

Overthinking over screens: Girls ruminate more after negative social media interactions with peers compared to in-person interactions

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Abstract

With the rise and ubiquity of social media (SM), the context for peer interactions has changed drastically for adolescents, yet little is known about how digital peer interactions compare to in-person interactions in their impact on adolescents' emotional experiences. Adolescents employ various emotion regulation (ER) strategies to navigate the complexities of peer interactions, with varying strategy adaptiveness and efficacy. This study delves into the prevalence of ER strategies following daily negative peer interactions on SM, exploring to what extent context (SM or in-person) influences the selection of ER strategies. Over 16 days, 106 U.S. adolescent girls, aged 11-13 (half at high-risk for developing an affective disorder), participated in ecological momentary assessments, detailing their worst recent peer interactions, the context (SM or in-person), and the subsequent ER strategies employed. Multilevel models revealed that teens were more prone to rumination after negative peer interactions on SM than in-person ($OR = 2.08, p = 0.031$), after adjusting for the overall prevalence of SM and in-person interactions. No other significant differences emerged in ER strategy selection based on the context of the interaction. Findings highlight that although adolescents may adapt their ER strategy selection to suit the demands of specific interpersonal situations across contexts, negative peer interactions on SM may lead to more rumination, potentially contributing to the link between SM use and depression. We discuss how unique features of SM might elicit rumination, such as SM's lack of physical social cues and its permanent, public, and asynchronous nature.

Keywords: Social media, emotion regulation, rumination, adolescence, peer relationships

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With the rise and ubiquity of social media (SM) use among adolescents (Rideout et al., 2022; Vogels et al., 2022), the context for many peer interactions has changed drastically over the last couple of decades (Nesi et al., 2018a, 2018b). Yet, little is known about how digital peer interactions compare to in-person interactions in their impact on adolescents' emotional experiences. Adolescents use emotion regulation (ER) strategies, which vary in their adaptiveness and effectiveness, to manage their emotions during peer interactions. Notably, context-sensitive models of ER suggest that specific ER strategies are deployed more often when used in response to specific contexts (McKone et al., 2022). However, no work to date has explored whether adolescents engage in different ER strategies in response to interactions on SM vs. in-person. Here, we aim to investigate the prevalence of different ER strategies in response to daily negative peer interactions that take place on SM, and to further examine whether the context (SM or in-person) of negative peer interactions impacts ER strategy selection (problem solving, support seeking, acceptance, reframing, cognitive avoidance, behavioral avoidance, or rumination).

Adolescence is an important transitional period between childhood and adulthood characterized by extensive physical, cognitive, and psychosocial changes (Crone & Dahl, 2012). During adolescence there is a normative shift whereby youth start to place a greater level of importance on peer and romantic relationships as compared to parental relationships in order to build social status and gain more social support outside of family settings (Noller & Callan, 1991). Adolescents are highly attuned to social evaluation by peers, and as such may be more emotionally reactive and sensitive to social information that could indicate social exclusion or

rejection (Somerville, 2013). Adolescent girls, as compared to boys, experience more frequent interpersonal stressful life events and display heightened sensitivity to interpersonal stressors (Rudolph, 2002). Among other risk factors, this sensitivity to interpersonal stress is thought to contribute to a well-documented heightened risk for affective psychopathology, such as depression and anxiety, among adolescent girls (Oldehinkel & Bouma, 2011).

Given that many peer interactions today can occur on SM (Nesi et al., 2023), adolescent SM use has been described as a “double-edged sword” (Choukas-Bradley et al., 2023a), providing both positive and negative consequences. For instance, as documented in a recent U.S. Surgeon General advisory, some teens might benefit from self-expression and social connectedness on SM, while others might be exposed to more harmful content (Office of the Surgeon General, 2023). The effect of SM use on well-being may even be person-specific, further highlighting the complex influence of SM on adolescent mental health (Beyens et al., 2020, 2021; Valkenburg et al., 2021). The associations between adolescent SM use and quality of in-person interpersonal relationships have been well-documented in prior research (Dredge & Schreurs, 2020). However, little is known about how peer interactions in the digital context *compare* to in-person interactions in their impact on adolescents’ emotional experiences.

During this critical phase of development, ER strategies play a pivotal role in helping youth manage emotions during peer interactions, with their adaptiveness and efficacy varying across individuals. Youth use a range of ER strategies, including primary control strategies, such as problem-solving and support-seeking; secondary control strategies encompassing acceptance and reframing; disengagement strategies involving cognitive and behavioral avoidance; and involuntary engagement strategies, such as rumination (Compas et al., 2001). Importantly, recent meta-analyses suggest that lower use of adaptive ER strategies such as cognitive reappraisal,

problem-solving and acceptance have been associated with various forms of psychopathology, including depression and anxiety, particularly among adolescent girls (Compas et al., 2017; Schäfer et al., 2017). For instance, rumination is a central underlying mechanism contributing to higher levels of depressive symptoms, and avoidance is closely linked to both anxiety and depression in adolescence (Dickson et al., 2012; Wilkinson et al., 2013; Young et al., 2019). Similarly, avoidance, the tendency to emotionally distance oneself from the stressor, has been identified as a longitudinal predictor for youth development of depressive and anxiety symptoms (Mellick et al., 2019). Thus, investigating factors that contribute to ER selection among youth could further our understanding of risk for affective psychopathology during this crucial period.

Context-sensitive models of ER propose that specific strategies are deployed in response to specific circumstances (Aldao et al., 2015), and that adolescents' use of ER strategies across different contexts may be differentially linked to negative affect. For instance, cognitive reappraisal, the ability to reframe the meaning of a situation, can be adaptive in perceivably uncontrollable situations such as coping with a loved one's illness; individuals report fewer depressive symptoms if they engage in higher levels of cognitive reappraisal when uncontrollable stressors are present (Troy et al., 2013). On the other hand, rumination—negative repetitive thinking regarding stressors—may lead to higher levels of negative affect and depressive symptoms in chronic, uncontrollable, and emotionally salient situations (Michl et al., 2013).

Prior work has examined associations between specific SM experiences and use of certain ER strategies. Studies have looked at rumination and avoidance in the context of SM use, such as preoccupation with one's SM presence (e.g., number of followers or likes), distress over engagement with others, and using SM as an avoidance/distraction mechanism (Davila et al.,

2012; Nick et al., 2022; Wang et al., 2018). Surprisingly, despite the burgeoning significance of SM in today's popular culture and means of communication, no studies have investigated whether adolescents choose to use different ER strategies following peer interactions on SM vs. in-person.

The contextual differences between SM and in-person interactions may account for differences in ER strategy selection. A recent EMA study found that negative peer interactions on SM, compared to in-person, are associated with more sustained negative affect (Hamilton et al., 2021). It is plausible that some maladaptive ER strategies such as rumination or avoidance are employed more frequently by adolescents following negative peer interactions on SM, which might in turn contribute to longer-lasting negative affect. For instance, the asynchronous, permanent, and public nature of SM might result in interactions that feel more uncontrollable, unavoidable, and ambiguous (Nesi et al., 2018a), which in turn may result in increased deployment of rumination as an ER strategy (McKone et al., 2022). Additionally, because it is difficult to disengage from mobile devices, it might be harder for adolescents to avoid SM interactions, as compared to in-person interactions (Throuvala et al., 2019).

Examining potential differences in ER strategies used between online and in-person interactions is imperative to deepen understanding of adolescents' emotional functioning across varying peer contexts. The objective of this study was to utilize ecological momentary assessment (EMA) to investigate youths' selection of different ER strategies in response to daily negative peer interactions occurring on SM vs. in person among adolescent girls. Assessing ER strategy selection in real-time via EMA can help reduce potential recall bias associated with retrospective reports and capture dynamic time-varying associations between changing contexts and emotional experience (Silk et al., 2003). Our hypotheses were as follows:

Hypothesis 1: Adolescent girls will engage in more rumination following negative peer interactions on SM compared to negative in-person interactions because negative interactions on SM could induce amplified affect due to the asynchronous, immediate and permanent nature of SM (Nesi et al., 2018a, 2018b).

Hypothesis 2: Adolescent girls will engage in more avoidance following negative in-person peer interactions compared to negative SM interactions because it might be difficult to avoid SM interactions, whereas in-person interactions can be more easily avoided (Throuvala et al., 2019).

Hypothesis 3: The context of negative peer interactions will interact with magnitude of negative affect, such that adolescent girls will engage in avoidance and rumination more in the presence of increased negative affect in in-person and SM conditions, respectively.

Exploratory Aim: While the literature does not clearly support directional hypotheses for other ER strategies, we will also explore whether there are contextual differences in other strategies (problem solving, support seeking, acceptance, reframing).

Method

Participants

Participants were drawn from a longitudinal, multi-wave study of the development of anxiety and depressive symptoms in adolescent girls (based on parent demographic report of gender). The study recruited 129 girls aged 11-13 and their primary caregivers through online and community announcements. To recruit a high-risk sample for depression and anxiety, the study oversampled girls exhibiting shy and/or fearful temperaments. Temperament was assessed using the Fear and Shyness subscales of the Early Adolescent Temperament Questionnaire-Revised completed by parent-about-child and child-about-self (EATQ-R; Capaldi & Rothbart, 1992). Approximately two-thirds of the overall sample scored 0.75 standard

deviations above the mean on shyness and/or fearfulness and were classified as high-risk; the remaining were at typical risk for anxiety/depression.

Exclusion criteria included meeting current or lifetime DSM-5 diagnostic criteria for any anxiety disorder (except specific phobia), major depressive disorder, or any psychotic or autism spectrum disorder as assessed by the Kiddie-Schedule for Affective Disorders and Schizophrenia (KSADS-PL; Kaufman et al., 2016). Participants were also excluded if they presented with acute suicidality, risk of self-harm, risk of harm to others, neurological anomalies or head injury, any lifetime history of neurological or severe medical conditions, intellectual disability, the use of psychoactive or brain-interacting medications (except stimulants), MRI contraindications (e.g., metal in the body, including braces), and uncorrected ocular impairments that could interfere with eye-tracking measurements.

Of the initial 129 participants, three withdrew before the baseline assessment, and four participants discontinued the EMA portion of the study. Twelve participants were eliminated from the analysis due to providing unusable data ($n = 4$, attributable to technical issues or fake responses) and completing less than 25% of the EMA prompts ($n = 8$). Of the 110 participants that completed the EMAs, four participants did not report any peer interactions; therefore, these participants were excluded from the final analytic sample. Ultimately, the final sample included 106 girls, with 53 (50%) classified as high risk. The average age of participants was 12.37 years ($SD = 0.82$ years). The girls identified as follows: 68% white, 20% Black/African American, 8% biracial, and 4% Asian, Native American, or 'other.' Additionally, 8% of the girls also identified as Hispanic/Latinx. Full sample descriptives and more details on recruitment procedures are provided elsewhere (Sequeira et al., 2021).

Procedure

The current study included data from the first wave of a multi-wave longitudinal study in which participants completed an in-person baseline assessment, followed by a 16-day EMA protocol. During this EMA period, participants responded to brief surveys using study-provided smartphones. The EMA protocol started during the weekend and continued for 16 consecutive days, with three prompts on weekdays and four prompts on weekends. The first weekday prompt occurred before school hours, while the remaining two were randomly administered after school/during the evening. To ensure a representative assessment, weekday prompts were randomly distributed within two time blocks (morning and after school/evening hours), and weekend prompts were distributed within four time blocks (morning, early afternoon, late afternoon, and evening hours). In total, participants received 54 EMA prompts throughout the data collection period; they were asked to report details about their most positive and negative interactions with peers their age since the last EMA prompt, their emotional responses to these interactions, and the ER strategies they chose to engage in following these interactions. Participants in the final sample completed 81.5% of surveys. All study procedures were approved by the University of Pittsburgh Institutional Review Board.

Ecological Momentary Assessment Measures

In each EMA assessment, participants reported the context of their worst negative peer interaction, followed by the ER strategy they selected and the intensity of their negative affect.

Negative Interaction Context (In-Person vs. SM). Participants reported the peer social interaction since the last EMA prompt that made them feel the worst and indicated with whom they had this interaction by responding to the following prompt: *“Think about the interaction with other kids your age that made you feel the worst since the last beep on (prior EMA collection time). What happened?”* Then, participants indicated the context in which the

interaction occurred with the following options: in person; over the phone; text message; social networking site (Facebook, Instagram, Snapchat, etc.); FaceTime, Skype, webcam; and other (allowing for further free-text specification). Given the focus of the hypotheses on the contextual differences, only interactions that occurred in-person or on SM (i.e., text message or social networking site) were included. For the purposes of these analyses, all negative interactions with peers occurring within these contexts (i.e., friends, romantic interests, other peers, and siblings and/or cousins whose age is within 2 years of the participant's age) were included.

Emotion Regulation Strategy Selection. Participants were then asked the single-select, multiple-choice question: “*Did you react in any of the following ways?* (choose the one response that fits best)” and were given nine options that encompassed various ER strategies based on Silk et al. (2003) and Tan et al. (2012)’s ER EMA items: (a) acceptance (“I realized I just had to live with things the way they are”); (b) problem solving (“I did or planned something to make things better”); (c) support seeking (“I talked to someone about it”); (d) reframing (“I tried to think of the problem in a different way so it didn't seem as bad”); (e) cognitive avoidance (“I tried not to think about it or to forget all about it”); (f) rumination (“I kept thinking about how bad I was feeling or how bad the situation is”); (g) behavioral avoidance (“I tried to avoid being around the people or situation that was bothering me”); or (h) none of the above (“I didn't do any of these things”).

Negative Emotional Intensity. In addition to reporting their ER strategy selection following negative interactions, participants reported their intensity of negative emotions (sadness, worry, stress, and anger) during the interaction on a sliding scale from 0 = *Not at all* to 100 = *Extremely*. To capture the highest intensity emotion at each moment, negative affect

was calculated at each prompt by taking the value of the highest-rated negative emotion endorsed by participants.

Covariates

We evaluated whether age, pubertal development, socioeconomic status (SES) and temperament were associated with primary study variables and included the variable as a covariate in the event of a significant association. Age was a significant predictor of acceptance ($OR = 1.82, p = .015$), indicating for every one-year increase in age, participants were 82% more likely to report using acceptance. Temperament was a significant predictor of cognitive avoidance, such that participants with higher levels of shy and fearful temperament were less likely to report using avoidance in the moment ($OR = 0.52, p = .021$). Age and temperament were therefore included in subsequent models. Pubertal development and SES were not associated with primary variables and were not included.

Analytic Plan

Hypotheses were tested using multilevel models for intensive longitudinal data in R Version 4.2.1 (R Core Team, 2019) using the lme4 package, with observations nested within participants. Due to the binary nature of the ER strategy variables, models were run using a binomial distribution and a logit link. We adopted a model-building approach. First, means-only models with a random intercept of person were run to establish the amount of variance at the between- and within-person level. Second, covariates were tested simultaneously and only significant covariates were retained. Next, negative interaction context was added to the model. To disentangle the level of effects, person-means for negative interaction context (i.e., between-person) and the momentary negative interaction context (i.e., within-person) were included. Finally, interactions with emotional intensity were tested.

Results

Frequency of negative interactions with different types of peers across contexts are presented in Table 1 and endorsed percentages of ER strategies across contexts are presented in Table 2.

Means-only models indicated that there was substantial variability at both the within- and between-person levels for all strategies, with the exception of reframing, with intraclass correlation coefficients ranging from .28 to .43. The means-only model for reframing indicated that there was not significant variance at the within-person level, so multilevel models were not required for analyses that included reframing. No covariates significantly predicted rumination, problem-solving, support seeking, reframing, or behavioral avoidance.

Negative interaction context in-the-moment was a significant predictor of rumination. Girls whose most recent negative peer interaction occurred on SM were more than twice as likely to report engaging in rumination as compared to girls whose most recent negative peer interaction occurred in person ($OR = 2.08, p = .031$; hypothesis 1). Between-person negative interaction context (i.e., girls' tendency to have negative peer interactions via SM versus offline) was not significantly associated with rumination ($OR = 5.87, p = .275$). Negative interaction context was not associated with use of cognitive avoidance at either the between-person ($OR = 0.65, p = .654$) or within-person ($OR = 1.08, p = .817$) levels or with the use of behavioral avoidance at the between-person ($OR = 1.27, p = .811$) or within-person ($OR = 0.95, p = .873$) levels (hypothesis 2).

Moderation Analyses

Intensity of negative emotion was a significant predictor of rumination at the between-person level, such that for every 10-unit increase in average negative emotional

intensity (on a 0-100 scale), girls were more than twice as likely to report using rumination in the moment ($OR = 2.29, p = .001$). The interaction between negative interaction context and negative emotional intensity was not a significant predictor of rumination. Neither negative emotional intensity, negative interaction context, nor their interaction was associated with either cognitive or behavioral avoidance.

Exploratory Analyses

Negative interaction context was not significantly associated with problem-solving, support seeking, acceptance, cognitive avoidance, or behavioral avoidance.

Discussion

In today's digital world, SM platforms are a central part of adolescents' daily lives and emotional experiences. We found that adolescent girls are more likely to ruminate in response to negative peer interactions that occur via SM compared to in-person negative peer interactions. This suggests that the tendency to ruminate online could play a mechanistic role linking SM use to depression and/or anxiety. However, we also found that adolescents use avoidance, as well as the other ER strategies we explored, similarly across in-person and SM contexts. This means that for most strategies, adolescents do not differ in their likelihood of using them across contexts. Therefore, it may be especially important to focus on developing interventions to reduce rumination in the SM context.

In line with our first hypothesis, adolescent girls were twice as likely to engage in rumination to regulate their negative affect following negative SM interactions, compared to negative in-person interactions. There are several potential explanations as to why youth might ruminate more on SM compared to in-person interactions. The transformation framework suggests that SM interactions can be more long-lasting and public compared to in-person

interactions (Nesi et al., 2018a, 2018b). It is possible that adolescents ruminate about their online interactions in a repetitive and unproductive pattern because SM interactions often leave a digital trace (e.g., comments or messages) which can be revisited or viewed by others and by themselves for an extended period. Further, the asynchronous nature of SM may result in a lack of immediate feedback following negative interactions, which may exacerbate repetitive negative thinking or worries while the adolescent awaits a response. Some youth report that navigating online spaces can be stressful and the delay in receiving a response can create uncertainty (O'Reilly, 2020)—which may lead to adolescents uneasily anticipating and speculating about the possible negative outcomes of the interaction. Moreover, the absence of vital social cues, such as tone of voice, facial expressions, and body language in digital interactions can make it challenging to accurately interpret the intentions behind comments or messages (Hamilton et al., 2020), leading to increased uncertainty and rumination. Additionally, it has been documented that many adolescents feel pressure with their online self-presentation, social demands and social approval, and that this distress is associated with poorer mental health outcomes including higher levels of depressive symptoms (Fox et al., 2023; Lannin et al., 2021; Nick et al., 2022; Winstone et al., 2023). Perhaps, adolescents feel compelled to constantly monitor and manage their online image and are preoccupied with their online interactions more than their in-person interactions, which contributes to higher levels of rumination. Given that negative peer interactions online lead to more sustained negative affect compared to in-person interactions (Hamilton et al., 2021), it is also possible that rumination acts as an underlying mechanism leading to greater negative affect and eventually anxiety or depression. This should be investigated in future longitudinal research with high-risk samples for affective psychopathology.

Contrary to our second hypothesis, we did not find a significant difference in the likelihood of using avoidance following negative SM and in-person interactions. Across these two contexts, adolescents may employ different avoidance strategies by physically disengaging from a conversation or by logging off from SM, but the likelihood of using avoidance seems to be the same across contexts. This was surprising, as many adolescents report struggles around disengaging from smartphones, potentially making SM interactions feel less avoidable (O'Reilly, 2020; Weinstein & James, 2022). However, it is possible that adolescents may employ avoidance strategies as a universal response to negative affect stemming from peer interactions, regardless of the mode of interaction. Although difficulty in disengagement from SM interactions is linked to lower levels of well-being (Kushlev et al., 2019), avoidance has not previously been explored as an ER strategy in response to negative SM interactions.

Partially in line with our third hypothesis, girls who tended to have higher intensity negative emotions across the 16 days of EMA responses were more likely to ruminate, regardless of the online vs. in-person context of their interaction. Similarly, at the within-person level, girls were more likely to report use of avoidance in moments when they also reported greater negative affect. These findings suggest that adolescent girls tend to use more maladaptive coping strategies in moments of higher distress (Cracco et al., 2017; Schäfer et al., 2017). This tendency, however, does not seem to differ depending on whether the stressful situation happens on SM or in-person. Thus, the intensity of negative emotions may play a particularly important role in adolescent ER selection.

It is also important to note that our exploratory analyses for other ER strategies failed to reveal differences based on context, suggesting that, except for rumination, youth do not differ in their likelihood to regulate emotions across in-person and SM contexts. This may suggest that

adolescents employ a broad range of ER strategies across different contexts, adapting their approaches to suit the specific demands of each situation. In line with our moderation analyses, it is plausible that the intensity of negative affect is more instrumental in ER strategy selection rather than the context itself for most ER strategies.

Altogether, these findings highlight the importance of recognizing the distinctive features of SM that may elicit rumination and have implications for the well-being of adolescent girls. Given that rumination is a central mechanism in depression and anxiety (Wilkinson et al., 2013), and potential associations between SM use and depression (Cunningham et al., 2021), it is possible that greater likelihood of rumination in response to online experiences may be a mechanism contributing to development of depressive symptoms over time. Future longitudinal work is needed to examine this potential pathway. Future work should also investigate the underlying factors that drive this increased rumination in digital settings, such as the lack of social cues and the permanence of content, to gain a better understanding of how SM shapes emotional responses. Recognizing the potential harm of rumination in this context underscores the need to develop strategies and interventions to promote healthy online interactions and emotional well-being among adolescents, including interventions specifically targeting rumination. Recent work has focused on co-designing “digital well-being” interventions with youth to better understand the nuances of online stressors and pointing at ways to best interact with digital spaces (Choukas-Bradley & Weinstein, 2023; Weinstein et al., 2023). Future research should further investigate the nuanced dynamics of digital peer interactions and their consequences for adolescents' mental health, with an emphasis on potential strategies to mitigate the negative emotional impact as well. Furthermore, given that the likelihood of reporting most

of the ER strategies did not differ by context, teaching youth adaptive ER strategies at earlier ages could enhance emotional functioning in multiple contexts.

Limitations

There are several limitations and important directions for future research. First, how youth use SM is not universal; however, qualitative analysis of the descriptions of negative peer interactions was beyond the scope of this paper. Future work should qualitatively examine the nature of negative peer interactions on SM such as differentiating between direct vs. vicarious experiences of rejection (Veldhuis et al., 2014). The variability in these interactions may significantly influence associated affective and regulatory processes, depending on factors such as the nature of the interaction (e.g., private chat vs. public post). Notably, our assessment of SM interactions was limited in nature, only capturing text messages and interactions on social networking sites. Future work might incorporate other forms of digital communication (e.g., gaming, group chats, video calls). Second, adolescents were asked to report only one ER strategy for each interaction, even though they might have utilized multiple strategies. Additionally, some strategies were endorsed infrequently, limiting our analytic power to detect significant differences across contexts. We also found that, although most negative peer interactions included interactions with friends, a significant amount happened with “other peers” (i.e., kids who did not fit the other response options of friends, romantic interests, siblings or cousins). Perhaps interactions with friends carry more emotional valence, resulting in higher negative affect and more maladaptive ER strategy selection. Future work should explore differences based on different types of peer relationships.

Lastly, our sample consisted solely of girls and was predominantly white, limiting the generalizability of our findings. Future work should focus on adolescents of different genders, as

well as racially and ethnically diverse groups of adolescents from a wider age group. With regard to gender, it has been documented that adolescent girls tend to spend more time on SM and texting, and compared to adolescent boys, are more likely to communicate with peers while using SM (Smith & Anderson, 2018). Given well-documented gender differences in SM use and emotional experiences of peer interactions (Armstrong-Carter et al., 2023; Rose & Rudolph, 2006; Twenge & Martin, 2020), it is possible that our findings would not generalize to adolescent boys. Further, most research to date has focused exclusively on cisgender girls and boys; thus, more research is needed on transgender and nonbinary youths' SM use (e.g., Berger et al., 2022; Coyne et al., 2023). Additionally, with regard to age, we focused on an early adolescent sample, whose ER strategies and SM experiences may differ from those of older adolescents (Rideout et al., 2022; Zimmermann & Iwanski, 2014). Finally, the underrepresentation of youth of color in the peer relations research field has been well-documented (Graham & Echols, 2018) and research is especially needed that examines race-related stress, both online and offline (Roach et al., 2023; Nesi et al., 2023; Tynes et al., 2019).

Declarations

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On behalf of all authors the corresponding author states that there is no conflict of interest.

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The study was approved by the Institutional Review Board of the University of Pittsburgh.

Written informed consent was obtained from the parents and assent obtained from the participants.

The datasets generated during and/or analyzed during the current study are not publicly available because participants were not asked to consent to share their data at the time of the data collection. Code is available upon request.

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