use is that it has an abnormally high difference between benefits (e.g., obtaining novelty) and costs (moving the thumb on the screen). Thus, its present cost–benefit ratio outweighs the other alternatives, even though the other alternatives (e.g., doing homework or learning how to play a guitar) might bring more benefits in the long run. The examples and the specific cost and benefit values are only illustrative. Image credits: Canva/Pixabay.

5.1.1.4 [McHarg, Ribner, Devine, & Hughes \(2020\)](#). Screen Time and Executive Function in Toddlerhood: A Longitudinal Study. *Frontiers in Psychology*.

ABSTRACT: Technology is pervasive in homes with young children. Emerging evidence that electronic screen-based media use has adverse effects on executive functions may help explain negative relations between media use and early academic skills. However, longitudinal investigations are needed to test this idea. In a sample of 193 British toddlers tracked from age 2 to 3 years, we test concurrent and predictive relations between screen use and children’s executive function. **We find no concurrent association between screen use and executive function; however, screen time at age 2 is negatively associated with the development of executive functions in toddlerhood from age 2 to 3, controlling for a range of covariates including verbal ability.** Implications for parenting, education, and pediatric recommendations are discussed.

5.1.1.5 [Tamana... & Mandhane \(2019\)](#). Screen-time is associated with inattention problems in preschoolers: Results from the CHILD birth cohort study. PLOS ONE.

ABSTRACT: BACKGROUND: Pre-school children spend an average of two-hours daily using screens. We examined associations between screen-time on pre-school behavior using data from the Canadian Healthy Infant Longitudinal Development (CHILD) study. METHODS: CHILD participant parents completed the Child Behavior Checklist (CBCL) at five-years of age. Parents reported their child's total screen-time including gaming and mobile devices. Screen-time was categorized using the recommended threshold of two-hours/day for five-years or one-hour/day for three-years. Multiple linear regression examined associations between **screen-time and externalizing behavior (e.g. inattention and aggression)**. Multiple logistic regression identified characteristics of children at risk for clinically significant externalizing problems (CBCL T-score \geq 65). RESULTS: Screen-time was available for over 95% of children (2,322/2,427) with CBCL data. Mean screen-time was 1.4 hours/day (95%CI 1.4, 1.5) at five-years and 1.5 hours/day (95%CI: 1.5, 1.6) at three-years. **Compared to children with less than 30-minutes/day screen-time, those watching more than two-hours/day (13.7%) had a 2.2-point increase in externalizing T-score (95%CI: 0.9, 3.5, $p\leq 0.001$); a five-fold increased odd for reporting clinically significant externalizing problems (95%CI: 1.0, 25.0, $p = 0.05$); and were 5.9 times more likely to report clinically significant inattention problems (95%CI: 1.6, 21.5, $p = 0.01$).** Children with a DSM-5 ADHD T-score above the 65 clinical cut-off were considered to have significant ADHD type symptoms ($n = 24$). **Children with more than 2-hours of screen-time/day had a 7.7-fold increased risk of meeting criteria for ADHD (95%CI: 1.6, 38.1, $p = 0.01$).** There was no significant association between screen-time and aggressive behaviors ($p>0.05$). CONCLUSION: Increased screen-time in pre-school is associated with worse inattention problems.

5.1.1.6 [Santos, Mendes, Marques Miranda, & Romano-Silva \(2022\)](#). The Association between **Screen Time and Attention in Children: A Systematic Review**. *Developmental Neuropsychology*.

ABSTRACT: Electronic media pervade modern life. Childhood is a crucial period for attentional development and the screen exposure time is increasing. This review aimed to understand the association between screen time and attention of children with typical development. A systematic review was conducted in compliance with Preferred Reporting Items for Systematic Reviews and Meta-Analyzes PRISMA being registered

at Prospero under number CRD42021228721. A search was performed in January 2021 with the following keywords: “screen time,” “children,” and “attention,” combined with the operator AND, on databases PubMed, and PsycINFO. Four hundred and ninety-eight articles were identified, and **41 papers were fully read, of which 11 were included in this review. Most studies found associations between screen time and attention in children. Only one study reported that children with more screen time performed better in an attention task. The findings suggest that exposure to excessive screen time in children can be associated with attention problems.** Parents and teachers may be involved in controlling screen exposure, especially after the extensive exposition to online classes, due to the pandemic. Further studies are needed to assess the influence of this overexposure on care over time.

5.1.1.7 [Rosen, Carrier, & Cheever \(2013\)](#). Facebook and texting made me do it: Media-induced task-switching while studying. *Computers in Human Behavior*.

ABSTRACT: Electronic communication is emotionally gratifying, but how do such technological distractions impact academic learning? The current study observed 263 middle school, high school and university students studying for 15 min in their homes. Observers noted technologies present and computer windows open in the learning environment prior to studying plus a minute-by-minute assessment of on-task behavior, off-task technology use and open computer windows during studying. A questionnaire assessed study strategies, task-switching preference, technology attitudes, media usage, monthly texting and phone calling, [social networking](#) use and grade point average (GPA). **Participants averaged less than six minutes on task prior to switching most often due to technological distractions including social media, texting and preference for task-switching.** Having a positive attitude toward technology did not affect being on-task during studying. **However, those who preferred to task-switch had more distracting technologies available and were more likely to be off-task than others. Also, those who accessed Facebook had lower GPAs than those who avoided it.** Finally, students with relatively high use of study strategies were more likely to stay on-task than other students. The educational implications include allowing students short “technology breaks” to reduce distractions and teaching students [metacognitive strategies](#) regarding when interruptions negatively impact learning.

5.1.1.8 [Dietz & Henrich \(2014\)](#). Texting as a distraction to learning in college students. *Computers in Human Behavior*.

ABSTRACT: Texting has been shown to be cognitively distracting for students in lecture settings, but few have done empirical work, or looked at moderating effects between texting and academic outcomes. This experimental study compared the proportion of correct answers on a lecture quiz between students who were randomly assigned to text message during a pre-recorded lecture and those who were not, while investigating possible moderators. **The participants who text messaged throughout the lecture scored significantly lower in percent of correct responses ($t(95) = -4.6, p < .001, d = .93$).** No moderating effects were found, including: perceived distraction, perceived texting ability, number of text messages sent and received during the lecture, age, and gender.

5.1.1.9 [Stothart, Mitchum, & Yehnert \(2015\)](#). The attentional cost of receiving a cell phone notification. *Journal of Experimental Psychology. Human Perception and Performance*.

ABSTRACT: It is well documented that interacting with a mobile phone is associated with poorer performance on concurrently performed tasks because limited attentional resources must be shared between tasks. However, mobile phones generate auditory or tactile notifications to alert users of incoming calls and messages. Although these notifications are generally short in duration, they can prompt task-irrelevant thoughts, or mind wandering, which has been shown to damage task performance. We found that cellular phone notifications alone significantly disrupted performance on an attention-demanding task, even when participants did not directly interact with a mobile device during the task. The magnitude of observed distraction effects was comparable in magnitude to those seen when users actively used a mobile phone, either for voice calls or text messaging.

[What are we missing?]

5.1.2 EVIDENCE AND ESSAYS SHOWING BENEFITS OR NO HARMS

5.1.2.1 [Cecutti, Chemero, & Lee \(2021\)](#). Technology may change cognition without necessarily harming it. *Nature Human Behaviour*.

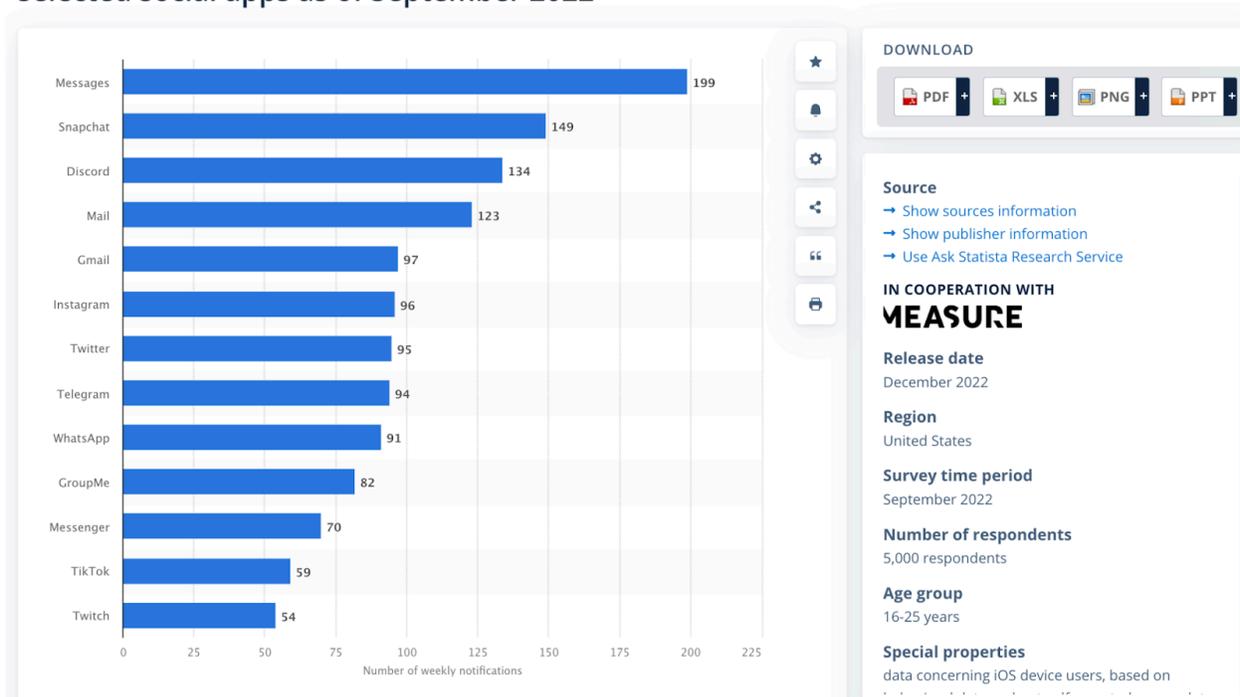
ABSTRACT: What is the long-term impact of technological advances on cognitive abilities? We critically examine relevant findings and argue that there is no clear evidence for detrimental lasting effects of digital technology on cognitive abilities. But we also suggest how digital technology may be changing predominant ways of cognition.

[What are we missing?]

5.1.3 HOW OFTEN DO TEENS HAVE THEIR FOCUS INTERRUPTED BY THEIR PHONES?

5.1.3.1 [Ceci \(2023\)](#). Average weekly notifications received by Gen Z mobile users in the United States from selected social apps as of September 2022. *Statista*.

Average weekly notifications received by Gen Z mobile users in the United States from selected social apps as of September 2022



5.1.3.2 [Lenhart \(2015\)](#). Teens, Social Media & Technology Overview 2015. *Pew Research Center: Internet, Science & Tech*.

EXCERPT: In a testament to the shifting landscape of texting, one third (33%) of teens with cell phones use messaging apps like Kik or WhatsApp. These apps are more likely to be used by Hispanic and African-American youth who own cell phones, with 46% of

Hispanic teens and 47% of African-American teens using messaging apps to send texts, compared with one-quarter (24%) of white teens with cell phones.

Teens on the lower end of the income spectrum are also more likely to use messaging apps on their smartphones, with 39% of cell-owning teens from households earning less than \$50,000 annually using the apps, compared with 31% of teens from wealthier families. Girls are also a bit more likely than boys to use messaging apps, with 37% of cell-owning girls using them compared with 29% of boys with cell phones. Use of these apps varies little by the age of the teen.

The number of text messages sent or received by cell phone owning teens ages 13 to 17 (directly through phone or on apps on the phone) on a typical day is 30. The number of messages exchanged for girls is higher, typically sending and receiving 40 messages a day. And for the oldest girls (15 to 17), this rises to a median of 50 messages exchanged daily.

Among teens with cell phones, those from less well-off families are more likely than others to report that they simply don't send text messages. Some 18% of teens from families earning less than \$30,000 annually report that they do not text, compared with less than 7% for those in higher-earning families.

FIGURE:

A Typical Teen Sends and Receives 30 Texts a Day

Among all teen cell phone users, the mean & median number of texts they send & receive

	Mean	Median
All teen cell phone users	67	30
Sex		
a Boys	56	20
b Girls	79	40
Race / ethnicity		
c White, non-Hispanic	67	30
d Black, non-Hispanic	63	30
e Hispanic	66	25
Age		
f 13-14	56	20
g 15-17	74	30
Sex by age		
h Boys 13-14	39	20
i Boys 15-17	65	25
j Girls 13-14	72 ^h	30
k Girls 15-17	83	50
Household income		
l <\$30K	53	20
m \$30K-\$49,999	87	30
n \$50K-\$74,999	60	30
o \$75K+	69	30
Parent educational attainment		
p Less than high school	47	20
q High school	79	30
r Some college	58	30
s College+	76	30
Urbanity		
t Urban	72	30
u Suburban	61	25
v Rural	83	30

Source: Pew Research Center's Teens Relationships Survey, Sept. 25-Oct. 9, 2014 and Feb. 10-Mar. 16, 2015 (n=929 teen cell phone users ages 13 to 17).

Note: Percentages marked with a superscript letter (e.g., ^h) indicate a statistically significant difference between that row and the row designated by that superscript letter, among categories of each demographic characteristic (e.g. age).

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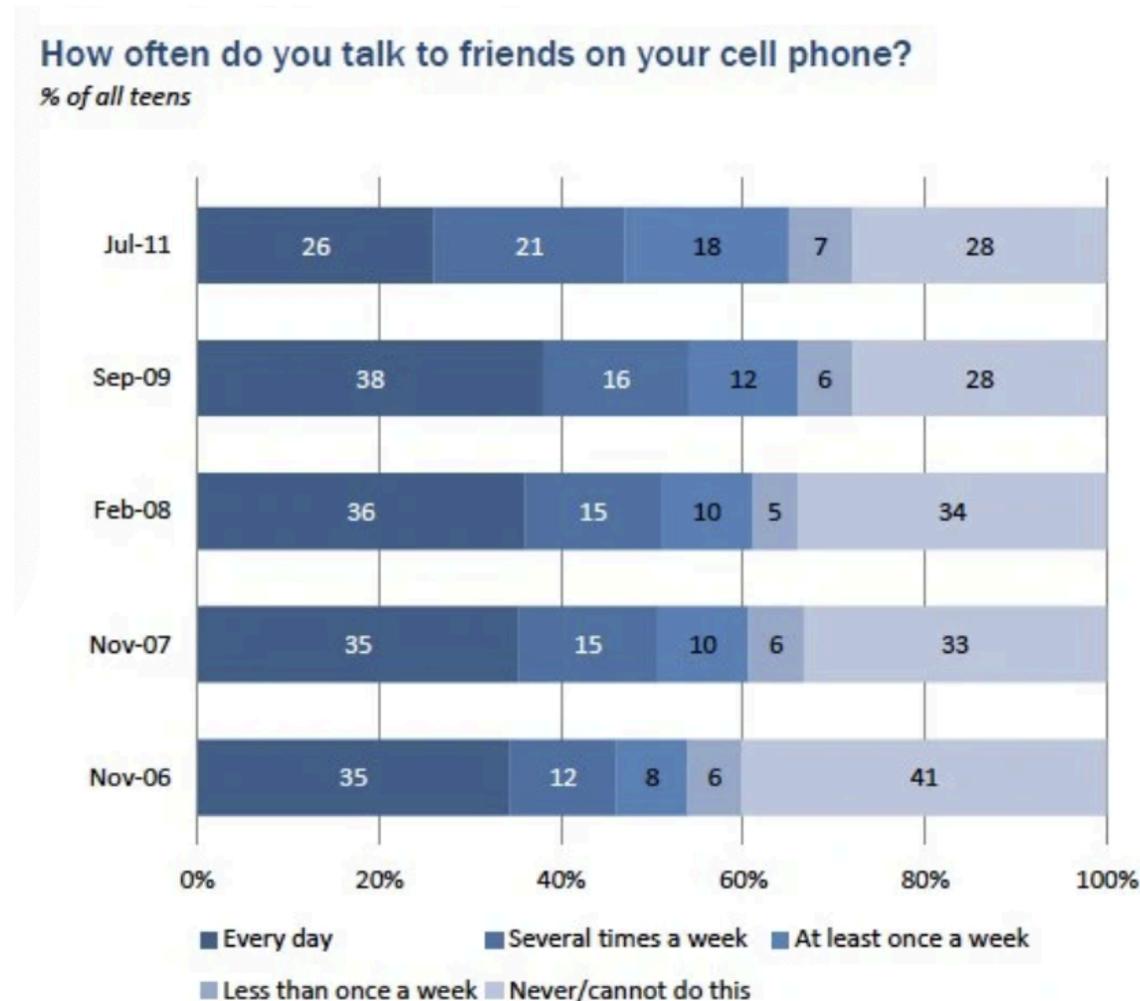
5.1.3.3 [What teens do with their phones \(2012\)](#). *Pew Research Center: Internet, Science & Tech.*

EXCERPT: The median number of texts (i.e. the midpoint user in our sample) sent on a typical day by teens ages 12-17 rose from 50 in 2009 to 60 in 2011. Much of this increase occurred among older teens 14-17, who went from a median of 60 texts a day to a median of 100 two years later. Boys also had a slightly larger increase in the median number of texts sent or received each day moving from 30 texts to 50 texts on a

typical day. Older girls remain the most enthusiastic texters, with a median of 100 texts a day in 2011, compared with 50 for boys the same age.

And while we see no growth in the median number of texts among white youth (flat at 50), black teens saw substantial increases, moving from a median of 60 to a median of 80 texts a day. Hispanic youth also send and receive very large numbers of texts with a median of 100 texts sent and received each day.

FIGURE:



Source: The Pew Research Center's Internet & American Life Project, April 19 – July 14, 2011 Parent/Teen Survey. n=799 teens 12-17 and a parent or guardian. Interviews were conducted in English and Spanish, by landline and cell phone.

5.1.3.4 [Vaterlaus, Barnett, Roche, & Young \(2016\)](#). “Snapchat is more personal”: An exploratory study on Snapchat behaviors and young adult interpersonal relationships. *Computers in Human Behavior*.

ABSTRACT: Snapchat is a social media platform that allows users to send images, videos, and text with a specified amount of time for the receiver(s) to view the content before it becomes permanently inaccessible to the receiver. Using focus group methodology and in-depth interviews, the current study sought to understand young adult (18–23 years old; $n = 34$) perceptions of how Snapchat behaviors influenced their interpersonal relationships (family, friends, and romantic). Young adults indicated that Snapchat served as a double-edged sword—a communication modality that could lead to relational challenges, but also facilitate more congruent communication within young adult interpersonal relationships.

EXCERPT: The young adults ranged from sending zero to 70 snaps per day ($m = 13$ snaps per day). But sample size of 32.

5.1.3.5 [Blodget \(2013\)](#). The Most Active Snapchat Users Get Hundreds Of “Snaps” A Day. *Business Insider*.

EXCEPRT: A Snapchat insider tells us that the most active Snapchat users get “hundreds” of Snaps per day. When asked for a more refined number, the insider suggested that ~150 might be a good approximation.* The average active Snapchat user, meanwhile, the insider estimates, gets 20-50 Snaps per day. The average active user (teenagers), the insider says, now gets more “Snaps” than texts.

...Now, remember that one Snap can be sent to many people, so the average number of Snaps sent is likely lower than this. Also, as with any average usage number like this, the average is skewed by super-heavy users.”

//

NOTES FROM ZACH:

If you have your ringer off, you get a vibration. You have to set the phone to silent to not get the vibration.

1) If you are on vibrate, you get a buzz every time a text comes in. And this includes group texts (which drive me mad). You get a notification for every text in the group chat. This could be HUNDREDS in a matter of a few hours. *That is the default setting; You can always change it to mute the group chat.*

2) Same deal with whatsapp. You get buzzed for every text, It is the default setting.

3) In terms of other apps, you often have the option to choose whether you want or don't want push-notifications. So, Uber, for example, will send a random text every day about some deal. This also will buzz you (if you don't turn it off). And we have dozens of apps on our phones. You can imagine how that can quickly build up. Its like getting spammy emails all day, but buzz notifications instead. But again, that is if you accept the push-notifications and don't change your settings.

4) You can customize notification settings on all the social media apps. But you do get a notification for every snapchat sent to you. By default, Instagram will alert you about anything that mentions you.

5) Dating apps too (notifications for every message)

[What are we missing?]

5.1.4 ILLUSTRATIONS

5.1.3.1

https://www.reddit.com/r/Discussion/comments/wxz72n/deleting_tiktok_for_my_mental_health_and_wellbeing/

EXCERPT: 5) Due to this emotional Rollercoaster of an app, we actually use so much energy because our brain is confused and tired. That by the time we turn it off, we are much too tired to mindfully be present with the ones in our lives. It will ruin relationships with people. Next time you use it pay attention to how tired you feel after you exit the app.

5.1.3.2

https://www.reddit.com/r/nosurf/comments/o1bccj/social_media_is_ruining_my_life/

Don't know how to explain it, but social media is mentally draining me. Whenever I scroll through acquaintances, old classmates, colleagues' posts and see how they are enjoying their life and how happy they are, I just feel really... empty? Inside.

https://en.wikipedia.org/wiki/Phantom_vibration_syndrome

[What are we missing?]

5.2 FLOW AND DEPTH

5.2.1 EVIDENCE AND ESSAYS SHOWING HARMS

5.2.1.1 [Marty-Dugas, & Smilek \(2020\)](#). The relations between smartphone use, mood, and flow experience. *Personality and Individual Differences*.

ABSTRACT: In two large samples (Sample 1, n = 2088; Sample 2, n = 1501), we examined how two types of smartphone use (i.e. general and absent-minded smartphone use) relate to a variety of outcomes, both negative (i.e. depression, anxiety, stress, negative affect) and positive (i.e. positive affect and flow). To assess the frequency of both types of smartphone use, affective experience, and the experience of flow, participants completed a number of questionnaires as part of a mass-screening survey. **In a series of regressions, absent-minded smartphone use emerged as a unique positive predictor of negative outcomes (i.e. depression, anxiety, stress, and negative affect) and a negative unique predictor of positive outcomes (i.e. positive affect and flow), while the corresponding relations with general smartphone use were in the opposite directions.** These results suggest that smartphone use is not a unitary construct and that the relation between smartphone use and well-being depends critically on the type of smartphone use being measured.

5.2.1.2 [Lavoie, & Zheng \(2023\)](#). Smartphone use, flow and wellbeing: A case of Jekyll and Hyde. *Computers in Human Behavior*.

ABSTRACT: This research advances our understanding of the nuanced relationship between [smartphone](#) use and wellbeing. Two studies reveal new ways in which [smartphone](#) use can be positively related to wellbeing and they also explain why those same smartphone functions can be harmful for other users. We juxtapose two different forms of smartphone use – [social media applications](#) ‘apps’ and productivity-related apps (e.g. email, notes). Our results demonstrate that both forms of smartphone use can be positively related to wellbeing, but it depends on the age of the user. **Time spent on productivity apps was positively related to wellbeing amongst Generation Z (<24 years old) but had a non-linear, cubic relationship for older participants, becoming negative after a moderate amount of use. The opposite was the case for time spent on social media; it had a negative relationship with wellbeing amongst Generation Z,** but a positive one amongst older users. **Our research reveals that flow is the underlying mechanism driving the nuanced relationship between**

smartphone use and wellbeing. In particular, the determining factor was whether screen time elicited or thwarted the fluency aspect of flow, which is an effortless feeling of full control as one demonstrates mastery.

5.2.1.3 [Leung \(2020\)](#). Exploring the relationship between smartphone activities, flow experience, and boredom in free time. *Computers in Human Behavior*.

ABSTRACT: The goal of this study is to investigate how flow experience and diverse [smartphone](#) activities play a role in influencing people's perceived boredom during free time. Through a telephone survey, data were gathered from a [probability sample](#) of 653 [smartphone](#) users. Results indicate that the more people who engage in pleasure-seeking, short-lived, and diversionary hedonic activities, the stronger the feeling that their physical involvement is lacking. Eudaemonic activities, such as information seeking, significantly predicted a lack of meaningful involvement, while utilities significantly predicted a perceived slowness of time and lack of mental involvement. **Findings also revealed that people achieve flow state when they use a smartphone for entertainment, information seeking, and [sociability](#), especially when they feel bored, sense a lack of meaningful involvement, and want their free time to last.** Furthermore, the interaction effects found in the study provide a more nuanced view about the ways in which eudaemonic smartphone activities (especially for information seeking and sociability) can interact with flow experience to regulate perceived boredom in free time. **This study suggests that app designers should recognize the role of newly developed hedonic and eudaemonic functions of the smartphone which may significantly alleviate perceived boredom in free time.**

5.2.1.4 [Pearson, Young, Shank, & Neighbors \(2021\)](#). Flow mediates the relationship between problematic smartphone use and satisfaction with life among college students. *Journal of American College Health*.

ABSTRACT: Smartphones, while useful, can also function as a source of distraction from daily life and may reduce life satisfaction by inhibiting concentration and interrupting attention to ongoing tasks, thoughts, and social interactions. Objectives: The current study tested whether interruptions in flow mediate associations between problematic smartphone use (PSU) and life satisfaction among college students. PARTICIPANTS: Two hundred and nine college student smartphone users screened in to the study. METHODS: 188 individuals (90%) completed baseline and 158 individuals (76%) completed one week of Ecological Momentary Assessment surveys and a one-week follow-up survey.

RESULTS: **Flow mediates the relationship between PSU and satisfaction with life such that PSU was negatively associated with flow, flow was positively associated with satisfaction with life, and the indirect effect of PSU on satisfaction with life through flow was significant and negative.**

CONCLUSION: These findings suggest that the lack of flow college students experience due to PSU contributes to lower life satisfaction.

[NOTES: --my students: all addicted; they think it normal to allow each new app to have some of their limited attention, every day.

--newport: According to Gallagher, decades of research contradict this understanding. Our brains instead construct our worldview based on what we pay attention to... Gallagher summarizes: "Who you are, what you think, feel, and do, what you love—is the sum of what you focus on." [and if you focus on SM...]

--newport: -- "The best moments usually occur when a person's body or mind is stretched to its limits in a voluntary effort to accomplish something difficult and worthwhile." Csikszentmihalyi calls this mental state flow... Human beings, it seems, are at their best when immersed deeply in something challenging.

--A deep life is a good life. [many seem shallow; not present; have not done anything, always supervised, have not thought anything]]

[What are we missing?]

5.2.2 EVIDENCE AND ESSAYS SHOWING BENEFITS OR NO HARMS

[What are we missing?]

5.2.3 ILLUSTRATIONS

https://www.reddit.com/r/nosurf/comments/wp95zj/reading_long_difficult_books_will_change_your_life/

Reading Long, Difficult Books Will Change Your Life

...

I'm not saying people need to read this book. **What I'm saying is, I find that the deeper you go on a subject, the more the noise and tribalism magically vanishes.** It no longer feels like everyone everywhere has an off the cuff opinion. **You will find**

yourself in a much quieter and emptier space, with a much smaller community of people who are ready to grapple with things which are not simple. And by the way, the longer the book is, the more likely you can find something in it somewhere you object to or disagree with, or just don't understand. Let it happen. Let the difficulty of the subject flow through you. Observe that you are not yet sure how you feel about something, and rest in knowing that you will not find a clear answer in the next five minutes. Know that it is not necessary to form an opinion before you have fully digested the material.

When you cut back on surfing the net, it is well and good to get into gardening or whatever. But for you thinkers out there, try reading a nonfiction book big enough to be used as a weapon, written by a boring old person who has studied that subject their entire life. Read a book that is somebody's magnum opus, the culmination of their life's work. If it's about big ideas like society or philosophy or religion, read something at least 10 years old to get out of the overton window you live in.

People have been talking about this stuff long before funny and attractive millennial / zoomer youtubers came along to give their hot takes and ten minute summaries and memes. Part of what's helping me kick my YouTube addiction is, it feels like I can barely stand how basic the level of discourse is anymore. I crave something that takes hours to understand, layer upon layer.

[What are we missing?]

5.3 MEMORY

5.3.1 EVIDENCE AND ESSAYS SHOWING HARMS

5.3.1.1 [Sharifian, & Zahodne \(2020\)](#). Social Media Bytes: Daily Associations Between Social Media Use and Everyday Memory Failures Across the Adult Life Span. *The Journals of Gerontology*.

ABSTRACT: OBJECTIVES: The prevalence of social media use in daily life is increasing; however, little is known about its cognitive costs and/or benefits. Social media use may help to offload memory to an external resource as well as to facilitate social relations, which could bolster or hinder everyday memory. Further, the relationship between social media use and memory may be moderated by age such that

associations—whether positive or negative—could be exacerbated among older adults due to age-related declines.

METHODS: Using an 8-day daily diary study from the Midlife in the United States Refresher cohort (n = 782, 25–75 years), multilevel models examined the impact of daily social media use, age, and their interaction on same-day and next-day memory failures.

RESULTS: The concurrent model revealed that **on days when social media use was high, individuals reported more memory failures. The lagged model further revealed that higher previous-day social media use was associated with more memory failures on the subsequent day, controlling for previous-day memory failures. These effects were not moderated by age. Post hoc analyses revealed no evidence of reverse-causation as previous-day memory failures did not predict next-day social media use.**

CONCLUSIONS: Although past research has consistently shown that social engagement is a protective resource for memory, social media use may be a risk factor for memory failures for adults of any age. These findings highlight the growing importance of understanding the implications of social media use.

5.3.1.2 [Tamir, Templeton, Ward, & Zaki \(2018\)](#). Media usage diminishes memory for experiences. *Journal of Experimental Social Psychology*.

ABSTRACT: People increasingly use social media to record and share their experiences, but it is unclear whether or how social media use changes those experiences. Here we present both naturalistic and controlled studies in which participants engage in an experience while using media to record or share their experiences with others, or not engaging with media. We collected objective measures of participants' experiences (scores on a surprise memory test) as well as subjective measures of participants' experiences (self-reports about their engagement and enjoyment). **Across three studies, participants without media consistently remembered their experience more precisely than participants who used media. There is no conclusive evidence that media use impacted subjective measures of experience. Together, these findings suggest that using media may prevent people from remembering the very events they are attempting to preserve.**

5.3.1.3 [Neophytou, Manwell, & Eikelboom \(2021\)](#). Effects of Excessive Screen Time on Neurodevelopment, Learning, Memory, Mental Health, and Neurodegeneration: A Scoping Review. *International Journal of Mental Health and Addiction*.

ABSTRACT: Evidence suggests that **chronic sensory stimulation via excessive exposure to screen time may affect brain development in negative ways. Excessive**

smartphone use may increase the risk of cognitive, behavioral, and emotional disorders in adolescents and young adults that also has the potential to increase the risk of early onset dementia in late adulthood. This scoping review assessed theoretical and empirical evidence for the relationships between excessive screen time and (i) neurodevelopment, (ii) learning and memory, (iii) mental health, (iv) substance use disorders, and (v) neurodegeneration. Using Halas et al.'s (BMJ Open, 5(1), 1–6; 2015) five-stage scoping review methodology, we systematically identified articles meeting the following inclusion criteria: published in English between January 1999–July 2019; human or animal subjects; primary and secondary sources including original research, systematic reviews, meta-analyses, scoping reviews, and narrative reviews. Primary search terms focused on “smartphone,” “mental health,” “substance use,” “neurodevelopment,” and “neurodegeneration”; secondary search terms focused on “social media,” “anxiety,” “cannabis,” and “dementia”. We analyzed 44 articles across 16 countries in this review. Each article corresponded to one of four research questions investigating screen time and mental health (n = 13), mental health and substance use (n = 8), chronic stress and development (n = 14), and chronic stress and neurodegeneration (n = 9). **Overall increased screen time is associated with negative outcomes such as lowered self-esteem, increased incidence and severity of mental health issues and addictions, slowed learning and acquisition, and an increased risk of premature cognitive decline.** Future directions to better inform public policy should expand research methodologies and explore the prolonged effects of excessive screen time on cognition and mental health in diverse populations and contexts.

5.3.1.4 [Suggate, & Martzog \(2020\)](#). Screen-time influences children’s mental imagery performance. *Developmental Science*.

ABSTRACT: Mental imagery is a foundational human faculty that depends on active image construction and sensorimotor experiences. However, children now spend a significant proportion of their day engaged with screen-media, which (a) provide them with ready-made mental images, and (b) constitute a sensory narrowing whereby input is typically focused on the visual and auditory modalities. Accordingly, we test the idea that screen-time influences the development of children's mental imagery with a focus on mental image generation and inspection from the visual and haptic domains. In a longitudinal cross-lagged panel design, children (n = 266) aged between 3 and 9 years were tested at two points in time, 10 months apart. Measures of screen-time and mental imagery were employed, alongside a host of control variables including working memory, vocabulary, demographics, device ownership, and age of exposure to screen-media. Findings indicate a statistically significant path from screen-time at time 1 to mental imagery at time 2, above and beyond the influence of the control variables.

These unique findings are discussed in terms of the influence of screen-time on mental imagery.

Research Highlights:

- Mental imagery lies at the heart of mental life and requires both active image generation and a broad range of sensorimotor experiences.
- Screen media provide children with ready-made and visually dominated mental images, hence may reduce multimodal mental imagery.
- Using a longitudinal cross-lagged design with 266 children we tested the effect of screen-time on mental imagery, controlling for a host of variables.
- **Greater screen-time linked to reduced mental imagery in children.**

5.3.1.5 [Veraksa, Veraksa, Gavrilova, Bukhalenkova, Oshchepkova, & Chursina \(2021\).](#)

Short- and Long-Term Effects of Passive and Active Screen Time on Young Children's Phonological Memory. *Frontiers in Education*.

ABSTRACT: The purpose of this study was to fill this gap by examining the relationship between phonological memory in preschool children and their passive (watching TV) and active screen time with using of Smart Screen Technologies such as tablets and phones with a touch screen interface. Study was conducted in two stages: in Time 1, the association between children's phonological memory, passive and active screen time and family factors was examined; in Time 2 (1 year later) the impact of passive and active screen time on a child's individual progress in phonological memory development was evaluated. The study enrolled 122 preschool children aged 5–6 years ($M = 5.72$, $SD = 0.33$); boys (54.9%). Information on each child's average daily passive and active screen time was obtained from a survey with the mother. The survey provided information on how much time each child spent on a typical day with passive ("traditional") and active (interactive) use of digital devices. For family factors, we included maternal highest educational qualification, family's financial situation. **For children's characteristics, age, gender and non-verbal fluid intelligence were included. The results indicate that time spent passively with digital devices (watching TV) is negatively related to a child's ability to process verbal information. In contrast, the interactive time the child spent with Smart Screen Technologies is not significant and does not pose a threat to the development of phonological memory in preschool age. The study also showed that passive and active use of digital devices has no long-term impact on children's phonological memory development progress over a year.** The implications are that use of Smart Screen Technologies, which implies a higher degree of interactivity, is not associated with either short- or long-term negative effects on phonological memory development in

preschool age, contrary to passive screen time exposure. The results can be applied in the elaboration of principles and programs on the use of digital devices for the entertainment and education of preschool children.

5.3.1.6 [Zhang... & Carson \(2022\)](#). Associations between screen time and cognitive development in preschoolers. *Paediatrics & Child Health*.

ABSTRACT: OBJECTIVES: To examine the cross-sectional associations between screen time and cognitive development in preschoolers.

METHODS: Participants were 97 preschoolers (36 to 60 months) in Alberta and Ontario, Canada in the supporting Healthy physical AcTive Childcare setting (HATCH) study. The time that children spent watching television, videos or DVDs (television time) or playing video or computer games (video game time) on a television, computer, or portable device was assessed using a parental questionnaire. Television time and video game time were summed to calculate total screen time. Adherence to the screen time recommendation (≤ 1 hour/day) of the Canadian 24-Hour Movement Guidelines was calculated. Expressive vocabulary and working memory were assessed using the Early Years Toolbox. Due to the distribution of working memory, it was categorized as a binary variable based on the median score. The associations between screen time and cognitive development were examined using mixed models (expressive vocabulary) or generalized mixed models (working memory).

RESULTS: **Screen time was not associated with expressive vocabulary.**

Preschoolers who had higher total screen time were less likely to have better working memory (OR=0.52; 95%CI:0.31, 0.88), despite the null associations for television time (P=0.155) and video game time (P=0.079). Preschoolers who met the screen time recommendation were more likely to have higher working memory capacity (OR=3.48; 95%CI:1.06, 11.47), compared to those who did not meet the recommendation.

CONCLUSION: **Limiting total screen time to no more than one hour per day may facilitate working memory development in preschoolers. Screen time may be unrelated to expressive language development in this age group.**

Also see section [5.5](#)

[What are we missing?]

5.3.2 EVIDENCE AND ESSAYS SHOWING BENEFITS OR NO HARMS

5.3.2.1 [Soares, de Oliveira, Wehrmeister, Menezes, & Gonçalves \(2021\)](#). Screen time and working memory in adolescents: A longitudinal study. *Journal of Psychiatric Research*.

ABSTRACT: Little is known about the effects of excessive screen time on Working Memory (WM) in adolescents. The aim of this study was to investigate the association between measures of screen time in adolescence and Working Memory. Data from the 1993 Pelotas (Brazil) Birth [Cohort Study](#) were analyzed (N = 3625). Self-reported screen time was collected at ages 11, 15 and 18. Working Memory performance (Digit Span backward score) was examined at age 22. [Multiple linear regression](#) was used to assess the associations between three screen time measures (television, video game and computer time) for each age and WM at age 22. We also evaluated the direct and indirect effect by mediation analysis, using the intelligence quotient (IQ) at 18 years as mediator. **In men, television and video game time at 11 years and computer at ages 11 and 15 years had a positive effect on WM. Also, these effects were mediated through IQ. In women there was no significant association between screen time measures at ages 11, 15, and 18 and WM.** This study provides new insights about the relationship between television, videogame, and computer time with WM in adolescents, by exploring the paths of these associations and considering the important mediating role of IQ.

[What are we missing?]

5.3.3 ILLUSTRATIONS

[What are we missing?]

5.4 INTELLIGENCE

5.4.1 EVIDENCE AND ESSAYS SHOWING HARMS

5.4.1.1 [Hutton, Dudley, Horowitz-Kraus, DeWitt, & Holland \(2020\)](#). Associations Between Screen-Based Media Use and Brain White Matter Integrity in Preschool-Aged Children. *JAMA Pediatrics*.

ABSTRACT: IMPORTANCE: The American Academy of Pediatrics (AAP) recommends limits on screen-based media use, citing its cognitive-behavioral risks. Screen use by young children is prevalent and increasing, although its implications for brain development are unknown.

OBJECTIVE: To explore the associations between screen-based media use and integrity of brain white matter tracts supporting language and literacy skills in preschool-aged children.

DESIGN, SETTING, AND PARTICIPANTS: This cross-sectional study of healthy children aged 3 to 5 years ($n = 47$) was conducted from August 2017 to November 2018. Participants were recruited at a US children's hospital and community primary care clinics.

EXPOSURES: Children completed cognitive testing followed by diffusion tensor imaging (DTI), and their parent completed a ScreenQ survey.

MAIN OUTCOMES AND MEASURES: ScreenQ is a 15-item measure of screen-based media use reflecting the domains in the AAP recommendations: access to screens, frequency of use, content viewed, and covieing. Higher scores reflect greater use. ScreenQ scores were applied as the independent variable in 3 multiple linear regression models, with scores in 3 standardized assessments as the dependent variable, controlling for child age and household income: Comprehensive Test of Phonological Processing, Second Edition (CTOPP-2; Rapid Object Naming subtest); Expressive Vocabulary Test, Second Edition (EVT-2; expressive language); and Get Ready to Read! (GRTR; emergent literacy skills). The DTI measures included fractional anisotropy (FA) and radial diffusivity (RD), which estimated microstructural organization and myelination of white matter tracts. ScreenQ was applied as a factor associated with FA and RD in whole-brain regression analyses, which were then narrowed to 3 left-sided tracts supporting language and emergent literacy abilities.

RESULTS: Of the 69 children recruited, 47 (among whom 27 [57%] were girls, and the mean [SD] age was 54.3 [7.5] months) completed DTI. Mean (SD; range) ScreenQ score was 8.6 (4.8; 1-19) points. Mean (SD; range) CTOPP-2 score was 9.4 (3.3; 2-15) points, EVT-2 score was 113.1 (16.6; 88-144) points, and GRTR score was 19.0 (5.9; 5-25) points. ScreenQ scores were negatively correlated with EVT-2 ($F_{2,43} = 5.14$; $R^2 = 0.19$; $P < .01$), CTOPP-2 ($F_{2,35} = 6.64$; $R^2 = 0.28$; $P < .01$), and GRTR ($F_{2,44} = 17.08$; $R^2 = 0.44$; $P < .01$) scores, controlling for child age. **Higher ScreenQ scores were correlated with lower FA and higher RD in tracts involved with language, executive function, and emergent literacy abilities ($P < .05$, familywise error-corrected), controlling for child age and household income.**

CONCLUSIONS: **This study found an association between increased screen-based media use, compared with the AAP guidelines, and lower microstructural integrity of brain white matter tracts supporting language and**

emergent literacy skills in prekindergarten children. The findings suggest further study is needed, particularly during the rapid early stages of brain development.

EXCERPT: Preschoolers who use screen-based media for more than 1 hour each day have been shown to have significantly less development in core brain regions involved in language and literacy.

5.4.1.2 [Madigan, Browne, Racine, Mori, & Tough \(2019\)](#). 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, SETTINGS, 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 OUTCOMES 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, 1227 (50.2%) 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 , -0.06 ; 95% CI, -0.10 to -0.01) and 60 months (β , -0.08 ; 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.

5.4.1.3 [Shellenbarger \(2016\)](#). Most Students Don't Know When News Is Fake, Stanford Study Finds. *Wall Street Journal*.

EXCERPT: Some 82% of middle-schoolers couldn't distinguish between an ad labeled "sponsored content" and a real news story on a website, according to a [Stanford University study of 7,804 students](#) from middle school through college. The study, set for release Tuesday, is the biggest so far on how teens evaluate information they find online. Many students judged the credibility of newsy tweets based on how much detail they contained or whether a large photo was attached, rather than on the source.

5.4.1.4 [Howley \(2021\)](#). Gina. Rosanne. Guy. What do you do the day after you storm the Capitol? *Intelligencer*.

EXCERPT: "Freedom isn't free is a true thing the right used to say, and the costs of freedom of speech are real costs, borne, in part, by those unskilled at sifting fact from fantasy: the people who join MLMs, who become Scientologists, who lie awake in bed at night worrying over small children drained of adrenochrome. **To spear the fact in the sea of grift is not an act of intelligence, exactly, but a kind of sensibility, a certain instinct for grasping the structure of the social world.**"

[NOTE from JH: Spending time around viral online media is terrible for developing that "sensibility"]

5.4.1.5 [Common Sense Media \(2020\)](#). Teens and the News: The Influencers, Celebrities, and Platforms They Say Matter Most.

EXCERPT: The rise of social media personalities and influencers as part of the news media landscape has given young people new ways to access information, understand biases, and think critically about how the news affects their lives (or doesn't). This report surveyed a nationally representative group of 804 kids age 13 to 18 in January 2020, asking how they get their news, how much they trust different news sources, and more. This report is a follow-up to our 2017 study on this topic, News and America's Kids, which asked kids age 10 to 18 similar questions about how they engaged with and understood the news.

...77% of teenagers get their news from social media, with 39% stating that they "often" get news from celebrities, influencers, or personalities, according to a survey of over 800 teens aged 13-18. In the last 3 years, there has been a

significant growth in the percentage of teens using YouTube and Instagram as their top news sources: YouTube use went from 27% to 44% while Instagram as a news source went from 22% to 32%... 30% teens report that they pay “very little attention” to considering the source from which they are getting their news on social media.

5.4.1.6 [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.

EXCERPT: We further hypothesize that the main detrimental effect of disruptive habitual smartphone use is on the ability to exert prolonged cognitive effort in tasks that do not involve smartphones. This ability is required for acquiring domain-specific knowledge and for real-life creativity. These activities call for a continuous investment of mental effort over weeks, months, and years. Any such detrimental effect would not be revealed in studies that measure attention or working memory, as the person can focus over a short term if they know that their abilities are being tested. There are reasons why certain smartphone-related activities might have a more favorable cost–benefit ratio than other tasks. For instance, one benefit of digital technologies is that obtaining novelty is a reward in itself: each novel video or image, text, post, or comment might work as a reward. Social media apps further combine this novelty reward with social rewards, where feedback in the form of likes, shares, and view counts are obtained.

Recent work showed that smartphone social media use is inversely related to striatal dopamine function, a central neural mechanism implicated in habit formation. Compared to smartphone use, cognitive work is inherently costly. The past decades of research have demonstrated that cognitive work is often aversive and that people choose tasks that are less effortful. Therefore, choosing to engage with social media may be rational to the extent that scrolling social media feed might have a more favorable cost–benefit ratio than doing homework (Figure 1). This possibility requires direct study. Second, our ability to focus and exert effort is compromised because ubiquitous access to smartphones means that there is always something new (text messages, news, social media posts, games) to be expected. Furthermore, many

people have push notifications activated, Mental effort is required for learning and real-life creativity...

Which tasks and behaviors are affected if the ability to exert effort is impeded?

Acquiring domain-specific knowledge is a prime example of such behavior. For instance, doing schoolwork in the classroom or at home is difficult when there are rewarding action alternatives available through smartphones and engagement in schoolwork is constantly disrupted by habitual smartphone use.

FIGURE 1:

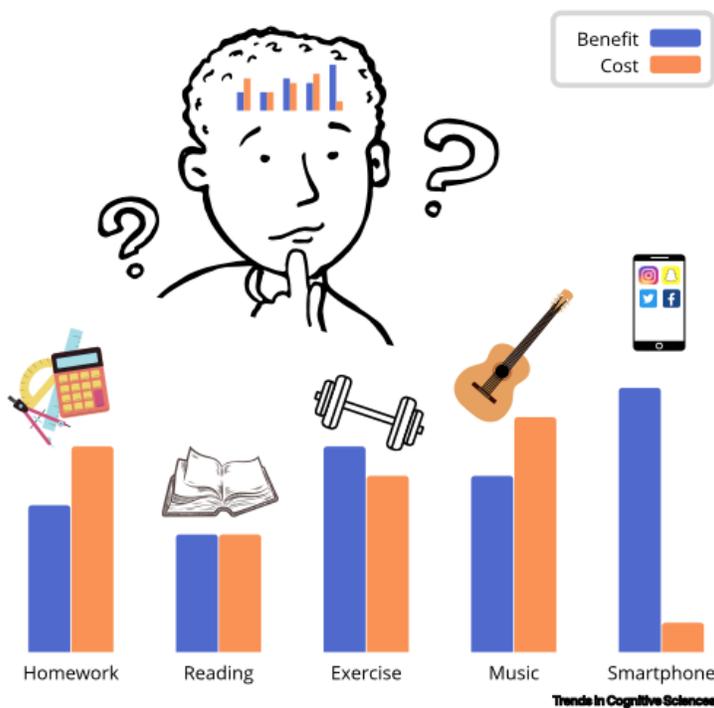


Figure 1. Smartphones habitually bias action selection. Action alternatives are evaluated to select the behavior that presently has the most favorable cost-benefit ratio. One typical cost (orange bars) is mental effort, which is weighed against the benefits (blue bars). The problem with disruptively habitual smartphone use is that it has an abnormally high difference between benefits (e.g., obtaining novelty) and costs (moving the thumb on the screen). Thus, its present cost-benefit ratio outweighs the other alternatives, even though the other alternatives (e.g., doing homework or learning how to play a guitar) might bring more benefits in the long run. The examples and the specific cost and benefit values are only illustrative. Image credits: Canva/Pixabay.

5.4.1.7 Platt, Keyes, McLaughlin, & Kaufman (2019). The Flynn effect for fluid IQ may not generalize to all ages or ability levels: A population-based study of 10,000 US adolescents. *Intelligence*.

ABSTRACT: Generational changes in IQ (the Flynn Effect) have been extensively researched and debated. Within the US, gains of 3 points per decade have been accepted as consistent across age and ability level, suggesting that tests with outdated norms yield spuriously high IQs. However, findings are generally based on small samples, have not been validated across ability levels, and conflict with reverse effects recently identified in Scandinavia and other countries. Using a well-validated measure of fluid intelligence, we investigated the **Flynn Effect by comparing scores normed in 1989 and 2003, among a representative sample of American adolescents ages 13–18 (n = 10,073)**. Additionally, we examined Flynn Effect variation by age, sex, ability level, parental age, and SES. Adjusted mean IQ differences per decade were calculated using generalized linear models. Overall the Flynn Effect was not significant; however, effects varied substantially by age and ability level. **IQs increased 2.3 points at age 13 (95% CI = 2.0, 2.7), but decreased 1.6 points at age 18 (95% CI = -2.1, -1.2). IQs decreased 4.9 points for those with IQ ≤ 70 (95% CI = -4.9, -4.8), but increased 3.5 points among those with IQ ≥ 130 (95% CI = 3.4, 3.6)**. The Flynn Effect was not meaningfully related to other background variables. Using the largest sample of US adolescent IQs to date, **we demonstrate significant heterogeneity in fluid IQ changes over time. Reverse Flynn Effects at age 18 are consistent with previous data, and those with lower ability levels are exhibiting worsening IQ over time.** Findings by age and ability level challenge generalizing IQ trends throughout the general population.

5.4.1.8 [Sparks \(2021\)](#). Young Adolescents' Scores Trended to Historic Lows on National Tests. And That's Before COVID Hit. *Education Week*.

EXCERPT: The NAEP Long-Term Trends study is a separate set of math and reading tests from the better-known main NAEP given every other year. Rather than testing students in particular grades, the trend NAEP uses a stable set of questions from the first administration in the early 1970s and tests a nationwide sample of students at ages 9, 13, and 17.

“Results of the National Assessment of Educational Progress Long-Term Trend study, released this morning, find **math scores in 2020 significantly declined for students at ages 9 and 13 since the test was last given in 2012.**”

“None of these results are impressive; all of the results were concerning, but the math results were particularly daunting, and particularly for 13-year-olds,” said Peggy Carr, the commissioner of the National Center for Education Statistics, which administers

NAEP. “I’ve been reporting these results for years, decades. And I’ve never reported a decline like this.”

“Reading scores for most students stayed flat for both age groups from 2012 to 2020, but they showed 6- and 7-point drops, respectively, for the lowest-performing 10 percent of students at ages 9 and 13.”

“Overall math scores for Black, Hispanic, and white 9-year-olds as well as white 13-year-olds flattened since 2012, while the performance of Black and Hispanic teenagers dropped. That led the math-score gap between Black and white young adolescents to widen from 28 points in 2012 to 35 in 2020.”

“Moreover, while 34 percent of 13-year-olds scored at least 300 out of 500 in math in 2012, only 32 percent of their peers in 2020 did so. This means that nearly two thirds of 13-year-olds could struggle with moderately complex math reasoning and procedures, such as finding the area of a square or gauging a percent a part represents of a whole.

“Among 9-year-olds, only 44 percent achieved at least 250 scale points, 3 percentage points fewer than in 2012. This means fewer of these students, and significantly less than half, could consistently multiply a three-digit number by a single-digit number or use the context of a situation to decide basic probability.”

“Background surveys conducted with the tests show that in spite of wide-scale state and district efforts to introduce algebra in middle school, only a quarter of 13-year-olds have taken algebra, a 9 percentage-point drop since 2012. Only 23 percent of the adolescents had taken at least pre-algebra, compared with 29 percent in 2012, with the rest taking regular math courses. In fact, the share of young teenagers who were taking no math classes at all, while very small, doubled from 1 percent to 2 percent in that time.”

“Similarly, far fewer students in NAEP reported they are reading for pleasure in 2020 versus 2012. The percentage who reported they “never or hardly ever” read for fun jumped from 9 percent in 1984 to 16 percent in 2020 among 9-year-olds, and from 8 percent to 29 percent of 13-year-olds in the same time period.”

5.4.1.9 [Bloomberg \(2022\)](#). Colleges Should Bring Back Testing Requirements.

Bloomberg.

EXCERPT: In the latest dismal signs for students, scores on the [ACT](#) college entrance exam have fallen to the lowest level in 30 years, while fourth- and eighth-grade math and reading scores from the [National Assessment of Educational Progress](#) (often called the nation's report card) show devastating declines. Taken together, these results underscore the urgency of K-12 interventions and the necessity of reinstating testing standards for college applicants.

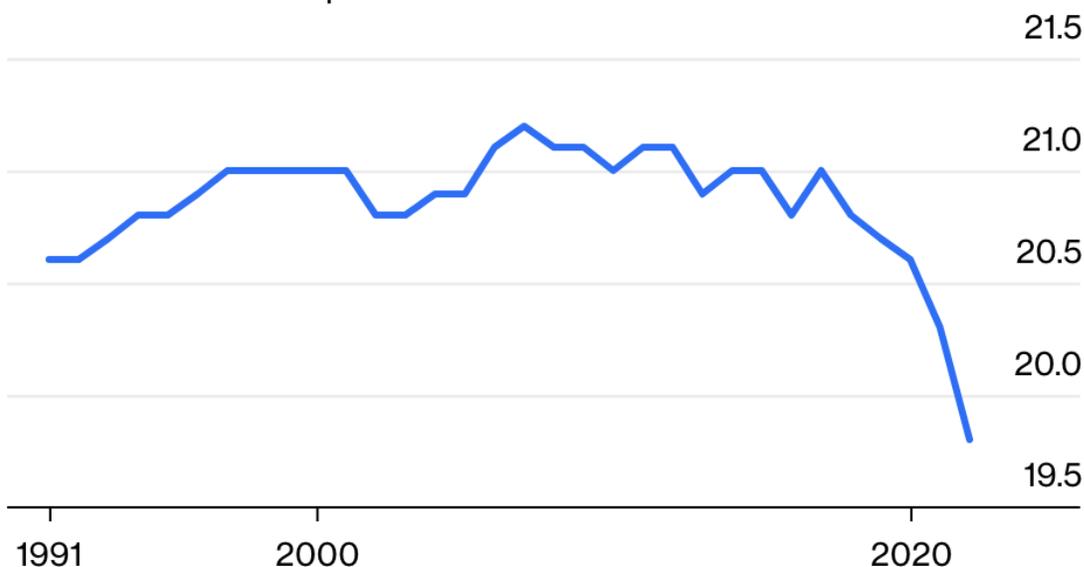
...Average ACT scores have declined every year since 2018, while the share of students failing to meet college readiness standards in any of its four subject areas — English, math, reading and science — has increased by 7 percentage points. With the exception of Asian students, teens of every race perform worse now than they did five years ago.

...This year's NAEP scores show that students in fourth and eighth grades suffered the largest declines ever recorded in math. Only about one-quarter of eighth-graders scored at a proficiency level in math, down from one-third three years ago. The decline in reading scores, while not as dramatic, was no less troubling.

Plummeting Performance

Scores on the ACT college entrance exam have fallen to the lowest level in 30 years

— National ACT composite score



Source: National Center for Education Statistics

5.4.1.10 [Beatty, & Egan \(2020\)](#). The Role of Screen Time and Screen Activity in the Nonverbal Reasoning of 5-Year-Olds: Cross-Sectional Findings from a Large Birth Cohort Study. *Cyberpsychology, Behavior and Social Networking*.

ABSTRACT: Family and home environment factors have been outlined in previous literature as important variables that affect early reasoning development. However, little research has focused on the association between screen use in the home environment and nonverbal reasoning ability. The aim of this cross-sectional study is to examine the role of both screen time and various screen activities (e.g., television, video, or educational games) in nonverbal reasoning ability in 9,001 5-year-old children using a large birth cohort study (Growing Up in Ireland). Interviews conducted with parents related to the children's screen use and various family factors, while reasoning ability was measured using a standardized task (Picture Similarities Task, British Ability Scales II). A hierarchical multiple regression examined the role of screen use in nonverbal reasoning, while also statistically controlling for family factors such as parental education and employment status. Screen use variables made a significant contribution to the regression model, even after family factors were accounted for, although the effect sizes were very small. **Playing educational games, video games, or engaging in over three hours screen use per day were all significant predictors of nonverbal reasoning scores in the final adjusted model.** The results of this study suggest that screen use may play a small role in the development of nonverbal reasoning in young children. The findings highlight the need for further studies in this area and may have implications for current debates in screen time research.

...It is important to note that while the findings show effects of screen use on nonverbal reasoning scores, that the effects are very small. While the screen use variables remained significant in the final regression model, the combined family factors played a larger role in predicting nonverbal reasoning scores overall, accounting for more than twice the amount of variance as the screen use variables. While the family factors have more of an impact on reasoning scores when combined, they may also be less amenable to change in comparison to screen use, as parents may be in a position to limit screen time or encourage their child toward particular screen activities

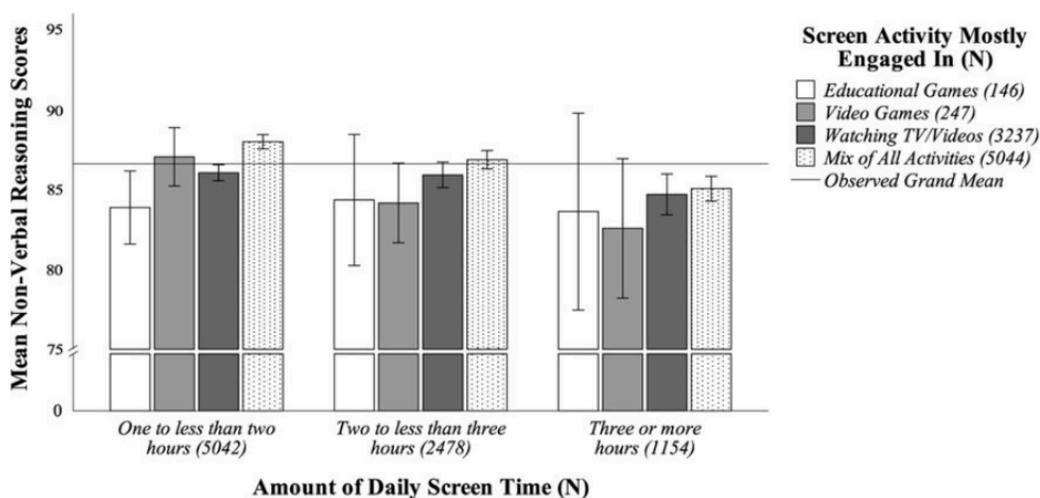


FIG. 1. Mean nonverbal reasoning scores for screen time and screen activity in 5-year-old children (error bars represent 95% CI).

5.4.1.11 [Onyeaka... & Torous \(2022\)](#). Excessive screen time behaviors and cognitive difficulties among adolescents in the United States: Results from the 2017 and 2019 national youth risk behavior survey. *Psychiatry Research*.

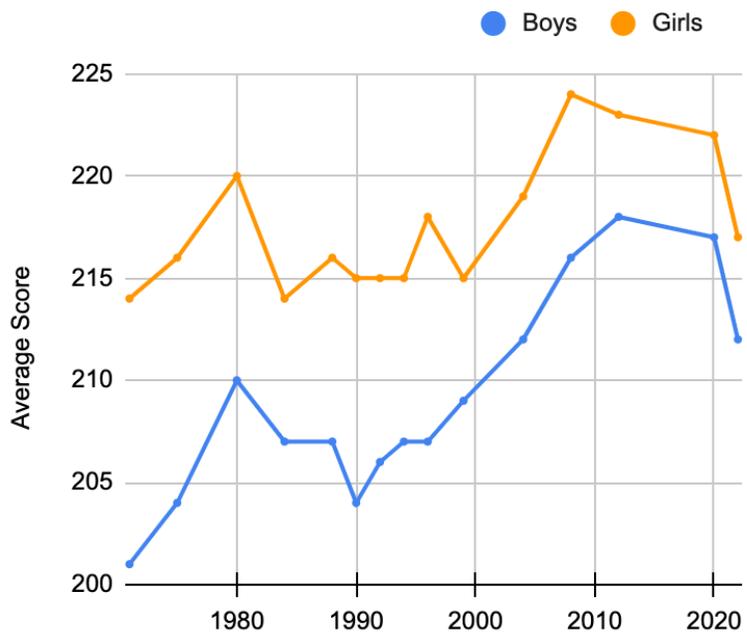
ABSTRACT: BACKGROUND: The widespread use of digital media by young people has generated speculations that their excessive use may have deleterious cognitive effects. Previous studies examining the association between screen time and [cognitive deficits](#) in youth have yielded mixed conclusions. We study this association using a nationally representative sample of school going adolescents in the United States. **METHODS:** We queried data from the 2017 and 2019 [Youth Risk Behavior Survey](#). An analytic sample of 17,076 adolescents was analyzed using binary [logistic regression](#). Outcome variable was cognitive difficulties (difficulty in concentrating, remembering, or making decisions), and the explanatory variable was excessive screen-time behaviors. **RESULTS:** **Of the 17,076 adolescents, about one in three (34.1%) had cognitive difficulties, and 45% of adolescents engaged in excessive screen-time behaviors on an average school day. After adjusting for covariates, the odds were 1.28 times higher for adolescents who engaged in excessive screen-time behaviors to report serious cognitive difficulties compared to adolescents who did not engage in excessive screen-time behaviors (AOR = 1.28, $p < .001$, 95% CI = 1.18–1.40).** **CONCLUSION:** Study results support the association between excessive screen behaviors and cognitive difficulties in adolescence. Findings of this study are discussed with implications for practice and research.

5.4.1.12 [Department of Education, Institute of Education Sciences](#), National Center for Education Statistics, National Assessment of Educational Progress (NAEP), various years, 1971–2020 Long-Term Trend Reading and Mathematics Assessments. Graphs created by Zach Rausch (see [spreadsheet](#)).

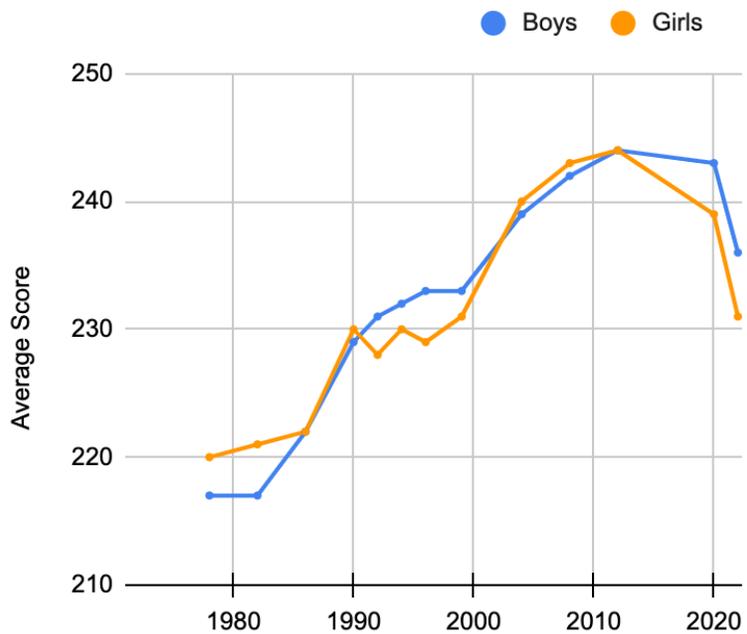
EXCERPT: Since the 1970s, the National Assessment of Educational Progress (NAEP) has monitored student performance in mathematics and reading through long-term trend (LTT) assessments across three age levels (9-, 13-, and 17-year-old students). These assessments measure students' educational progress over long time periods to look for and monitor trends in performance. NCES decided to administer the LTT assessment for age 9 students—the last NAEP assessment given before the pandemic in March 2020—after two years rather than four years in order to provide pre and postpandemic results for age 9 students in reading and mathematics. **The assessments were administered from January to March in 2020 and 2022, respectively. About 7,400 age 9 students from 410 schools participated in each subject in 2022.** The focus of the 2022 Age 9 Long-Term Trends Reading and Mathematics Highlights Report is on the comparison of age 9 students (typically in grade 4) between 2020 and 2022. A report summarizing results across the entire trend period will be released in the spring of 2023, along with results for 13-year-old students.

FIGURES:

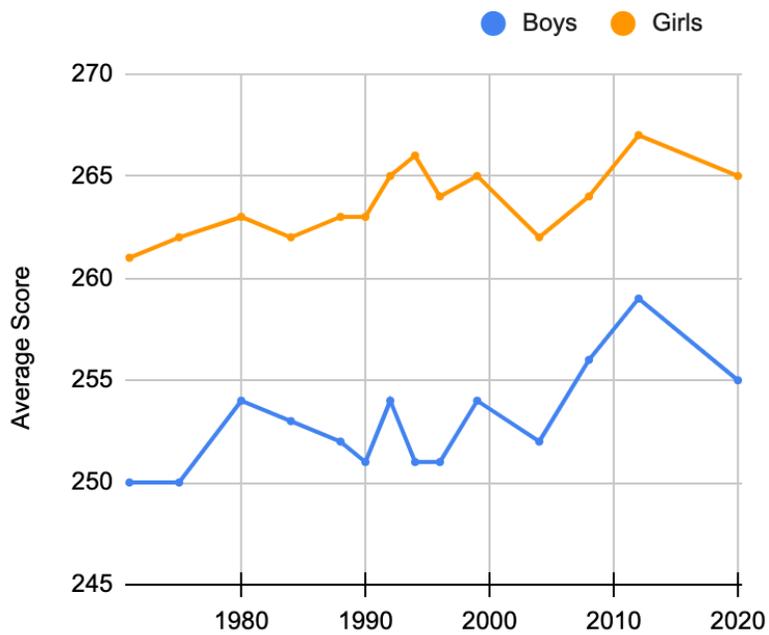
NAEPS Reading, Age 9



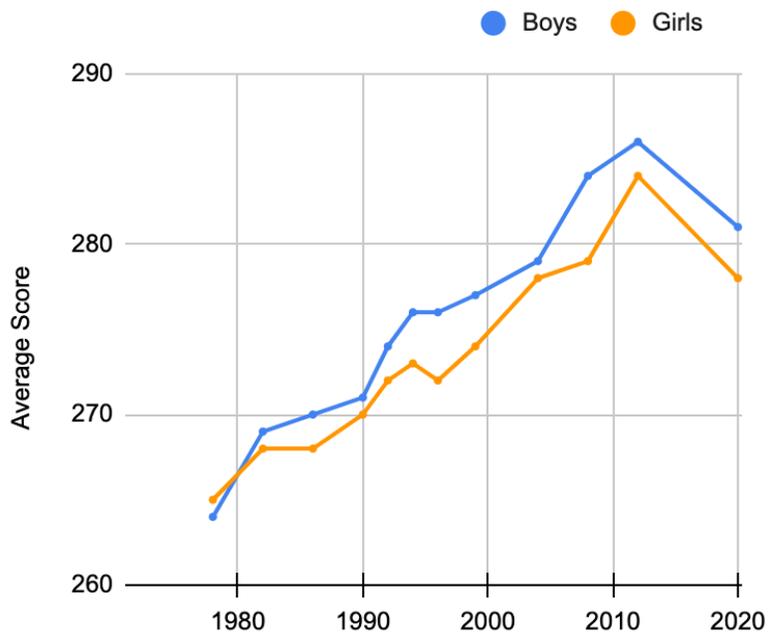
NAEPS Math, Age 9



NAEPS Reading, Age 13



NAEPS Math, Age 13



5.4.1.13 [Meisenberg, & Lynn \(2023\)](#). Ongoing trends of human intelligence.
Intelligence.

ABSTRACT: The aim of the study is to estimate the most recent trends of intelligence world-wide. **We find that the most recent studies report mainly positive Flynn effects in economically less developed countries, but trivial and frequently negative Flynn effects in the economically most advanced countries.** This is confirmed by an analysis of 48 countries in the 2000–2018 PISA tests, showing that **high pre-existing IQ and school achievement are the best predictors of declining test scores.** IQ gaps between countries are still large (e.g., 19 IQ points in PISA between East Asia and South Asia) but are diminishing world-wide. We predict that these trends, observed in adolescents today, will reduce cognitive gaps between the working-age populations of countries and world regions during coming decades. As is predicted by the well-established relationship between intelligence and economic growth, there is already evidence that the ongoing cognitive convergence is paralleled by global economic convergence. These developments raise questions as to how long this cognitive and economic convergence will continue, whether it will eliminate cognitive and economic gaps between countries entirely, and whether a condition with high levels of cognitive ability and economic prosperity is sustainable long-term.

EXCERPT: The empirical relationship between intelligence and economic growth is well established (Francis & Kirkegaard, 2022; Jones & Schneider, 2006; Lynn & Vanhanen, 2002; Meisenberg, 2012, 2014a, 2014b; Weede & Kämpf, 2002). **There is also evidence that rising intelligence in countries is often followed by periods of economic growth (Rindermann & Becker, 2018), indicating that rising intelligence is not only a consequence but a cause of economic growth.** This implies that today and in the near future, we can expect faster economic growth in developing countries and emerging economies than in the post-industrial nations of Europe, North America, and East Asia. Economic convergence has indeed been observed to occur since the fourth quarter of the 20th century (Grinin & Korotayev, 2015), and it has been postulated to be caused by the expansion of educational systems in less developed countries. Giroux, Eloundou-Enyegue, Sipple, and Tenikue (2020) attribute this economic convergence to improvements of educational quality rather than quantity. This comes close to our position that rising intelligence, as the foundation for economically useful skills or “human capital”, is the important link. The “Great Divergence” (Pomeranz, 2000) that began with the Industrial Revolution extended beyond the economic fortunes of nations to the intellectual level of the populations, as described for multiple industrialized nations by Flynn.

Based on these well-established facts, we can predict that environmental inputs, such as improved nutrition and intensified educational efforts, will encounter diminishing returns as these factors cannot be improved indefinitely. For example, every year of schooling adds between 1 and 5 points to the IQ of children and adolescents (Ritchie & Tucker-Drob, 2018), but length of schooling cannot be extended much further when every youth already goes to school for 12, 16, or more years.

The predicted outcome is a saturation curve where intelligence rises as long as economic development translates into improved quality and quantity of schooling, elimination of childhood malnutrition, and other improvements that stimulate intellectual development. Eventually, however, Flynn effects will end when the possibilities of further environmental improvements have been exhausted while the genetic limits of human intelligence have been reached. A culmination point is reached at which the artificially boosted intelligence can only decline when the prevailing near-optimal conditions are no longer maintained.

The apparent end of positive Flynn effects in some of the economically most advanced countries can and should be taken as an indication that this culmination point has already been reached in at least some of the world's most advanced economies. It has not yet been reached in economically less developed countries where further improvements of environmental conditions are still possible. Also global economic development, which is hypothesized to parallel the cognitive trends that we describe as Flynn effects, supports this interpretation: economic growth rates that are diminishing and possibly trending towards zero in the wealthiest countries, while strong economic growth continues in most of the less developed world (Grinin & Korotayev, 2015). We do not know when and at what cognitive level these developing countries will reach their own culmination points. This depends on economic conditions, the ability to translate economic advances into cognitive gains, and ultimately the genetic limits to human intelligence. We still know little about these limits in different parts of the world (Fuerst, Hu, & Connor, 2021; Piffer, 2019), and only the future can show what cognitive levels different nations will reach at their respective culmination points. Lacking historical precedents, we also do not know how stable "peak intelligence" is once it has been reached.

IMPORTANT NOTE ABOUT SCORES: As mentioned, absolute changes in cognitive performance on the PISA tests cannot be assessed with any degree of certainty because the results are scored anew in every year of the testing cycle, based on the individual-level mean and standard deviation of the included OECD countries. We can, however, assess the differences between the secular trends of various countries and

world regions. As such, the most important result in Table 2 are the standard deviations for the total sample of 48 countries. **During this brief period of only 15 years, the standard deviation declined by 24.8%, from 61.8 to 46.5.** This means that differences between country averages, relative to individual differences in the included OECD countries, have become smaller. For example, in 2000/2003 the lowest score was 309.3 (Peru), and the highest score was 544.6 (Finland). In 2015/2018, the lowest score was 370.9 (Tunisia), and the highest score was 534.8 (Macau). Thus the range of scores narrowed from 235.3 to 163.9. Accordingly, we see losses for the higher-scoring regions East Asia, Northern Europe, and the English-speaking countries. The East Asian data do not include mainland China, which did not participate in the early iterations of PISA. The lower-scoring regions of Latin America and Middle East / North Africa (MENA) recorded the largest gains.

FIGURE:

Table 1
Summary of recently reported Flynn effects. IQ gain is gains per decade in IQ points.

Country	Test	Age	N	Time	IQ gain	Remarks	Reference
Czech Rep.	IPT	12–15	1025–359	1971–2015	2.3	School-based	Laciga and Cigler (2017)
Czech Rep.	Number sequence	12–14	1025–359	1971–2015	4.2	School-based	Laciga and Cigler (2017)
Estonia	SPM	18±	552–304	2001–2011	–7.9	High school grads	Kõrgesaar (2013)
Denmark	Børge Prien's Prøve	18±	400,288	2006–2019	–2.1	Conscripts	Hegelund, Okholm, and Teasdale (2021)
Austria, Germany	3 DC (spatial perception)	22 ± 6.5	13,172	1977–2014	–4.8	Meta-analysis	Pietschnig and Gittler (2015)
Austria, Germany	VDT	3–6	1077–1251	2001–2018	–0.6	Meta-analysis	Pietschnig, Deimann, Hirschmann, and Kastner-Koller (2021)
Romania	MAB	10–74	12,034	2003–2018	3.4	Meta-analysis	Gunnesch-Luca and Iliescu (2020)
Portugal	CPM-P	6–10	213–1492	2008–2016	1.8	North Portugal	Carvalho et al. (2020)
USA	CVLT: Immediate recall	16–90	1087–700	1999–2016/17	–1.3	Standardization	Graves et al. (2021)
USA	CVLT: Delayed recall	16–90	1087–700	1999–2016/17	–0.3	Standardization	Graves et al. (2021)
USA	WISC-IV	6–16	126–126	2002–2013/14	3.1	Population-based	Weiss, Gregoire, and Zhu (2016)
China	WISC-R full scale	12	346–495	1985/86–2011/12	2.4	Urban schools	Liu and Lynn (2013)
China	WISC-R performance	12	346–495	1985/86–2011/12	2.5	Urban schools	Liu and Lynn (2013)
China	WISC-R verbal	12	346–495	1985/86–2011/12	0.7	Urban schools	Liu and Lynn (2013)
Saudi Arabia	SPM	8–15	2661–1553	1977–2010	3.5	School-based	Batterjee, Khaleefa, Ali, and Lynn (2013)
Saudi Arabia	CPM	10–11	302–100	1999–2013	3.1	Deaf boys	Bakhiet, Barakat, and Lynn (2014)
Kuwait	SPM	8–15	6529–6431	2006–2015	–6.2	School-based	Dutton, Bakhiet, Essa, Blahmar, and Hakami (2017)
Sudan	SPM	9–18	6877–5659	1999–2010	–2.1	Khartoum	Dutton, Bakhiet, Ziada, Essa, and Blahmar (2017)
Sudan	CPM	6–9	1683–3015	2004–2016	8.4	Khartoum	Dutton et al. (2018)
Sudan	CPM	6–9	1683–3015	2004–2016	7.2	Khartoum	Elbanna, Bakhiet, Ali, Cheng, and Lynn (2018)
Sudan	SPM	9–14	2133–2747	1999–2015	4.1	Urban schools	Batterjee and Ashria (2015)
Sudan	SPM	15–19+	1760–1362	1999–2015	–3.2	Urban schools	Batterjee and Ashria (2015)
Qatar	SPM	6–11	1135–1003	2000–2011	10.2	School-based	Khaleefa, Al-Thani, and Warrag (2012)
Qatar	SPM	8–11	679–573	2000–2011	7.6	School-based	Warrag, Khaleefa, Al-Thani, and Lynn (2018)
Libya	CPM	6–11	600–903	2006–2017	2.8	School-based	Al-Shahomee, Abdalla, and Lynn (2017)
Libya	SPM	13–18	1100–720	2008–2017	9.4	School-based	Al-Shahomee, Abdalla, and Lynn (2018)
Libya	SPM	13–18	1100–720	2008–2017	11.2	School-based	Al-Shahomee, Lynn, Abdalla, and Alrafadi (2019)
Turkey	Draw-a-Person	11 ± (5th grade)	218–258	1977–2010	3.5	School-based	Rindermann, Schott, and Baumeister (2013)
Turkey	Draw-a-Person	11 ± (5th grade)	218–258	1977–2010	1.6	School-based	Kagitcibasi and Biricik (2011)

Table 2

Trends in average scores on PISA assessments for different world regions. Compared are the averaged scores on the PISA 2000 and 2003 assessments and on the 2015 and 2018 assessments \pm (country-level) standard deviation for the 48 countries having scores for both. Also shown are average IQs in the included countries according to the National IQ data set (Becker IQ) and according to Lynn and Vanhanen (2012) (L&V12 IQ). Countries are weighted by square root of population size.

	N	PISA 2000/03 avg.	PISA 2015/18 avg.	Change	Becker IQ	L&V12 IQ
Protestant Europe	7	509.1 \pm 20.6	504.1 \pm 7.2	-5.0	99.4	98.9
Catholic Europe	10	486.0 \pm 24.5	486.9 \pm 13.3	0.9	95.2	96.8
English speaking	6	510.0 \pm 17.8	500.2 \pm 10.5	-9.8	98.3	98.4
Ex-communist countries	11	459.6 \pm 37.1	470.1 \pm 34.1	10.5	93.5	94.8
Latin America	6	377.9 \pm 32.2	409.5 \pm 14.3	31.6	85.5	87.7
MENA	2	408.5 \pm 35.6	423.7 \pm 42.4	15.3	84.9	88.3
South & Southeast Asia	2	388.6 \pm 29.4	397.1 \pm 13.4	8.5	82.3	87.2
East Asia	4	539.0 \pm 5.0	524.0 \pm 5.0	-15.0	104.8	104.4
Total	48	460.1 \pm 61.8	465.7 \pm 46.5	5.6	93.2	94.6

Table 3

Correlations of the PISA trend (difference between the 2015/18 and the 2000/03 scores) with cognitive and economic indicators. Unweighted correlations are above the diagonal, and correlations weighted by square root of population size are below the diagonal. $N = 47$ countries; * $p < .05$; ** $p < .01$; *** $p < .001$.

	PISA trend	PISA 2000/03	PISA 2015/18	Becker IQ	L&V12 IQ	lgGDP 2019	Years in school ¹
PISA trend	1	-0.780***	-0.519***	-0.640***	-0.711***	-0.499***	-0.093
PISA 2000/03	-0.790***	1	0.940***	0.941***	0.954***	0.829***	0.288
PISA 2015/18	-0.577***	0.957***	1	0.935***	0.914***	0.860***	0.342*
Becker IQ	-0.652***	0.950***	0.956***	1	0.961***	0.825***	0.313*
L&V12 IQ	-0.710***	0.964***	0.947***	0.969**	1	0.783***	0.330*
lgGDP 2019	-0.587***	0.883***	0.897***	0.858***	0.846***	1	0.263
Years in school	-0.337*	0.467**	0.463**	0.495***	0.525***	0.428**	1

¹ Average years of schooling age 15–24 in 2015.

5.4.1.14 [Platt, Keyes, McLaughlin, & Kaufman \(2019\)](#). The Flynn effect for fluid IQ may not generalize to all ages or ability levels: A population-based study of 10,000 US adolescents. *Intelligence*.

ABSTRACT: Generational changes in IQ (the Flynn Effect) have been extensively researched and debated. Within the US, gains of 3 points per decade have been accepted as consistent across age and ability level, suggesting that tests with outdated norms yield spuriously high IQs. However, findings are generally based on small samples, have not been validated across ability levels, and conflict with reverse effects recently identified in Scandinavia and other countries. Using a well-validated measure of fluid intelligence, we investigated the **Flynn Effect by comparing scores normed in 1989 and 2003, among a representative sample of American adolescents ages 13–18 (n = 10,073)**. Additionally, we examined Flynn Effect variation by age, sex, ability level, parental age, and SES. Adjusted mean IQ differences per decade were calculated using generalized linear models. Overall the Flynn Effect was not significant; however, effects varied substantially by age and ability level. **IQs increased 2.3 points at age 13 (95% CI = 2.0, 2.7), but decreased 1.6 points at age 18 (95% CI = -2.1, -1.2). IQs decreased 4.9 points for those with IQ ≤ 70 (95% CI = -4.9, -4.8), but increased 3.5 points among those with IQ ≥ 130 (95% CI = 3.4, 3.6)**. The Flynn Effect was not meaningfully related to other background variables. Using the largest sample of US adolescent IQs to date, **we demonstrate significant heterogeneity in fluid IQ changes over time. Reverse Flynn Effects at age 18 are consistent with previous data, and those with lower ability levels are exhibiting worsening IQ over time.** Findings by age and ability level challenge generalizing IQ trends throughout the general population.

5.4.1.15 [Baert, Vujić, Amez, Claeskens, Daman, Maeckelberghe, Omeij, & De Marez \(2020\)](#). Smartphone Use and Academic Performance: Correlation or Causal Relationship? *Kyklos*.

ABSTRACT: After a decade of correlational research, this study attempts to measure the causal impact of (general) smartphone use on educational performance. To this end, we merge survey data on general smartphone use, exogenous predictors of this use, and other drivers of academic success with the exam scores of first-year students at two Belgian universities. The resulting data are analysed with instrumental variable estimation techniques. **A one-standard-deviation increase in daily smartphone use yields a decrease in average exam scores of about one point (out of 20). When relying on ordinary least squares estimations, the magnitude of this effect is**

substantially underestimated. The negative association between smartphone use and exam results is more outspoken for students (i) with highly educated fathers, (ii) with divorced parents and (iii) who are in good health. Policy-makers should at least invest in information and awareness campaigns of teachers and parents to highlight this trade-off between smartphone use and academic performance.

5.4.1.16 [Ward, Duke, Gneezy, & Bos \(2017\)](#). Brain Drain: The Mere Presence of One's Own Smartphone Reduces Available Cognitive Capacity. *Journal of the Association for Consumer Research*.

ABSTRACT: Our smartphones enable—and encourage—constant connection to information, entertainment, and each other. They put the world at our fingertips, and rarely leave our sides. Although these devices have immense potential to improve welfare, their persistent presence may come at a cognitive cost. In this research, we test the “brain drain” hypothesis that the mere presence of one’s own smartphone may occupy limited-capacity cognitive resources, thereby leaving fewer resources available for other tasks and undercutting cognitive performance. **Results from two experiments indicate that even when people are successful at maintaining sustained attention—as when avoiding the temptation to check their phones—the mere presence of these devices reduces available cognitive capacity. Moreover, these cognitive costs are highest for those highest in smartphone dependence. We conclude by discussing the practical implications of this smartphone-induced brain drain for consumer decision-making and consumer welfare.**

5.4.1.17 [Lepp, Barkley, & Karpinski \(2015\)](#). The Relationship Between Cell Phone Use and Academic Performance in a Sample of U.S. College Students. *SAGE Open*.

ABSTRACT: The cell phone is ever-present on college campuses and is frequently used in settings where learning occurs. This study assessed the relationship between cell phone use and actual college grade point average (GPA) after controlling for known predictors. As such, 536 undergraduate students from 82 self-reported majors at a large, public university were sampled. **A hierarchical regression ($R^2 = .449$) demonstrated that cell phone use was significantly ($p < .001$) and negatively ($\beta = -.164$) related to actual college GPA after controlling for demographic variables, self-efficacy for self-regulated learning, self-efficacy for academic achievement, and actual high school GPA, which were all significant predictors ($p < .05$).** Thus, after controlling for other established predictors, increased cell phone use was associated with decreased academic performance. Although more research is needed

to identify the underlying mechanisms, findings suggest a need to sensitize students and educators about the potential academic risks associated with high-frequency cell phone use.

5.4.1.18 [Junco \(2012\)](#). The relationship between frequency of Facebook use, participation in Facebook activities, and student engagement. *Computers & Education*.

ABSTRACT: Educators and others are interested in the effects of social media on college students, with a specific focus on the most popular social media website—Facebook. Two previous studies have examined the relationship between Facebook use and student engagement, a construct related to positive college outcomes. However, these studies were limited by their evaluation of Facebook usage and how they measured engagement. This paper fills a gap in the literature by using a large sample (N = 2368) of college students to examine the relationship between frequency of Facebook use, participation in Facebook activities, and student engagement. Student engagement was measured in three ways: a 19-item scale based on the National Survey of Student Engagement, time spent preparing for class, and time spent in co-curricular activities. **Results indicate that Facebook use was significantly negatively predictive of engagement scale score and positively predictive of time spent in co-curricular activities.** Additionally, some Facebook activities were positively predictive of the dependent variables, while others were negatively predictive.

...Students who spent more time on Facebook spent more time in campus activities.

5.4.1.19 [Junco \(2012\)](#). Too much face and not enough books: The relationship between multiple indices of Facebook use and academic performance. *Computers in Human Behavior*.

ABSTRACT: Because of the social media platform's widespread adoption by college students, there is a great deal of interest in how Facebook use is related to academic performance. A small number of prior studies have examined the relationship between Facebook use and college grade point average (GPA); however, these studies have been limited by their measures, sampling designs and failure to include prior academic ability as a control variable. For instance, previous studies used non-continuous measures of time spent on Facebook and self-reported GPA. This paper fills a gap in

the literature by using a large sample (N = 1839) of college students to examine the relationship among multiple measures of frequency of Facebook use, participation in Facebook activities, and time spent preparing for class and actual overall GPA.

Hierarchical (blocked) linear regression analyses revealed that time spent on Facebook was strongly and significantly negatively related to overall GPA, while only weakly related to time spent preparing for class. Furthermore, using Facebook for collecting and sharing information was positively predictive of the outcome variables while using Facebook for socializing was negatively predictive.

5.4.1.20 [Jacobsen & Forste \(2011\)](#). The Wired Generation: Academic and Social Outcomes of Electronic Media Use Among University Students. *Cyberpsychology, Behavior, and Social Networking*.

ABSTRACT: Little is known about the influence of electronic media use on the academic and social lives of university students. Using time-diary and survey data, we explore the use of various types of electronic media among first-year students. Time-diary results suggest that the majority of students use electronic media to multitask. Robust regression results indicate a negative relationship between the use of various types of electronic media and first-semester grades. In addition, we find a positive association between social-networking-site use, cellular-phone communication, and face-to-face social interaction.

5.4.1.21 [Lawson & Henderson \(2015\)](#). The Costs of Texting in the Classroom. *College Teaching*.

ABSTRACT: Many college students seem to find it impossible to resist the temptation to text on electronic devices during class lectures and discussions. One common response of college professors is to yield to the inevitable and try to ignore student texting. However, research indicates that because of limited cognitive capacities, even simple texting can reduce comprehension of class material at a rate of 10–20%. We review that research and present our study of the effects of texting on comprehension. Proposed alternatives to ignoring texting or outright bans include using smartphones for classroom exercises, educating students about the dangers of multitasking, and the use of “technology breaks.”

5.4.1.22 [Andrzejewski, Zeilinger and Pietschnig \(2023\)](#). Is there a Flynn effect for attention? Cross-temporal meta-analytical evidence for better test performance (1990–2021). *Personality and Individual Differences*.

ABSTRACT: Generational IQ test score changes (i.e., the Flynn effect) have been observed for most measures of cognitive ability, although certain cognitive domains appear to be less affected by this effect than others. IQ test score changes have been found to differ between domains, but evidence of Flynn effects for specific IQ-related abilities is sparse. In the present cross-temporal meta-analysis, we investigate potential test score changes for attention as assessed by the d2 Test of attention. **Based on data from 287 independent samples (N = 21,291) from 32 countries over a timespan of 31 years (1990–2021) we found evidence for moderate generational test score gains in concentration performance in adults, but not children.** While no changes in test effectiveness were found for either age group, there was a substantial increase in overall errors and processing speed in children. Our results are consistent with the idea that IQ test score changes may be rooted in changes in executive functioning components and provide further support for domain-specificity of the Flynn effect.

[What are we missing?]

5.4.2 EVIDENCE AND ESSAYS SHOWING BENEFITS OR NO HARMS

5.4.1 [Sung, Chang, & Liu \(2016\)](#). The effects of integrating mobile devices with teaching and learning on students' learning performance: A meta-analysis and research synthesis. *Computers & Education*.

ABSTRACT: Mobile devices such as laptops, personal digital assistants, and mobile phones have become a learning tool with great potential in both classrooms and outdoor learning. Although there have been qualitative analyses of the use of mobile devices in education, systematic quantitative analyses of the effects of mobile-integrated education are lacking. This study performed a meta-analysis and research synthesis of the effects of integrated mobile devices in teaching and learning, in which 110 experimental and quasi-experimental journal articles published during the period **1993–2013** were coded and analyzed. **Overall, there was a moderate mean effect size of 0.523 for the application of mobile devices to education.** The effect sizes of moderator variables were analyzed and the advantages and disadvantages of mobile learning in different levels of moderator variables were synthesized based on content analyses of individual studies. The results of this study and their implications for both research and practice are discussed.

ADDITIONAL EXCERPT: Analysis of the empirical research on the use of mobile devices as tools in educational interventions that were published in peer-reviewed journals has revealed that the overall effect of using mobile devices in education is better than when using desktop computers or not using mobile devices as an intervention, with a moderate effect size of 0.523.

5.4.2 [Rung, Warnke, & Mattheos \(2014\)](#). Investigating the Use of Smartphones for Learning Purposes by Australian Dental Students. *JMIR MHealth and UHealth*.

ABSTRACT: BACKGROUND: Mobile Internet devices and smartphones have at present a significant potential as learning tools and the development of educational interventions based on smartphones have attracted increasing attention.

OBJECTIVE: The objective of this study was to obtain a deeper insight in the nature of students' use of smartphones, as well as their attitudes towards educational use of mobile devices in order to design successful teaching interventions.

METHOD: A questionnaire was designed, aiming to investigate the actual daily habitual use, as well as the attitudes of dental students towards smartphones for their university education purposes. The survey was used to collect data from 232 dental students.

Results:

Of the 232 respondents, 204 (87.9%) owned a smartphone, and 191 (82.3%) had access to third generation (3G) mobile carriers. The most popular devices were the iPhone and Android. Most of the respondents had intermediate smartphone skills and used smartphones for a number of learning activities. **Only 75/232 (32.3%) had specific educational applications installed, while 148/232 (63.7%) used smartphones to access to social media and found it valuable for their education (P<.05).** Students accessing social media with their smartphones also showed significantly more advanced skills with smartphones than those who did not (P<.05). There was no significant association between age group, gender, origin, and smartphone skills. **There was positive correlation between smartphone skills and students' attitudes toward improving access to learning material (r=.43, P<.05), helping to learn more independently (r=.44, P<.05), and use of smartphones by teaching staff (r=.45, P<.05).**

CONCLUSION: The results in this study suggest that students use smartphones and social media for their education even though this technology has not been formally included in the curriculum. This might present an opportunity for educators to design educational methods, activities, and material that are suitable for smartphones and allow students to use this technology, thereby accommodating students' current diverse learning approaches.

5.4.3 [Ye, Toshimori, & Horita \(2018\)](#). Causal Relationships between Media/Social Media Use and Internet Literacy among College Students: Addressing the Effects of Social Skills and Gender Differences. *Educational Technology Research*.

ABSTRACT: This study investigates the causal relationships between the electronic media/social media use of college students and their Internet literacy, addressing the effects of social skills and gender differences. We conducted a panel survey targeting Japanese college students and analyzed 107 responses. The following results were produced: (a) The college students in the study reported that they were able to make new friends using Twitter and Facebook and could communicate with strangers in this way; (b) for male students, improving their Internet literacy in relation to Facebook use helped them increase the frequency of their Facebook posts and improved their social skills; and (c) for female students, increasing the frequency of their Facebook posts helped to improve their Internet literacy.

5.4.4 [Cecutti, Chemero, & Lee \(2021\)](#). Technology may change cognition without necessarily harming it. *Nature Human Behaviour*.

ABSTRACT: What is the long-term impact of technological advances on cognitive abilities? We critically examine relevant findings and argue that there is no clear evidence for detrimental lasting effects of digital technology on cognitive abilities. But we also suggest how digital technology may be changing predominant ways of cognition.

5.4.5 [Gupta, & Irwin \(2016\)](#). In-class distractions: The role of Facebook and the primary learning task. *Computers in Human Behavior*.

ABSTRACT: While laptops and other Internet accessible technologies facilitate student learning in the classroom, they also increase opportunities for interruptions from off-task [social networking sites](#) such as Facebook (FB). A small number of correlational studies have suggested that FB has a detrimental effect on learning performance, however; these studies had neglected to investigate student-engagement in the primary learning task and how this affects task-switching to goal-irrelevant FB intrusions (distractions); and how purposeful deployment of attention to FB (goal-relevant interruptions) affect lecture comprehension on such tasks. This experiment fills a gap in the literature by manipulating lecture interest-value and controls for duration of FB exposure, time of interruption, FB material and the order of FB posts. One hundred and fifty participants

were randomly allocated to one of six conditions: (A) no FB intrusions, high-interest (HI) lecture; (B) no FB intrusions, low-interest (LI) lecture (C) goal-relevant FB intrusions, HI lecture (D) goal-relevant FB intrusions, LI lecture (E) goal-irrelevant FB intrusions, HI lecture (F) goal-irrelevant FB intrusions, LI lecture. **As predicted, participants were more susceptible to FB distractions when the primary learning task was of low-interest. The study also found that goal-relevant FB intrusions significantly reduced HI lecture comprehension compared to the control condition (A).** The results highlight the need for recourses that will help educators increase student engagement with their learning task. Implications for future research are discussed.

NOTE: This article is included here because it discusses an important additional variable: engagement and interest. If tasks are low-interest, FB intrusions increase.

5.4.6 [Olin-Scheller, & Tanner \(2015\)](#). "Street smart" in the classroom? - upper secondary students' use of smartphones in the breaks between lessons. *Kapet*.

ABSTRACT: Recently, many schools and municipalities have invested heavily in digital tools. In order to keep pace with the spread of media technology tools, students in junior high and high school have been provided with their own tablets or laptops - often with the expectation that this will have a positive effect on teaching and learning. At the same time as these investments, the classroom - via the students' own smartphones - has become connected from the inside. This article highlights the role of the smartphone in the classroom and we discuss partly when and how smartphones appear, and partly what social and didactic implications the phones can have in student interaction. The study's material consists of observations and video recordings of the teaching in a classroom in grade 9. The class consisted of 20 students, and the school is located in a small central Swedish town. The video material consists of 12 hours of recorded data. Overall, our study shows that **mobile phones rarely appear as an order problem in the classroom. As used in the example studied, they usually do not compete with the teacher's agenda in teaching, but are used as a way to pass the time while waiting for new instruction in the teaching "in-between"**. The extent of use varies between different students, but usually has little or no connection to the teaching content. **Conversation analyzes further show how mobile use is coordinated with other aspects of classroom interaction such as task completion, students' social interaction and the teacher's teaching. The use of mobile phones also seems to be able to function both unifying and exclusionary in the social interaction between the students.**

[What are we missing?]

5.4.3 ILLUSTRATIONS

https://www.reddit.com/r/nosurf/comments/100rzgk/there_is_no_light_at_the_end_of_the_tunnel_for_me/

EXCERPT: I'm currently 3 weeks free of the internet and my brain is slowly reintegrating into the real world. I've joined the gym and started reading books while also got an appointment with a psychologist. This reintegration process is extremely painful and it makes me feel like I will most likely go insane since reality is too much for me to bear. It feels like my brain is finally waking up from a deep slumber that lasted for 10 years which feels somewhat nice, but then the realizations hit me.

I realized that my development pretty much stopped at 12 years old when I developed this addiction, I realized that I'm completely socially inept and I don't know the very basics of human interaction, I realized that everyone will from now on treat me as a 22 year old fully grown adult while in reality I have the experiences of a 10 year old kid, when I'm walking around outside and seeing kids from collage/high school hanging out it hits me how much I missed out on and how lonely I truly am, I realized that I can't and probably never will be able to connect with people since I basically missed 10 years of social development, I realized that I'm a total and complete social reject and a failure in all life aspects, I realized that reality that I built for the past 10 years is nothing more than a giant illusion that has no connection with the real world. When this illusion that I built my identity on and is keeping me sane shatters I will most likely end up in a mental health ward. And don't get me started that my concentration is completely shot and my once sharp brain has turned into a complete mush with the damage probably being permanent.

[What are we missing?]

5.5 WAYFINDING: ORIENTATION SKILLS

5.5.1 EVIDENCE AND ESSAYS SHOWING HARMS

5.5.1.1 [Scroggins](#). My twins didn't know their own neighborhood. *Let Grow*.

5.5.1.2 [Gonzalez-Franco, Clemenson, & Amos. \(2021\)](#). How GPS Weakens Memory and What We Can Do About It. *Scientific American*.

EXCERPT: Using mobile phones to navigate has become second nature. Whether you're heading to a new park, meeting friends at a restaurant, or going to run errands, you just tap the location on your phone and go. Prior to GPS, exploring and wayfinding in new places required preparation. We had to think, consult paper maps, and plan and memorize parts of our route. But in today's technological world, there is no need to think. Simply follow the turn-by-turn directions on your phone, and you'll end up where you need to be. But your overall sense of the place suffers. Spatial navigation, which had been a process performed exclusively by the human brain and perceptual system, has now been surrendered to technology.

However, in doing so, we also surrendered our agency. Does it matter?

There are structures in the brain dedicated to these complex pathfinding tasks. In particular, the hippocampus is deeply associated with supporting [spatial memory](#), [spatial navigation and mental mapping](#).

...However, multiple experiments have shown that this easy egocentric navigation also reduces spatial awareness and mental mapping when compared to more traditional forms of allocentric navigation like paper maps. See for example recent work by Eran Ben-Elia [comparing paper maps](#) to Google Maps, in which app users significantly underperformed on traditional memory map tasks such as pointing or landmark recognition.

5.5.1.3 [Ben-Elia \(2021\)](#). An exploratory real-world wayfinding experiment: A comparison of drivers' spatial learning with a paper map vs. turn-by-turn audiovisual route guidance. *Transportation Research Interdisciplinary*.

ABSTRACT: Turn-by-turn (TBT) route guidance technology installed on mobile phones is very popular among car drivers for wayfinding purposes. Previous studies examined their effect on spatial knowledge predominantly on pedestrians or in virtual environments. Drivers' spatial knowledge was experimentally compared in two random groups: audiovisual route guidance using the TBT navigation feature of the Google Maps app installed on a mobile phone, and a paper map. Participants drove their own vehicles to a predesignated destination in an unfamiliar residential neighborhood. Spatial knowledge tests (orientation, landmark recognition and route recognition) were subsequently administered. The scores of map-assisted drivers were uncorrelated and, on average, higher in orientation (deviation in direction), landmark recognition and route recognition (error percentage). The landmark recognition scores of drivers assisted by

TBT route guidance were significantly lower with a very large effect size. The route recognition scores of drivers assisted by route guidance showed strong correlations with orientation and with landmark recognition scores. **Results can be attributed to the differences in cognitive effort required to complete the wayfinding task: unlike memorizing a global map survey, passively following TBT audiovisual instructions does not require drivers to actively encode, transform, and continuously monitor their egocentric position in space. Drivers also showed somewhat poorer performance relative to studies with pedestrians which can be explained by the greater mental effort, compared to wandering on foot, involved in wayfinding while safely driving a rapidly moving vehicle.** The future implications of the increasing dependence on mobile navigation technologies are further discussed.

5.5.1.4 [Dahmani, & Bohbot \(2020\)](#). Habitual use of GPS negatively impacts spatial memory during self-guided navigation. *Scientific Reports*.

ABSTRACT: Global Positioning System (GPS) navigation devices and applications have become ubiquitous over the last decade. However, it is unclear whether using GPS affects our own internal navigation system, or spatial memory, which critically relies on the hippocampus. We assessed the lifetime GPS experience of 50 regular drivers as well as various facets of spatial memory, including spatial memory strategy use, cognitive mapping, and landmark encoding using virtual navigation tasks. We first present cross-sectional results that show that people with greater lifetime GPS experience have worse spatial memory during self-guided navigation, i.e. when they are required to navigate without GPS. In a follow-up session, 13 participants were retested three years after initial testing. **Although the longitudinal sample was small, we observed an important effect of GPS use over time, whereby greater GPS use since initial testing was associated with a steeper decline in hippocampal-dependent spatial memory. Importantly, we found that those who used GPS more did not do so because they felt they had a poor sense of direction, suggesting that extensive GPS use led to a decline in spatial memory rather than the other way around.** These findings are significant in the context of society's increasing reliance on GPS.

5.5.1.5 [Ishikawa, Fujiwara, Imai, & Okabe \(2008\)](#). Wayfinding with a GPS-based mobile navigation system: A comparison with maps and direct experience. *J. Environ. Psychol.*

ABSTRACT: This study examined the effectiveness of a Global Positioning System (GPS)-based mobile navigation system in comparison to paper maps and direct experience of routes, by focusing on the user's wayfinding behavior and acquired spatial knowledge. Based on information received from one of these three media, participants walked six routes finding the way to goals. Results showed that GPS users traveled longer distances and made more stops during the walk than map users and direct-experience participants. Also, **GPS users traveled more slowly, made larger direction errors, drew sketch maps with poorer topological accuracy, and rated wayfinding tasks as more difficult than direct-experience participants.**

Characteristics of navigation with these three learning media and possible reasons for the ineffectiveness of the GPS-based navigation system are discussed.

5.5.1.6 [Gardony, Brunyé, Mahoney, & Taylor \(2013\)](#). How navigational aids impair spatial memory: Evidence for divided attention. *Spat. Cognition Computation*.

ABSTRACT: Research has demonstrated navigational aids impair spatial memory, but has not considered important spatial cognitive concepts. For example, impairment may stem from spatial perspective switches between route-based aids and survey-based memory assessments. Further, the verbal format of aid instructions may selectively interfere with verbal working memory (VWM). To address these potential explanations, participants navigated desktop virtual environments in a goal-directed manner. In each within-participants condition, **participants either navigated with a verbal or tonal aid that presented mixed spatial perspective instructions or without aid. Both aids yielded slight navigational advantages and steep spatial memory costs despite their mixed perspective instructions.** The equivalent impairment between information formats suggests navigational aids impair spatial memory by dividing attention rather than selective interference of VWM.

[What are we missing?]

5.5.2 EVIDENCE AND ESSAYS SHOWING BENEFITS OR NO HARMS

[What are we missing?]

5.5.3 ILLUSTRATIONS

[What are we missing?]

5.6 CREATIVITY

5.6.1 EVIDENCE AND ESSAYS SHOWING HARMS

5.6.1.1 [Gray \(2022\)](#). As Children’s Freedom Has Declined, So Has Their Creativity. *Psychology Today*.

EXCERPT: Kim, who is a professor of [education](#) at the College of William and Mary, analyzed scores on a battery of measures of creativity—called the Torrance Tests of [Creative Thinking](#) (TTCT)—collected from normative samples of schoolchildren in kindergarten through twelfth grade over several decades. According to Kim’s analyses, the scores on these tests at all grade levels began to decline somewhere between 1984 and 1990 and have continued to decline ever since. The drops in scores are highly significant statistically and in some cases very large. In Kim’s words, the data indicate that “children have become less emotionally expressive, less energetic, less talkative and verbally expressive, less humorous, less imaginative, less unconventional, less lively and passionate, less perceptive, less apt to connect seemingly irrelevant things, less synthesizing, and less likely to see things from a different angle.”

According to Kim’s research, all aspects of creativity have declined, but the biggest decline is in the measure called Creative Elaboration, which assesses the ability to take a particular idea and expand on it in an interesting and novel way. Between 1984 and 2008, the average Elaboration score on the TTCT, for every age group from kindergarten through 12th grade, fell by more than 1 standard deviation. Stated differently, this means that more than 85% of children in 2008 scored lower on this measure than did the average child in 1984.

[What are we missing?]

5.6.2 EVIDENCE AND ESSAYS SHOWING BENEFITS OR NO HARMS

[What are we missing?]

5.6.3 ILLUSTRATIONS

[What are we missing?]

5.7 EMOTIONAL REGULATION

5.7.1 EVIDENCE AND ESSAYS SHOWING HARMS

5.7.1.1 [Konok ... & Fitzpatrick \(2024\)](#). Cure for tantrums? Longitudinal associations between parental digital emotion regulation and children's self-regulatory skills. *Child and Adolescent Psychiatry*.

ABSTRACT: INTRODUCTION: Parents often use digital devices to regulate their children's negative emotions, e.g., to stop tantrums. However, this could hinder child development of self-regulatory skills. The objective of the study was to observe bidirectional longitudinal associations between parents' reliance on digital devices to regulate their child's emotions and self-regulatory tendencies (anger/frustration management, effortful control, impulsivity).

METHODS: Parents (N = 265) filled out the Child Behavior Questionnaire—Short Form and the Media Assessment Questionnaire twice: the initial assessment (T1) took place in 2020 (mean child age = 3.5 years old), and follow-up (T2) occurred a year later in 2021 (mean child age = 4.5 years old).

RESULTS: **Higher occurrence of parental digital emotion regulation (PDER) in T1 predicts higher anger and lower effortful control in T2, but not impulsivity.** Higher anger in T1, but not impulsivity and effortful control, predicts higher PDER in T2.

DISCUSSION: Our results suggest that parents of children with greater temperament-based anger use digital devices to regulate the child's emotions (e.g., anger). However, this strategy **hinders development of self-regulatory skills, leading to poorer effortful control and anger management in the child.**

[What are we missing?]

5.7.2 EVIDENCE AND ESSAYS SHOWING BENEFITS OR NO HARMS

[What are we missing?]

5.7.3 ILLUSTRATIONS

[What are we missing?]

5.8 STUDIES ON MULTIPLE COGNITIVE OUTCOMES

5.8.1.1 [Reed \(2023\)](#). Impact of social media use on executive function. *Computers in Human Behavior*.

ABSTRACT: Associations between digital dependency and cognition have not received the same attention as emotional and effects, and an area of importance in this regard is Executive Functioning (EF) as there are theoretical debates regarding whether impulse control is a key aspect of functioning for digital dependency. Three experiments examined associations between social media addiction (SMA) and everyday memory (Experiment 1), EF tasks using neutral stimuli before and after social media exposure (Experiments 1 and 2), and deficits in impulse control using social media related and neutral cues (Experiment 3). Experiments 1 and 2 demonstrated a relationship between SMA and inhibitory control, as measured by the Iowa Gambling Task (IGT), but less strong associations with attention and attention switching tasks. Experiment 3 demonstrated a relationship between SMA and higher impulsivity using the Go-GoNo task. These relationships were either exacerbated by exposure to social media (Experiment 2), or stronger when performance involved social media related stimuli (Experiment 3). **These results are novel as there is very limited evidence relating EF functioning to social media dependency, and they imply a link between SMA and impaired impulse control on exposure to social media related cues.**

5.8.1.2 [Maza, Fox, Kwon, Flannery, Lindquist, Prinstein, & Telzer \(2023\)](#). Association of Habitual Checking Behaviors on Social Media With Longitudinal Functional Brain Development. *JAMA Pediatrics*.

ABSTRACT: IMPORTANCE: Social media platforms provide adolescents with unprecedented opportunities for social interactions during a critical developmental period when the brain is especially sensitive to social feedback.

OBJECTIVE: To explore how adolescents' frequency of checking behaviors on social media platforms is associated with longitudinal changes in functional brain development across adolescence.

DESIGN: A 3-year longitudinal cohort study of functional magnetic resonance imaging (fMRI) among sixth- and seventh-grade students recruited from 3 public middle schools in rural North Carolina.

EXPOSURES: At wave 1, participants reported the frequency at which they checked Facebook, Instagram, and Snapchat.

MAIN OUTCOME AND MEASURES: Neural responses to the Social Incentive Delay task when anticipating receiving social feedback, measured annually using fMRI for 3 years. Participants saw a cue that indicated whether the social feedback (adolescent faces with emotional expressions) would be a reward, punishment, or neutral; after a delay, a target appeared and students responded by pressing a button as quickly as possible; a display of social feedback depended on trial type and reaction time.

RESULTS: Of 178 participants recruited at age 12 years, 169 participants (mean [SD] age, 12.89 [0.58] years; range, 11.93-14.52 years; 91 [53.8%] female; 38 [22.5%] Black, 60 [35.5%] Latinx, 50 [29.6%] White, 15 [8.9%] multiracial) met the inclusion criteria.

Participants with habitual social media checking behaviors showed lower neural sensitivity to social anticipation at age 12 years compared with those with nonhabitual checking behaviors in the left amygdala, posterior insula (PI), and ventral striatum (VS; β , -0.22; 95% CI, -0.33 to -0.11), right amygdala (β , -0.19; 95% CI, -0.30 to -0.08), right anterior insula (AI; β , -0.23; 95% CI, -0.37 to -0.09), and left dorsolateral prefrontal cortex (DLPFC; β , -0.29; 95% CI, -0.44 to -0.14). Among those with habitual checking behaviors, there were longitudinal increases in the left amygdala/PI/VS (β , 0.11; 95% CI, 0.04 to 0.18), right amygdala (β , 0.09; 95% CI, 0.02 to 0.16), right AI (β , 0.15; 95% CI, 0.02 to 0.20), and left DLPFC (β , 0.19; 95% CI, 0.05 to 0.25) during social anticipation, whereas among those with nonhabitual checking behaviors, longitudinal decreases were seen in the left amygdala/PI/VS (β , -0.12; 95% CI, -0.19 to -0.06), right amygdala (β , -0.10; 95% CI, -0.17 to -0.03), right AI (β , -0.13; 95% CI, -0.22 to -0.04), and left DLPFC (β , -0.10, 95% CI, -0.22 to -0.03).

CONCLUSIONS: The results of this cohort study suggest that **social media checking behaviors in early adolescence may be associated with changes in the brain's**

sensitivity to social rewards and punishments. Further research examining long-term associations between social media use, adolescent neural development, and psychological adjustment is needed to understand the effects of a ubiquitous influence on development for today's adolescents.

SUMMARY FROM [ESSAY](#) ON STUDY:

"These teens might become more attuned to social rewards or punishments including those in digital forms such as 'likes,' notifications, or comments," Telzer told MedPage Today. "Meanwhile, teens who do not check social media as often become less sensitive or attuned to social feedback over time."

"This increasing sensitivity to social information in teens who habitually check social media might prompt future compulsive social media checking. However, importantly, it may also be adaptive by helping them navigate social interactions in their increasingly digital worlds," Telzer added.

She emphasized that this research was focused on the behavior of children, who were recruited at age 12 to 13 years, so the specific social media site was not particularly important. She noted that an individual's behaviors are common across all platforms, so these results would likely be applicable to other social media sites or even new platforms that have not become widely used yet.

Telzer highlighted that a key study limitation was that the difference in sensitivity to social feedback was different at baseline between the children who habitually checked social media and the ones who did not.

"Teens who habitually checked started out less sensitive to social information, and became more sensitive over time, and teens who checked less often started out more sensitive and became less sensitive over time," she explained. "Because of this, we cannot determine if teens' social media use before the study caused these developmental differences."

"Nonetheless, differing social media behaviors were associated with different trajectories of brain development," Telzer added, noting that more research will be needed to help determine the social and emotional impact those differences have on a child.

5.8.1.3 [Ward, Duke, Gneezy, & Bos \(2017\)](#). Brain Drain: The Mere Presence of One's Own Smartphone Reduces Available Cognitive Capacity. *Journal of the Association for Consumer Research*.

ABSTRACT: Our smartphones enable—and encourage—constant connection to information, entertainment, and each other. They put the world at our fingertips, and rarely leave our sides. Although these devices have immense potential to improve welfare, their persistent presence may come at a cognitive cost. In this research, we test the “brain drain” hypothesis that the mere presence of one’s own smartphone may occupy limited-capacity cognitive resources, thereby leaving fewer resources available for other tasks and undercutting cognitive performance. **Results from two experiments indicate that even when people are successful at maintaining sustained attention—as when avoiding the temptation to check their phones—the mere presence of these devices reduces available cognitive capacity.** Moreover, these cognitive costs are highest for those highest in smartphone dependence. We conclude by discussing the practical implications of this smartphone-induced brain drain for consumer decision-making and consumer welfare.

5.8.1.4 [Lee, Namkoong, Lee, Lee, & Jung \(2019\)](#). Lateral orbitofrontal gray matter abnormalities in subjects with problematic smartphone use. *Journal of Behavioral Addictions*.

ABSTRACT: BACKGROUND: Smartphone use is becoming commonplace and exerting adequate control over smartphone use has become an important mental health issue. Little is known about the neurobiology underlying problematic smartphone use. We hypothesized that structural abnormalities in the fronto-cingulate brain region could be implicated in problematic smartphone use, similar to that has been reported for Internet gaming disorder and Internet addiction. This study investigated fronto-cingulate gray matter abnormalities in problematic smartphone users, particularly those who spend time on social networking platforms.

METHODS: The study included 39 problematic smartphone users with excessive use of social networking platforms via smartphone and 49 normal control male and female smartphone users. We conducted voxel-based morphometric analysis with diffeomorphic anatomical registration using an exponentiated Lie algebra algorithm. Region of interest analysis was performed on the fronto-cingulate region to identify whether gray matter volume (GMV) differed between the two groups.

RESULTS: **Problematic smartphone users had significantly smaller GMV in the right lateral orbitofrontal cortex (OFC) than healthy controls, and there were significant negative correlations between GMV in the right lateral OFC and the**

Smartphone Addiction Proneness Scale (SAPS) score, including the SAPS tolerance subscale.

CONCLUSIONS: These results suggest that lateral orbitofrontal gray matter abnormalities are implicated in problematic smartphone use, especially in social networking platform overuse. Small GMV in the lateral OFC was correlated with an increasing tendency to be immersed in smartphone use. Our results suggest that orbitofrontal gray matter abnormalities affect regulatory control over previously reinforced behaviors and may underlie problematic smartphone use.

SECTION 6: THE EFFECTS OF DIGITAL MEDIA USE ON CHILDHOOD AND TEENAGE RISKY BEHAVIOR

This section includes studies on **suicide, sexual grooming and predation, violence, guardrails, and diffusion limiters**

6.1 GUARDRAILS, SPEEDBUMPS, OR DIFFUSION LIMITERS

6.1.1 EVIDENCE AND ESSAYS INDICATING THAT DIGITAL MEDIA CONTAIN INADEQUATE PROTECTIONS FOR CHILDREN

6.1.1.1 [Sjoberg \(2020\)](#). This deadly TikTok challenge has teens passing out for likes.
Daily Dot.

EXCERPT: Several self-harming videos have been circulating on TikTok, from the "Skull breaker" challenge to the "Cha Cha Slide" challenge (which involves repeatedly swerving a car across a road in time to music). Videos that contain the tag "#passoutchallenge" had over 233,000 views on TikTok as of February 2020.

[NOTE from JH: --we have 100 years of practice with ratings for movies; then we move online, and there is zero protection; parents have just weak parental controls, but kids can just go to pornhub.]

6.1.1.2 [Medina, Chapman, Winter, & Tolan \(2022\)](#). *Salvador Ramos threatened rapes, school shootings on Yubo app in weeks leading up to the massacre, users say.* CNN.

EXCERPT: Salvador Ramos told girls he would rape them, showed off a rifle he bought, and threatened to shoot up schools in livestreams on the social media app Yubo, according to several users who witnessed the threats in recent weeks.

But those users – all teens – told CNN that they didn’t take him seriously until they saw the news that Ramos had gunned down 19 children and two adults at an elementary school in Uvalde, Texas, this week.

Three users said they witnessed Ramos threaten to commit sexual violence or carry out school shootings on Yubo, an app that is used by tens of millions of young people around the world.

...The users all said they reported Ramos’ account to Yubo over the threats. But it appeared, they said, that Ramos was able to maintain a presence on the platform. CNN reviewed one Yubo direct message in which Ramos allegedly sent a user the \$2,000 receipt for his online gun purchase from a Georgia-based firearm manufacturer.

...Despite those safety features, the users who spoke to CNN said Ramos made personal and graphic threats. During one livestream, Amanda Robbins, 19, said Ramos verbally threatened to break down her door and rape and murder her after she rebuffed his sexual advances. She said she witnessed Ramos threaten other girls with similar “acts of sexual assault and violence.”

6.1.1.3 [Hobbs, Barry, & Koh \(2021\)](#). *‘The Corpse Bride Diet’: How TikTok Inundates Teens With Eating-Disorder Videos.* Wall Street Journal.

EXCERPT: TikTok is flooding teen users with videos of rapid-weight-loss competitions and ways to purge food that health professionals say contribute to a wave of eating-disorder cases spreading across the country.

6.1.1.4 [Barry, Wells, West, Stern, & French \(2021\)](#). How TikTok Serves Up Sex and Drug Videos to Minors. *Wall Street Journal*.

EXCERPT: The account was one of dozens of automated accounts, or bots, created by The Wall Street Journal to understand what TikTok shows young users. These bots, registered as users aged 13 to 15, were turned loose to browse TikTok's For You feed, the highly personalized, never-ending feed curated by the algorithm.

An analysis of the videos served to these accounts found that through its powerful algorithms, TikTok can quickly drive minors—among the biggest users of the app—into endless spools of content about sex and drugs.

TikTok served one account registered as a 13-year-old at least 569 videos about drug use, references to cocaine and meth addiction, and promotional videos for online sales of drug products and paraphernalia. Hundreds of similar videos appeared in the feeds of the Journal's other minor accounts.

TikTok also showed the Journal's teenage users more than 100 videos from accounts recommending paid pornography sites and sex shops. Thousands of others were from creators who labeled their content as for adults only.

[What are we missing?]

6.1.2 EVIDENCE AND ESSAYS INDICATING DISPUTING THE CLAIM OF INADEQUATE PROTECTION

High Tech or High Risk: Moral Panics about Girls Online

[What are we missing?]

6.1.3 ILLUSTRATIONS

[What are we missing?]

- <https://techcrunch.com/2022/10/17/tiktok-raising-age-requirement-tiktok-live-adding-adult-only-livestreams/>
- [Live gifts on TikTok](#)

6.2 SEXUAL SOLICITATION AND PREDATION

6.2.1 EVIDENCE AND ESSAYS INDICATING SEXUAL SOLICITATION AND PREDATION

6.2.1.1 [Fox32 Digital Staff \(2022\)](#). Delphi detectives seek info on fake social media profile linked to 2017 [double murder](#) of teens. *Fox 32*.

6.2.1.2 [THORN \(2021\)](#). Responding to Online Threats: Minors' Perspectives on Disclosing, Reporting, and Blocking.

EXCERPT:

- Nearly 1 in 3 teen girls have been approached by adults asking for nudes
- 1 in 6 girls aged 9 -12 years have interacted sexually with an adult on these platforms.
- 1 in 2 participants (48%) said they had been made to feel uncomfortable, been bullied, or had a sexual interaction online.
- 27% of boys aged 9-12 years use adult dating apps, often exposing themselves to adult sexual predators. This shows how easily children can sidestep the simplistic safety procedures & age restrictions platforms use.

6.2.1.3 [Coates, Hardman, Halford, Christiansen, & Boyland \(2019\)](#). Social Media Influencer Marketing and Children's Food Intake: A Randomized Trial. *Pediatrics*.

ABSTRACT: OBJECTIVES: To examine the impact of social media influencer marketing of foods (healthy and unhealthy) on children's food intake.

METHODS: In a between-subjects design, 176 children (9-11 years, mean 10.5 ± 0.7 years) were randomly assigned to view mock Instagram profiles of 2 popular YouTube video bloggers (influencers). Profiles featured images of the influencers with unhealthy snacks (participants: n = 58), healthy snacks (n = 59), or nonfood products (n = 59). Subsequently, participants' ad libitum intake of unhealthy snacks, healthy snacks, and overall intake (combined intake of healthy and unhealthy snacks) were measured.

RESULTS: **Children who viewed influencers with unhealthy snacks had significantly increased overall intake (448.3 kilocalories [kcal]; P = .001), and significantly increased intake of unhealthy snacks specifically (388.8 kcal; P = .001), compared with children who viewed influencers with nonfood products**

(357.1 and 292.2 kcals, respectively). Viewing influencers with healthy snacks did not significantly affect intake.

CONCLUSIONS: Popular social media influencer promotion of food affects children's food intake. Influencer marketing of unhealthy foods increased children's immediate food intake, whereas the equivalent marketing of healthy foods had no effect. Increasing the promotion of healthy foods on social media may not be an effective strategy to encourage healthy dietary behaviors in children. More research is needed to understand the impact of digital food marketing and inform appropriate policy action.

6.2.1.4 [Alruwaily, Mangold, Greene, Arshonsky, Cassidy, Pomeranz, & Bragg \(2020\).](#)

Child Social Media Influencers and Unhealthy Food Product Placement.
Pediatrics.

ABSTRACT: OBJECTIVES: We aimed to determine the frequency with which kid influencers promote branded and unbranded food and drinks during their YouTube videos and assess the nutritional quality of food and drinks shown.

METHODS: Researchers used Socialbakers data to identify the 5 most-watched kid influencers (ages 3 to 14 years) on YouTube in 2019. We searched for 50 of their most-watched videos and 50 of their videos that featured food and/or drinks on the thumbnail image of the video. We coded whether kid influencers consumed or played with food or toys, quantified the number of minutes food and/or drinks appeared, and recorded names of branded food and/or drinks. We assessed the nutritional quality of foods using the Nutrient Profile Model and identified the number of drinks with added sugar.

RESULTS: A sample of 418 YouTube videos met the search criteria, and 179 of those videos featured food and/or drinks. Food and/or drinks were featured in those videos 291 times. **Kid influencers' YouTube videos were collectively viewed >48 billion times, and videos featuring food and/or drinks were viewed 1 billion times. Most food and/or drinks were unhealthy branded items (n = 263; 90.34%; eg, McDonald's), followed by unhealthy unbranded items (n = 12; 4.1%; eg, hot dogs), healthy unbranded items (n = 9; 3.1%; eg, fruit), and healthy branded items (n = 7; 2.4%; eg, Yoplait yogurt).**

CONCLUSIONS: **Kid influencers generate millions of impressions for unhealthy food and drink brands through product placement.** The Federal Trade Commission should strengthen regulations regarding product placement on YouTube videos featuring young children.

[NOTE from CHT: Over 40% of videos from the 5 most popular kid-influencer YouTube channels feature food and drink, with 90% explicitly showing unhealthy food or drink products, sponsored by brands. The 179 food/ drink videos created by these child influencers have more than 1

billion views. Such advertising exploits the fact that children aged 8 and younger are highly susceptible to product placement, cannot distinguish advertising from real content, and spend on average 1 hour daily watching videos online.]

[NOTES from JH: quote lisa damour, on what she would have had to do to send a sext photo of herself. now it can be done instantly, with permanent and widespread effects]

6.2.1.5 [D’Anastasio \(2022\)](#). Child Predators Use Twitch to Systematically Track Kids Livestreaming. *Bloomberg*.

EXCERPT: Critics say Twitch is over-dependent on crowdsourced reports. The researcher reported 1,200 accounts apparently belonging to children to Twitch. In March, the company updated its reporting form to make it easier for users to flag child streamers. Still, only about 37% of accounts reported by the researcher in May were removed.

Even in the many instances when Twitch has eliminated inappropriate content or suspended clearly underage users, it’s easy enough to create a new account. When one viewer “dared” a child to pull down her pants during a livestream in late May, the child responded that she wouldn’t do so because she had already had one of her three accounts suspended. The viewer, who followed primarily young girls on Twitch, replied in the chat: “u can always make a new account easy.” Later in the broadcast, she pulled her shirt up.

6.2.1.6 [Kelly \(2022\)](#). The dark side of Discord. *CNN*

6.2.1.7 [Vogels \(2021\)](#). The state of online harassment. *Pew Research Center*.

Other Pew studies:

- [Vogels \(2021\)](#). Online harassment occurs most often on social media, but strikes in other places, too. *Pew Research Center*.
- [Anderson & Vogels \(2020\)](#). Young women often face sexual harassment online – including on dating sites and apps. *Pew Research Center*.
- [Anderson \(2018\)](#). A majority of teens have experienced some form of cyberbullying. *Pew Research Center*.

6.2.1.8 [Whittle, Hamilton-Giachritsis, Beech, & Collings \(2013\)](#). A review of online grooming: Characteristics and concerns. *Aggression and Violent Behavior*.

ABSTRACT: The process of online grooming facilitates child abuse and is a threat to young people across the world. This literature review explores the research surrounding how young people are targeted by offenders on the internet. Definitions, prevalence, and characteristics of online grooming are addressed in addition to consideration of [child sexual abuse](#) theories and internet behaviors. **There are a variety of techniques used by internet groomers to manipulate young people (e.g., flattery, bribes, and threats) and different ways that young people engage in risk taking behavior on the internet (e.g., communicating with strangers online and sharing personal information).** While models and typologies can aid professionals in understanding the crime, it is important to acknowledge that internet offenders, victims, and the dynamics between the two are often unique and varied. This is fundamental to the development of effective preventative education for online grooming and abuse. The review concludes that research concerning the online grooming of young people is limited, and calls for further study in this field.

6.2.1.9 [Winters, Kaylor, & Jeglic \(2017\)](#). Sexual offenders contacting children online: An examination of transcripts of sexual grooming. *Journal of Sexual Aggression*.

ABSTRACT: The present study investigated transcripts of adults sexually grooming decoy victims on the Internet. One hundred transcripts were coded for offender characteristics, victim characteristics, and dynamics of the conversation. The results revealed that **all of the offenders were male, most of whom believed they were communicating with an adolescent female. The sexual intentions of the offenders were made clear, with the majority introducing sexual content early on into the conversation. The length of the contact ranged from one day to nearly one year,** suggesting that the duration of the online grooming process may vary significantly. The majority of offenders also communicated with the decoy victim over the telephone and attempted to arrange an in-person meeting, many within short periods of time. Implications for prevention and future research are discussed.

6.2.1.10 [Kloess, Beech, & Harkins \(2014\)](#). Online Child Sexual Exploitation: Prevalence, Process, and Offender Characteristics. *Trauma, Violence, & Abuse*.

ABSTRACT: This review provides an overview of current knowledge and understanding of the process of sexual grooming and exploitation of children via the Internet. Specifically, the prevalence of online sexual grooming and exploitation is explored as well as associated challenges relating to the identification of its occurrence. This is complemented by a detailed outline and discussion of the process, both online and in

the physical world, and legal responses to this phenomenon. A number of factors are examined to provide an explanation of the facilitating and contributing role they may play in offense processes online. Finally, current typologies are discussed in relation to characteristics of Internet offenders in general and “groomers”/chat room offenders specifically. This review concludes by offering suggestions for future research.

6.2.1.11 [de Santisteban, del Hoyo, Alcázar-Córcoles, & Gámez-Guadix \(2018\)](#).

Progression, maintenance, and feedback of online child sexual grooming: A qualitative analysis of online predators. *Child Abuse & Neglect*.

ABSTRACT: The limited literature on online child grooming has focused mainly on studying the characteristics of perpetrators and victims that facilitate the sexual abuse of minors. Little attention has been given to the perceptions of the perpetrators about the abuse process and the strategies used to sustain it over time. In the present study, after identifying a sample of 12 men convicted of online grooming, we used qualitative grounded theory through in-depth interviews and comparisons with the proven facts of their convictions. **The results show how aggressors actively study the structural environment, the needs and vulnerabilities of the minors). In this way, the aggressors adapt by using most effective strategies of [persuasion](#) at all times, so that the child feels like an active part of the plot.** This allows the aggressors to have sexual interactions with minors either online or offline and in a sporadic or sustained manner. This process is maintained with some distorted perceptions about minors and the abuse process, which seem to feed back to the beginning of the cycle with other potential victims. The interaction between the persuasive processes and the distorted perceptions of the aggressor leads to a potential work focus for treatment as well as detection and prevention. Trying to visualize the complexity of the phenomenon could also help researchers to understand processes from this approach that may be applied with other types of vulnerable populations.

6.2.1.12 [Choo \(2009\)](#). Online child grooming: a literature review on the misuse of social networking sites for grooming children for sexual offences. Australian Institute of Criminology.

EXCERPT: Individuals who have sexual fantasies involving children or erotic attractions towards children have been present in society throughout history. Surveys have found that almost two-thirds (62%) of the general male population report sexual fantasies about young girls, while surveys of university students have found that almost one-quarter (21%) acknowledge being sexually attracted to children on occasions (Briere & Runtz 1989 cited in Gee, Devilly & Ward 2004). Surveys of clinical psychiatric

patients have found that up to one-third of offenders with mental disorders report having either deviant fantasies involving children or deviant sexual activities (Langevin, Lang & Curnoe 1998). Pathological sexual 'interest' in children has been explained using various theoretical models, one of which argues that offenders seek relationships with children due to a fear of relationships with adults, as relationships with children are deemed less threatening by perpetrators (the social skills deficit model of Emmers-Sommer & Allen 1999 cited in Olson et al. 2007).

The nature of online grooming: Children have been found to be vulnerable to adult sexual predators because their development of social skills is not yet complete, making them less likely to pick up relevant cues such as inappropriate remarks that predators may make during conversations. Children with low self-esteem, lack of confidence and naivety are more at risk and more likely to be targeted by offenders. Sexually curious adolescents who are often easily aroused are also more willing to take risks than less curious children, thus making them a target for predators.

The child grooming process: Child grooming, a premeditated behaviour intended to secure the trust and cooperation of children prior to engaging in sexual conduct, is a process that commences with sexual predators choosing a location or target area likely to be attractive to children. A process of grooming then commences during which offenders take a particular interest in their child victim to make them feel special with the intention of gaining their trust. As trust is developed between the child victim and the offender, offenders then seek to desensitise child victims to sexual conduct by introducing a sexual element into the relationship.

The attractions of new technologies for children: All this is able to be achieved with ease in the online environment. Large numbers of children now use the internet. In one US study, 55 percent of the young people surveyed aged between 12 and 17 years were found to have used online social networking sites (Lenhart & Madden 2007). Another study estimated that 70 percent of all teenagers in the United States currently visit social networking sites on a monthly basis and, by 2011, 84 percent of online teens in the United States will use social networking each month (eMarketer 2007). Social networking through blogging, instant messaging, IRC rooms and short message services all enable children to communicate with friends quickly, effectively and ostensibly with confidentiality. Other communications technologies such as email, VoIP and mobile phones can also be used in the grooming process. Acronyms and other non-linguistic signs (so-called 'emoticons') are often used to accelerate the writing process, and many of these are used to represent sexual content.

The attractions of new technologies for sexual predators: Sexual offenders are also using the internet to locate children for criminal purposes including the creation of pornography, sex tourism, making contact with child prostitutes and establishing contacts for subsequent sexual assault. **The anonymous nature of the internet allows offenders to masquerade as children in cyberspace to gain the confidence and trust of their victims over a period of time before introducing a sexual element into the online conversation and eventually arranging a physical meeting. The lack of visual cues in cyberspace that may assist child victims in making judgments about the suitability, trustworthiness and sincerity of others with whom they communicate also facilitates the grooming process for offenders. Another emerging risk relating to online child exploitation is ‘rape’ crimes that take place in online gaming or virtual worlds.** These forms of virtual crimes can potentially cause real psychological, social and financial harms to their victims, particularly children.

Personal information online: Part of the grooming process involves eliciting personal information from children. This can be for purposes of sexual gratification itself, use in evading detection, or use in other illegal activities, such as cases involving fraud and deception. In online child grooming cases, offenders have been known to use the internet to gather private information on their child victims to further their criminal pursuit with little risk of interdiction. Search engines are an invaluable tool that can be abused to locate publicly available information concerning children and their activities. Private information about a target child can also be obtained by engaging the victim in conversation in public domain sites such as chat rooms and online gaming forum sites. Another effective way of obtaining personal information and pictures of children is to browse personal profiles set up on sites such as MySpace, Facebook and Friendster.

6.2.1.13 [Picheta \(2019\)](#). Instagram is leading social media platform for child grooming. *CNN*.

EXCERPT: *ore children are being groomed on Instagram than on other social media platforms, new figures suggest, leading to calls for tech companies to face stronger child welfare regulations.*

Overall, police in England and Wales have recorded more than 5,000 cases of online grooming since having sexual communications with a child became a crime in April 2017, child protection charity the NSPCC found.

Instagram was used in a third of cases where a method was disclosed, while Facebook was used in 23% of cases and Snapchat in 14%. **The number of cases on Instagram that police dealt with rose by 200% in the space of a year.**

Girls aged 12 to 15 were most likely to be targeted by groomers, and victims included children as young as five years old, according to the group, which based its figures on freedom of information requests to 39 of the 43 police forces in England and Wales.

6.2.1.14 Exploitation cases on social media

- [Twitter Thread](#)
- [Newton, C. \(2022, August 30\). How Twitter's child porn problem ruined its plans for an OnlyFans competitor.](#) The Verge.

6.2.1.15 [Bowles & Keller \(2019\)](#). Video Games and Online Chats Are 'Hunting Grounds' for Sexual Predators. *The New York Times*.

EXCERPT: Sexual predators and other bad actors have found an easy access point into the lives of young people: They are meeting them online through multiplayer video games and chat apps, making virtual connections right in their victims' homes.

The criminals strike up a conversation and gradually build trust. Often they pose as children, confiding in their victims with false stories of hardship or self-loathing. Their goal, typically, is to dupe children into sharing sexually explicit photos and videos of themselves — which they [use as blackmail for more imagery](#), much of it increasingly graphic and violent.

Reports of abuse are emerging with unprecedented frequency around the country, with some perpetrators grooming hundreds and even thousands of victims, according to a review of prosecutions, court records, law enforcement reports and [academic studies](#). Games are a common target, but predators are also finding many victims on social platforms like Instagram and Kik Messenger.

„There are many ways for gamers to meet online. They can use built-in chat features on consoles like Xbox and services like Steam, or connect on sites like Discord and Twitch. The games have become extremely social, and developing relationships with strangers on them is normal.

“These virtual spaces are essentially hunting grounds,” said Mary Anne Franks, a professor at the University of Miami School of Law and president of the Cyber Civil Rights Initiative, a nonprofit group dedicated to combating online abuse.

...“Tech has made it easier for predators to get our kids faster and more efficiently,” he said, adding that it made children vulnerable by “normalizing communication with strangers.” Today, even games meant for small children, like on Roblox, allow players to chat with others.... When announcing the arrests, the authorities highlighted Fortnite, Minecraft and Roblox as platforms where suspects began conversations before moving to chat apps. Nearly all those arrested had made arrangements to meet in person... Any young person who converses online with strangers is at risk. In 2018, three men from across the country were convicted of running a sextortion ring for years that lured hundreds of children, some as young as 8, from social and video-streaming platforms that included LiveMe; Omegle; Musical.ly, the predecessor of TikTok; Skype; Snapchat; and Twitter’s Periscope. The men pretended to be teenage boys and girls and coerced children into undressing and performing explicit acts. They shared files and information about the victims over Discord. In another case, a girl attending high school in Tennessee thought she had made a new female friend on Kik Messenger. They both loved volleyball, and they even resembled each other physically, their profile photos showed. They chatted for six months...After the teenager shared a partially nude photo of herself, the “friend” became threatening and demanded that she record herself performing explicit acts. “You literally have no choice but to obey unless u want ur pics spread to your friends,” the person wrote, according to court records. The girl told her mother, who called the police. The offender was a Louisiana man, Matthew Chaney Walker, who was 24 years old at the time of the chat in 2014. **The police said Mr. Walker, now in prison, had forced more than 50 girls to send him nude and sexually explicit photos. [one guy, 50 traumatized girls, and their families. Multiply this guy times 100,000]**

IMAGES:

 You've been tricked. I'm a guy. And I will email all the pics u sent to your school I would not block me or delete kik, because if you do that, I'm still sending it to your school. If you obey me and do everything I want, then I will delete your pics and I will not email your school. But I warn you, if you disobey me once, I will send your pics

Okay what do I have to do?

 It'll involve nudes

Take ur bra off and show your boobs

I'm crying

Please is there anything else I can do?

 Nope

Just 1 pic?

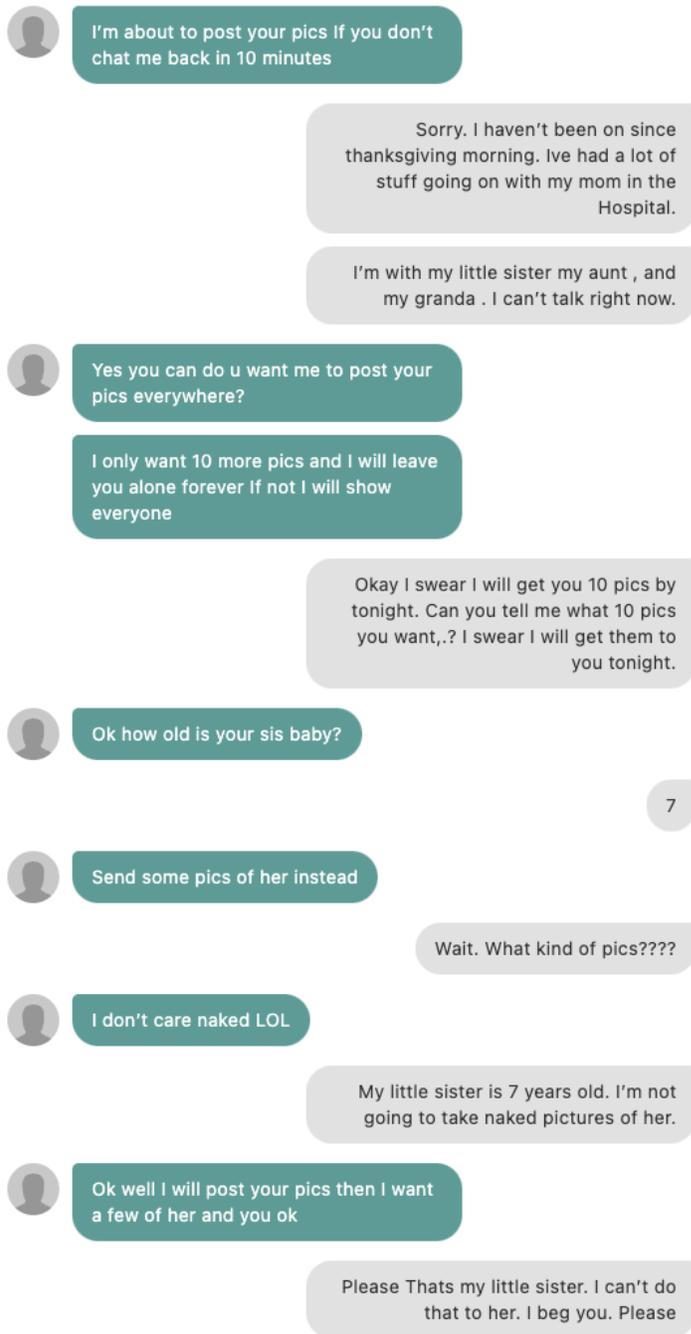
 No. I will let you know when we are done.

If I don't send you nudes, what is my other option?

 There is literally no other option.

Please give me another option.

Source: United States District Court for the Middle District of Louisiana.
Note: This conversation has been edited for clarity.



Source: United States District Court for the Middle District of Florida.
 Note: This conversation has been edited for clarity.

6.2.1.16 [Dance, & Keller \(2019\)](#). An Explosion in Online Child Sex Abuse: What You Need to Know. *The New York Times*.

EXCERPT: Tech companies are reporting a boom in online photos and videos of children being sexually abused — a record 45 million illegal images were flagged last year alone — exposing a system at a breaking point and unable to keep up with the perpetrators, [an investigation by The New York Times](#) found.

6.2.1.17 [Keller, & Dance \(2019\)](#). The Internet Is Overrun With Images of Child Sexual Abuse. What Went Wrong? *The New York Times*.

ABSTRACT: The images are horrific. Children, some just 3 or 4 years old, being sexually abused and in some cases tortured.

Pictures of child sexual abuse have long been produced and shared to satisfy twisted adult obsessions. But it has never been like this: Technology companies reported a record 45 million online photos and videos of the abuse last year.

...A [paper recently published](#) in conjunction with that group, the National Center for Missing and Exploited Children, described a system at “a breaking point,” with reports of abusive images “exceeding the capabilities of independent clearinghouses and law enforcement to take action.” It suggested that future advancements in machine learning might be the only way to catch up with the criminals.

...In a particularly disturbing trend, online groups are devoting themselves to sharing images of younger children and more extreme forms of abuse. The groups use encrypted technologies and the dark web, the vast underbelly of the internet, to teach [pedophiles](#) how to carry out the crimes and how to record and share images of the abuse worldwide. In some online forums, children are forced to hold up signs with the name of the group or other identifying information to prove the images are fresh.

...The videos found on the computer of an Ohio man were described by investigators as among “the most gruesome and violent images of child pornography.” One showed a woman orally forcing herself on a girl who was then held upside down by the ankles in a bathroom while “another child urinates” on her face, according to court documents.

Another showed a woman “inserting an ice cube into the vagina” of a young girl, the documents said, before tying her ankles together, taping her mouth shut and suspending her upside down. As the video continued, the girl was beaten, slapped and burned with a match or candle.

“The predominant sound is the child screaming and crying,” according to a federal agent quoted in the documents.’

The videos were stored in a hidden computer file and had also been encrypted, one common way abusive imagery has been able to race across the internet with impunity. Increasingly, criminals are using advanced technologies like encryption to stay ahead of the police. In this case, the Ohio man, who helped run a website on the dark web known as the Love Zone, had over 3 million photos and videos on his computers.

The site, now shuttered, had nearly 30,000 members and required them to share images of abuse to maintain good standing, according to the court documents. A private section of the forum was available only to members who shared imagery of children they abused themselves. They were known as “producers.”

Multiple police investigations over the past few years have broken up enormous dark web forums, including one known as [Child’s Play](#) that was reported to have had over a million user accounts.

IMAGE:

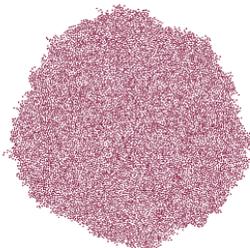
In 1998, there were over **3,000** reports of child sexual abuse imagery.

 — One dot represents 100 reports.

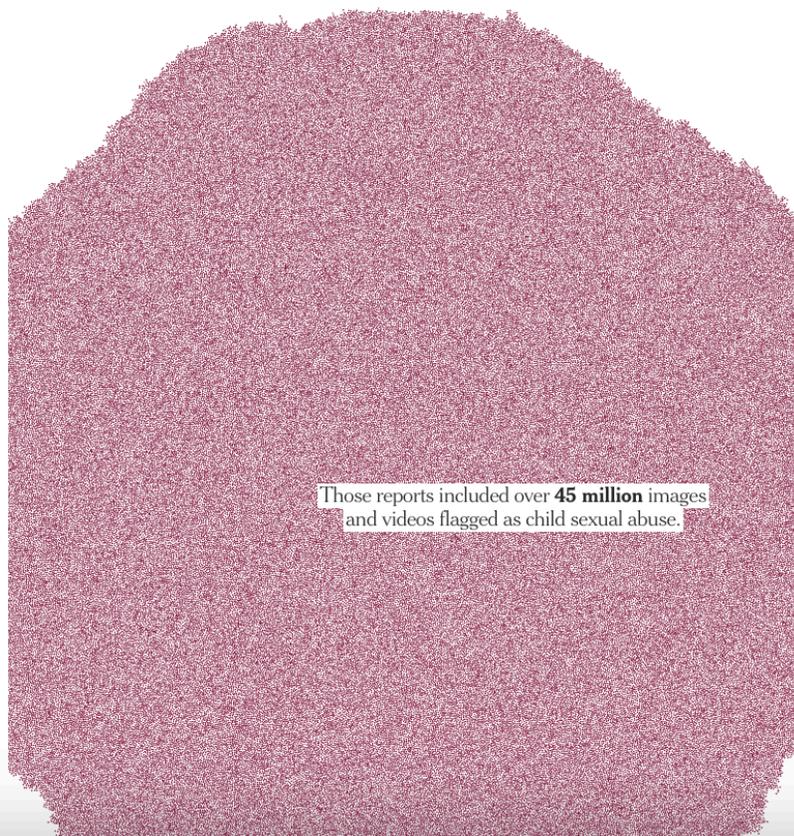
Just over a decade later, yearly reports soared past **100,000**.



In 2014, that number surpassed **1 million** for the first time.



Last year, there were **18.4 million**, more than one-third of the total ever reported.

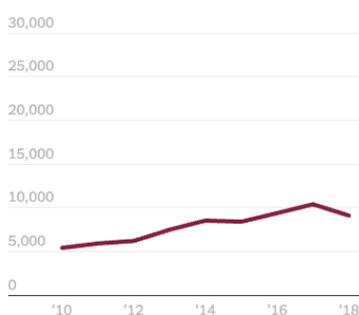


Those reports included over **45 million** images and videos flagged as child sexual abuse.

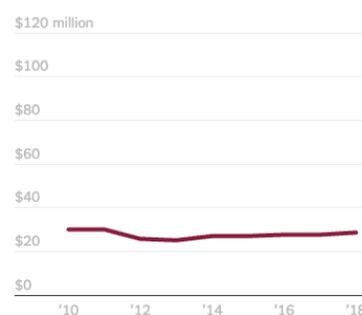
Reports to U.S. law enforcement agencies have proliferated ...



... while **arrests** have risen slightly ...



... but **federal funding** has remained almost flat.



Note: Data is for fiscal years.

By Rich Harris and Rumsey Taylor | Source: Justice Department

6.2.1.18 [Mendez \(2022\)](#). *The Teens Slipping Through the Cracks on Dating Apps*. The Atlantic.

EXCERPT: The exact number of minors who secretly make profiles is hard to quantify, but estimations exist. According to a [Northwestern University study](#) published in 2018, more than 50 percent of sexually active gay and bisexual underage boys have had sex with people they met on apps such as Grindr.

...Tristien Nguyen, a 19-year-old gay man, who started a Grindr account at age 15, summed up the situation bluntly: “I only met up with creeps, I only talked to creeps, and it changed my viewpoint on older people in my community.” He felt deeply unsettled that so many men were willing to meet up after learning his true age. “Some of them were old enough to be my grandpa,” he told me about the people who messaged him. Nguyen’s profile was flagged and taken down several times, but each time he found that making a new one was easy.

...he [GBH News Center for Investigative Reporting found](#) that from 2015 to 2021, more than 100 men—including police officers, teachers, and priests—were charged in the United States with crimes related to sexually assaulting minors or attempting to engage in a sexual act with a minor through Grindr.

...Similarly, the United Kingdom’s Sunday Times [has reported](#) that, from 2015 to 2019, there were at least 30 cases of child rape and 60 cases of children being otherwise

sexually exploited on dating apps in the U.K. (Both Tinder and Grindr emphasized their efforts to keep minors off their platform in statements to The Sunday Times.)

6.2.1.19 [Keller & Dance \(2019\)](#). Child Abusers Run Rampant as Tech Companies Look the Other Way. *The New York Times*.

EXCERPT: “The first thing people need to understand is that any system that allows you to share photos and videos is absolutely infested with child sexual abuse,” said Mr. Stamos, the former security chief at Facebook and Yahoo, who is now a professor at Stanford.

Criminals often discuss in online forums and chat groups how to exploit vulnerabilities in platforms, the criminal cases show. They carefully follow the prosecutions of people who have been found with explicit imagery and learn from them. There are even online manuals that explain in graphic detail how to produce the images and avoid getting caught.

--High stakes

- +no way to reliably limit who can contact you
- +kids don't tell their parents about what happens to them online
- +internet is forever
- +nothing a child does online can go away
- +anything a google search can find will impact ability to get a job
- +the whole world is a potential audience]

6.2.1.20 [Keller \(2024\)](#). “A Marketplace of Girl Influencers Managed by Moms and Stalked by Men.” *The New York Times*.

EXCERPT: Nearly [one in three preteens](#) lists influencing as a career goal, and [11 percent of those born in Generation Z](#), between 1997 and 2012, describe themselves as influencers. The so-called creator economy surpasses \$250 billion worldwide, according to Goldman Sachs, with U.S. brands spending more than \$5 billion a year on influencers. Health and technology experts [have recently cautioned](#) that **social media presents a “profound risk of harm” for girls**. Constant comparisons to their peers and face-altering filters are driving negative feelings of self-worth and promoting objectification of their bodies, researchers found. But **the pursuit of online fame, particularly through Instagram, has supercharged the often toxic phenomenon**, The Times found, encouraging parents to commodify their children's images. Some of the child influencers earn six-figure incomes, according to interviews.

In the dance and gymnastics worlds, teens and preteens jockey to become brand ambassadors for products and apparel. They don bikinis in Instagram posts, walk runways in youth fashion shows and offer paid subscriptions to videos showing the everyday goings-on of children seeking internet fame.

In 2022, Instagram launched paid subscriptions, which allows followers to pay a monthly fee for exclusive content and access. The rules don't allow subscriptions for anyone under 18, but the mom-run accounts sidestep that restriction. The Times found dozens that charged from 99 cents to \$19.99. At the highest price, **parents offered “ask me anything” chat sessions and behind-the-scenes photos.**

“You are so sexy,” read one comment on an image of a 5-year-old girl in a ruffled bikini. “Those two little things look great thru ur top,” said another on a video of a girl dancing in a white cropped shirt, who months later posted pictures of her 11th birthday party.

In monitoring multiple Telegram chat rooms, **The Times found men who treat children’s Instagram pages and subscription services as menus to satisfy their fantasies.** They trade information about parents considered receptive to producing and selling “private sets” of images. **“I’m so glad for these new moms pimping their daughters out,”** wrote one of them. “And there’s an infinite supply of it — literally just refresh your Instagram Explore page there’s fresh preteens.” A small group of men go even further and cultivate business and patronage relationships with mothers. **“It’s almost like the girls become a currency,”** said the gymnast’s mother, who did not want to be named

[What are we missing?]

6.2.2 EVIDENCE AND ESSAYS INDICATING LITTLE TO NO SEXUAL SOLICITATION AND PREDATION

[What are we missing?]

6.2.3 ILLUSTRATIONS

[What are we missing?]

6.3 SUICIDE

6.3.1 EVIDENCE AND ESSAYS INDICATING CAUSAL CONNECTIONS BETWEEN DIGITAL MEDIA AND SUICIDE

6.3.1.1 [van Geel, Vedder, & Tanilon \(2014\)](#). Relationship Between Peer Victimization, Cyberbullying, and Suicide in Children and Adolescents: A Meta-analysis. *JAMA Pediatrics*.

ABSTRACT: IMPORTANCE: Peer victimization is related to an increased chance of suicidal ideation and suicide attempts among children and adolescents.

OBJECTIVE: To examine the relationship between peer victimization and suicidal ideation or suicide attempts using meta-analysis.

DATA SOURCES: Ovid MEDLINE, PsycINFO, and Web of Science were searched for articles from 1910 to 2013. The search terms were bully*, teas*, victim*, mobbing, ragging, and harassment in combination with the term suic*. Of the 491 studies identified, 34 reported on the relationship between peer victimization and suicidal ideation, with a total of 284 375 participants. Nine studies reported on the relationship between peer victimization and suicide attempts, with a total of 70 102 participants.

STUDY SELECTION: Studies were eligible for inclusion if they reported an effect size on the relationship between peer victimization and suicidal ideation or suicide attempt in children or adolescents.

DATA EXTRACTION AND SYNTHESIS: Two observers independently coded the effect sizes from the articles. Data were pooled using a random effects model.

Main Outcomes and Measures This study focused on suicidal ideation and suicide attempts. Peer victimization was hypothesized to be related to suicidal ideation and suicide attempts.

RESULTS: Peer victimization was found to be related to both suicidal ideation (odds ratio, 2.23 [95% CI, 2.10-2.37]) and suicide attempts (2.55 [1.95 -3.34]) among children and adolescents. Analyses indicated that these results were not attributable to publication bias. Results were not moderated by sex, age, or study quality.

Cyberbullying was more strongly related to suicidal ideation compared with traditional bullying.

CONCLUSIONS: Peer victimization is a risk factor for child and adolescent suicidal ideation and attempts. Schools should use evidence-based practices to reduce bullying.

[NOTE from CHT: **Children who have been cyberbullied are 3x more likely to contemplate suicide compared to their peers. The experience of being bullied online is significantly more harrowing than "traditional bullying", potentially due to the victim's awareness that this is taking place in front of a much larger public audience.**"]

6.3.1.2 [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/internet use 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.

6.3.1.3 [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 deliberate 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.**

6.3.1.4 [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.

6.3.1.5 [Mantey, Yockey, & Springer \(2022\)](#). Digital screen time and suicidality during high school: How important is cyberbullying? A mediation analysis using the youth risk behavioral surveillance survey, 2011–2019. *Preventive Medicine*.

ABSTRACT: Elevated digital screen time (i.e., 2+ hours per day) is associated with suicidal ideations, planning, and attempts during adolescence. Recent studies suggest quality, rather than duration, of digital screen time is most impactful on adolescent mental health. We investigate the role of cyberbullying victimization on the relationship between elevated digital screen time and risk factors for completed suicide. We pooled five years of biennial Youth Risk Behavioral Surveillance (YRBS) survey data (2011–2019). Participants were $n = 73,011$ high school students in the United States (US). Elevated digital screen time reflected spending 3 h (or more) per day on leisure, digital media. Outcome variables were: (1) feeling sad/hopeless; (2) suicidal ideation; (3) suicidal planning; and (4) suicide attempt. Structural equation models (SEMs) tested the mediating effects of self-reported online bullying victimization (i.e., cyberbullying) on the effect of elevated digital screen time on suicidality. We controlled for age, sex, race/ethnicity, and survey year. Subsample analyses stratified by sex were also conducted. Overall, 40.5% of high school students reported elevated digital screen time and 15.4% reported cyberbullying. **Cyberbullying mediated a substantial proportion of the relationship between digital screen time and feeling sad/hopeless (16%), suicidal ideation (18%), planned suicide attempt (18%), and past suicide attempt (26%), among high school students, controlling for covariates.** Similar mediating effects were observed in models stratified by sex. Findings reinforce prior research demonstrating that the quality of leisure, digital media strongly influences the relationship between digital screen time and mental health during adolescence. Findings need replication via longitudinal designs.

[What are we missing?]

6.3.2 EVIDENCE AND ESSAYS DISPUTING A CAUSAL CONNECTION BETWEEN DIGITAL MEDIA AND SUICIDE

6.3.2.1 [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.

[What are we missing?]

6.3.3 ILLUSTRATIONS

https://www.reddit.com/r/nosurf/comments/l1uvge/ive_been_struggling_with_depression_and_suicide/

ive been struggling with depression and suicide for years, i think youtube might be a big part of it

i spend hours watching youtube, or netflix, or twitch, or porn. and i feel like it might just be avoiding myself. i dont know if i can stop. i dont even know if i should. and i guess posting on a subreddit dedicated to stopping is probably not a good way to find out because the answers will be really biased. but to be honest any answer would be better than where im headed.

[What are we missing?]

6.4 POLITICAL EXTREMISM AND IDEOLOGIES

A list of studies addressing issues of social media and political dysfunction can be found in our additional document: [Social Media and Political Dysfunction: A Collaborative Review](#).

6.4.1 EVIDENCE AND ESSAYS INDICATING INCREASED POLITICAL EXTREMISM AND IDEOLOGIES

6.4.1.1 [Horwitz & Seetharaman \(2020\)](#). Facebook executives shut down efforts to make the site less divisive. *Wall Street Journal*.

+algorithms privilege extremist information (youtube algorithm switch) and then create echo chambers around it

[NOTE from CHT: “64% of all extremist group joins are due to our recommendation tools...our recommendation systems grow the problem”, noted an internal Facebook presentation in 2016. Yet repeated attempts to counteract this have been repeatedly ignored, diluted, or deliberately shut down by senior Facebook officers, according to a 2020 Wall Street Journal investigation. In 2018, Facebook managers told employees the company’s priorities were shifting “away from societal good to individual value.”]

6.4.1.2 [Brady, Wills, Jost, Tucker, & Van Bavel \(2017\)](#). Emotion shapes the diffusion of moralized content in social networks. *Proceedings of the National Academy of Sciences*.

+moral outrage rises to the surface

ABSTRACT: Political debate concerning moralized issues is increasingly common in online social networks. However, moral psychology has yet to incorporate the study of social networks to investigate processes by which some moral ideas spread more rapidly or broadly than others. Here, we show that the expression of moral emotion is key for the spread of moral and political ideas in online social networks, a process we call “moral contagion.” Using a large sample of social media communications about three polarizing moral/political issues (n = 563,312), we observed **that the presence of moral-emotional words in messages increased their diffusion by a factor of 20% for each additional word. Furthermore, we found that moral contagion was bounded by group membership; moral-emotional language increased diffusion more strongly within liberal and conservative networks, and less between them.** Our results highlight the importance of emotion in the social transmission of moral ideas

and also demonstrate the utility of social network methods for studying morality. These findings offer insights into how people are exposed to moral and political ideas through social networks, thus expanding models of social influence and group polarization as people become increasingly immersed in social media networks.

6.4.1.3 [Pennycook, Cannon, & Rand \(2018\)](#). *Prior Exposure Increases Perceived Accuracy of Fake News*. *Journal of Experimental Psychology: General*.

+it is difficult to unlearn fake news

ABSTRACT: The 2016 U.S. presidential election brought considerable attention to the phenomenon of “fake news”: entirely fabricated and often partisan content that is presented as factual. Here we demonstrate one mechanism that contributes to the believability of fake news: fluency via prior exposure. Using actual fake-news headlines presented as they were seen on Facebook, **we show that even a single exposure increases subsequent perceptions of accuracy, both within the same session and after a week. Moreover, this “illusory truth effect” for fake-news headlines occurs despite a low level of overall believability and even when the stories are labeled as contested by fact checkers or are inconsistent with the reader’s political ideology. These results suggest that social media platforms help to incubate belief in blatantly false news stories and that tagging such stories as disputed is not an effective solution to this problem.** It is interesting, however, that we also found that prior exposure does not impact entirely implausible statements (e.g., “The earth is a perfect square”). These observations indicate that although extreme implausibility is a boundary condition of the illusory truth effect, only a small degree of potential plausibility is sufficient for repetition to increase perceived accuracy. As a consequence, the scope and impact of repetition on beliefs is greater than has been previously assumed.

[What are we missing?]

6.4.2 EVIDENCE AND ESSAYS INDICATING THAT THERE IS LITTLE OR NO INCREASE IN POLITICAL EXTREMISM AND IDEOLOGIES

[What are we missing?]

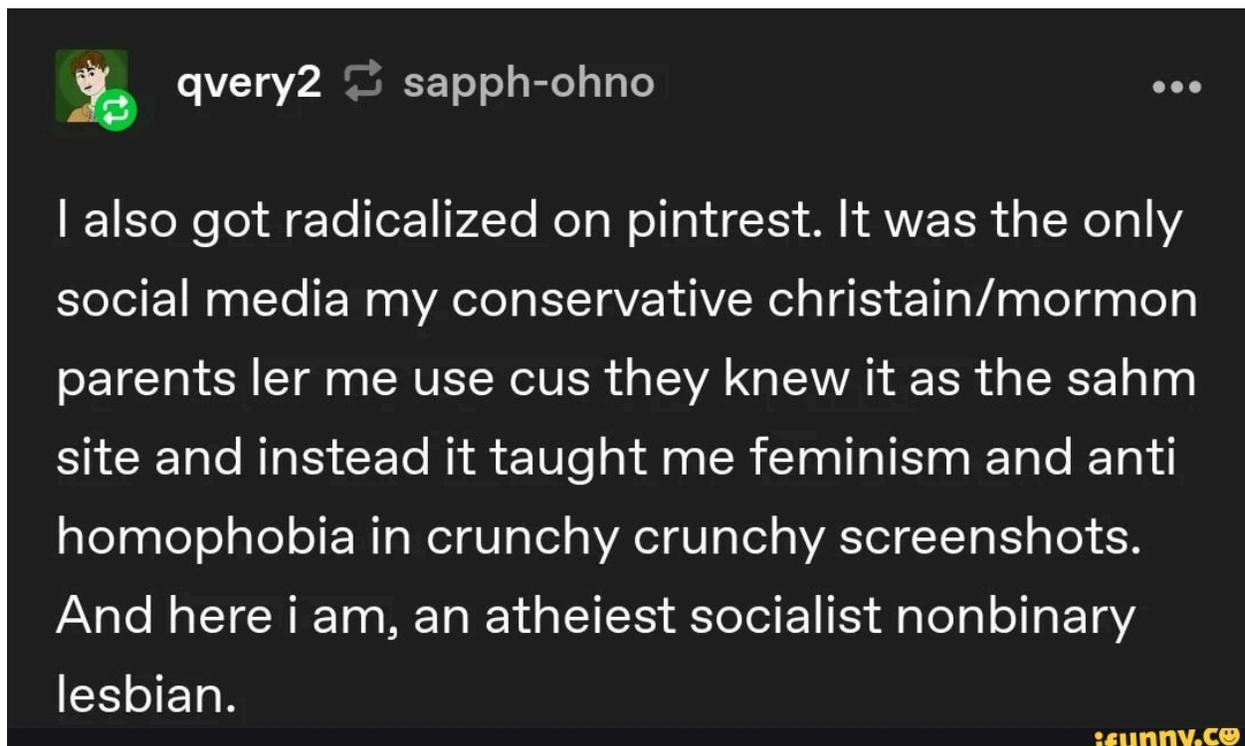
6.4.3 ILLUSTRATIONS

https://www.reddit.com/r/TrueOffMyChest/comments/gl83ar/i_feel_like_im_being_radicalized/

I feel like I'm being radicalized

I feel myself being further radicalized every day politically. I used to keep my social media feed very apolitical, but the past few years have pushed me further and further towards limiting my interaction with the other side so much that I've created an echo chamber. In the past month I've unfriended people spreading misinformation and started commenting and posting much more political posts.

As I sit here typing this I just left a small dinner with friends after getting into a shouting match with someone over politics and storming off. I embarrassed the hell out of myself. I found myself telling a friend who encouraged me to talk it out with him "I've talked to people like him before, he will never change his mind." and I realized what a tone deaf thing to say that is, but the thing is... I do believe that statement to be true and think it's futile to try and change someone's mind about politics right now. And I don't want to open my social media back up to people spreading lies. So I am being radicalized but don't know what to do about it.



From [Kill All Normies: Online Culture Wars form 4Chan and Tumblr to Trump and the Alt-Right](#) (Angela Nagle, 2017) pg 63-64:

The following are just a few of the ever-expanding list of genders, now in the hundreds, all taken directly from Tumblr:

Alexigender – Gender identity that is fluid between more than one gender, but the individual cannot tell what those genders are.

Ambigender – A feeling of two genders simultaneously, but without fluidity/shifting. May be used synonymously in some cases with bigender.

Anxiegender – A gender affected by anxiety.

Cadensgender – A gender that is easily influenced by music.

Cassflux – When your level of indifference towards your gender fluctuates.

Daimogender – A gender closely related to demons and the supernatural.

Expecgender – A gender that changes depending on who you are around.

Faegender – A gender that changes with the seasons, equinoxes and moon phases.

Fissgender – A gender experience that is in some way split, similar to bigender or demigenders.

Generale – A gender that is hard to describe. Mainly associated with plants, herbs and liquids.

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Kingender – A gender somehow related to being otherkin.

Levigender – A lightweight, superficial gender you don't feel very much.

Necrogender – A gender that used to exist but is now 'dead' or nonexistent.

Omnigay – Genderfluid, with one's attraction to other genders changing with one's gender, so that the individual is always attracted to the same gender.

Perigender – Identifying with a gender, but not as that gender.

Polygenderflux – Having more than one gender, which intensity fluctuates.

Technogender – Only comfortable with one's gender when using technology/online, usually because of social anxiety (specialized for people with anxiety disorders).

Xoy – Someone who identifies in some way as a nonbinary boy or nonbinary boy-adjacent.

Xirl – Someone who identifies in some way as a nonbinary girl or nonbinary girl-adjacent.

* * * * *

SECTION 7: THE EFFECTS OF DIGITAL MEDIA USE ON MENTAL HEALTH

This section includes studies on emotional contagion, iatrogenic illness, and mental illness. The list of studies addressing issues of depression, anxiety, self-harm and suicide can be found on our main document: [Adolescent Mood Disorders Since 2010: A Collaborative Review](#)

7.1 CONTAGION (INCLUDING EMOTIONS)

7.1.1 EVIDENCE AND ESSAYS INDICATING INCREASED CONTAGION

7.1.1.1 [The call is coming from within the house.](#) [RE: Tourettes]

7.1.1.2 [Hodas, & Lerman \(2014\)](#). The Simple Rules of Social Contagion. *Scientific Reports*.

ABSTRACT: It is commonly believed that information spreads between individuals like a pathogen, with each exposure by an informed friend potentially resulting in a naive individual becoming infected. However, empirical studies of social media suggest that individual response to repeated exposure to information is far more complex. As a proxy for intervention experiments, we compare user responses to multiple exposures on two different social media sites, Twitter and Digg. We show that the position of exposing messages on the user-interface strongly affects social contagion. Accounting for this visibility significantly simplifies the dynamics of social contagion. **The likelihood an individual will spread information increases monotonically with exposure, while explicit feedback about how many friends have previously spread it increases the likelihood of a response.** We provide a framework for unifying information visibility, divided attention and explicit social feedback to predict the temporal dynamics of user behavior.

7.1.1.3 [Hodas, & Lerman \(2012\)](#). How Visibility and Divided Attention Constrain Social Contagion. *2012 International Conference on Privacy, Security, Risk and Trust and 2012 International Conference on Social Computing*.

ABSTRACT: How far and how fast does information spread in social media? Researchers have recently examined a number of factors that affect information

diffusion in online social networks, including: the novelty of information, users' activity levels, who they pay attention to, and how they respond to friends' recommendations. Using URLs as markers of information, we carry out a detailed study of retweeting, the primary mechanism by which information spreads on the Twitter follower graph. Our empirical study examines how users respond to an incoming stimulus, i.e., a tweet (message) from a friend, and reveals that dynamically decaying visibility, which is the increasing cognitive effort required for discovering and acting upon a tweet, combined with limited attention play dominant roles in retweeting behavior. Specifically, we observe that users retweet information when it is most visible, such as when it near the top of their Twitter feed. Moreover, our measurements quantify how a user's limited attention is divided among incoming tweets, providing novel evidence that highly connected individuals are less likely to propagate an arbitrary tweet. Our study indicates that the finite ability to process incoming information constrains social contagion, and we conclude that rapid decay of visibility is the primary barrier to information propagation online.

7.1.1.4 [Steinert \(2021\)](#). Corona and value change. The role of social media and emotional contagion. *Ethics and Information Technology*.

ABSTRACT: People share their emotions on social media and evidence suggests that in times of crisis people are especially motivated to post emotional content. The current Coronavirus pandemic is such a crisis. The online sharing of emotional content during the Coronavirus crisis may contribute to societal value change. Emotion sharing via social media could lead to emotional contagion which in turn could facilitate an emotional climate in a society. In turn, the emotional climate of a society can influence society's value structure. The emotions that spread in the current Coronavirus crisis are predominantly negative, which could result in a negative emotional climate. Based on the dynamic relations of values to each other and the way that emotions relate to values, a negative emotional climate can contribute to societal value change towards values related to security preservation and threat avoidance. As a consequence, a negative emotional climate and the shift in values could lead to a change in political attitudes that has implications for rights, freedom, privacy and moral progress. Considering the impact of social media in terms of emotional contagion and a longer-lasting value change is an important perspective in thinking about the ethical long-term impact of social media technology.

7.1.1.5 [Cheng, Li, Silenzio, & Caine \(2014\)](#). Suicide Contagion: A Systematic Review of Definitions and Research Utility. *PLOS ONE*.

ABSTRACT: OBJECTIVES: Despite the common use of contagion to analogize the spread of suicide, there is a lack of rigorous assessment of the underlying concept or theory supporting the use of this term. The present study aims to examine the varied definitions and potential utility of the term contagion in suicide-related research.

METHODS: 100 initial records and 240 reference records in English were identified as relevant with our research objectives, through systematic literature screening. We then conducted narrative syntheses of various definitions and assessed their potential value for generating new research.

RESULTS: 20.3% of the 340 records used contagion as equivalent to clustering (contagion-as-cluster); 68.5% used it to refer to various, often related mechanisms underlying the clustering phenomenon (contagion-as-mechanism); and 11.2% without clear definition. Under the category of contagion-as-mechanism, four mechanisms have been proposed to explain how suicide clusters occurred: transmission (contagion-as-transmission), imitation (contagion-as-imitation), contextual influence (contagion-as-context), and affiliation (contagion-as-affiliation). Contagion-as-cluster both confounds and constrains inquiry into suicide clustering by blending proposed mechanism with the phenomenon to be studied. Contagion-as-transmission is, in essence, a double or internally redundant metaphor. Contagion-as-affiliation and contagion-as-context involve mechanisms that are common mechanisms that often occur independently of apparent contagion, or may serve as a facilitating background. When used indiscriminately, these terms may create research blind spots.

Contagion-as-imitation combines perspectives from psychology, sociology, and public health research and provides the greatest heuristic utility for examining whether and how suicide and suicidal behaviors may spread among persons at both individual and population levels.

CONCLUSIONS: Clarifying the concept of “suicide contagion” is an essential step for more thoroughly investigating its mechanisms. Developing a clearer understanding of the apparent spread of suicide-promoting influences can, in turn, offer insights necessary to build the scientific foundation for prevention and intervention strategies that can be applied at both individual and community levels.

7.1.1.6 [Khasawneh, Madathil, Dixon, Wiśniewski, Zinzow, & Roth \(2020\)](#). Examining the Self-Harm and Suicide Contagion Effects of the Blue Whale Challenge on YouTube and Twitter: Qualitative Study. *JMIR Mental Health*.

ABSTRACT: BACKGROUND: Research suggests that direct exposure to suicidal behaviors and acts of self-harm through social media may increase suicidality through imitation and modeling, particularly in more vulnerable populations. One example of a social media phenomenon that demonstrates how self-harming behavior could

potentially be propagated is the blue whale challenge. In this challenge, adolescents and young adults are encouraged to engage in self-harm and eventually kill themselves. **OBJECTIVE:** This paper aimed to investigate the way individuals portray the blue whale challenge on social media, with an emphasis on factors that could pose a risk to vulnerable populations.

METHODS: We first used a thematic analysis approach to code 60 publicly posted YouTube videos, 1112 comments on those videos, and 150 Twitter posts that explicitly referenced the blue whale challenge. We then deductively coded the YouTube videos based on the Suicide Prevention Resource Center (SPRC) safe messaging guidelines as a metric for the contagion risk associated with each video.

RESULTS: The thematic analysis revealed that social media users post about the blue whale challenge to raise awareness and discourage participation, express sorrow for the participants, criticize the participants, or describe a relevant experience. **The deductive coding of the YouTube videos showed that most of the videos violated at least 50% of the SPRC safe and effective messaging guidelines.**

CONCLUSIONS: These posts might have the problematic effect of normalizing the blue whale challenge through repeated exposure, modeling, and reinforcement of self-harming and suicidal behaviors, especially among vulnerable populations such as adolescents. More effort is needed to educate social media users and content generators on safe messaging guidelines and factors that encourage versus discourage contagion effects.

Additional studies on blue whale challenge:

- <https://www.psychiatrist.com/pcc/depression/suicide/blue-whale-challenge-social-media-self-harm-suicide-contagion/>
- <https://pubmed.ncbi.nlm.nih.gov/29129013/>
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6341922/>
- <https://onlinelibrary.wiley.com/doi/10.1111/1556-4029.13880>

Articles on Blue Whale Challenge

- <https://www.bbc.com/news/world-asia-india-40960593>
- <https://www.vice.com/en/article/mgmwbn/the-truth-about-blue-whale-an-online-game-that-tells-teens-to-self-harm>
- <https://www.bbc.com/news/blogs-trending-46505722>
- https://en.wikipedia.org/wiki/Blue_Whale_Challenge#In_popular_culture
- <https://www.dcfp.org.uk/health-and-wellbeing/suicide-awareness/suicide-awareness-information-for-professionals/blue-whale/>

Stories about deaths that happened, where there are suspected connections to the challenge.

- <https://www.cnn.com/2017/07/17/health/blue-whale-suicide-game/index.html>
- <https://www.newindianexpress.com/states/tamil-nadu/2017/sep/01/blue-whale-challenge-at-least-75-whalers-in-tamil-nadus-madurai-1651006--1.html>
- <https://www.financialexpress.com/india-news/blue-whale-challenge-indore-boy-noted-tasks-in-school-diary-before-trying-to-kill-self/803991/>
- <https://zeenews.india.com/india/blue-whale-challenge-class-vi-student-hangs-himself-to-death-2037034.html>
- <https://www.webdo.tn/fr/actualite/national/les-jeux-la-baleine-bleue-et-mariam-de-sormais-interdits-en-tunisie/155936>
- See also the [“Fire Fairy” game](#)

List of 50 tasks:

https://www.educare.co.uk/files_cms/resources/What_is_the_blue_whale_challenge.pdf

Phillip Budeikin

- <https://www.dailymail.co.uk/news/article-4491294/Blue-Whale-game-mastermind-says-s-cleansing-society.html>
- https://metro.co.uk/2017/04/22/blue-whale-suicide-game-linked-to-130-teen-deaths-makes-its-way-to-uk-6590737/?ico=more_text_links
- <https://ria.ru/20170511/1494079056.html>

7.1.1.7 [Swedo... & Sumner \(2021\)](#). Associations Between Social Media and Suicidal Behaviors During a Youth Suicide Cluster in Ohio. *Journal of Adolescent Health*.

ABSTRACT: PURPOSE: Youth [suicide](#) clusters may be exacerbated by [suicide](#) contagion—the spread of suicidal behaviors. Factors promoting suicide contagion are poorly understood, particularly in the advent of social media. Using cross-sectional data from an ongoing youth suicide cluster in Ohio, this study examines associations between suicide cluster-related social media and suicidal behaviors.

METHODS: We surveyed 7th- to 12th-grade students in northeastern Ohio during a 2017–2018 suicide cluster to assess the prevalence of [suicidal ideation](#) (SI), suicide attempts (SAs), and associations with potential contagion-promoting factors such as suicide cluster-related social media, vigils, memorials, news articles, and watching the Netflix series *13 Reasons Why* before or during the cluster. Generalized estimating

equations examined associations between potential contagion-promoting factors and SI/SA, adjusting for nonmodifiable risk factors. Subgroup analyses examined whether associations between cluster-related factors and SI/SA during the cluster varied by previous history of SI/SA.

RESULTS: Among participating students, 9.0% (876/9,733) reported SI and 4.9% attempted suicide (481/9,733) during the suicide cluster. **Among students who posted suicide cluster–related content to social media, 22.9% (267/1,167) reported SI and 15.0% (175/1,167) attempted suicide during the suicide cluster. Posting suicide cluster–related content was associated with both SI (adjusted odds ratio 1.7, 95% confidence interval 1.4–2.0) and SA during the cluster (adjusted odds ratio 1.7, 95% confidence interval 1.2–2.5). In subgroup analyses, seeing suicide cluster–related posts was uniquely associated with increased odds of SI and SA during the cluster among students with no previous history of SI/SA.**

CONCLUSIONS: Exposure to suicide cluster–related social media is associated with both SI and SA during a suicide cluster. Suicide interventions could benefit from efforts to mitigate potential negative effects of social media and promote prevention messages.

7.1.1.8 [Carlyle, Guidry, Williams, Tabaac, & Perrin \(2018\)](#). Suicide conversations on Instagram™: Contagion or caring? *Journal of Communication in Healthcare*.

ABSTRACT: BACKGROUND: Suicide is a significant public health concern with approximately a million deaths from suicide worldwide each year. There is increasing evidence that media reporting of suicide can lead to imitative suicidal behaviors, and the World Health Organization's (WHO) guidelines for reporting suicides provided a framework of analysis. Given the use and reach of visual social media platforms like Instagram and the paucity of research focusing on the platform, the potential for contagion effects via a social media platform like Instagram should be considered. As such, understanding conversations about suicide on Instagram is of interest to health communicators, public health professionals, and mental health professionals alike.

METHOD: This study examines both the visual and textual components of suicide-themed posts on social media platform Instagram. A random sample of 500 Instagram posts including the hashtags #suicide and/or #suicidal were extracted from a larger sample collected during March-June 2016.

RESULTS: **Results show that self-harm was present in a majority of Instagram posts, and that posts that mention suicide ideation elicited higher engagement than posts that did not. Public health voices were largely absent from the conversation surrounding suicide on Instagram.** Finally, few of the constructive WHO recommendations to prevent media contagion were visible in the study sample.

These guidelines should be considered for participation in suicide-related online conversations.

CONCLUSIONS: Instagram appears to be used frequently for suicide-related communications. Public health and mental health professionals should consider increased involvement on this platform, as well as application of the WHO suicide contagion media guidelines.

7.1.1.9 [Ferrara, & Yang \(2015\)](#). Measuring Emotional Contagion in Social Media. PLOS ONE.

ABSTRACT: Social media are used as main discussion channels by millions of individuals every day. The content individuals produce in daily social-media-based micro-communications, and the emotions therein expressed, may impact the emotional states of others. A recent experiment performed on Facebook hypothesized that emotions spread online, even in absence of non-verbal cues typical of in-person interactions, and that individuals are more likely to adopt positive or negative emotions if these are over-expressed in their social network. Experiments of this type, however, raise ethical concerns, as they require massive-scale content manipulation with unknown consequences for the individuals therein involved. Here, we study the dynamics of emotional contagion using a random sample of Twitter users, whose activity (and the stimuli they were exposed to) was observed during a week of September 2014. Rather than manipulating content, we devise a null model that discounts some confounding factors (including the effect of emotional contagion). We measure the emotional valence of content the users are exposed to before posting their own tweets. We determine that on average a negative post follows an over-exposure to 4.34% more negative content than baseline, while positive posts occur after an average over-exposure to 4.50% more positive contents. We highlight the presence of a **linear relationship between the average emotional valence of the stimuli users are exposed to, and that of the responses they produce**. We also identify two different classes of individuals: highly and scarcely susceptible to emotional contagion. Highly susceptible users are significantly less inclined to adopt negative emotions than the scarcely susceptible ones, but equally likely to adopt positive emotions. In general, the likelihood of adopting positive emotions is much greater than that of negative emotions.

7.1.1.10 [Jouhki, Lauk., Penttinen, Sormanen, & Uskali \(2016\)](#). Facebook's Emotional Contagion Experiment as a Challenge to Research Ethics. *Media and Communication*.

ABSTRACT: This article analyzes the ethical discussion focusing on the Facebook emotional contagion experiment published by the Proceedings of the National Academy of Sciences in 2014. **The massive-scale experiment manipulated the News Feeds of a large amount of Facebook users and was successful in proving that emotional contagion happens also in online environments.** However, the experiment caused ethical concerns within and outside academia mainly for two intertwined reasons, the first revolving around the idea of research as manipulation, and the second focusing on the problematic definition of informed consent. The article concurs with recent research that the era of social media and big data research are posing a significant challenge to research ethics, the practice and views of which are grounded in the pre social media era, and reflect the classical ethical stances of utilitarianism and deontology.

7.1.1.11 [Goldenberg & Gross. \(2020\).](#) Digital Emotion Contagion. *Trends in Cognitive Sciences.*

ABSTRACT: People spend considerable time on digital media, and are thus often exposed to expressions of emotion by other people. This exposure can lead their own emotion expressions becoming more similar to those of others, a process we refer to as 'digital emotion contagion'. This article reviews the growing literature on digital emotion contagion. After defining emotion contagion, we suggest that one unique feature of **digital emotion contagion is that it is mediated by digital media platforms that are motivated to upregulate user emotions.** We then turn to measurement, and consider the challenges of demonstrating that digital emotion contagion has occurred, and how these challenges have been addressed. Finally, we call for a greater focus on understanding when emotion contagion effects are likely to be strong versus weak or nonexistent.

7.1.1.12 [Haltigan, Pringsheim, & Rajkumar \(2023\).](#) Social media as an incubator of personality and behavioral psychopathology: Symptom and disorder authenticity or psychosomatic social contagion? *Comprehensive Psychiatry.*

ABSTRACT: There has been an increasing recognition among both medical and psychological professionals, as well as the public media, of a **concerning trend for child and adolescent users of audiovisual-based, algorithmic social media platforms (e.g., TikTok) to present with or claim functional psychiatric impairment that is inconsistent with or distinct from classic psychiatric nosology.** In this short communication, we provide a detailed historical overview of this transdiagnostic phenomenon and suggest a conceptual model to organize thinking and research

examining it. We then discuss the implications of our suggested model for accurate assessment, diagnosis, and medical-psychiatric treatment. We believe there is an urgent need for focused empirical research investigation into this concerning phenomenon that is related to the broader research and discourse examining social media influences on mental health.

7.1.1.13 [Haltigan, Pringsheim, & Rajkumar \(2023\)](#). Social media as an incubator of personality and behavioral psychopathology: Symptom and disorder authenticity or psychosomatic social contagion? *Comprehensive Psychiatry*.

ABSTRACT: There has been an increasing recognition among both medical and psychological professionals, as well as the public media, of a concerning trend for child and adolescent users of audiovisual-based, algorithmic social media platforms (e.g., TikTok) to present with or claim functional psychiatric impairment that is inconsistent with or distinct from classic psychiatric nosology. In this short communication, we provide a detailed historical overview of this transdiagnostic phenomenon and suggest a conceptual model to organize thinking and research examining it. We then discuss the implications of our suggested model for accurate assessment, diagnosis, and medical-psychiatric treatment. We believe there is an urgent need for focused empirical research investigation into this concerning phenomenon that is related to the broader research and discourse examining social media influences on mental health.

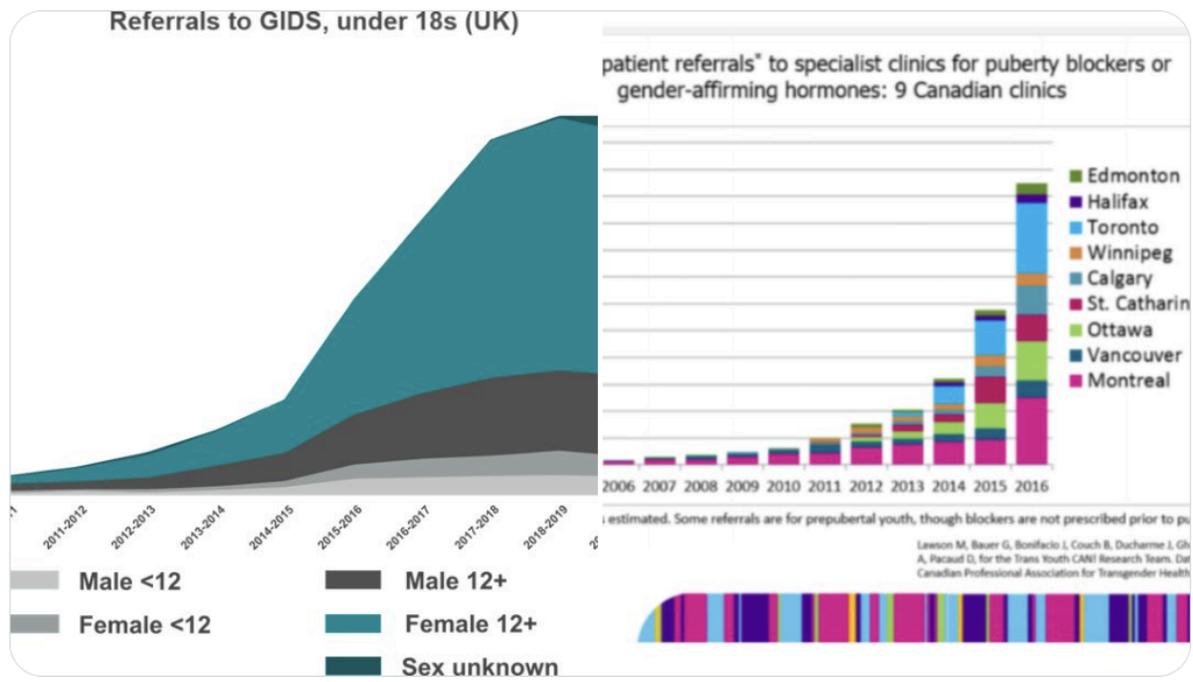
7.1.1.14 [Haltigan, Pringsheim, & Rajkumar \(2023\)](#). Social media as an incubator of personality and behavioral psychopathology: Symptom and disorder authenticity or psychosomatic social contagion? *Comprehensive Psychiatry*.

ABSTRACT: There has been an increasing recognition among both medical and psychological professionals, as well as the public media, of a concerning trend for child and adolescent users of audiovisual-based, algorithmic social media platforms (e.g., TikTok) to present with or claim functional psychiatric impairment that is inconsistent with or distinct from classic psychiatric nosology. In this short communication, we provide a detailed historical overview of this transdiagnostic phenomenon and suggest a conceptual model to organize thinking and research examining it. We then discuss the implications of our suggested model for accurate assessment, diagnosis, and medical-psychiatric treatment. We believe there is an urgent need for focused empirical research investigation into this concerning phenomenon that is related to the broader research and discourse examining social media influences on mental health.

7.1.1.15 [A Twitter Thread About Social Contagions by @ CryMiaRiver](#)



Just like bulimia, gender dysphoria was virtually unheard of in the teenage girl population prior to 2010, and then, all of a sudden, countries all over the industrialised world saw an explosion of adolescent girls identifying as transgender./7



10:06 AM · Feb 8, 2022

7.1.1.16 Social media challenges

- [Spread of dangerous challenges](#)
- [List of challenges](#)
- [Challenges that led to deaths](#)
- [Blackout challenge](#)
- [TikTok challenges](#)

- [Can't forget the good things](#)

7.1.1.17 [Christov-Moore, Simpson, Coudé, Grigaityte, Iacoboni, & Ferrari \(2014\)](#).

Empathy: Gender effects in brain and behavior. *Neuroscience and Biobehavioral Reviews*.

ABSTRACT: Evidence suggests that there are differences in the capacity for empathy between males and females. However, how deep do these differences go? Stereotypically, females are portrayed as more nurturing and empathetic, while males are portrayed as less emotional and more cognitive. Some authors suggest that observed gender differences might be largely due to cultural expectations about gender roles. However, empathy has both evolutionary and developmental precursors, and can be studied using implicit measures, aspects that can help elucidate the respective roles of culture and biology. This article reviews evidence from ethology, social psychology, economics, and neuroscience to show that there are fundamental differences in implicit measures of empathy, with parallels in development and evolution. Studies in nonhuman animals and younger human populations (infants/children) offer converging evidence that sex differences in empathy have phylogenetic and ontogenetic roots in biology and are not merely cultural byproducts driven by socialization. We review how these differences may have arisen in response to males' and females' different roles throughout evolution. Examinations of the neurobiological underpinnings of empathy reveal important quantitative gender differences in the basic networks involved in affective and cognitive forms of empathy, as well as a qualitative divergence between the sexes in how emotional information is integrated to support decision making processes. Finally, the study of gender differences in empathy can be improved by designing studies with greater statistical power and considering variables implicit in gender (e.g., sexual preference, prenatal hormone exposure). These improvements may also help uncover the nature of neurodevelopmental and psychiatric disorders in which one sex is more vulnerable to compromised social competence associated with impaired empathy.

KEY EXCERPT: In one study, females, compared to males, reported greater susceptibility to contagion and displayed more overt signs of contagion in a semi-naturalistic setting, for both positive and negative emotions ([Doherty et al., 1995](#)). Similarly, when providing support for a troubled friend, females experience more emotion contagion than males ([Magen and Konasewich, 2011](#)). In fact, females report experiencing emotion contagion more often than males in their daily lives ([Kevrekidis et al., 2008](#)). Females, compared to males, exhibit greater facial mimicry when viewing expressions ([Dimberg and Lundquist, 1990](#);

[Lundqvist, 1995](#); [Sonnby-Borgström et al., 2003](#)) and rely more than males on facial feedback for recognizing facial expressions ([Stel and van Knippenberg, 2008](#)).

7.1.1.18 [Alho, Gutvilig, Niemi, Komulainen, Böckerman, Webb, Elovainio, & Hakulinen \(2024\)](#). Transmission of Mental Disorders in Adolescent Peer Networks. *JAMA Psychiatry*.

ABSTRACT: IMPORTANCE: Previous research indicates that mental disorders may be transmitted from one individual to another within social networks. However, there is a lack of population-based epidemiologic evidence that pertains to the full range of mental disorders.

OBJECTIVE: To examine whether having classmates with a mental disorder diagnosis in the ninth grade of comprehensive school is associated with later risk of being diagnosed with a mental disorder.

DESIGN, SETTING, PARTICIPANTS: In a population-based registry study, data on all Finnish citizens born between January 1, 1985, and December 31, 1997, whose demographic, health, and school information were linked from nationwide registers were included. Cohort members were followed up from August 1 in the year they completed ninth grade (approximately aged 16 years) until a diagnosis of mental disorder, emigration, death, or December 31, 2019, whichever occurred first. Data analysis was performed from May 15, 2023, to February 8, 2024.

EXPOSURE: The exposure was 1 or more individuals diagnosed with a mental disorder in the same school class in the ninth grade.

OUTCOMES: Being diagnosed with a mental disorder during follow-up.

RESULTS: Among the 713 809 cohort members (median age at the start of follow-up, 16.1 [IQR, 15.9-16.4] years; 50.4% were males), 47 433 had a mental disorder diagnosis by the ninth grade. Of the remaining 666 376 cohort members, 167 227 persons (25.1%) received a mental disorder diagnosis during follow-up (7.3 million person-years). **A dose-response association was found, with no significant increase in later risk of 1 diagnosed classmate (HR, 1.01; 95% CI, 1.00-1.02), but a 5% increase with more than 1 diagnosed classmate (HR, 1.05; 95% CI, 1.04-1.06).** The risk was not proportional over time but was highest during the first year of follow-up, showing a 9% increase for 1 diagnosed classmate (HR, 1.09; 95% CI, 1.04-1.14), and an 18% increase for more than 1 diagnosed classmate (HR, 1.18; 95% CI, 1.13-1.24). Of the examined mental disorders, the **risk was greatest for mood, anxiety, and eating disorders. Increased risk was observed after adjusting for an array of parental, school-level, and area-level confounders.**

Conclusions and Relevance The findings of this study suggest that mental disorders might be transmitted within adolescent peer networks. More research is required to elucidate the mechanisms underlying the possible transmission of mental disorders.

[What are we missing?]

7.1.2 EVIDENCE AND ESSAYS INDICATING THAT THERE IS LITTLE OR NO INCREASE IN CONTAGION

[What are we missing?]

7.1.3 ILLUSTRATIONS

7.1.3.1

https://www.reddit.com/r/bulimia/comments/j4hnnf/tw_tiktok_is_literally_turning_into_pro_ana_and/

EXCERPT: Like, am i the only one having hundreds of videos where people give you tips n shit? Literally havent purged in like 2 weeks but tiktok was like "nah fam, how bout showing you new ways to purge?" 🙄👄🙄 bro stop romanticizing that shit, my Partner doesnt really enjoy finding me on the bathroom floor, puke all over my ugleh face luv.

7.1.3.2

<https://www.edsupportforum.com/threads/skinny-tik-tok-girls-trigger-me.3877161/>

EXCERPT: I always see these skinny girls on tik tok or instagram doing their "getting ready for hoco" or any other trend that involves your body and they always manage to trigger me or make me never want to eat again.

7.1.3.3

https://www.reddit.com/r/DecidingToBeBetter/comments/r4tmlq/deleted_tiktok_for_the_sake_of_my_mental_health/

EXCERPT: for the past month or so i've become increasingly insecure, angry, irritable, triggered (SO easily) and emotionally numb. i've not been able to be present, have had constant ear worms (songs stuck in my head) and have absolutely spiralled. i've lashed out at loved ones and pushed friends away. my memory and attention span has gone to

shit, i'm constantly zoning out. comparison, low self-esteem and self doubt have been rampant.

7.1.3.4

<https://slate.com/technology/2022/02/instagram-tiktok-influencer-social-media-dangers.html>

EXCERPT: I've been on the other side of influencing, of course—a victim to its insidious powers. I'm mindlessly scrolling, and then a bright color, beautiful face, or particular texture catches my eye. I tap on the photo and am pleased to discover the product is tagged. Suddenly I have a digital shopping cart and hopeful visions of my future self. I'm not buying a \$70 shirt. I am buying poreless skin, a flat stomach, long legs. I'm buying a type of beauty that I will never have. I recognize (and worry) that when I post images of my own body on social media—advertising clothes or powders or lotions—I may be the very source of toxic thought spirals of body comparison for other women.

7.1.3.5

<https://www.teenvogue.com/story/7-teens-on-instagram-filters-social-media-and-mental-health>

EXCERPT: This is the danger with filters: they're so easy — just a click away, and so they start to seem real. They make having no pores, no blemishes, and perfect skin seem like the norm. They allow you to put an image into the world that isn't really you. It took me a long time to realize that the people that looked angelic in my eyes had been manipulated into looking that way.

[What are we missing?]

7.2 IATROGENIC ILLNESS

7.2.1 EVIDENCE AND ESSAYS INDICATING INCREASED IATROGENIC ILLNESS

[What are we missing?]

7.2.2 EVIDENCE AND ESSAYS INDICATING THAT THERE IS LITTLE OR NO INCREASE IN IATROGENIC ILLNESS

[What are we missing?]

7.2.3 ILLUSTRATIONS

[What are we missing?]

7.3 DEPRESSION AND ANXIETY

The list of studies addressing issues of depression, anxiety, self-harm and suicide can be found on our main document: [Adolescent Mood Disorders Since 2010: A Collaborative Review](#)

<https://hiplatina.com/being-a-social-media-influencer-has-impacted-my-mental-health/>

The hundreds of dollars and time spent on one Instagram photo felt like a waste. Nothing was perfect enough to post. Even though I was preaching self-love, I was doing the complete opposite with myself. I kept comparing my Instagram page to other influencers whose images were prettier. I began to measure my personal worth and the value of my work with the amount of likes my images were getting.

I fell into a depressive episode and cried for days feeling unworthy of what I did and what I was representing online. I felt inadequate and constantly questioned every little thing I did. I thought it was just me feeling this pressure to constantly stay relevant online and to create content.

8. THE FUTURE OF TECHNOLOGY

What is life like in (social) outer space for teens?

Here are all the asteroids coming at them. Kids just don't belong in space.

8.1 THE METAVERSE AND AUGMENTED/VIRTUAL REALITY

8.1.1 EVIDENCE AND ESSAYS SHOWING/PREDICTING HARMS

[What are we missing?]

8.1.2 EVIDENCE AND ESSAYS SHOWING/PREDICTING BENEFITS OR NO HARM

[What are we missing?]

8.2 ARTIFICIAL INTELLIGENCE AND ROBOTICS

Major AI Platforms:

- [Imagen](#) (Google)
- [Chat GPT 3.5](#) (Open.AI)
- [DALL-E2](#) Open.AI)
- [Midjourney](#)

8.2.1 EVIDENCE AND SHOWING/ESSAYS PREDICTING HARMS

8.2.1.1 [Powell, Flynn, & Henry \(2018\)](#). AI can now create fake porn, making revenge porn even more complicated. *The Conversation*.

EXCERPT: The technology uses an AI method known as “[deep learning](#)”, which involves feeding a computer data that the computer then uses to make decisions. In the case of fake porn, the computer will assess which facial images of a person will be most convincing as a face swap in a pornographic video.

Known as “morph” porn, or “parasite porn”, fake sex videos or photographs are not a new phenomenon. But what makes deepfakes a new and concerning problem is that AI-generated pornography looks significantly more convincing and real.

...Creating, distributing or threatening to distribute fake pornography without the consent of the person whose face appears in the video is a form of “image-based sexual abuse” ([IBSA](#)). Also known as “non-consensual pornography” or “revenge porn”, it is an invasion of privacy and a violation of the right to dignity, sexual autonomy and freedom of expression.

[In one case](#) of morph porn, an Australian woman’s photos were stolen from her social media accounts, superimposed onto pornographic images and then posted on multiple websites. She described the experience as causing her [to feel](#):

physically sick, disgusted, angry, degraded, dehumanised

Yet responses to this kind of sexual abuse remain inconsistent. Regulation is lacking in Australia, and elsewhere.

8.2.1.2 [Galaitzi, Hendren, Trump, & Linkov \(2019\)](#). Sex Robots—A Harbinger for Emerging AI Risk. *Frontiers in Artificial Intelligence*.

EXCERPT: Sex robots' ability to physically and emotionally resemble actual people—usually idealized and hyper-sexualized women—to provide gratifying intimate experiences is the key innovation and main risk driver. For example, a developer seeking to enhance the user experience with a sex robot may design a machine learning algorithm that builds trust between the human user and robot. Trust certainly benefits intimacy. But such a technology, once developed, may be deployed both within sex robots and other formats to induce user trust even potentially against the user's best interest. Advanced machine learning may allow robots to cultivate love and devotion, the ability to elicit personal information or to manipulate and influence behavior. These capabilities are all theoretically possible, and perhaps more importantly, they are profitable for AI sex robots to cultivate. With the worldwide sex technology reportedly worth 30 billion USD ([Kleeman, 2017](#)), the market may incentivize the development of AI capabilities that may be vastly more consequential than blinking silicon sex dolls....

...In addition to enhancing conventional risks, internet-enabled sex toys and sex robots also pose new cybersecurity risks that cannot be fully addressed under existing regulatory processes for other products. Such risks including lax security measures that allow uninvited parties to collect and store usage information or videos, or the potential hacking of remotely operated sex toys ([Hern, 2016](#); [Burgess, 2018](#); [Devlin, 2018](#)). With the expiration of the teledildonics patent in August 2018, the cybersex toy industry is now poised for rapid expansion, but without protections in place for consumers ([Kobie,](#)

[2018](#)). AI development for sex robots may increase consumer exposure to existing conventional risks and cybersecurity risks of sex toys.

8.2.1.3 [Ratner \(2021\)](#). When “Sweetie” is not so Sweet: Artificial Intelligence and its Implications for Child Pornography. *Family Court Review*.

ABSTRACT: The production of child pornography using Artificial Intelligence is poised to potentially evade current laws protecting child abuse. Artificial Intelligence “DeepFakes” can be used to create indistinguishable videos and images of child abuse, without actual child abuse ever occurring. This Note proposes two solutions for curbing this inevitable dilemma. First, Artificial Intelligence should fall under the “computer-generated” terminology found in the 18 U.S.C. § 2256(8) definition of child pornography. Second, if Artificial Intelligence cannot be considered to fall under that definition, then 18 U.S.C. § 2256(8) should be amended to include “Artificial Intelligence-generation.”

8.2.1.4 [Hundt, Agnew, Zeng, Kacianka, & Gombolay \(2022\)](#). Robots Enact Malignant Stereotypes. *2022 ACM Conference on Fairness, Accountability, and Transparency*.

ABSTRACT: Stereotypes, bias, and discrimination have been extensively documented in Machine Learning (ML) methods such as Computer Vision (CV). Natural Language Processing (NLP), or both, in the case of large image and caption models such as OpenAI CLIP. In this paper, we evaluate how ML bias manifests in robots that physically and autonomously act within the world. We audit one of several recently published CLIP-powered robotic manipulation methods, presenting it with objects that have pictures of human faces on the surface which vary across race and gender, alongside task descriptions that contain terms associated with common stereotypes. Our experiments definitively show robots acting out toxic stereotypes with respect to gender, race, and scientifically discredited physiognomy, at scale. Furthermore, the audited methods are less likely to recognize Women and People of Color. Our interdisciplinary sociotechnical analysis synthesizes across fields and applications such as Science Technology and Society (STS), Critical Studies, History, Safety, Robotics, and AI. We find that robots powered by large datasets and Dissolution Models (sometimes called “foundation models”, e.g. CLIP) that contain humans risk physically amplifying malignant stereotypes in general; and that merely correcting disparities will be insufficient for the complexity and scale of the problem. Instead, we recommend that

robot learning methods that physically manifest stereotypes or other harmful outcomes be paused, reworked, or even wound down when appropriate, until outcomes can be proven safe, effective, and just. Finally, we discuss comprehensive policy changes and the potential of new interdisciplinary research on topics like Identity Safety Assessment Frameworks and Design Justice to better understand and address these harms.

8.2.2.6 [World Economic Forum \(2022\)](#). *Artificial Intelligence for Children Toolkit*.

INTRODUCTION: For the first time in history, a generation of children is growing up in a world shaped by artificial intelligence (AI). AI is a set of powerful algorithms designed to collect and interpret data to make predictions based on patterns found in the data.

Children and youth are surrounded by AI in many of the products they use in their daily lives, from social media to education technology, video games, smart toys and speakers. AI determines the videos children watch online, their curriculum as they learn, and the way they play and interact with others. This toolkit, produced by a diverse team of youth, technologists, academics and business leaders, is designed to help companies develop trustworthy artificial intelligence (AI) for children and youth and to help parents, guardians, children and youth responsibly buy and safely use AI products. AI can be used to educate and empower children and youth and have a positive impact on society.

But children and youth can be especially vulnerable to the potential risks posed by AI, including bias, cybersecurity and lack of accessibility. AI must be designed inclusively to respect the rights of the child user. Child-centric design can protect children and youth from the potential risks posed by the technology. AI technology must be created so that it is both innovative and responsible. Responsible AI is safe, ethical, transparent, fair, accessible and inclusive. Designing responsible and trusted AI is good for consumers, businesses and society. Parents, guardians and adults all have the responsibility to carefully select ethically designed AI products and help children use them safely. What is at stake? AI will determine the future of play, childhood, education and societies. Children and youth represent the future, so everything must be done to support them to use AI responsibly and address the challenges of the future. This toolkit aims to help responsibly design, consume and use AI. It is designed to help companies, designers, parents, guardians, children and youth make sure that AI respects the rights of children and has a positive impact in their lives.

EXCERPT: GREATEST POTENTIAL HARMS:

1. **Putting children and youth FIRST:** The news is full of examples of biased and discriminatory AI models. **Without careful design, AI models can be biased**

and unfair, violate trust and consent, and cause emotional and developmental harm to child and youth users. Breaches of trust and consent While product teams should always endeavour to be worthy of their users' trust, safeguarding the health and safety of children requires them to be even more vigilant. Consent from parents/ guardians and their children should be solicited before collecting data from them, and parents/ guardians and children must be informed about what data is collected and how it is being used, have control over how their data circulates (as with standards such as the General Data Protection Regulation's [GDPR] "right to be forgotten") and secure access to the data once collected.

2. **Emotional and developmental harm:** Adults have a responsibility to confirm that the material shown to children is directed towards their well-being and flourishing. **Children are rapidly developing their autonomy, agency, habits and relationships with technology and each other, and the way systems are designed can negatively affect this development without care and oversight.**
3. **Bias, unequal access and impact:** **Algorithmic decision-making can all too often reinforce existing societal biases and prejudices, and cause unequal impacts across different populations.** A single aggregate performance metric, such as accuracy, may fail to capture and recognize the people being punished, left out or mistreated by your system.

8.2.1.7 [Hasse, Cortesi, Lombana-Bermudez, & Gasser \(2019\)](#). Youth and artificial intelligence: Where we stand. *Youth and Media, Berkman Klein Center for Internet & Society*.

INTRODUCTION: While much has been written about the impacts of artificial intelligence (AI) on society more broadly, **little work has focused on how youth (12-18-year-olds) interact with and are impacted by AI.** This spotlight reviews recent literature and examples on artificial intelligence and its impact on the lives of youth³ in domains such as education, health and well-being, creativity and entertainment, and the future of work. This piece is not intended to be a comprehensive discussion of all the challenges and opportunities that AI presents for young people; instead, the spotlight aims to highlight some of the Youth and Media team's initial exploratory learnings and questions around the interplay between AI and youth. The main aim is to share preliminary observations as well as highlight questions for a concerned public audience and provide different entry points for further exploration our team is pursuing.

EXCERPT: Over the past several years, technologies based on AI have started changing our daily lives. Innovations are rolled out at an accelerated pace, not only in professional working environments but also at home and in schools. **Hello Barbie and Cozmo are just two examples of AI-enabled toys that have already made their way into some children’s homes in the U.S., with many more in development around the world. AI-powered toys offer playful and creative opportunities for children, with some systems promoting enhanced literacy, social skills, and language development.** Thus far, there is less research on the beneficial impact of AI-based systems specifically on adolescents, compared to young children.

However, recent reports and studies indicate that AI is playing an increasingly important role in, for instance, the domains of education and learning, and health and well-being. Within the formal education setting, AI-powered educational technology (ed tech) — **such as intelligent tutoring systems, tailored curriculum plans, and intelligent virtual reality — can improve educational outcomes, and offer rich and engaging interactive learning experiences for youth.** In informal and connected learning environments, such as MIT Media Lab’s Scratch platform, youth have the opportunity to design and program **AI-based interactive games, simulations, chatbots, and virtual robots with great benefits for creativity, learning, and self-expression.** Within the domain of health and well-being, AI-driven applications are being designed and deployed to address health care concerns for young people — particularly in the context of mental and behavioral health — in the form of diagnostic tools, therapeutic chatbots, and public health interventions. These technologies open up the potential for earlier intervention for vulnerable youth, increased access to and engagement with therapeutic services, and greater awareness around public health issues.

However, AI-based technologies also create challenges for young people that need to be addressed by a variety of stakeholders (including youth themselves in the conversation) to safeguard and uphold young people’s rights (e.g., right to privacy, right to participation). **Particularly in relation to privacy, there are serious concerns around how AI-powered toys and ed tech applications can collect and store personal data. There is a risk of undermining youth privacy if the companies that design AI-fueled technologies are not clear and ethical about how they collect user data, where that data is stored, who can access it, and what can be done with it.** From the spoken dialogue between a teenager and a digital personal assistant to the record of geographic locations a high school student creates when using an ed tech homework app, a wide range of personal information from young users can be recorded and stored as they interact with AI-powered systems. Thus, it is crucial that AI-based technologies are designed in a responsible way that safeguards youth privacy,

especially when, as we have seen in the online platforms ecosystem, personal data on the cloud raises concerns around data privacy, security, and retention.

Additionally, the complex interplay between data sets and algorithms that power these “black box” AI systems — particularly when these systems are connected to the Internet — lead to pressing questions around bias and discrimination, transparency and accountability, and privacy and safety. There are also important concerns around the impact that AI systems might have in amplifying existing social inequalities among youth of different races, socio-economic statuses, genders, and regions (e.g., Global North and Global South). Obstacles to the adoption of AI-powered technologies in under-resourced schools and underrepresented homes could exacerbate existing gaps within the youth population with respect to access to AI systems and the skills to utilize them.

Last but not least, the deep knowledge gap separating most people affected by AI systems and their designers creates an information asymmetry that complicates and often threatens progress toward a more inclusive future. The youth population is a particularly vulnerable group, as very little has been done to empower young people to critically engage the discourse surrounding the next generation of technologies that have a marked potential to shape their lives for better or for worse. As just one example, innovations in artificial intelligence are helping to reshape the labor market, with important implications for career trajectories, and the requisite skills for youth to thrive in this shifting occupational landscape. Taking into account the massive impact AI is predicted to have on their lives, it is critical that young people have a basic understanding of what AI is and the ethical, societal, and privacy- and safety-related implications of these technologies.

8.2.1.8 [Cohut \(2018\)](#). Sex robots may do more harm than good. *Medical News Today*.

EXCERPT: However, Cox-George and Bewley identified four themes describing the alleged benefits brought by sexbots to potential users (and society at large). These are, as the researchers name them in their published paper:

- safer sex
- therapeutic potential
- potential to treat pedophiles and sex offenders
- changing societal norms

Current claims in support of these realistic sex dolls suggest that, by using them, potential buyers would no longer be tempted to support sex trafficking, or engage in sex tourism.

They would also, allegedly, encourage safer sex as the sexbots themselves are made of washable materials that are resistant to bacteria.

Also, there are claims that sexbots could be used therapeutically by people who might otherwise engage in pedophilia, or various forms of sexual harassment and assault. But, in the absence of hard evidence to support these ideas, they are, at best, a sign of wishful thinking, argue the authors of the new study.

...As for the claim that sexbots could be an “easy fix” for sexual violence or deviancy, Cox-George and Bewley fear that they may instead strengthen or normalize these urges — even potentially leading to addictive behavior.

The team is also concerned about the impact that dolls’ artificially flawless appearance, and other idealized features — such as the lack of bodily hair on many of these dolls — may have on users’ perception of what is “normal” and “attractive” in a potential partner. “Sexbots are generally female and ‘air-brushed,’” the authors write, which “rais[es] the question of public interest in avoiding gender discrimination and inequality due to the promotion of distorted views of attractiveness that reduce female body confidence.” Cox-George and Bewley conclude that, despite claims that sex robots would bring a number of health-related benefits, the sale of these dolls has very little to do with such concerns.

8.2.1.9 [MacClure \(2022\)](#). Text-to-Image-to-Porn? The Future of X-Rated, AI-Generated Porn. *The Guardian*.

EXCERPT: Some blend of the AI avatar service and text-to-image could make its way into the porn sector and possibly pave the way for porn actors to monetize animations of their likeness with consent.

However, no on-demand or user-friendly animation technology is perfect.

"People thought that deepfakes would just sort of totally eliminate or completely disrupt the porn industry and that hasn't really happened," said Noelle Perdue, a porn historian, writer and futurist based in Toronto. "Ultimately, performers are very talented and successful for a reason, and it's because they're very good at performing."

While the likelihood of text-to-image or video technology taking over or revolutionizing porn appears low in the short term, people will continue to be people and use the latest

internet toy as an outlet for their most absurd thoughts, all while improving the technology.

8.2.1.10 [Wiggers \(2022\)](#). Meet Unstable Diffusion, the group trying to monetize AI porn generators. *TechCrunch*.

EXCERPT: When [Stable Diffusion](#), the text-to-image AI developed by startup [Stability AI](#), was open sourced earlier this year, it didn't take long for the internet to wield it for porn-creating purposes. **Communities across Reddit and 4chan tapped the AI system to generate realistic and anime-style images of nude characters, mostly women, as well as non-consensual fake nude imagery of celebrities.**

But while Reddit quickly shut down many of the subreddits dedicated to AI porn, and communities like NewGrounds, which allows some forms of adult art, banned AI-generated artwork altogether, new forums emerged to fill the gap. By far the largest is [Unstable Diffusion](#), whose operators are building a business around AI systems tailored to generate high-quality porn. The server's [Patreon](#) — started to keep the server running as well as fund general development — is currently raking in over \$2,500 a month from several hundred donors.

...Unsurprisingly, some AI ethicists are as worried as Chaudhry is optimistic. While the use of AI to create porn isn't new — TechCrunch covered an AI-porn-generating app just a few months ago — Unstable Diffusion's models are capable of generating higher-fidelity examples than most. The generated porn could have negative consequences particularly for marginalized groups, the ethicists say, including the artists and adult actors who make a living creating porn to fulfill customers' fantasies.

...**“The risks include placing even more unreasonable expectations on women's bodies and sexual behavior, violating women's privacy and copyrights by feeding sexual content they created to train the algorithm without consent and putting women in the porn industry out of a job,”** Ravit Dotan, VP of responsible AI at Mission Control, told TechCrunch. “One aspect that I'm particularly worried about is the disparate impact AI-generated porn has on women. For example, a previous AI-based app that can ‘undress’ people works only on women.”

...The group has its work cut out for it. Of all the challenges Unstable Diffusion faces, moderation is perhaps the most immediate — and consequential. **Recent history is filled with examples of spectacular failures at adult content moderation. In 2020, MindGeek, Pornhub's parent company, lost the support of major payment**

processors after the site was found to be circulating child porn and sex-trafficking videos.

8.2.1.11 [Wiggers \(2022\)](#). AI is getting better at generating porn. *TechCrunch*.

EXCERPT: Called Porn Pen, the website allows users to customize the appearance of nude AI-generated models — all of which are women — using toggleable tags like “babe,” “lingerie model,” “chubby,” ethnicities (e.g., “Russian” and “Latina”) and backdrops (e.g., “bedroom,” “shower” and wildcards like “moon”). Buttons capture models from the front, back or side, and change the appearance of the generated photo (e.g., “film photo,” “mirror selfie”). There must be a bug on the mirror selfies, though, because in the feed of user-generated images, some mirrors don’t actually reflect a person — but of course, these models are not people at all. Porn Pen functions like “[This Person Does Not Exist](#),” only it’s NSFW.

...But Porn Pen raises a host of ethical questions, like biases in image-generating systems and the sources of the data from which they arose. Beyond the technical implications, one wonders whether new tech to create customized porn — assuming it catches on — could hurt adult content creators who make a living doing the same.

“I think it’s somewhat inevitable that this would come to exist when [OpenAI’s] DALL-E did,” Os Keyes, a Ph.D. candidate at the University of Washington, told TechCrunch via email. “But it’s still depressing how both the options and defaults replicate a very heteronormative and male gaze.”

Currently, few laws around the world pertain to [deepfaked](#) porn. In the U.S., only Virginia and California have regulations restricting certain uses of faked and deepfaked pornographic media.

...In theory, a porn actor could use copyright protections, defamation and potentially even human rights laws to fight the creator of a deepfaked image. But as a piece in MIT Technology Review notes, gathering [evidence](#) in support of the legal argument can prove to be a massive challenge.

When more primitive AI tools popularized deepfaked porn several years ago, a [Wired investigation](#) found that nonconsensual deepfake videos were racking up millions of views on mainstream porn sites like Pornhub. Other deepfaked works

found a home on sites akin to Porn Pen — according to Sensity data, the top four deepfake porn websites received more than 134 million views in 2018.

8.2.1.12 [Monge \(2022\)](#). The Age Of AI-Generated Porn Is Here. *Geek Culture*.

EXCERPT: Deepfake media are already here. The existing process alters the face of an existing image or video with someone else's. It poses particular harm to women as AI-generated porn can be used to blackmail and silence them.

In 2019, [Sensity AI](#), a research company found that 96% of deepfake videos online were non-consensual porn.

But what about coming up with images and videos of celebrities from scratch? That's where the new AI models like Stable Diffusion come in. Soon, deepfakes will be possible with nothing but a photo of a real person and a couple of text instructions.

Child pornography

The very idea of child pornography is repulsive and abhorrent. And now, with the advent of AI, there is a new and even more troubling development: computer-generated child pornography.

AI does not have a soul and will only follow whatever human instructs it to do. It's extremely difficult to regulate what people try to come up with and publish using this technology.

More violent than traditional pornography

Because it is created by computers, there are no limits to what the creators can make. This can lead to some very disturbing and violent content.

Unfortunately, there are a few laws in the world that address the issues surrounding deepfake content.

In the U.S., Virginia and California are the first states to have regulations restricting certain use and distribution of deepfake media.

The law in Virginia imposes criminal penalties on the distribution of nonconsensual deepfake pornography, whereas the law in Texas prohibits the creation and distribution of deepfake videos intended to harm candidates for public office or influence elections.

With the rise of new AI models like Stable Diffusion, I expect more legislation and technological tools against synthetic porn will occur soon.

8.2.1.13 [Ruben \(2023\)](#). Teens exploited by fake nudes illustrate threat of unregulated AI. *Axios*.

EXCERPT: A phone, a few photos and [artificial intelligence](#) have stirred controversy and shattered the privacy of several teens at a New Jersey high school after they learned that nude images of them — created via AI — were circulated in group chats.

Why it matters: The incident is a poignant example of the threats that come with unregulated, [expanding](#) artificial intelligence access, experts told *Axios*.

Driving the news: Some teen girls at Westfield High School in New Jersey learned last month that fake nude images of them were shared among other students, [the Wall Street Journal reported](#).

From January to September of this year, 54% more deepfake pornographic videos were uploaded to website hosts than in all of 2022, [Wired reported](#).... Earlier this year, students in New York State used AI to generate a video of a middle school principal making a racist rant, [the Washington Post reported](#).

8.2.1.14 [Miranda \(2023\)](#). Attorneys general: Congress must bar AI-generated child sexual abuse content. *Axios*.

8.2.1.15 Videos related to sex robots

- <https://money.cnn.com/mostly-human/i-love-you-bot/>
- <https://www.engadget.com/2018-06-05-the-truth-about-sex-robots.html>
- <https://www.engadget.com/2018-06-05-the-truth-about-sex-robots.html>
- <https://www.cnet.com/videos/abyss-creations-sex-robots-realdolls/>
- <https://www.nytimes.com/video/technology/100000003731634/the-uncanny-lover.html>

8.2.1.16 AI and Marketing

- <https://www.agilitypr.com/pr-news/public-relations/the-future-of-media-how-ai-is-going-to-transform-the-industry/>
- <https://www.marketingaiinstitute.com/blog/what-is-artificial-intelligence-for-social-media>
- <https://communitools.com/social-media-artificial-intelligence/>

8.2.1.17 Deepfake Scams

- [Joe Rogan and Huberman](#)

[What are we missing?]

8.2.2 EVIDENCE AND ESSAYS SHOWING/PREDICTING BENEFITS OR NO HARM

8.2.2.1 [Grové \(2021\)](#). Co-developing a Mental Health and Wellbeing Chatbot With and for Young People. *Frontiers in Psychiatry*.

ABSTRACT: There are many young people who experience mental health and wellbeing challenges. A potential negative mental health trigger for some youth is a struggle to cope with stress at school, feelings of depression and anxiety and availability of adequate help for these stressors. In response to youth needs a mental health and wellbeing Chatbot has been co-developed with youth, technology partners and expert stakeholders. An element of the Chatbot is powered by artificial intelligence and rules based AI using natural language processing. It is created to communicate evidence based resources, wellbeing support, educational mental health information and adaptive coping strategies. This paper will discuss how the Chatbot has been developed, highlighting its participatory, co-design process with youth who are the key stakeholders to benefit from this digital tool. Research from interviews and surveys informed the creation of the Chatbot's personality and its character design. Examples of the conversation design and content development are provided. The paper finishes with how, if at all, digital tools such as Chatbot applications could support the mental health of young people in secondary schools or health care settings in conjunction with the wellbeing or health care team, concluding with lessons learned and cautions.

8.2.2.2 [Radovic & Badawy \(2020\)](#). Technology Use for Adolescent Health and Wellness. *Pediatrics*.

ABSTRACT: As avid users of technology, adolescents are a key demographic to engage when designing and developing technology applications for health. There are multiple opportunities for improving adolescent health, from promoting preventive behaviors to providing guidance for adolescents with chronic illness in supporting treatment adherence and transition to adult health care systems. This article will provide a brief overview of current technologies and then highlight new technologies being used specifically for adolescent health, such as artificial intelligence, virtual and augmented reality, and machine learning. Because there is paucity of evidence in this field, we will make recommendations for future research.

8.2.2.3 [D'Alfonso, Santesteban-Echarri, Rice, Wadley, Lederman, Miles, Gleeson, & Alvarez-Jimenez \(2017\)](#). Artificial Intelligence-Assisted Online Social Therapy for Youth Mental Health. *Frontiers in Psychology*.

ABSTRACT: INTRODUCTION: Benefits from mental health early interventions may not be sustained over time, and longer-term intervention programs may be required to maintain early clinical gains. However, due to the high intensity of face-to-face early intervention treatments, this may not be feasible. Adjunctive internet-based interventions specifically designed for youth may provide a cost-effective and engaging alternative to prevent loss of intervention benefits. **However, until now online interventions have relied on human moderators to deliver therapeutic content. More sophisticated models responsive to user data are critical to inform tailored online therapy. Thus, integration of user experience with a sophisticated and cutting-edge technology to deliver content is necessary to redefine online interventions in youth mental health.** This paper discusses the development of the moderated online social therapy (MOST) web application, which provides an interactive social media-based platform for recovery in mental health. We provide an overview of the system's main features and discuss our current work regarding the incorporation of advanced computational and artificial intelligence methods to enhance user engagement and improve the discovery and delivery of therapy content.

METHODS: Our case study is the ongoing Horyzons site (5-year randomized controlled trial for youth recovering from early psychosis), which is powered by MOST. We outline the motivation underlying the project and the web application's foundational features and interface. We discuss system innovations, including the incorporation of pertinent usage patterns as well as identifying certain limitations of the system. This leads to our current motivations and focus on using computational and artificial intelligence methods to enhance user engagement, and to further improve the system with novel mechanisms for the delivery of therapy content to users. In particular, we cover our

usage of natural language analysis and chatbot technologies as strategies to tailor interventions and scale up the system.

CONCLUSIONS: To date, the innovative MOST system has demonstrated viability in a series of clinical research trials. Given the data-driven opportunities afforded by the software system, observed usage patterns, and the aim to deploy it on a greater scale, an important next step in its evolution is the incorporation of advanced and automated content delivery mechanisms.

8.2.2.4 [Luxton \(2016\)](#). Chapter 1—An Introduction to Artificial Intelligence in Behavioral and Mental Health Care. *In D. D. Luxton (Ed.), Artificial Intelligence in Behavioral and Mental Health Care.*

ABSTRACT: Artificial intelligence (AI) technologies and techniques have useful purposes in just about every domain of behavioral and mental health care including clinical decision-making, treatments, assessment, self-care, healthcare management, research and more. This introductory chapter provides an overview of AI and includes definitions of common terms and concepts to provide a foundation for what is discussed in subsequent chapters. Recent technological innovations are highlighted to demonstrate emerging capabilities and forthcoming opportunities. The benefits of the use of AI in mental health care are also discussed.

8.2.2.5 [Graham, Depp, Lee, Nebeker, Tu, Kim, & Jeste \(2019\)](#). Artificial Intelligence for Mental Health and Mental Illnesses: An Overview. *Current Psychiatry Reports.*

ABSTRACT: PURPOSE: Artificial intelligence (AI) technology holds both great promise to transform mental healthcare and potential pitfalls. This article provides an overview of AI and current applications in healthcare, a review of recent original research on AI specific to mental health, and a discussion of how AI can supplement clinical practice while considering its current limitations, areas needing additional research, and ethical implications regarding AI technology.

RECENT FINDINGS: We reviewed 28 studies of AI and mental health that used electronic health records (EHRs), mood rating scales, brain imaging data, novel monitoring systems (e.g., smartphone, video), and social media platforms to predict, classify, or subgroup mental health illnesses including depression, schizophrenia or other psychiatric illnesses, and suicide ideation and attempts. **Collectively, these studies revealed high accuracies and provided excellent examples of AI's potential in mental healthcare, but most should be considered early proof-of-concept works demonstrating the potential of using machine learning**

(ML) algorithms to address mental health questions, and which types of algorithms yield the best performance.

SUMMARY: As AI techniques continue to be refined and improved, it will be possible to help mental health practitioners re-define mental illnesses more objectively than currently done in the DSM-5, identify these illnesses at an earlier or prodromal stage when interventions may be more effective, and personalize treatments based on an individual's unique characteristics. However, caution is necessary in order to avoid over-interpreting preliminary results, and more work is required to bridge the gap between AI in mental health research and clinical care.

[What are we missing?]

9. MAJOR REVIEW ARTICLES

9.1.1 [Uhls, Ellison, & Subrahmanyam \(2017\)](#). Benefits and Costs of Social Media in Adolescence. *Pediatrics*.

EXCERPT: BENEFITS OF SOCIAL MEDIA: By and large, extant research has found that youth use social media in the service of critical adolescent developmental tasks, **such as identity development, aspirational development, and peer engagement**. As adolescents seek intimacy with their peers and strive for autonomy, their online environments frequently reflect their off-line lives. In contrast to early online applications, which were seen as refuges from real life, today's online environments reflect, complement, and reinforce off-line relationships, practices, and processes.

The literature on social media and adolescents, as well as more extensive studies of emerging adults, reveals associations between **time spent using social media and increased self-esteem, increased social capital (resources accessed through one's social relationships), safe identity exploration, social support, and more opportunity for self-disclosure**. These processes are all critical to healthy growth and identity development.

A consistent finding is that adolescents use social media to develop and maintain friendships. Nearly two-thirds of teenagers report that they make new friends through social media, and >90% use social media to connect with existing off-line friends every day. Adolescents also report that these media help them understand their friends'

feelings and feel more connected to them. During a developmental stage when peer support and approval is critical, social media support these needs.

Identity exploration, or the search for a coherent sense of self, takes place online as well as offline. Adolescents use social media for self-presentation through the ways they choose to represent themselves online by posting pictures and sharing aspects of their lives. In addition, youth use social media for impression management by attempting to use these media to control other people's perceptions of who they are and how they act. Such self-exploration can help youth to discover aspects of themselves; one study found that adolescents who communicated more online had greater self-concept clarity, which is the ability to understand who one is clearly and stably.¹⁷ Social media can thus provide a good forum to practice skills related to identity development, such as self-presentation and self-disclosure.

In addition, social media tools have been found to be beneficial for youth who may have learning difficulties or those struggling with their sexual identity. Research confirms that by increasing the likelihood that these adolescents can find like-minded youth, online social media tools may help them feel less lonely and more confident.

COSTS OF SOCIAL MEDIA: The use of social media during adolescence can also negatively impact health and development. Although the majority of adolescents report that social media are a positive contribution to their lives, more negative associations with social media have also been documented in the research literature. These include **cyberbullying, depression, social anxiety, and exposure to developmentally inappropriate content.**

Cyberbullying has received a great deal of attention in both the popular press and academic research. The Pew Research Center report noted that 1 in 4 adolescents report digital "drama," a word that adolescents seem to relate to more than the term "cyberbullying." Research found that online bullying, often displayed through social media, is associated with more depressive symptoms than traditional bullying. One reason for this may be the public and enduring nature of online posts. A recent study found that risky online self-presentation increased the likelihood of receiving negative online feedback on social media.

Because teenagers have nearly unlimited access to peers through mobile technologies, social media use may result in changing sleep cycles for adolescents, which may contribute to depression. Teenagers who report having mobile devices in their bedrooms and leaving them on at night sleep less than those who turn them off. Lack of sleep is related to depressive symptoms, loss of memory, problems at school, motor vehicle crashes, and other serious issues.

Research on traditional media such as television and magazines has identified problematic implications for adolescents (especially female adolescents) around issues such as self-esteem, gender stereotypes, self-objectification, and impossible body standards. Similarly, a longitudinal study found that frequency of social media use played a role in the relationship between mass media and an objectified self-concept (eg, judging oneself on the basis of how one is perceived by others). Given the interactive nature of social media, these relations may be magnified because peers amplify social media content, providing additional social validation. One study found that 54% of 18 year olds' public social media profiles contained or more references to a high-risk behavior, such as sexual activity, substance abuse, or violence.

Exposure to inappropriate content and the ability to display and consequently receive endorsement through peer validation of risky behaviors (such as drinking alcohol) may entice some adolescents to make poor decisions about what to share on social media. Finally, it is important to remember that most social media platforms are owned by for-profit companies, which often advertise, collect information, and sell data. This direct channel to adolescents, outside the eyes and ears of adults, means commercial interests can take precedence over prosocial and developmentally appropriate interests. Advertisers for sexual content, alcohol, and many other unhealthy products can also easily reach children and adolescents through these new media.

9.1.2 [Valkenburg & Peter \(2011\)](#). Online communication among adolescents: An integrated model of its attraction, opportunities, and risks. *The Journal of Adolescent Health: Official Publication of the Society for Adolescent Medicine*.

ABSTRACT: Adolescents far outnumber adults in their use of e-communication technologies, such as instant messaging and social network sites. In this article, we present an integrative model that helps us to understand both the appeal of these technologies and their risks and opportunities for the psychosocial development of adolescents. We first outline how the three features (anonymity, asynchronicity, and accessibility) of online communication stimulate controllability of online self-presentation and self-disclosure among adolescents. **We then review research on the risks and opportunities of online self-presentation and self-disclosure for the three components of adolescents' psychosocial development, including identity (self-unity, self-esteem), intimacy (relationship formation, friendship quality, cyberbullying), and sexuality (sexual self-exploration, unwanted sexual solicitation).** Existing research suggests several opportunities of online communication, such as enhanced self-esteem, relationship formation, friendship quality, and sexual

self-exploration. It also yields evidence of several risks, including cyberbullying and unwanted sexual solicitation. We discuss the shortcomings of existing research, the possibilities for future research, and the implications for educators and health care professionals.

9.1.3 [Small, Lee, Kaufman, Jalil, Siddarth, Gaddipati, Moody, & Bookheimer \(2020\)](#).
Brain health consequences of digital technology use. *Dialogues in Clinical Neuroscience*.

ABSTRACT: Emerging scientific evidence indicates that frequent digital technology use has a significant impact—both negative and positive—on brain function and behavior. **Potential harmful effects of extensive screen time and technology use include heightened attention-deficit symptoms, impaired emotional and social intelligence, technology addiction, social isolation, impaired brain development, and disrupted sleep. However, various apps, videogames, and other online tools may benefit brain health. Functional imaging scans show that internet-naive older adults who learn to search online show significant increases in brain neural activity during simulated internet searches. Certain computer programs and videogames may improve memory, multitasking skills, fluid intelligence, and other cognitive abilities.** Some apps and digital tools offer mental health interventions providing self-management, monitoring, skills training, and other interventions that may improve mood and behavior. Additional research on the positive and negative brain health effects of technology is needed to elucidate mechanisms and underlying causal relationships.

ADDITIONAL EXCERPT:

Reduced Attention: Multiple studies have drawn a link between computer use or extensive screen time (eg, watching television, playing videogames) and symptoms of attention-deficit hyperactivity disorder (ADHD). **A 2014 meta-analysis indicated a correlation between media use and attention problems. A recent survey of adolescents without symptoms of ADHD at the start of the study indicated a significant association between more frequent use of digital media and symptoms of ADHD after 24 months of follow-up. Although most of the research linking technology use and ADHD symptoms has involved children and adolescents, this association has been identified in people at any age.**

The reason for the link between technology use and attention problems is uncertain, but might be attributed to repetitive attentional shifts and multitasking, which can impair executive functioning. Moreover, when people are constantly using their technology,

they have fewer opportunities to interact offline and allow their brain to rest in its default mode.

Impaired emotional and social intelligence: Because of concern that a young, developing brain may be particularly sensitive to chronic exposure to computers, smartphones, tablets, or televisions, the American Academy of Pediatrics has recommended that parents limit screen time for children aged 2 years or younger, when the brain is particularly malleable. Spending extensive periods of time with digital media translates to spending less time communicating face to face.

Kirsh and Mounts explored the hypothesis that playing videogames would interfere with the ability to recognize emotions conveyed through facial expressions. They examined the effects of playing videogames on recognition of facial expressions of emotions in 197 students (ages 17 to 23 years). Participants played violent videogames before watching a series of calm faces morph into either angry or happy faces. Participants were asked to quickly identify the emotion while the facial expression changed. The authors found that happy faces were identified faster than angry faces, and that playing violent videogames delayed happy-face recognition time.

Our team at the University of California, Los Angeles (UCLA) hypothesized that preteens restricted from screen-based media would have more opportunities for face-to-face interactions, which would improve their ability to recognize nonverbal emotional and social cues. We studied 51 schoolchildren who spent five days at an overnight nature camp where television, computers, and smartphones were forbidden, and compared them with 54 school-based matched controls who continued their usual media practices (4 hours of screen time per day). At baseline and after 5 days, participants were assessed for their ability to recognize emotions from photographs of facial expressions and videotaped scenes of social interactions (without verbal cues). After 5 days, the nature camp participants restricted from screen time demonstrated significantly better recognition of nonverbal emotional and social cues than participants who continued their usual daily screen time. These findings suggest that time away from screen-based media and digital communication tools improves both emotional and social intelligence.

Technology addiction:

Although not formally included in the Diagnostic and Statistical Manual of Mental Disorders, excessive and pathological internet use has been recognized as an internet addiction, which shares features with substance-use disorders or pathological gambling. Common features include preoccupations, mood changes, development of tolerance, withdrawal, and functional impairment. The global prevalence of internet addiction is

estimated at 6%, but in some regions such as the Middle East the prevalence is as high as 11%. **Students with internet addiction are more likely to suffer from ADHD symptoms than from other psychiatric disorders.** You and colleagues reported that schoolchildren with internet addiction experienced significantly greater symptoms of inattention, hyperactivity, and impulsivity than non–internet-addicted students. Panagiotidi and Overton reported greater ADHD symptoms in adults aged 18 to 70 years with internet addiction: predictors of addiction included younger age, playing massively multiplayer online role-playing games, and spending more time online. Despite consistent associations between ADHD symptoms and internet addiction, a causal relationship has not been confirmed. It is possible that people with ADHD symptoms have a greater risk for developing technology addiction, but an alternative explanation is that extensive technology use from addictive behavior causes ADHD symptoms.

Social isolation: Ninety percent of young adults in the United States use social media platforms such as Facebook, Twitter, Snapchat, and Instagram, and most visit these sites at least daily. **Paradoxically, social media use is linked to social isolation (ie, a lack of social connections and quality relationships with others),** which is associated with poor health outcomes and increased mortality.

Primack and colleagues studied 1787 young adults (ages 19 to 32 years) and found that using social media 2 or more hours each day doubled the odds for perceived social isolation compared with use less than 30 minutes each day. Similar associations between perceived social isolation and social media use were observed in 213 middle-aged and older adults.

Screen time may also adversely impact cognitive and brain development. In a recent review, children under age 2 were reported to spend over 1 hour each day in front of a screen; by age 3, that number exceeded 3 hours. Increased screen time (and less reading time) has been associated with poorer language development and executive functioning, particularly in very young children, as well as poorer language development in a large cohort of minority children. In infants, increased screen time was one of several factors that predicted behavioral problems. For infants 6 to 12 months, increased screen time was linked to poorer early language development. In children of preschool age and older, digital media directed toward active learning can be educational, but only when accompanied by parental interaction.

Recent research has examined the effects of media exposure on brain development. In a study of children aged 8 to 12 years, more screen and less reading time were associated with decreased brain connectivity between regions controlling word

recognition and both language and cognitive control. Such connections are considered important for reading comprehension and suggest a negative impact of screen time on the developing brain. Structurally, increased screen time relates to decreased integrity of white-matter pathways necessary for reading and language. Given the growing prominence of screen use among even very young children at stages when brain plasticity is greatest, there is significant concern about the cognitive and brain development of the current generation of screen-exposed children that requires greater understanding

[What are we missing?]

10. CONCLUSION

What is life like in outer space for teens?

Here are all the asteroids coming at them. Kids just dont belong in space.

11. APPENDICES

[What are we missing?]

11.1 SEXUALIZATION

11.1.1 EVIDENCE AND ESSAYS INDICATING INCREASED SEXUALIZATION

11.1.1.1 [THORN \(2021\)](#). Responding to Online Threats: Minors' Perspectives on Disclosing, Reporting, and Blocking.

METHODS: The quantitative research was designed to track trends in minors' online behaviors from our national benchmark research¹ in 2019, and explore additional topics such as barriers to disclosure of online harms. In total, 2,002 minors from across the United States participated in a 20-minute online survey from October 25 to November 11, 2020. Specifically, sample makeup included: N=742: 9-12 year olds, N=1,260: 13-17 year olds. However, only the demographic questions and some of the broader questions, such as platform usage, were asked of the entire sample. For the majority of the survey, minors were split evenly and randomly into two groups and shown a set of questions based on the group they were assigned to. This report will focus on the Hurdles to Disclosure questions, which were asked of 1,000 minors. Specifically, this group included: • N=391: 9-12 year olds • N=609: 13-17 year olds

EXCERPT: “1 in 3 participants (33%) reported having had an online sexual interaction.... for example, sexting or being asked for or sent nude imagery. Online sexual interactions were more prevalent with both LGBTQ+ minors and teen girls. For example, more than 1 in 4 (28%) LGBTQ+ minors have been sent a nude photo or video, compared to 1 in 5 (20%) non-LGBTQ+ minors. Teen girls were nearly three times more likely to be solicited for a nude (28%) than teen boys (11%). One-quarter of participants (25%) reported having had an online sexual interaction with someone they thought was 18 or older compared to the 23% of participants that have had a similar experience with someone they believed to be under 18 years old.”

11.1.1.2 [Soriano-Ayala, Bonillo Díaz, & Cala \(2022\)](#). TikTok and Child Hypersexualization: Analysis of Videos and Narratives of Minors. *American Journal of Sexuality Education*.

ABSTRACT: The objective of this study is to analyze the degree of sexualization observed in TikTok videos and to compare it with the narratives of young people about the social network. A mixed-methods research design was used combining (1) a quantitative observational study based on measuring indicators of sexualization in 648 videos published by the 12 TikTokers most followed in Spain and (2) a qualitative study with 12 in-depth interviews to TikTok users (6 male, 6 female) between 8 and 17 years old from Spain. The video analysis reveal hypersexualized behaviors in 10/12 accounts, without statistically significant gender differences. Narratives about the social network showed ambivalent ideas, considering it a fundamental space for fun and socialization while being aware of numerous risks and threats. Sexualization is described with the

expression “being loose” and is recognized as an intrinsic characteristic of the network. The discourses on hypersexualization are markedly gendered, recognizing sexualization almost exclusively in women. Some young people perceive self-sexualization as a form of self-empowerment, while when they describe it in other women, it is penalized and negatively valued as a form of objectification that favors bullying. They also warn about its impact on self-esteem and mental health, especially in terms of those bodies that do not fit into body hierarchies. The climate of the network facilitates criticism and insult, the dissociation between the real and virtual self, and that public exposure increases their vulnerability. It is urgent to advance digital affective-sexual education that addresses these problems.

[--early exposure to sexual content, along with evidence that this affects children in some way]

[What are we missing?]

11.1.2 EVIDENCE AND ESSAYS INDICATING THAT THERE IS LITTLE OR NO INCREASE IN SEXUALIZATION

[What are we missing?]

11.1.3 ILLUSTRATIONS

<https://www.spectator.co.uk/article/the-death-of-the-tweenager/>

[What are we missing?]

11.2 STUDIES AND ESSAY ON THE EFFECTS OF TIKTOK

11.2.1 [Paul \(2022\)](#). What TikTok does to your mental health: ‘It’s embarrassing we know so little.’ *The Guardian*.

ABSTRACT: But TikTok [hosts similar harmful content](#), and experts warn a host of innovative features of the platform raise unique concerns.

TikTok largely optimizes content for minutes and hours of view time, [internal documents](#) leaked in 2021 showed, rather than prioritizing metrics like clicks and engagement favored by most social media platforms before. In order to do that, the company has deployed a unique algorithm and a landing page that marks the most extreme departure yet from a chronological to an algorithmic feed.

“What that does to the brain, we don’t know,” said Lorenz-Spreen.

Studies show that when chronological feeds are discarded in favor of suggested content, the algorithm frequently gives rise to more extreme views. One report in 2021 showed more than [70% of extremist content](#) found on YouTube was recommended to users by the algorithm. And it incentivizes users to share attention-grabbing content that gets picked up by the feed.

...In recent years, TikTok has faced intense scrutiny for dangerous challenges the algorithm has given rise to. **The “Benadryl challenge”, wherein participants took a large amount of antihistamines in an attempt to produce hallucinogenic effects, led to at least [one death](#). A new lawsuit claims the “blackout challenge” [led to deaths](#) of several young girls.**

“Compared to other social media sites, TikTok is uniquely performative,” said Rich, the pediatrician. “This leads to both interesting content, and some edgy ways of seeking attention that are less healthy.”

TikTok also appears to be “faster than any other platform at detecting interest”, said Marc Faddoul, co-director of Tracking Exposed, a digital rights organization investigating TikTok’s algorithm. The app’s For You Page seems to know its users’ desires and interests so well it has sparked memes and articles such as [The TikTok Algorithm Knew My Sexuality Better Than I Did](#) and [‘Why is My TikTok For You Page All Lesbians?’ Asks Woman Who is About to Realize Why](#).

...Researchers are still parsing what that uncanny tailoring means for users, particularly as it relates to targeted content around mental illness and other sensitive issues.

“The app provides an endless stream of emotional nudges, which can be hard to recognize and really impact users in the long run,” Faddoul said. “It’s not going to make anyone depressed overnight, but hours of consumption every day can have a serious impact on your mental health.”

These concerns are particularly pronounced in the realm of ADHD content, where users have [reported being diagnosed](#) by medical professionals after seeing videos about their symptoms. But while the prevalence of the #ADHD hashtag has brought increased awareness of the condition experts have warned of unintended negative effects, including medical misinformation, especially as the platform [accepts advertising money](#) from a number of for-profit mental health startups such as Cerebral.

TikTok declined to comment on criticisms relating to health misinformation and users self-diagnosing based on content seen on the app. It also declined to comment on its partnership with mental health startup Cerebral or its policies on medical information used in advertisements.

11.2.2 [Paul \(2021\)](#). ‘It spreads like a disease’: How pro-eating-disorder videos reach teens on TikTok. *The Guardian*.

EXCERPT: TikTok-specific features have prompted a number of concerns unique to the platform, research from UltraViolet found. TikTok’s “For You” page, a feed of videos from accounts users may not even follow that is recommended by an algorithm based on viewing history, makes it possible for problematic content to start “trending” with little friction. **One experiment by the Lowy Institute [found](#), for example, that TikTok’s politically neutral feed turned conservative and far-right in just a day of looping, liking and sharing certain content.**

Efforts by the Guardian to engage with diet content led to full-blown eating disorder promotion in less than 24 hours. The popular hashtag #WhatIEatInADay, for example, soon led to #ketodiet videos – then more restrictive diets and eventually overtly unhealthy hashtags such as #Iwillbeskinny and #thinspoa.

Todd said TikTok’s use of augmented reality camera filters can also contribute to negative body image, especially for young girls. While both [Snapchat](#) and [Instagram](#) have said they won’t allow filters that promote or mimic plastic surgery, TikTok has dozens of beauty filters that let young girls change their skin, face shape, body shape and more.

“This contributes to creating an impossible standard of beauty,” she said.
 ‘No room for half measures’

UltraViolet has launched a petition that has garnered more than 2,000 signatures calling on TikTok to disable such filters on the accounts of teens. The organization has also called on TikTok to remove all advertisement of weight loss and diet supplement products, and asked it to prevent loopholes for disordered eating hashtags and provide resources from accredited medical and nutrition boards on potentially inflammatory content.

“When you’re dealing with a really young and impressionable user base, there is not room for half measures,” Todd said. “We need to make sure this is meaningfully dealt with, and that means not allowing any of this content on the platform.”

11.2.3 [Zha \(2020\)](#). The unique power of TikTok’s algorithm. *The Interpreter*.

EXCERPT: TikTok’s recommendation system is unlike anything we have seen before. **Older platforms rely solely on our active online behaviours (e.g., following, friending, subscribing, liking or clicking) to gauge our preferences. But TikTok [captures](#) even our passive and subtle behavioural patterns to teach its algorithms about us in real time, as we consume videos. These patterns include how many times we let a video loop, how quickly we scroll past certain content, and whether we are drawn to a particular category of effects and sounds. This hyper-responsive recommendation system allows TikTok users to remain completely passive, if they so wish, while still arriving at an engaging, personalised content feed much faster than on other platforms.**

The fact that the platform no longer relies on people’s social networks to recommend engaging content makes TikTok [extremely accessible](#) for both content consumers and creators. For one, it relieves people of their [performative social burden](#) of accumulating friends, cultivating a follower base and building an audience. Once entering TikTok’s recommendation engine, a video from someone with no [follower base](#) could still go viral as long as it is engaging enough. So far, the platform has generated an entire [entertainment industry](#) made up of young TikTokers who rose to fame overnight.

...As such, the rise of TikTok has in many ways redefined social media’s role in today’s information ecosystem. It no longer has to aim at connecting more individuals. Instead, it can sidestep social networks altogether by matching individuals directly with their interests – the more efficiently it does so, the more it is rewarded by the global attention economy.

But as TikTok's popularity soars, the "everything goes" platform increasingly hosts heavier content, such as [personal traumas](#) and [politics](#). It is worth recalling [Facebook's path](#) from a tiny dating platform among college kids to a tech behemoth at the centre of global politics and (mis)information.

One potential challenge is an intensified "[filter bubble](#)" effect. The filter bubble describes a scenario in which social media reinforces our existing beliefs rather than exposing us to new information that we may dislike. While filter bubble is a [contested](#) phenomenon not exclusive to online environment, TikTok's hyper-efficient recommendation system could be more prone than traditional platforms are to shrinking the diversity of the content users consume.

By aiming content directly at [groups and subcultures](#) sharing the same tastes, TikTok de-prioritises the human network that underlies other platforms and the organic diversity that derives from human networks. Further, this platform model could also intensify political polarisation. An [experiment](#) shows that TikTok's politically neutral, fun-loving feed can turn conservative and far-right in just a day of looping, liking and sharing certain content.

11.2.4 [TikTok and the Sorting Hat \(2020\)](#). *Remains of the Day*.

EXCERPT: They say you learn the most from failure, and in the same way I learn the most about my mental models from the exceptions. How did an app designed by two guys in Shanghai managed to run circles around U.S. video apps from YouTube to Facebook to Instagram to Snapchat, becoming the most fertile source for meme origination, mutation, and dissemination in a culture so different from the one in which it was built?

The answer, I believe, has significant implications for the future of cross-border tech competition, as well as for understanding how product developers achieve product-market-fit. **The rise of TikTok updated my thinking. It turns out that in some categories, a machine learning algorithm significantly responsive and accurate can pierce the veil of cultural ignorance. Today, sometimes culture can be abstracted.**

...TikTok's story begins in 2014, in Shanghai. Alex Zhu and Luyu "Louis" Yang had launched an educational short-form video app that hadn't gotten any traction. They decided to pivot to lip-synch music videos, launching Musical.ly in the U.S. and China.

Ironically, the app got more traction across the Pacific Ocean, so they killed their efforts in their home country of China and focused their efforts on their American market. The early user base consisted mostly of American teenage girls. Finally, an app offered users the chance to lip synch to the official version of popular songs and have those videos distributed to an audience for social feedback.

That the app got any traction at all was progress. However, it presented Alex, Louis, and their team with a problem. American teen girls were not exactly an audience Alex and Louis really understood.

Prior to TikTok, I would've said YouTube had the strongest exploit algorithm in video, The exploit versus explore conundrum is sort of a classic of algorithmic design, usually mentioned in relation to the multi-armed bandit problem. For the purposes of this discussion, think of it simply as the problem of choosing which videos to show you.

[An exploit algorithm will give you more of what you like, while an explore algorithm tries to broaden your exposure to more than just what you've shown you like. YouTube is often described as an exploit algorithm because it tends to really push more of what you like, and then before you know it, you're looking at some alt-right video that's trying to redpill you. but in comparison to TikTok, YouTube's algorithm feels primitive (the top creators on YouTube have long ago figured out how to game YouTube's algorithm's heavy dependence on click-through rates and watch time, one reason so many YouTube videos are lengthening over time, much to my dismay).]

...After some time, new subcultures did indeed emerge on TikTok. No longer was it just teenage girls lip-synching. **There are [so many subcultures on TikTok](#) I can barely track them because I only ever see a portion of them in my personalized FYP. This broadened TikTok's appeal and total addressable market.** Douyin had followed that path in China, so Bytedance at least had some precedent for committing to such an expensive bet, but I wasn't certain if it would work in the U.S., a much more competitive media and entertainment market.

Within a larger social network, even subcultures need some minimum viable scale, and though Bytedance paid dearly to fill the top of the funnel, its algorithm eventually helped assemble many subcultures surpassing that minimum viable scale. More notably, it did so with amazing speed.

Think of how most other social networks have scaled. The usual path is organic. Users are encouraged to follow and friend each other to assemble their own graph one connection at a time. The challenge with that is that it's almost always a really slow build, and you have to provide some reason for people to hang around and build that graph, often encapsulated by the aphorism "[come for the tool, stay for the network.](#)" Today, it's not as easy to build the "tool" part when so much of that landscape has already been mined and when scaled networks have learned to copy any tool achieving any level of traction.

11.2.5 [Macgowan \(2020\)](#). The TikTok Algorithm Knew My Sexuality Better Than I Did.
Repeller.

ABSTRACT: The TikTok algorithm is smart. Or, at least, I think it is. Over the past few weeks I've continued liking the things that I like with abandon (e.g., [rollerskating](#), [sweet moments with elderly folks](#), [teens being teens](#)). There are obviously problems in the way the algorithm machinates in that, depending on who you are and what you like, it can reinforce and cater to your worldview in an unproductive way. **But it can also be illuminating. My feed has become curated so specifically to my tastes that it has alerted me to parts of myself I hadn't fully embraced yet: It's a medley of absurd animal videos, spooky happenings that are more than likely hoaxes... and queer femmes.**

...The more queer content I was served, the more I engaged. I liked videos of [best friends declaring crushes on each other](#), which has since become an entire theme of video content on the platform. I liked videos from [lesbian women married for 23 years](#) sharing their love stories, so tender they made me cry in 15 seconds. I liked videos that made me laugh about [clichés in the queer femme community](#) (you will not find me at a Lowe's, but you will 100% find me in the skate parks, thrift stores, and your local "forest").

...Spending time on TikTok has opened my eyes to the glorious breadth of identity, presentation, and sexuality in the world. I don't mean that I was unaware of it before, per se, but the narratives I see on TikTok are uniquely joyful. I sound like a millennial when I say that for so long I associated queerness with hardship, having seen and felt the painful stories of some of my closest friends in coming to terms with their identity in their families and communities. This is not to say that stigma, trauma, and fear don't still exist in these spaces. I know they do, tragically, and at varying levels based on which family, community, and to which identity you belong.

11.2.6 [Basch, Donelle, Fera, & Jaime \(2022\)](#). Deconstructing TikTok Videos on Mental Health: Cross-sectional, Descriptive Content Analysis. *JMIR Formative Research*.

ABSTRACT: BACKGROUND: Social media platforms that are based on the creation of visual media, such as TikTok, are increasingly popular with adolescents. Online social media networks provide valuable opportunities to connect with each other to share experiences and strategies for health and wellness.

OBJECTIVE: The aim of this study was to describe the content of the hashtag #mentalhealth on TikTok.

METHODS:: This cross-sectional, descriptive content analysis study included 100 videos with the hashtag #mentalhealth on TikTok. All videos that included the hashtag #mentalhealth were analyzed and coded for the presence of content categories. Additionally, the comments to each video were viewed and coded for content in the following themes: offering support or validation; mentioning experience with suicide or suicidal ideation; mentioning experience with self-harm; describing an experience with hospitalization for mental health issues; describing other mental health issues; and sharing coping strategies, experiences of healing, or ways to feel better.

RESULTS: Collectively, the 100 videos studied received 1,354,100,000 views; 266,900,000 likes; and 2,515,954 comments. On average, each video received 13,406,930.69 (SD 8,728,095.52) views; 2,657,425.74 (SD 1,449,920.45) likes; and 24,910.44 (SD 21,035.06) comments. The only content category observed in most (51/100, 51%) of the videos included in the sample was “general mental health.” The remaining content categories appeared in less than 50% of the sample. In total, 32% (32/100) of the videos sampled received more than the overall average number of likes (ie, more than 2.67 million likes). Among these 32 videos, 23 (72%) included comments offering support or validation and 20 (62%) included comments that described other mental health issues or struggles.

CONCLUSIONS: **With over 1 billion cumulative views, almost half of the assessed TikTok videos included in this study reported or expressed symptoms of mental distress.** Future research should focus on the potential role of intervention by health care professionals on social media.

11.2.7 [Logrieco, Marchili, Roversi, & Villani \(2021\)](#). The Paradox of Tik Tok Anti-Pro-Anorexia Videos: How Social Media Can Promote Non-Suicidal Self-Injury and Anorexia. *International Journal of Environmental Research and Public Health*.

ABSTRACT: The literature shows that social pressure promotes non-suicidal self-injury (NSSI) Eating disorders, along with self-injury, are also favored by underregulated social media. Tik Tok is one of the most used social media platforms among adolescents. It has been shown that the time young children spend on this platform doubled during the lockdown. The theme of anorexia is very common on this platform. **While most “pro-ana” (pro-anorexia) videos, where users exchanged advice on how to pathologically lose weight, have been censored by the application, other “anti-pro-ana” (anti-pro-anorexia) videos, officially aimed at raising awareness of the consequences of anorexia, have become increasingly popular. However, our case shows how even these safer videos paradoxically lead the users to emulate these “guilty” behaviors.**

11.2.8 [Zhang \(2022\)](#). How Psychological Factors Impact Chinese Youth Tik Tok Addiction.

ABSTRACT: Tik Tok is very popular all over the world, especially in China. In some cases, the excessive use of Tik Tok can lead to addiction among Chinese youth. This report is based on the Mesomeric effect to study the factors affecting short video app addiction. A total of 349 valid questionnaires were collected to test the hypothesis. **The results confirmed that social anxiety, loneliness and happiness were positively correlated with Tik Tok addiction. At the same time, social anxiety, loneliness, and happiness contribute to the desire to seek relationships and lead to Tik Tok addiction.** Loneliness partly leads to escapism, and through escapism leads to Tik Tok addiction.

11.2.9 [Montag, Yang, & Elhai \(2021\)](#). On the Psychology of TikTok Use: A First Glimpse From Empirical Findings. *Frontiers in Public Health*.

ABSTRACT: TikTok (in Chinese: DouYin; formerly known as musical.ly) currently represents one of the most successful Chinese social media applications in the world. Since its founding in September 2016, TikTok has seen widespread distribution, in particular, attracting young users to engage in viewing, creating, and commenting on “LipSync-Videos” on the app. Despite its success in terms of user numbers, psychological studies aiming at an understanding of TikTok use are scarce. This narrative review provides a comprehensive overview on the small empirical literature available thus far. In particular, insights from uses and gratification theory in the realm of TikTok are highlighted, and we also discuss aspects of the TikTok platform design. Given the many unexplored research questions related to TikTok use, it is high time to

strengthen research efforts to better understand TikTok use and whether certain aspects of its use result in detrimental behavioral effects. In light of user characteristics of the TikTok platform, this research is highly relevant because TikTok users are often adolescents and therefore from a group of potentially vulnerable individuals.

11.2.10 [Sha, & Dong \(2021\)](#). Research on Adolescents Regarding the Indirect Effect of Depression, Anxiety, and Stress between TikTok Use Disorder and Memory Loss. *International Journal of Environmental Research and Public Health*.

ABSTRACT: This research involved the participation of 3036 Chinese students in the first and second years of senior high school. The adolescents were active users of TikTok. The mediating effect of depression, anxiety, and stress between TikTok use disorder and memory loss was investigated. A forward and backward digit span test was applied to measure memory loss. Structural equation modeling (SEM) was established, and SPSS Amos was used for analysis. **The results show a partial mediation effect of depression and anxiety between TikTok use disorder and forward digit span. A partial mediation effect of depression, anxiety, and stress between TikTok use disorder and backward digit span is also shown.** These results also show gender differences. **Attention should be given to male students, who have more depression, anxiety, and stress than female students; they also have more memory loss.**

[put in cog effects]

11.2.11 [Botella \(2019\)](#). TikTok Admits It Suppressed Videos by Disabled, Queer, and Fat Creators. *Slate*.

EXCERPT: The admission came after the German site [Netzpolitik](#) reported that TikTok asked moderators to watch 15-second videos and decide if the creator looked like the type of person others might want to bully. If so, moderators were instructed to add flags to the accounts of these “vulnerable” users. These flags would stop their videos from being shown to audiences outside their home countries and, in some cases, would even prevent their videos from appearing in other users’ feeds. A list of flagged users obtained by Netzpolitik included people with and without disabilities, whose bios included hashtags like #fatwoman and #disabled or had rainbow flags and other LGBTQ identifiers.

Among those who found out their content had been suppressed was Annika, or “Miss_Anni21,” a 21-year-old self-described fat woman with 23,000 TikTok followers.

Although Annika’s videos have attracted both positive and negative comments, she told Netzpolitik that the action was “discriminatory” and “inhuman.”

A TikTok spokesperson told NetzPolitik “this approach was never intended to be a long-term solution” and said the policies were no longer in use. TikTok also said, “while the intention was good, the approach was wrong and we have long since changed the earlier policy in favor of more nuanced anti-bullying policies and in-app protections.” Despite TikTok’s statement, NetzPolitik has identified the rules were in place as recently as September.

The team at TikTok that developed the video suppression policy may have earnestly believed it was a helpful reaction to the scourge of bullying. Online harassment remains an intractable problem, and people with disabilities are among those disproportionately targeted. One [study](#) found that in Boston, students with disabilities were 1.8 times as likely as their peers to be victims of cyberbullying. And yet, the same study, authored by Miriam Heyman of the Ruderman Family Foundation, also found that students with disabilities were also more likely to receive support from others via social media. For members of any minority group, social media provides an opportunity to connect with others with shared experiences, to find role models and content reflecting their own life that isn’t represented in traditional media. Some even translate their reach into dollars. [Aaron Philip](#), a disabled trans influencer, won modeling contracts with Sephora and Dove after going viral on [Twitter](#), and Keah Brown landed a book deal with Simon & Schuster for her essay collection [The Pretty One](#) after her hashtag [#disabledandcute](#) took off.* Social media suppression denies people economic, political, and cultural opportunities and, in that sense, really isn’t that different from an employer not hiring a software engineer because they use a wheelchair.

11.2.12 [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

ABSTRACT: Fitspiration is a popular social media trend that aims to inspire individuals to improve 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.

11.2.13 [Haltigan, Pringsheim, & Rajkumar \(2023\)](#). Social media as an incubator of personality and behavioral psychopathology: Symptom and disorder authenticity or psychosomatic social contagion? *Comprehensive Psychiatry*.

ABSTRACT: There has been an increasing recognition among both medical and psychological professionals, as well as the public media, of a concerning trend for child and adolescent users of audiovisual-based, algorithmic social media platforms (e.g., TikTok) to present with or claim functional psychiatric impairment that is inconsistent with or distinct from classic psychiatric nosology. In this short communication, we provide a detailed historical overview of this transdiagnostic phenomenon and suggest a conceptual model to organize thinking and research examining it. We then discuss the implications of our suggested model for accurate assessment, diagnosis, and medical-psychiatric treatment. We believe there is an urgent need for focused empirical research investigation into this concerning phenomenon that is related to the broader research and discourse examining social media influences on mental health.

11.2.14 [Haltigan, Pringsheim, & Rajkumar \(2023\)](#). Social media as an incubator of personality and behavioral psychopathology: Symptom and disorder authenticity or psychosomatic social contagion? *Comprehensive Psychiatry*.

ABSTRACT: There has been an increasing recognition among both medical and psychological professionals, as well as the public media, of a concerning trend for child and adolescent users of audiovisual-based, algorithmic social media platforms (e.g., TikTok) to present with or claim functional psychiatric impairment that is inconsistent with or distinct from classic psychiatric nosology. In this short communication, we provide a detailed historical overview of this transdiagnostic phenomenon and suggest a conceptual model to organize thinking and research examining it. We then discuss the implications of our suggested model for accurate assessment, diagnosis, and medical-psychiatric treatment. We believe there is an urgent need for focused empirical

research investigation into this concerning phenomenon that is related to the broader research and discourse examining social media influences on mental health.

11.2.15 [Gurwinder \(2023\)](#). TikTok is a Chinese Superweapon [Substack newsletter].
The Prism.

EXCERPT:

[What are we missing?]

11.3 STUDIES AND ESSAYS ON THE EFFECTS OF TELEVISION

11.3.1 [Cespedes, Gillman, Kleinman, Rifas-Shiman, Redline, & Taveras \(2014\)](#).

Television Viewing, Bedroom Television, and Sleep Duration From Infancy to Mid-Childhood. *Pediatrics*.

ABSTRACT: BACKGROUND: Television and insufficient sleep are associated with poor mental and physical health. This study assessed associations of TV viewing and bedroom TV with sleep duration from infancy to midchildhood.

METHOD: We studied 1864 children in Project Viva. Parents reported children's average daily TV viewing and sleep (at 6 months and annually from 1–7 years) and the presence of a bedroom TV (annually 4–7 years). We used mixed effects models to assess associations of TV exposures with contemporaneous sleep, adjusting for child age, gender, race/ethnicity, maternal education, and income.

RESULTS: Six hundred forty-three children (35%) were racial/ethnic minorities; 37% of households had incomes \leq \$70 000. From 6 months to 7 years, mean (SD) sleep duration decreased from 12.2 (2.0) hours to 9.8 (0.9) hours per day; TV viewing increased from 0.9 (1.2) hours to 1.6 (1.0) hours per day. At 4 years, 17% had a bedroom TV, rising to 23% at 7 years. **Each 1 hour per day increase in lifetime TV viewing was associated with 7 minutes per day (95% confidence interval [CI]: 4 to 10) shorter sleep.** The association of bedroom TV varied by race/ethnicity; bedroom TV was associated with 31 minutes per day shorter sleep (95% CI: 16 to 45) among

racial/ethnic minority children, but not among white, non-Hispanic children (8 fewer minutes per day [95% CI: -19 to 2]).

CONCLUSIONS: More TV viewing, and, among racial/ethnic minority children, the presence of a bedroom TV, were associated with shorter sleep from infancy to midchildhood.

11.3.2 [Helm, & Spencer \(2019\)](#). Television use and its effects on sleep in early childhood. *Sleep Health*.

ABSTRACT: OBJECTIVES: The purpose of this study was to investigate the impacts of television (TV) viewing and bedroom TV presence on young children's sleep as measured by [actigraphy](#).

DESIGN: Analyses of covariance were run to examine differences in sleep duration and quality among children based on the presence of TVs in their bedrooms and the amount of TV watched.

Setting

Recruited in preschools in Massachusetts; recorded ambulatory (in home, environs).

PARTICIPANTS: Participants were 470 children between 33 and 71 months of age (M = 51.02).

MEASUREMENTS: Children were instructed to wear an [actigraph](#) watch for 16 days. Caregivers reported demographic information, completed behavior questionnaires, and answered questions regarding their child's TV use.

RESULTS: **Children who watched more TV and had TVs in their bedroom displayed significantly shorter sleep duration and worse sleep, but they also napped significantly longer in the daytime. Nonetheless, total 24-hour sleep was shorter for those who watched more TV and had TVs in their bedroom compared to those who did not have TVs in their bedrooms or watch TV frequently. Children who had TVs in their bedrooms watched TV later at night, watched more adult TV programs, and had higher negative affect than children without TVs in their bedrooms.**

CONCLUSIONS: These findings suggest that TV use in young children does impact sleep duration and quality as measured by actigraphy, and daytime napping does not offset these negative impacts.

11.3.3 [Paavonen, Pennonen, Roine, Valkonen, & Lahikainen \(2006\)](#). TV exposure associated with sleep disturbances in 5- to 6-year-old children. *Journal of Sleep Research*.

ABSTRACT: The aim of this study was to investigate the effects of various forms of TV exposure on the quality of children's sleep. In this randomized population-based survey questionnaires concerning TV viewing, sleep disturbances, and psychiatric symptoms were administered to 321 parents of children aged 5–6 years. Sleep disturbance scores were the main outcome measures. **Active TV viewing and passive TV exposure were related to sleeping difficulties, especially sleep–wake transition disorders and overall sleep disturbances. Particularly, passive TV exposure and viewing adult-targeted TV programs were strongly related to sleep disturbances.** The association remained significant when socioeconomic status, family income, family conflicts, the father's work schedule, and the child's psychiatric symptoms were controlled statistically. **The adjusted odds ratios were 2.91 (95% CI 1.03–8.17) and 3.01 (95% CI 1.13–8.05), respectively.** TV viewing and particularly passive TV exposure and viewing adult-targeted programs significantly increase the risk of sleeping difficulties. The results suggest that health-care professionals should be aware of the association between TV exposure and sleep disturbances.

11.3.4 [Garmy, Nyberg, & Jakobsson \(2012\)](#). Sleep and Television and Computer Habits of Swedish School-Age Children. *The Journal of School Nursing*.

ABSTRACT: The aim of this study was to investigate sleep, television and computer habits and enjoyment and feelings of tiredness in school of school-age children and adolescents in Sweden. An instrument found to be valid and reliable here was distributed to 3,011 children aged 6, 7, 10, 14, and 16 years. Those sleeping less than the median length of time reported a significantly lower degree of enjoyment of school. **Short sleep was found to be associated with having a bedroom TV, spending more than 2 hr a day at the TV or the computer, being tired in school, and having difficulties both in waking up and in sleeping.** Discussing sleep and media habits with schoolchildren and their parents regarding matters of optimal sleep and of how media habits affect sleep and learning is seen to be an important task of the school health service.

11.3.5 [Brockmann, Diaz, Damiani, Villarroel, Núñez, & Bruni \(2016\)](#). Impact of television on the quality of sleep in preschool children. *Sleep Medicine*.

ABSTRACT: We aimed to investigate the impact of different habits concerning television (TV) use and the time of day in which TV is watched on the sleep quality of young children.

METHODS: Parents of 100 healthy children (58% boys, mean age of 2.7 ± 1.5 years) attending a routine health check completed the Sleep Disturbance Scale for Children (SDSC) and a questionnaire concerning TV and electronic media use. Children were divided into those with a normal (SDSC-) or abnormal (SDSC+) questionnaire score. TV viewing habits were compared between groups.

RESULTS: The total sleep time and total TV viewing time were not different between groups. A TV set was inside each child's bedroom in 51% of participants. **Children with a TV in their bedroom showed significantly higher scores in the “sleep terrors,” “nightmares,” “sleep talking,” and “tired when waking up” responses of the SDSC (P = 0.02, 0.01, 0.01, and 0.01, respectively). Children with a TV in their room had an odds ratio (95% confidence interval) of 3.29 (1.08–9.99) for having an abnormal SDSC. Evening TV viewers had significantly higher SDSC scores compared with those who watched TV earlier during the day (P = 0.04).**

CONCLUSIONS: The presence of a TV set in the child's bedroom was associated with significant reductions in the quality of young children's sleep. Evening exposure to TV was associated with significantly worse sleep quality.

11.3.6 [Owens, Maxim, McGuinn, Nobile, Msall, & Alario \(1999\)](#). Television-viewing Habits and Sleep Disturbance in School Children. *Pediatrics*.

ABSTRACT: OBJECTIVE: To investigate the relationship between specific television-viewing habits and both sleep habits and sleep disturbances in school children.

METHODS: The parents of 495 children in grades kindergarten through fourth grade in three public elementary schools completed two retrospective survey questionnaires, one assessing their children's sleep behaviors and the other examining television-viewing habits of both the child and the family. Sleep domains assessed included bedtime resistance, sleep onset delay, sleep duration, anxiety around sleep, parasomnias, night wakings, and daytime sleepiness. Teachers from all three schools also completed daytime sleepiness questionnaires (N = 402) for the sample.

RESULTS: Most of the television-viewing practices examined in this study were associated with at least one type of sleep disturbance. Despite overall close monitoring of television-viewing habits, one quarter of the parents reported the presence of a television set in the child's bedroom. **The television-viewing habits associated most significantly with sleep disturbance were increased daily television viewing amounts and increased television viewing at bedtime, especially in the context of having a television set in the child's bedroom.** The sleep domains that appeared to be affected most consistently by television were bedtime resistance, sleep onset delay, and anxiety around sleep, followed by shortened sleep duration. The parent's threshold

for defining “problem sleep behavior” in their child was also important in determining the significance of the association between sleep disturbance and television-viewing habits. CONCLUSION Health care practitioners should be aware of the potential negative impact of television viewing at bedtime. Parents should be questioned about their children's television-viewing habits as part of general screening for sleep disturbances and as part of anticipatory guidance in regards to healthy sleep habits in children. In particular, the presence of a television set in the child's bedroom may be a relatively underrecognized, but important, contributor to sleep problems in school children.

11.3.7 [Thompson, & Christakis \(2005\)](#). The Association Between Television Viewing and Irregular Sleep Schedules Among Children Less Than 3 Years of Age. *Pediatrics*.

ABSTRACT: BACKGROUND: Regular sleep schedules are an important part of healthy sleep habits. Although television viewing is associated with altered sleep patterns and sleep disorders among children and adolescents, the effect of television viewing on the sleep patterns of infants and toddlers is not known.

OBJECTIVE: To test the hypothesis that television viewing by infants and toddlers is associated with having irregular naptime and bedtime schedules.

METHODS: We used data from the National Survey of Early Childhood Health, a nationally representative, cross-sectional study of the health and health care of children 4 to 35 months of age. Our main outcome measures were whether children had irregular naptime and bedtime schedules. Our main predictor was hours of television watched on a daily basis. We performed multivariate logistic regression analyses, adjusting for a variety of factors including demographic information, measures of maternal mental health, and measures of family interactions, to test the independent association of television viewing and irregular naptime and bedtime schedules.

RESULTS: Data were available for 2068 children. Thirty-four percent of all children had irregular naptime schedules, and 27% had irregular bedtime schedules. Mean hours of television viewing per day were as follows: 0.9 hours/day (95% confidence interval [CI]: 0.8–1.0 hours/day) for children <12 months of age, 1.6 hours/day (95% CI: 1.4–1.8 hours/day) for children 12 to 23 months of age, and 2.3 hours/day (95% CI: 2.1–2.5 hours/day) for children 24 to 35 months of age. **In our logistic regression model, the number of hours of television watched per day was associated with both an irregular naptime schedule (odds ratio: 1.09; 95% CI: 1.01–1.18) and an irregular bedtime schedule (odds ratio: 1.13; 95% CI: 1.04–1.24).**

CONCLUSIONS: Television viewing among infants and toddlers is associated with irregular sleep schedules. More research is warranted to determine whether this association is causal.

11.3.8 [Robertson,McAnally, & Hancox \(2013\)](#). Childhood and Adolescent Television Viewing and Antisocial Behavior in Early Adulthood. *Pediatrics*.

ABSTRACT: OBJECTIVE: To investigate whether excessive television viewing throughout childhood and adolescence is associated with increased antisocial behavior in early adulthood.

METHODS: We assessed a birth cohort of 1037 individuals born in Dunedin, New Zealand, in 1972–1973, at regular intervals from birth to age 26 years. We used regression analysis to investigate the associations between television viewing hours from ages 5 to 15 years and criminal convictions, violent convictions, diagnosis of antisocial personality disorder, and aggressive personality traits in early adulthood.

RESULTS: **Young adults who had spent more time watching television during childhood and adolescence were significantly more likely to have a criminal conviction, a diagnosis of antisocial personality disorder, and more aggressive personality traits compared with those who viewed less television. The associations were statistically significant after controlling for sex IQ, socioeconomic status, previous antisocial behavior, and parental control.**

The associations were similar for both sexes, indicating that the relationship between television viewing and antisocial behavior is similar for male and female viewers.

CONCLUSIONS: Excessive television viewing in childhood and adolescence is associated with increased antisocial behavior in early adulthood. The findings are consistent with a causal association and support the American Academy of Pediatrics recommendation that children should watch no more than 1 to 2 hours of television each day.

11.3.9 [Morgan \(1982\)](#). Television and adolescents' sex role stereotypes: A longitudinal study. *Journal of Personality and Social Psychology*.

ABSTRACT: A 2-yr study examined the relationship between the TV viewing and sex-role stereotypes of 349 6th–9th graders. **Among females, the amount of TV viewing was significantly associated with sexism scores 1 yr later, over and above the effects of demographic controls and early sexism levels. There was, however, no evidence that females' degree of sex-typing subsequently led to TV viewing. For males, these patterns were precisely the reverse: TV had no longitudinal impact on sex-role attitudes, but sexism foreshadowed greater viewing.** Among females, the effect of TV increased with social class. Both lower-class females and males as a group were more sexist regardless of viewing levels. This

suggests that TV viewing is most likely to make a difference among those who are otherwise least likely to hold traditional sex-role views. TV's impact may thus reflect a convergence of disparate perspectives into a more homogeneous "mainstream" commonality of outlooks.

11.3.10 [Johnson, Cohen, Kasen, & Brook \(2007\)](#). Extensive Television Viewing and the Development of Attention and Learning Difficulties During Adolescence. *Archives of Pediatrics & Adolescent Medicine*.

ABSTRACT: OBJECTIVE: To investigate the association of television viewing with educational and intellectual outcomes during adolescence and early adulthood.

DESIGN: Prospective epidemiological study.

SETTING: Families participating in the Children in the Community Study, a prospective longitudinal investigation, were interviewed at mean offspring ages 14, 16, and 22 years.

PARTICIPANTS: A community-based sample of 678 families from upstate New York.

EXPOSURES: Television viewing, attention difficulties, learning difficulties, and educational achievement during adolescence and early adulthood.

OUTCOME MEASURES: The Disorganizing Poverty Interview and age-appropriate versions of the Diagnostic Interview Schedule for Children.

RESULTS: **Frequent television viewing during adolescence was associated with elevated risk for subsequent attention and learning difficulties after family characteristics and prior cognitive difficulties were controlled. Youths who watched 1 or more hours of television per day at mean age 14 years were at elevated risk for poor homework completion, negative attitudes toward school, poor grades, and long-term academic failure. Youths who watched 3 or more hours of television per day were the most likely to experience these outcomes. In addition, youths who watched 3 or more hours of television per day were at elevated risk for subsequent attention problems and were the least likely to receive postsecondary education.** There was little evidence of bidirectionality in the association of television viewing with attention and learning difficulties.

CONCLUSION: Frequent television viewing during adolescence may be associated with risk for development of attention problems, learning difficulties, and adverse long-term educational outcomes.

11.3.11 [Khan, & Burton \(2021\)](#). Electronic Games, Television, and Psychological Wellbeing of Adolescents: Mediating Role of Sleep and Physical Activity. *International Journal of Environmental Research and Public Health*,.

ABSTRACT: This study investigated the associations between two common recreational screen activities and the psychological wellbeing of adolescents, and whether this association was mediated by sleep duration or physical activity frequency. This study used nationally representative cross-sectional survey data from 2946 adolescents (mean age 16.9 [0.38] years; 49% female) in the Longitudinal Study of Australian Children (LSAC). Adolescents provided information on daily time spent for each of the following: playing electronic games and watching television, time of sleep onset and wakeup, and number of days/week doing ≥ 60 min/day of physical activity. Psychological wellbeing was assessed by the Strengths and Difficulties Questionnaire (SDQ). Generalized estimating equations were used to examine the associations, and a contemporary multiple mediation analysis was used to examine the mediation effects. One fifth (20%) of adolescents were categorized as having poor wellbeing (SDQ total ≥ 17) with a significant sex difference (males: 16%; females: 24%; $p < 0.001$). **Playing electronic games was inversely associated with psychological wellbeing for both male and female adolescents ($p < 0.001$). Watching television was inversely associated with psychological wellbeing for female adolescents ($p < 0.001$). Sleep duration and physical activity frequency were found to partially mediate the relationships between playing electronic games and the psychological wellbeing of male and female adolescents.** Physical activity frequency partially mediated the association between television watching and wellbeing among female adolescents. Longitudinal studies are required to determine the causal pathway between screen-based activities and the wellbeing of adolescents, and to inform intervention strategies.

11.3.12 [McAnally, Young, & Hancox \(2019\)](#). Childhood and adolescent television viewing and internalising disorders in adulthood. *Preventive Medicine Reports*.

ABSTRACT: Time spent watching television during childhood and adolescence has been linked to socio-emotional and physical health problems in adulthood. It is unclear whether excessive television viewing is a risk factor for internalising mental health disorders such as anxiety and depression. Longitudinal associations between television viewing in childhood and adult diagnoses of anxiety and depression were investigated in a population-based birth cohort from Dunedin, New Zealand. Mean weekday television viewing time was reported by parents and adolescents between ages 5 and 15 years (1977–1987). Diagnoses of any anxiety disorder and [major depression](#) were made using standard criteria from symptoms reported for the previous year at ages 18, 21, 26, 32, and 38 years (between 1990 and 2012). Analyses adjusted for sex, parent and teacher reports of worry/fearfulness at age 5, and socioeconomic status during

childhood. Diagnoses were counted if present at any of these assessments. Approximately half of all participants met criteria for anxiety disorder or depression during at least one adult assessment. **Participants who had watched more television during childhood and adolescence were more likely to have a diagnosis of anxiety in sex-adjusted analyses (OR [95% CI] 1.22 [1.05, 1.41], $p = 0.01$), although this association weakened after adjustment for early childhood worry/fearfulness and socioeconomic status. There was no association between television viewing and depression in sex- or fully-adjusted analyses.** Excessive television viewing during childhood and adolescence may be a risk factor for developing an anxiety disorder in adulthood, but does not appear to influence the long-term risk for major depression.

11.3.13 [Hamer, Stamatakis, & Mishra \(2009\)](#). Psychological Distress, Television Viewing, and Physical Activity in Children Aged 4 to 12 Years. *Pediatrics*.

ABSTRACT: OBJECTIVES: Sedentary behavior and physical activity may be independent risk factors for psychological distress in adolescents, although there is no existing information for children. We examined the cross-sectional association between psychological distress, television and screen entertainment time, and physical activity levels among a representative sample of children aged 4 to 12 years from the 2003 Scottish Health Survey.

METHODS: Participants were 1486 boys and girls (mean age: 8.5 ± 2.3 years). Parents answered on behalf of children who were required to be present. The parents completed the Strengths and Difficulties Questionnaire and information on television and screen entertainment time, physical activity, and dietary intake of their children.

RESULTS: An abnormally high Strengths and Difficulties Questionnaire total difficulties score (20–40) was found in 4.2% of the sample. Approximately 25% of the children were exposed to television and screen entertainment at least 3 hours/day. In general linear models, television and screen entertainment time per week and physical activity levels were independently associated with the Strengths and Difficulties Questionnaire total difficulties score after adjustment for age, gender, area deprivation level, single-parent status, medical conditions, and various dietary intake indicators. There was also an additive interaction effect showing that the combination of high television and screen entertainment time and low physical activity was associated with the highest Strengths and Difficulties Questionnaire score. **Higher television and screen entertainment exposure (>2.7 hours/day) alone resulted in a 24% increase in the Strengths and Difficulties Questionnaire score in comparison with lower television and screen entertainment exposure (<1.6 hours/day), although when combined with low physical activity this resulted in a 46% increase.**

CONCLUSION: Higher levels of television and screen entertainment time and low physical activity levels interact to increase psychological distress in young children.

11.3.14 [Hancox, Milne, & Poulton \(2004\)](#). Association between child and adolescent television viewing and adult health: A longitudinal birth cohort study. *The Lancet*.

ABSTRACT: BACKGROUND: Watching television in childhood and adolescence has been linked to adverse health indicators including obesity, poor fitness, smoking, and raised cholesterol. However, there have been no longitudinal studies of childhood viewing and adult health. We explored these associations in a birth cohort followed up to age 26 years.

METHODS: We assessed approximately 1000 unselected individuals born in Dunedin, New Zealand, in 1972–73 at regular intervals up to age 26 years. We used regression analysis to investigate the associations between earlier television viewing and body-mass index, cardiorespiratory fitness (maximum aerobic power assessed by a submaximal cycling test), serum cholesterol, smoking status, and blood pressure at age 26 years.

FINDINGS: **Average weeknight viewing between ages 5 and 15 years was associated with higher body-mass indices ($p=0.0013$), lower cardiorespiratory fitness ($p=0.0003$), increased cigarette smoking ($p<0.0001$), and raised serum cholesterol ($p=0.0037$). Childhood and adolescent viewing had no significant association with blood pressure.** These associations persisted after adjustment for potential confounding factors such as childhood socioeconomic status, body-mass index at age 5 years, parental body-mass index, parental smoking, and physical activity at age 15 years. In 26-year-olds, population-attributable fractions indicate that 17% of overweight, 15% of raised serum cholesterol, 17% of smoking, and 15% of poor fitness can be attributed to watching television for more than 2 h a day during childhood and adolescence.

INTERPRETATION: Television viewing in childhood and adolescence is associated with overweight, poor fitness, smoking, and raised cholesterol in adulthood. Excessive viewing might have long-lasting adverse effects on health.

11.3.15 [Landhuis, Poulton, Welch, & Hancox \(2007\)](#). Does Childhood Television Viewing Lead to Attention Problems in Adolescence? Results From a Prospective Longitudinal Study. *Pediatrics*.

ABSTRACT: CONTEXT: There is controversy over whether childhood television viewing causes attention problems. The findings from cross-sectional and longitudinal studies

have been mixed. To our knowledge, no longitudinal studies have assessed the impact of children's television viewing on attention problems in adolescence. The objective of this study was to assess this association.

DESIGN, PARTICIPANTS, AND SETTING: Study members were a general population birth cohort of 1037 participants (502 female) born in Dunedin, New Zealand, between April 1972 and March 1973. Parental estimates of children's television-viewing time were obtained at ages 5, 7, 9, and 11 years. Self-, parent-, and teacher-reported attention problems in adolescence were obtained at ages 13 and 15 years.

RESULTS: **The mean of hours of television viewing during childhood was associated with symptoms of attention problems in adolescence. These associations remained significant after controlling for gender, attention problems in early childhood, cognitive ability at 5 years of age, and childhood socioeconomic status.** This association was also independent of adolescent television viewing.

CONCLUSIONS. Childhood television viewing was associated with attention problems in adolescence, independent of early attention problems and other confounders. These results support the hypothesis that childhood television viewing may contribute to the development of attention problems and suggest that the effects may be long-lasting.

11.3.16 [Johnson, Cohen, Kasen, First, & Brook \(2004\)](#). Association Between Television Viewing and Sleep Problems During Adolescence and Early Adulthood. *Archives of Pediatrics & Adolescent Medicine*.

ABSTRACT: BACKGROUND: Although research has suggested that extensive television viewing may be associated with sleep problems, the direction of this association has not yet been determined.

OBJECTIVE: To investigate directional hypotheses regarding the association between television viewing and sleep problems during adolescence and early adulthood.

DESIGN: The Children in the Community Study, a prospective longitudinal investigation.

PARTICIPANTS: A community-based sample of 759 mothers from upstate New York and their offspring were interviewed during the early adolescence (mean age, 14 years), middle adolescence (mean age, 16 years), and early adulthood of the offspring (mean age, 22 years).

OUTCOME MEASURES: Television viewing and sleep problems during adolescence and early adulthood measured using the Disorganizing Poverty Interview and the age-appropriate versions of the Diagnostic Interview Schedule for Children.

RESULTS: Adolescents who watched 3 or more hours of television per day during adolescence were at a significantly elevated risk for frequent sleep problems by early adulthood. This elevation in risk remained significant after offspring age, sex, previous

sleep problems, offspring psychiatric disorders, offspring neglect, parental educational level, parental annual income, and parental psychiatric symptoms were controlled statistically. **Adolescents who reduced their television viewing from 1 hour or longer to less than 1 hour per day experienced a significant reduction in risk for subsequent sleep problems. Sleep problems during adolescence were not independently associated with subsequent television viewing when prior television viewing was controlled.**

CONCLUSION: Extensive television viewing during adolescence may contribute to the development of sleep problems by early adulthood.

[What are we missing?]

11.4 STUDIES AND ESSAYS ON THE EFFECTS OF THE INTERNET

11.4.1 [Forsman & Nordmyr \(2017\)](#). Psychosocial Links Between Internet Use and Mental Health in Later Life: A Systematic Review of Quantitative and Qualitative Evidence. *Journal of Applied Gerontology*.

ABSTRACT: Research on the role of information and communication technology (ICT) use for active aging is limited. The aim of this systematic review is to investigate the link between Internet use and mental health among older adults. The review was conducted based on searches in 9 electronic databases (2002-2014). A meta-synthesis approach was applied, examining quantitative (18) and qualitative (14) studies. **The findings from the synthesis of quantitative statistical data indicate an overall positive association between Internet use and mental health and its psychosocial covariates in later life.** The psychosocial links between Internet use and mental health identified from the qualitative data were **(a) enhanced interpersonal interaction at individual level, (b) increased access to resources within the community, and (c) empowered social inclusion at society level.**

The results highlight the multi-level psychosocial links between Internet use and mental health, which may be applied in initiatives targeting healthy aging in various settings.

11.4.2 [El Asam, Samara, & Terry \(2019\)](#). Problematic internet use and mental health among British children and adolescents. *Addictive Behaviors*.

ABSTRACT: Despite concerns about the effects of internet use, little is known about how [problematic internet use](#) impacts on British children and adolescents. By adapting the Problematic Internet Use Questionnaire (PIUQ, Demetrovics, Szeredi, & Rózsa, 2008), this study seeks its validation while studying its association with psychopathological and health problems. A sample of 1,814 children and adolescents (aged 10–16 years old) from UK schools completed questionnaires about PIU, behavioural problems, depression, anxiety and health problems. [Confirmatory Factor Analysis](#) identified three independent factors: Neglect, Obsession and Control Disorder. Using path analysis, **PIU was significantly predicted by conduct problems, hyperactivity, impact on daily life activities, depression and poorer physical health**. Males were more likely than females to score higher on PIU. The study shows for the first time that the adapted PIU questionnaire constitutes a valid tool for the assessment of [problematic internet use](#) among children/adolescents. The results also suggest an urgent need for the development of intervention strategies.

11.4.3 [Lam, Jivraj, & Scholes \(2020\)](#). Exploring the Relationship Between Internet Use and Mental Health Among Older Adults in England: Longitudinal Observational Study. *Journal of Medical Internet Research*.

ABSTRACT: BACKGROUND: There is uncertainty about the impact of internet use on mental health in older adults. Moreover, there is very little known specifically about the impact of particular purposes of internet use.

OBJECTIVE: This study aims to investigate the longitudinal relationship between two distinct concepts of mental health with the frequency of internet use among older adults: the moderating role of socioeconomic position (SEP) and the association between specific purposes of internet use.

METHODS: Longitudinal fixed and random effects (27,507 person-years) models were fitted using waves 6-8 of the English Longitudinal Study of Ageing to examine the relationship between different aspects of internet use (frequency and purpose) and two mental health outcomes (depression and life satisfaction). The potential moderating effect of SEP on these associations was tested using interaction terms.

RESULTS: Infrequent internet use (monthly or less vs daily) was predictive of deteriorating life satisfaction ($\beta=-0.512$; $P=.02$) but not depression. Education and occupational class had a moderating effect on the association between frequency of internet use and mental health. The associations were stronger in the highest

educational group in both depression ($P=.09$) and life satisfaction ($P=.02$), and in the highest occupational group in life satisfaction ($P=.05$) only. **Using the internet for communication was associated with lower depression ($\beta=-0.24$; $P=.002$) and better life satisfaction ($\beta=.97$; $P<.001$), whereas those using the internet for information access had worse life satisfaction ($\beta=-0.86$; $P<.001$) compared with those who did not.**

CONCLUSIONS: Policies to improve mental health in older adults should encourage internet use, especially as a tool to aid communication.

11.4.4 [Ciarrochi, Parker, Sahdra, Baljinder, Jackson, Gloster, & Heaven \(2016\)](#). The development of compulsive internet use and mental health: A four-year study of adolescence. *Developmental Psychology*.

ABSTRACT: Is compulsive Internet use (CIU) an antecedent to poor mental health, a consequence, or both? Study 1 used a longitudinal design to track the development of CIU and mental health in Grade 8 ($N = 1030$ males, 1038 females, $M_{age} = 13.7$), 9, 10, and 11. Study 2 extended Study 1 by examining the kinds of Internet behaviors most strongly associated with CIU within males and females. Structural equation modeling revealed that CIU predicted the development of poor mental health, whereas poor mental health did not predict CIU development. **Latent growth analyses showed that both females and males increased in CIU and mental health problems across the high school years. Females had higher CIU and worse mental health than males, and tended to engage in more social forms of Internet use.** We discuss future directions for CIU intervention research.

11.4.5 [Choi, Park, & Cha \(2017\)](#). Relationships of Mental Health and Internet Use in Korean Adolescents. *Archives of Psychiatric Nursing*.

ABSTRACT: AIM: The purpose of this study was to identify the relationships of mental health and internet use in Korean adolescents. Also, it was intended to provide guidelines for reducing [internet overuse](#) based on the influencing factors of internet use. METHODS: Participants in this study were convenient sampling, and selected middle and high school students in Incheon metropolitan city, South Korea. Internet use and mental health of adolescents were measured by self-reported instruments. This study was carried out from June to July 2014. 1248 participants were collected overall except for insufficient data. The data were analyzed by descriptive statistics, t-test, ANOVA, [Pearson's correlation coefficient](#), and [multiple regression](#).

RESULTS: There were significant correlations between mental health and internet use. The significant influencing factors of internet use were normal internet use group, mental health, middle school, internet using time on weekends (3 h or more), internet using time at a time (3 h or more), and high school record. These six variables accounted for 38.1% of internet use.

CONCLUSIONS: The results of this study will be used as guidelines for reducing internet overuse of adolescents.

11.4.6 [Zhou... & Zhang, J. \(2020\)](#). A four-wave, cross-lagged model of problematic internet use and mental health among Chinese college students: Disaggregation of within-person and between-person effects. *Developmental Psychology*.

ABSTRACT: Based on 4 annual waves of data from a large sample of Chinese college students (N = 2,329, Mage = 18.40 years old, SD = .85; 63.10% females), this study examines the within-person and between-person effects in the association between problematic Internet use (PIU) and mental health issues. Results of analyses using the developmental equilibrium model (i.e., an autoregressive, cross-lagged panel model) **demonstrate a reciprocal positive association between PIU and mental health issues consistently across waves.** In contrast, results of analyses utilizing the random intercept, cross-lagged panel model (i.e., a model that can disaggregate within-person and between-person effects) indicate a unidirectional positive within-person effect from PIU to mental health issues (rather than the reverse) consistently over time, while controlling for the between-person effects that exist when comparing different individuals. Such findings highlight the importance of disaggregating within-person and between-person effects in understanding the nature of the temporal dynamics of the association between PIU and mental health.

11.4.7 [Liu, Desai, Krishnan-Sarin, Cavallo, & Potenza \(2011\)](#). Problematic Internet Use and Health in Adolescents: Data From a High School Survey in Connecticut. *The Journal of Clinical Psychiatry*.

ABSTRACT: OBJECTIVE: This study aims to explore the prevalence and health correlates of problematic Internet use among high school students in the United States. **METHOD:** A cross-sectional survey with a sample size of 3,560 students was conducted among high schools in Connecticut. Demographic data, characteristics of Internet use, health measures, and risk behaviors were assessed. Chi-square and

logistic regression analyses were used to study the relationship between problematic Internet use and risk behaviors as well as related gender differences.

RESULTS: When problematic Internet use was diagnosed with criteria modeled after the Minnesota Impulsive Disorder Inventory that address core features of impulse-control disorder (strong urge, growing tension, and attempts to cut back), **the overall prevalence was about 4%, with no significant difference between genders. Problematic Internet use was more common among Asian (7.86%) and Hispanic (6.07%) students. Even though boys spent significantly more time on the Internet (16.52% of boys spent over 20 hours per week vs 12.62% of girls; P = .0001) and more frequently missed important school or social activities as a result (8.97% of boys vs 5.85% of girls; P = .0004), girls more frequently self-reported measures of excessive use of the Internet (11.81% of girls thought that they had a problem vs 8.90% of boys; P = .0048).** After adjustment of sociodemographic factors, problematic Internet use was found to associate significantly with substance use (P = .0014), depression (P < .0001), and aggression (P < .0001), with largely similar patterns of associations between genders.

CONCLUSIONS: Problematic Internet use may be present in about 4% of high school students in the United States. It may be associated with depression, substance use, and aggressive behaviors. High school boys, though, may have heavier Internet use and may be less self-aware of the related problems.

11.4.8 [Yoo, Cho, & Cha \(2014\)](#). Associations between overuse of the internet and mental health in adolescents. *Nursing & Health Sciences*.

ABSTRACT: This study examined the factors influencing internet addiction levels and mental health in a nationally-representative sample of 74,980 Korean middle- and high-school students who completed the 2010 Korea Youth Risk Behavior Web-Based Survey. **The prevalence rates of potential internet addiction and internet addiction were 14.8% and 3%, respectively. The odds ratios for potential internet addiction were higher in both boys and girls who reported suicidal ideation, depressive mood, moderate or higher subjective stress, moderate or more happiness, or ever having engaged in problematic substance use. Adolescents at high risk for internet addiction had poor mental health outcomes.** The findings indicate the need for measures to prevent and manage internet addiction in adolescents that consider the severity of factors related to internet addiction.

11.4.9 [Xiugin... & Ran \(2010\)](#). Mental Health, Personality, and Parental Rearing Styles of Adolescents with Internet Addiction Disorder. *Cyberpsychology, Behavior, and Social Networking*.

ABSTRACT: The objectives of this study were to compare the personality profiles of adolescent males with and without Internet addiction disorder (IAD), and to determine if IAD is associated with specific parental rearing behaviors. A total of 304 subjects (204 IAD positive and 100 IAD negative controls) completed three instruments: Symptom Checklist-90-revision (SCL-90-R), Eysenck Personality Questionnaire Revised (EPQ-R), and Egna Minnen av Barndoms Uppfostran—My Memories of Upbringing (EMBU). **SCL-90-R profiles of adolescents with IAD revealed comparatively higher mean scores for all of the nine domains, and significantly higher scores for obsessive–compulsive, interpersonal sensitivity, depression, anxiety, hostility, and paranoid ideation;** the mean global symptom index of adolescents with IAD was also significantly higher by approximately 10%. **EPQ profiles of adolescents with IAD showed that Internet-dependent individuals tended to exhibit a significantly lower degree of extraversion and a significantly higher degree of psychoticism when compared with the control group.** EMBU profiles revealed that adolescents with IAD generally rated both maternal and paternal rearing practices as lacking in emotional warmth, being over-involved, rejecting, and punitive (mothers only). The results of this study confirm that IAD often occurs concurrently with mental symptoms and personality traits such as introversion and psychoticism. Adolescents with IAD consistently rated parental rearing behaviors as being over-intrusive, punitive, and lacking in responsiveness. These findings suggest that the influences of parenting style and family function are important factors in the development of Internet dependency.

11.4.10 [Bozkurt, Coskun, Ayaydin, Adak, & Zoroglu \(2013\)](#). Prevalence and patterns of psychiatric disorders in referred adolescents with Internet addiction. *Psychiatry and Clinical Neurosciences*.

ABSTRACT: AIM: To investigate prevalence and patterns of psychiatric disorders in young subjects with Internet addiction (IA).

METHODS: Subjects were taken from a sample of patients, aged 10–18 years old, referred to Istanbul Medical Faculty, Child and Adolescent Psychiatry Department due to a variety of behavioral and emotional problems alongside problematic Internet use. Inclusion criteria included IQ ≥ 70 and score ≥ 80 on Young's Internet Addiction Scale (YIAS). Psychiatric comorbidity was assessed using the Turkish version of the Schedule

for Affective Disorders and Schizophrenia for School Age Children—Present and Lifetime Version.

RESULTS: Subjects were 45 boys (75%) and 15 girls (25%) with an age range of 10–18 years old (mean age, 13.38 ± 1.79 years). A total of 60% ($n = 36$) had been using Internet for ≥ 5 years. Mean hours/week spent on the Internet was 53.7 (range, 30–105 h) and the average YIAS score was 85. All subjects (100%) had at least one and 88.3% ($n = 53$) had at least two comorbid psychiatric disorders. The frequency of diagnostic groups were as follows: behavioral disorder, $n = 52$ (86.7%); anxiety disorder, $n = 43$ (71.7%); mood disorder, $n = 23$ (38.3%); elimination disorder, $n = 16$ (26.7%); tic disorder, $n = 10$ (16.7%); and substance use disorder, $n = 4$ (6.7%). **The most common psychiatric disorders were attention-deficit hyperactivity disorder ($n = 53$; 83.3%), social phobia ($n = 21$; 35.0%) and major depressive disorder ($n = 18$; 30.0%).**

CONCLUSION: High rates of psychiatric comorbidity, particularly behavioral, anxiety and mood disorders were found in young subjects with IA. Because the presence of psychiatric disorders may affect the management /prognosis of IA, assessment should include that for other psychiatric disorders.

11.4.11 [Restrepo... & Milham \(2020\)](#). Problematic internet use in children and adolescents: Associations with psychiatric disorders and impairment. *BMC Psychiatry*.

ABSTRACT: BACKGROUND: Problematic internet use (PIU) is an increasingly worrisome issue, as youth population studies are establishing links with internalizing and externalizing problems. There is a need for a better understanding of psychiatric diagnostic profiles associated with this issue, as well as its unique contributions to impairment. Here, we leveraged the ongoing, large-scale Child Mind Institute Healthy Brain Network, a transdiagnostic self-referred, community sample of children and adolescents (ages 5–21), to examine the associations between PIU and psychopathology, general impairment, physical health and sleep disturbances.

METHODS: A total sample of 564 (190 female) participants between the ages of 7–15 (mean = 10.80, SD = 2.16), along with their parents/guardians, completed diagnostic interviews with clinicians, answered a wide range of self-report (SR) and parent-report (PR) questionnaires, including the Internet Addiction Test (IAT) and underwent physical testing as part of the Healthy Brain Network protocol.

RESULTS: PIU was positively associated with depressive disorders (SR: aOR = 2.43, CI: 1.22–4.74, $p = .01$; PR: aOR = 2.56, CI: 1.31–5.05, $p = .01$), the combined presentation of ADHD (SR: aOR = 1.91, CI: 1.14–3.22, $p = .01$; PR: n.s.), Autism Spectrum Disorder (SR: n.s.; PR: aOR = 2.24, CI: 1.34–3.73, $p < .001$), greater levels of impairment (SR: Standardized Beta = 4.63, CI: 3.06–6.20, $p < .001$;

PR: Standardized Beta = 5.05, CI: 3.67–6.42, $p < .001$) and increased sleep disturbances (SR: Standardized Beta = 3.15, CI: 0.71–5.59, $p = .01$; PR: Standardized Beta = 3.55, CI: 1.34–5.75, $p < .001$), even when accounting for demographic covariates and psychiatric comorbidity.

CONCLUSIONS: The association between PIU and psychopathology, as well as its impact on impairment and sleep disturbances, highlight the urgent need to gain an understanding of mechanisms in order to inform public health recommendations on internet use in U.S. youth.

11.4.12 [Strittmatter... & Wasserman \(2015\)](#). Pathological Internet use among adolescents: Comparing gamers and non-gamers. *Psychiatry Research*.

ABSTRACT: “Internet gaming disorder” was recently included in Section 3 of the [Diagnostic and Statistical Manual of Mental Disorders](#) (DSM-5). Non-gaming Internet activities were not considered because of a lack of evidence. This study examined whether gamers differ from non-gamers with respect to their psychological well-being among students who show [pathological Internet use](#) (PIU). This cross-sectional study was conducted within the project “Working in Europe to Stop Truancy Among Youth (WE-STAY)”. A total of 8807 European representative students from randomly selected schools were included. The Young Diagnostic Questionnaire was applied to assess PIU, and students with this condition were divided into gamers (PIU-G) and non-gamers (PIU-NG). Overall, 3.62% and 3.11% of the students were classified as having PIU-G and PIU-NG, respectively. **A multinomial [logistic regression](#) revealed that students with PIU-G and those with PIU-NG showed similarly increased risks for emotional symptoms, conduct disorder, hyperactivity/inattention, self-injurious behaviors, and suicidal ideation and behaviors.** Students with PIU-G were more likely to be male and have a higher risk for peer problems than those with PIU-NG. Students with PIU-NG had a higher risk of depression than those with PIU-G. The significant psychological impairment of PIU-NG suggests that it should be considered in future diagnostic criteria.

11.4.13 [Ha, & Hwang \(2014\)](#). Gender Differences in Internet Addiction Associated with Psychological Health Indicators Among Adolescents Using a National Web-based Survey. *International Journal of Mental Health and Addiction*.

ABSTRACT: Internet addiction, especially its prevalence among adolescents and its predictors, has been the focus of much research. Few studies have investigated gender differences in the relationship between Internet addiction and psychological health

among adolescents. The present study investigated gender differences in Internet addiction associated with self-rated health, subjective happiness, and depressive symptoms among Korean adolescents aged 12 to 18 years using a nationally representative dataset. Data from 56,086 students (28,712 boys and 27,374 girls) from 400 middle schools and 400 high schools were analyzed. We found that 2.8 % of the students (3.6 % boys and 1.9 % girls) were addicted users, and the prevalence of Internet addiction was higher in boys than in girls. In multiple logistic regression analysis, three psychological health indicators including poor self-rated health, subjective unhappiness, and depressive symptoms were significantly related with Internet addiction in boys and girls. Girls with emotional difficulties such as subjective unhappiness or depressive symptoms had much higher risks of Internet addiction than did boys with similar problems. Further attention should be given to developing Internet addiction prevention and intervention programs that are tailored to fit boys' and girls' different needs.

11.4.14 [Kelleci, & Inal \(2010\)](#). Psychiatric Symptoms in Adolescents with Internet Use: Comparison without Internet Use. *Cyberpsychology, Behavior, and Social Networking*.

ABSTRACT: The purpose of the present study was to investigate the psychiatric symptoms of adolescents with and without Internet use. A total of 2,080 students (1,105 male, 975 female) were recruited for the study. We administered the Symptom Checklist-90-Revision and Questions Related to Internet Use. Students in 10th through 12th grades were recruited from 14 senior high schools in Sivas, Turkey. Data were collected from October to May 2008. Data were analyzed after excluding the participants who provided incomplete data. **It was found that Internet use in adolescents was associated with more severe psychiatric symptoms.** Attention should be devoted to adolescents with Internet use for the design of preventive strategies.

11.4.15 [Bélanger, Akre, Berchtold, & Michaud \(2011\)](#). A U-Shaped Association Between Intensity of Internet Use and Adolescent Health. *Pediatrics*.

ABSTRACT: OBJECTIVE: To examine the relationship between different Internet-use intensities and adolescent mental and somatic health.

METHODS: Data were drawn from the 2002 Swiss Multicenter Adolescent Survey on Health, a nationally representative survey of adolescents aged 16 to 20 years in post-mandatory school. From a self-administered anonymous questionnaire, 3906

adolescent boys and 3305 girls were categorized into 4 groups according to their intensity of Internet use: heavy Internet users (HIUs; >2 hours/day), regular Internet users (RIUs; several days per week and ≤ 2 hours/day), occasional users (≤ 1 hour/week), and non-Internet users (NIUs; no use in the previous month). Health factors examined were perceived health, depression, overweight, headaches and back pain, and insufficient sleep.

RESULTS: In controlled multivariate analysis, using RIUs as a reference, **HIUs of both genders were more likely to report higher depressive scores, whereas only male users were found at increased risk of overweight and female users at increased risk of insufficient sleep. Male NIUs and female NIUs and occasional users also were found at increased risk of higher depressive scores. Back-pain complaints were found predominantly among male NIUs.**

CONCLUSIONS: Our study provides evidence of a U-shaped relationship between intensity of Internet use and poorer mental health of adolescents. In addition, HIUs were confirmed at increased risk for somatic health problems. Thus, health professionals should be on the alert when caring for adolescents who report either heavy Internet use or very little/none. Also, they should consider regular Internet use as a normative behavior without major health consequence.

11.4.16 [Kawabe, Horiuchi, Ochi, Oka, & Ueno \(2016\)](#). Internet addiction: Prevalence and relation with mental states in adolescents. *Psychiatry and Clinical Neurosciences*.

ABSTRACT: AIM: Internet addiction disrupts the daily lives of adolescents. We investigated the prevalence of Internet addiction in junior high school students, elucidated the relation between Internet addiction and mental states, and determined the factors associated with Internet addiction in adolescents.

METHODS: Junior high school students (aged 12–15 years) were assessed using Young's Internet Addiction Test (IAT), the Japanese version of the General Health Questionnaire (GHQ), and a questionnaire on access to electronic devices.

RESULTS: Based on total IAT scores, 2.0% (male, 2.1%; female, 1.9%) and 21.7% (male, 19.8%; female, 23.6%) of the total 853 participants (response rate, 97.6%) were classified as addicted and possibly addicted, respectively. **Total GHQ scores were significantly higher in the addicted (12.9 ± 7.4) and possibly addicted groups (8.8 ± 6.0) than in the non-addicted group (4.3 ± 4.6 ; $P < 0.001$, both groups).** A comparison of the percentage of students in the pathological range of GHQ scores revealed significantly higher scores in the possibly addicted group than in the non-addicted group. Further, accessibility to smartphones was significantly associated with Internet addiction.

CONCLUSION: Students in the addicted and possibly addicted groups were considered 'problematic' Internet users. Use of smartphones warrants special attention, being among the top factors contributing to Internet addiction.

11.4.17 [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.

11.4.18 [Donati, Durante, Sobbrío, & Zejčirovic \(2022\)](#). *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.

11.4.19 [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.

[What are we missing?]

11.5 STUDIES AND ESSAYS ON THE EFFECTS OF THE LAPTOP

11.5.1

[What are we missing?]

11.6 EFFECTS OF DIGITAL MEDIA ON ADULTS (18+)

11.6.1 [Ratan, Parrish, Zaman, Alotaibi, & Hosseinzadeh \(2021\)](#). Smartphone Addiction and Associated Health Outcomes in Adult Populations: A Systematic Review. *International Journal of Environmental Research and Public Health*.

ABSTRACT: **BACKGROUND:** Smartphones play a critical role in increasing human–machine interactions, with many advantages. However, the growing popularity of smartphone use has led to smartphone overuse and addiction. This review aims to systematically investigate the impact of smartphone addiction on health outcomes. **METHODS:** The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were used to carry out the systematic review. Five electronic databases including Medline, Web of Science, PsycINFO, PubMed, and Scopus were searched to identify eligible studies. Eligible studies were screened against predetermined inclusion criteria and data were extracted according to the review questions. This review is registered in PROSPERO (CRD42020181404). The quality of the articles was assessed using the National Institutes of Health (NIH) Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies. **RESULTS:** A total of 27 of 2550 articles met the inclusion criteria. All of the studies were cross-sectional and focused on physical, mental, and neurological health outcomes. **The majority of the studies focused on mental health outcomes and consistent associations were observed between smartphone addiction and several mental health outcomes. Anxiety and depression were commonly found to mediate mental health problems. A wide range of physical health sequelae was also associated with smartphone addiction.** Furthermore, there was an association between smartphone addiction and neurological disorders. **CONCLUSIONS:** Our findings suggest that there are consistent associations between smartphone addiction and physical and mental health, especially mental health. Social awareness campaigns about smartphone addiction and its impact on physical and mental health are needed. Further studies, especially randomized controlled trials, are warranted to validate the impacts of smartphone addiction.

11.6.2 [Yang, Liu, & Rui \(2022\)](#). Association between social network sites use and mental illness: A meta-analysis. *Cyberpsychology: Journal of Psychosocial Research on Cyberspace*.

ABSTRACT: The existing literature shows mixed results of how the use of social networking sites (SNSs) is related to mental health. Some studies provided evidence that SNS users are more mentally healthy because of the exchanged social support, while others argued that users tend to engage in upward social comparison, which would result in mental illness. To shed light on this relationship, we conducted a meta-analytic review to examine a) the association between SNS use and mental illness and b) the factors that moderate the association. A total of 1,451 studies were retrieved from six databases (i.e., Communication & Mass Media Complete, PsycINFO, Academic Search Complete, Web of Science, PubMed, and Medline), among which 37 empirical studies (N = 84,955) were eligible for meta-analysis based on the inclusion criteria (i.e., empirical and quantitative studies with human subjects, including sufficient statistical information for effect size computation, concerned with SNS use and mental illness). **Results showed that SNS use is associated with not only the likelihood of experiencing overall mental illness ($r = .11$) but also specific illness, including depression ($r = .10$), suicidal ideation ($r = .22$), schizophrenia/mania ($r = .09$), and ADHD/hyperactivity ($r = .27$).** In addition, the intensity of SNS use, continuous measurement (vs. categorical), and participants' health condition were found as positive moderators, whereas adopting social support as the theoretical framework and the proportion of African American participants as negative moderators of the association between SNS use and mental illness. Implications of the current study were discussed.

11.6.3 [Huang \(2022\)](#). A meta-analysis of the problematic social media use and mental health. *International Journal of Social Psychiatry*.

ABSTRACT: BACKGROUND: Although previous meta-analyses were conducted to quantitatively synthesize the relation between problematic social media (SM) use and mental health, they focused on Facebook addiction.

AIMS: The purpose of this meta-analysis is to examine this relation by extending the research scope via the inclusion of studies examining problematic use of all platforms.

METHOD: One hundred and thirty-three independent samples (N =244,676) were identified.

RESULTS: As expected, the mean correlations between problematic SM use and well-being are negative, while those between problematic SM use and distress are positive. Life satisfaction and self-esteem are commonly used to represent well-being, while depression and loneliness are usually used to indicate distress. **The mean**

correlations of problematic SM use with life satisfaction and self-esteem are small, whereas those of problematic SM use with depression and loneliness are moderate. The moderating effects of publication status, instruments, platforms and mean age are not significant.

CONCLUSIONS: The magnitude of the correlations between problematic SM use and mental health indicators can generalize across most moderator conditions.

11.6.4 [Huang \(2017\)](#). Time Spent on Social Network Sites and Psychological Well-Being: A Meta-Analysis. *Cyberpsychology, Behavior, and Social Networking*.

ABSTRACT: This meta-analysis examines the relationship between time spent on social networking sites and psychological well-being factors, namely self-esteem, life satisfaction, loneliness, and depression. Sixty-one studies consisting of 67 independent samples involving 19,652 participants were identified. **The mean correlation between time spent on social networking sites and psychological well-being was low at $r = -0.07$. The correlations between time spent on social networking sites and positive indicators (self-esteem and life satisfaction) were close to 0, whereas those between time spent on social networking sites and negative indicators (depression and loneliness) were weak.** The effects of publication outlet, site on which users spent time, scale of time spent, and participant age and gender were not significant. As most included studies used student samples, future research should be conducted to examine this relationship for adults.

11.6.5 [Nesi... & Liu \(2021\)](#). Social media use and self-injurious thoughts and behaviors: A systematic review and meta-analysis. *Clinical Psychology Review*.

ABSTRACT: Despite considerable public and scholarly debate about the role of social media in self-injurious thoughts and behaviors (SITBs), no comprehensive, quantitative synthesis of this literature has previously been undertaken. The current systematic review and meta-analysis examines associations between social media use and SITBs, including suicidal ideation, suicide plans, suicide attempts, and nonsuicidal self-injury (NSSI). A range of social media behaviors and experiences were identified, including cybervictimization and perpetration, exposure to and generation of SITB-related content, problematic use, sexting, social media importance, and frequency of use. A systematic search of PsycINFO, Medline, CINAHL, and the references of prior reviews yielded 61 eligible studies. **Results largely suggested medium effect sizes for associations between specific social media constructs (cybervictimization,**

SITB-related social media use, problematic social media use) and SITBs. There was **no association between frequency of social media use and SITBs; however, studies on this topic were limited.** The majority of studies identified focused on cybervictimization, and results suggested positive associations with all SITBs, with the association between cybervictimization and suicidal ideation stronger for adolescents than adults. Overall, findings highlight the utility of examining specific social media behaviors and experiences, and point to the need for more research in this area.

11.6.6 [Liu, Baumeister, Yang, & Hu \(2019\)](#). Digital Communication Media Use and Psychological Well-Being: A Meta-Analysis. *Journal of Computer-Mediated Communication*.

ABSTRACT: The puzzle of whether digital media are improving or harming psychological well-being has been plaguing researchers and the public for decades. Derived from media richness theory, this study proposed that phone calls and texting improve well-being, while use of social network sites (SNSs), instant messaging (IM), and online gaming may displace other social contacts and, thereby, impair well-being. To test this hypothesis, a meta-analysis of 124 studies was conducted. **The results showed that phone calls and texting were positively correlated with well-being, whereas online gaming was negatively associated with well-being. Furthermore, the relationship between digital media use and well-being was also contingent upon the way the technology was used.** A series of meta-analyses of different types of SNS use and well-being was used to elucidate this point: interaction, self-presentation, and entertainment on SNSs were associated with better well-being, whereas consuming SNSs' content was associated with poorer well-being.

EXCERPT: Across multiple studies, the more often people made and received telephone calls, the better their overall well-being. Texting was also positively correlated with well-being. In contrast, **SNS usage and online gaming were negatively related to well-being.** IM showed a weak positive correlation with well-being, but it fell short of significance, so no conclusions can be drawn. Recent literature has suggested that mobile IM is a convenient tool for people to instantly address close ties (Cui, 2016). But the literature we analyzed involved studies with traditional IM, rather than mobile messaging.

As one would assume for such a complex variable as well-being, the effects of digital communication were rather small. Three of the effects were nearly identical in size (phoning, texting, and online gaming). **SNS usage had a smaller effect size, which**

was about the same as that of IM, but given the vastly greater number of published studies, the SNS usage effect was significant, unlike the IM effect.

Given the larger amount of data available on SNS usage, as well as the multifunctional complexity of the medium, we performed a second set of analyses that broke SNS usage down into multiple categories. The global weak effect is a bit misleading, because different SNS activities have quite different relationships to well-being (and all but one was larger than the combined overall effect). **Interactions and online entertainment had significant, positive links to well-being. Self-presentation also correlated positively with well-being, but the effect was very small. The largest effect we found in our entire meta-analysis was the negative correlation between well-being and SNS content consumption.**

11.6.7 [Su, Han, Yu, Wu, & Potenza \(2020\)](#). Do men become addicted to internet gaming and women to social media? A meta-analysis examining gender-related differences in specific internet addiction. *Computers in Human Behavior*.

ABSTRACT: Males have been proposed to be more vulnerable to internet addiction (IA) than females. However, males and females may differ with respect to specific patterns and types of internet usage and related IA. To investigate further, a meta-analysis was conducted to investigate gender-related differences in internet gaming disorder (IGD) and social media addiction (SMA). The current meta-analysis aimed to quantify gender-related effect sizes relating to IGD and SMA, examine potential moderating influences of regions and other possible confounds, and compare the findings with generalized IA at the country level. The meta-analysis comprised 53 effect sizes with 82,440 individuals from 21 countries/regions for IGD, and 41 effect sizes with 58,336 individuals from 22 countries/regions for SMA. **A random-effects model confirmed important gender-specific distinctions as men were more likely to exhibit IGD than women ($g = 0.479$) and less likely to exhibit SMA than women ($g = -0.202$). Additional moderator analyses revealed that effect sizes of IGD and SMA were larger in Europe and the Americas than in Asia.** Further analyses indicated that the effect sizes of gender-related differences in IGD and SMA at the country-level were significantly larger than those in generalized IA, which suggests that gender-related differences in specific IAs may be underestimated in the “umbrella” of generalized IA. Results have implications for explaining why males and females may become addicted to internet use through different pathways.

11.6.8 [Saiphoo, & Vahedi \(2019\)](#). A meta-analytic review of the relationship between social media use and body image disturbance. *Computers in Human Behavior*.

ABSTRACT: With the quickly rising popularity of social media within the past decade, researchers have started to investigate the relationship between social media use and various psychological wellbeing variables. Given social media's similarity to traditional media, and the unique types of social comparisons that may occur on these platforms, body image has been a variable of interest. However, this literature has produced mixed findings and lacks a consensus on the valence of this relationship. Thus, this meta-analysis aimed to provide a quantitative review of cross sectional research on this topic to provide clarification on the relationship between social media use and body image. **An analysis of sixty-three independent samples (N = 36,552) using a random-effects model revealed an overall effect size of $r = 0.169$, CI [0.131, 0.206], indicating a small, positive, and significant relationship between social media use and body image disturbance.** Type of social media use, body image dimension, country grouping, and age were all found to be significant moderators of this relationship. Strengths and limitations of the meta-analysis, as well as future directions for this line of research are discussed.

11.6.9 [Escobar-Viera... & Primack, B. A. \(2018\)](#). Passive and Active Social Media Use and Depressive Symptoms Among United States Adults. *Cyberpsychology, Behavior, and Social Networking*.

ABSTRACT: Social media allows users to explore self-identity and express emotions or thoughts. Research looking into the association between social media use (SMU) and mental health outcomes, such as anxiety or depressive symptoms, have produced mixed findings. These contradictions may best be addressed by examining different patterns of SMU as they relate to depressive symptomatology. We sought to assess the independent associations between active versus passive SMU and depressive symptoms. For this, we conducted an online survey of adults 18–49 of age. Depressive symptoms were measured using the Patient-Reported Outcomes Measurement Information System brief depression scale. We measured active and passive SMU with previously developed items. Factor analysis was used to explore the underlying factor structure. Then, we used ordered logistic regression to assess associations between both passive and active SMU and depressive symptoms while controlling for sociodemographic covariates. Complete data were received from 702 participants. Active and passive SMU items loaded on separate factors. In multivariable analyses that controlled for all covariates, **each one-point increase in passive SMU was associated with a 33 percent increase in depressive symptoms (adjusted odds**

ratio [AOR] = 1.33, 95 percent confidence interval [CI] = 1.17–1.51). However, in the same multivariable model, each one-point increase in active SMU was associated with a 15 percent decrease in depressive symptoms (AOR = 0.85, 95 percent CI = 0.75–0.96). To inform interventions, future research should determine directionality of these associations and investigate related factors.

[What are we missing?]

11.7 MISCELLANEOUS

11.7.1 OBSESSIVE COMPULSIVE DISORDER

11.7.1.1 [Nagata, Chu, Zamora, Ganson, Testa, Jackson, Costello, Murray, & Baker \(2022\)](#). Screen Time and Obsessive-Compulsive Disorder Among Children 9–10 Years Old: A Prospective Cohort Study. *Journal of Adolescent Health*.

ABSTRACT: PURPOSE: The aim of this study is to determine the prospective associations between baseline screen time and obsessive-compulsive disorder (OCD) at 2-year follow-up in a national (United States) cohort of 9- to 10-year-old children. **METHODS:** We analyzed prospective cohort data from the Adolescent Brain Cognitive Development study (n = 9,208). Logistic regression analyses were used to determine the associations between baseline self-reported screen time (exposure) and OCD, based on the Kiddie Schedule for Affective Disorders and Schizophrenia (outcome), at 2-year-follow-up, adjusting for race/ethnicity, sex, household income, parent education, family history of psychopathology, and study site, excluding participants with baseline OCD.

RESULTS: The sample was 48.9% female and racially and ethnically diverse (43.5% non-White). **Each additional hour of total screen time was prospectively associated with 1.05 higher odds of OCD at 2-year follow-up (95% confidence interval [CI] 1.01–1.09). For specific screen time modalities, each additional hour of playing video games (adjusted odds ratio 1.15, 95% CI 1.03–1.28) and watching**

videos (adjusted odds ratio 1.11, 95% CI 1.01–1.23) was associated with a subsequent OCD diagnosis.

CONCLUSIONS: Video games and watching videos are prospectively associated with new-onset OCD in early adolescents. Future research should examine mechanisms linking these specific screen modalities to OCD development to inform future prevention and intervention efforts.

11.7.2 RISKY BEHAVIOR

11.7.2.1 [Vannucci, Simpson, Gagnon, & Ohannessian \(2020\)](#). Social media use and risky behaviors in adolescents: A meta-analysis. *Journal of Adolescence*.

ABSTRACT: INTRODUCTION: This systematic review and meta-analysis examined the associations between social media use and risky behaviors during adolescence, and evaluated study characteristics (e.g., sample age, type of social media platform assessed) that may moderate these relationships.

METHODS: A comprehensive search strategy identified relevant studies from PsycInfo, PubMed, Google Scholar, and Proquest Dissertations and Theses Global.

RESULTS: The final sample included 27 independent cross-sectional studies with a total of 67,407 adolescents (Mage = 15.5, range: 12.6–18.0 years; 51.7% girls; 57.2% White). **Results from random effects models indicated that there were positive, small-to-medium correlations between social media use and engagement in risky behaviors generally ($r = 0.21$, 95% CI = 0.16-0.25), substance use ($r = 0.19$, 95% CI = 0.12-0.26), and risky sexual behaviors ($r = 0.21$, 95% CI = 0.15-0.28). There were an insufficient number of independent samples available to conduct a random effect models for violence-related behaviors ($k = 3$).** Moderator analyses suggested that studies assessing solely early social media platforms (e.g., Facebook/MySpace only) in relation to substance use had smaller effect sizes than substance use studies assessing a broader range of contemporary social media platforms. In addition, younger samples had larger effect sizes for studies focused on social media use and risky sexual behaviors.

CONCLUSIONS: The positive links identified between social media and risky behaviors during adolescence in this meta-analysis suggest that developmental theories of risk taking would benefit from incorporating the social media context. Longitudinal studies are needed to clarify directionality and make more specific practice and policy recommendations so that social media is a safe place in which adolescents can thrive.

11.7.2 FEAR OF MISSING OUT

[What are we missing?]

xx. BENEFITS OF SOCIAL MEDIA

- for people who are isolated, or parts of identity groups
- people who have good social lives,
- BUT: could people keep in touch without a news feed?
- how can LGBT find each other without FB/Insta
- FB recreates a college campus, being in a community that is not your closest friends, but you can keep up

[THIS IS A MAJOR RECENT REVIEW THAT GIVES US MANY LINKS ON BOTH SIDES]

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Despite its utility, there is ongoing debate regarding the consequences of social media use (e.g., [Huang, 2022](#); [D. Liu et al., 2019](#)). On the one hand, social media enhances wellbeing by allowing people to focus on social connection and building and maintaining relationships ([Burke & Kraut, 2016](#); [Clark et al., 2018](#); [Deters & Mehl, 2014](#); [Lee et al., 2013](#); [C. Y. Liu & Yu, 2013](#); [Marzouki et al., 2021](#); [Verduyn et al., 2017](#); [Wenninger et al., 2019](#)). This is especially true when people receive positive feedback that aligns with their expectations ([Greitemeyer et al., 2014](#); [Grinberg et al., 2017](#); [Valkenburg et al., 2006](#)). On the other hand, there is concern that frequent use may cause social withdrawal ([Kraut et al., 1998](#)), addictive behavior patterns ([Hou et al., 2019](#)), and decreased wellbeing ([Kross et al., 2013](#)). Specifically, a focus on the passive consumption of others' content ([D. Liu et al., 2019](#); [Tosun & Kasdarma, 2020](#); [Verduyn et al., 2015, 2017](#)) and/or negative feedback that poorly aligns with expectations may lead to problematic outcomes ([Greitemeyer et al., 2014](#); [Grinberg et al., 2017](#); [Valkenburg et al., 2006](#))

--One reason for social media's ubiquitous influence may be that it activates reward circuitry in the brain ([Meshi et al., 2015](#)) similarly to face-to-face interactions ([Sherman et al., 2018](#)). For example, in face-to-face interactions, people find social cues such as smiles and praise to be highly rewarding ([Bhanji & Delgado, 2014](#); [Furl et al., 2012](#); [Hammerschmidt et al., 2018](#); [Shore & Heerey, 2011](#); [Zernig et al., 2013](#)). Likewise, broadcasting and observing information, giving and receiving feedback, and comparing oneself to others also trigger reward networks ([Fareri & Delgado, 2014](#); [Meshi et al., 2015](#)). Thus, interacting on social media may be intrinsically rewarding.

--One difference between the rewards obtained on social media and those associated with face-to-face interactions is their timing. Specifically, rewards in real-time conversation occur immediately and predictably ([Heerey & Crossley, 2013](#)), whereas rewards on social media are delayed by pseudorandom time increments. Specifically, people must revisit a social media post for anticipated likes, shares, and comments,

which are variably delayed depending on when followers respond. This delay might affect reward responsiveness. For example, dopamine neurons in many brain regions are sensitive to reward timing and predictability (e.g., [Ballard & Knutson, 2009](#); [Bermudez & Schultz, 2014](#); [Estle et al., 2007](#); [Kable & Glimcher, 2007](#); [Roesch et al., 2007](#); [Wanat et al., 2010](#)). Dopaminergic responses to unpredictable and delayed rewards subsequently shape how those rewards are experienced ([Berns et al., 2001](#); [de Lafuente & Romo, 2011](#)), potentially leading to reward sensitization ([Berridge & Robinson, 2016](#); [Hellberg et al., 2019](#); [Konova et al., 2018](#)). Thus, social media use may sensitize the reward system to the presence of social rewards, thereby enhancing their value. Accordingly, for some people, social media use is associated with heightened sensitivity to reward magnitude and reduced sensitivity to risk ([Meshi et al., 2019, 2020](#)).

Future of Tech

MEtaverse, Robotics, AI

- How will affect social needs:

Sex, Dating,

Eric Schmidt

Future proofing it (doc in the book)

Updated edition in 5 yrs