

Disconnection More Problematic for Adolescent Self-Esteem than Heavy Social Media Use: Evidence from Access Inequalities and Restrictive Media Parenting in Rural America

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Abstract

Some argue that social media use displaces time that adolescents spend with friends and family and is therefore associated with lower psychological well-being. They reason that young people who experience “disconnection,” because their parents actively restrict media use, or they have limited material access to the Internet, are better protected from psychological harm. Prior research has misspecified and exaggerated the magnitude of the relationship between screen time and adolescent psychological well-being. If the harm associated with heavy (excessive) or even average use of new media has been overstated, then the recommendation of disconnection may also be problematic. New media use is heavily integrated into youth culture and sociality, restrictive media parenting practices or digital inequalities may rob adolescents of experiences that would otherwise be protective of self-esteem. We conducted a survey of rural adolescents, who are more likely to experience disconnection at home because of a lack of physical availability of broadband, not simply affordability. Based on that survey, we find that a negative relationship between screen time and lower self-esteem is eclipsed by a more substantive, negative relationship to inequalities in material access to the Internet and restrictive mediation of media by parents. Findings show that new media use does not substantively displace time spent socializing with family and friends and in other social activities (e.g., volunteering). Omitting the supportive, indirect relationship between time on social media and self-esteem, through time spent socializing, exaggerates the negative relationship between social media use and adolescent well-being for girls, and for boys, misspecified the direction of the relationship. Adolescents, who experience heavy

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restrictive mediation of media by parents or have limited Internet access at home, tend to report substantively lower self-esteem than heavy users of any new media.

Keywords

displacement, screen time, techlash, addiction, mental health, digital inequality, moral panic, media parenting, depression, anxiety

Introduction

A body of research suggests that use of new media, such as social media and video games, displaces time that adolescents spend socializing with friends and family. The research posits that this displacement is associated with problematic mental health outcomes, including increased loneliness, depression, social isolation, and lower levels of self-esteem (e.g., [Twenge et al., 2018](#)). These findings have been widely reported by the popular press, which has amplified parents' and policy makers' impressions of widespread harm, and has been interpreted by the general public as expert advice ([Stern & Burke Odland, 2017](#)). "Disconnection," voluntarily or involuntarily, is the prescribed solution ([Vanden Abeele & Mohr, 2021](#)). Governments in Canada, the United States, and the United Kingdom have initiated hearings and suggested the need for new regulation. Two-thirds of parents worry that their teens spend too much time online, and, as a result, a majority of parents use restrictive mediation to actively limit their teen's mobile phone and Internet privileges ([Anderson, 2019](#)). Some even advocate un-adoption, arguing that those who lack home Internet access, often because of digital inequality, are uniquely protected from harm ([Riley, 2019](#)). Yet, much of this research on the dangers to adolescent psychological well-being has significant deficits. This includes model misspecification, exaggerating the degree of harm from "excessive use," and ignoring the potentially greater harm associated with disconnection, which can take many forms, but includes heavy restrictive mediation of media by parents, and limits on material access to the Internet.

Many studies perpetuate the false argument that new media use substantively displaces time spent socializing with family and friends. As a result, they have misspecified the relationship between screen time and adolescent psychological well-being. If, as suggested here, the harm associated with heavy (excessive) or even average use of new media has been overstated, then the recommendation of disconnection may be problematic. The focus on harm often omits a discussion of how new media are integrated into youth culture, serving as a source of entertainment and socialization that contributes to identity formation, self-efficacy, and social support ([Mesch & Talmud, 2010](#)). It is not clear that adolescents who are disconnected invest more time with friends or family or in activities that would otherwise contribute to time spent socializing. Poor material access to media may exclude adolescents from opportunities that protect psychological well-being, in particular adolescent self-esteem. Given the negative relationship between self-esteem and family environments that are highly controlled ([Ross et al., 1999](#)), restrictive mediation of media by parents may serve to limit time with peers and families, thus undermining adolescent well-being. We suggest that any negative relationship between time spent on digital media and adolescent self-esteem is eclipsed by a more substantive, negative relationship between self-esteem, material inequalities in Internet access, and restrictive, parental mediation of media.

Given the near ubiquity of Internet access among adolescents in the global north (e.g., the United States, Canada, Western Europe), disconnection is difficult to study in a natural context. There are few settings in which adolescents experience material limitations on access that are not driven exclusively by parental mediation or income inequalities. In a sample that has been

randomly selected from the general population, there tend to be few participants who can afford broadband home Internet that live in households that have no, or slow Internet access. The connate nature of digital inequality with income and race confounds the relationship to measures of well-being (Gordon, 1968). As a result, experimental approaches are often used to study disconnection and psychological well-being, for example, temporarily separating college students from their devices or imposing short-term limits on their media use (e.g., Hunt et al., 2018). However, it is not clear that observations from these studies are generalizable to adolescents or to experiences in the real world. To overcome these limitations, this work studies disconnection in a natural social setting by drawing on a population in the United States where significant inequalities in material access remain—rural youth.

Access inequalities tend to be unevenly distributed and clustered in specific geographic areas (Mossberger & Tolbert, 2021). Unlike urban and suburban areas, where the primary barriers to adoption are related to cost, many small towns and rural areas do not have access to broadband Internet because of an absence of broadband infrastructure, they experience disconnection that is unrelated to subscription costs (Horrigan, 2019). As such, rural areas provide a unique opportunity to study disconnection. Based on a survey of 3258 adolescents from 15, rural, Michigan school districts, this work contrasts the magnitude of the relationship between self-esteem and heavy use of various new media with that related to disconnection. While disconnection can take many forms of both voluntary and involuntary constraint on media use, we focus on access inequalities, such as they persist in rural areas of the United States and elsewhere, and the restrictive mediation of media by parents. We argue that overly generalized reports of widespread harm to adolescents' self-esteem in relation to new media use are a textbook example of a moral panic, in which "the untypical is made typical" (Cohen, 2011). Not only has the potential for harm been exaggerated, but the cure proposed by purveyors of this panic may induce a more substantive harm to adolescent well-being.

Literature Review

Adolescent Psychological Well-Being

Adolescence is a developmental period that marks the transition between childhood and adulthood. It is a time of increased stress and a desire for independence that often coincides with family conflict. Most notably, it is a period marked by a shift away from time spent with family and toward time spent with peer groups (Larson et al., 1996). A confluence of factors is related to psychological well-being during this developmental stage, including gender, inequality, family structure, and parenting style (Demo & Acock, 1996). An extensive literature also documents the relationship between media use and well-being during this time, including general internet use, video games, social media, and mobile phones (for a review, see Appel et al., 2019; Orben, 2020). This body of work recognizes that new media can be damaging, beneficial, or benign, depending on type of use, development stage (Orben et al., 2022), individual susceptibility (Beyens et al., 2020), and social context (Livingstone, 2018).

Clear evidence of widespread harm from everyday or even heavy use of new media has not been established. Meta-analytic and other systematic reviews of the relationship between use of new media and psychological well-being (Appel et al., 2019; Orben, 2020) and correlational evidence from large-scale datasets (Orben & Przybylski, 2019) have found that time spent using new media accounts for less than 1% of the variation in adolescent well-being. There is little evidence that this relationship has increased over time (Vuorre et al., 2021). Longitudinal studies have found no substantive relationship between frequency of use and adolescent, psychological well-being (Coyne et al., 2020; Schemer et al., 2020). However, media scholars and journalists

continue to overwhelmingly advance a narrative that problematizes the time that adolescents spend using these media.

A growing number of scholars has expressed concern about the quality of studies that have reported lower, psychological well-being that is commonly experienced in relation to time spent online. Criticisms include not reporting the magnitude of effects, the use of insufficiently validated scales, a narrow focus on “screen time,” a dependence on experimental evidence, and a failure to adequately explore the role of third variables (Hampton, 2019; Orben, 2020). For example, Twenge et al. (2018) focus on a very small association between social media use and depression (a correlation of .06 for girls and no relationship for boys) as evidence of a substantive relationship between screen time and well-being. Studies of “problematic” or “addictive” uses of new media often rely on scales with low construct validity; they have negligible to small correlations with measures of psychological well-being (Duradoni et al., 2020). Some scholars have attempted to identify how new media may contribute to lower well-being by differentiating media activities, investigating differential susceptibility (Beyens et al., 2020), and by identifying mechanisms such as a fear of missing out (Reer et al., 2019), cyber-bullying (Machmutow et al., 2012), emotional contagion (Hampton, 2019), and awareness of undesirable network life events (Hampton et al., 2016; Shin & Hampton, 2021). However, reports of across-the-board, negative relationships to new media use are most commonly expressed in relation to a simple measure of screen time (Orben, 2020).

Studies frequently argue that time on screens displaces or distracts from in-person interaction or engagement in activities outside of the home, such as volunteering, sports, extracurricular activities, and paid work (Twenge et al., 2018). Indeed, if founded, such a displacement would be concerning. Adolescents who spend more time with friends and family and those involved in activities outside of school, such as volunteering, sports, clubs, and work for pay, tend to report better psychological well-being, including higher self-esteem (Barber et al., 2001; Collins et al., 2018). However, there is little evidence to support the displacement hypothesis.

Studies of screen time and psychological well-being theorize displacement (e.g., Twenge et al., 2018), but generally do not formally test how time spent using new media and psychological well-being are mediated by the time adolescents spend with family and friends. In fact, prior research has cast considerable doubt on theories of displacement. New media tend to supplement or stimulate rather than displace contact (Valkenburg & Peter, 2007; Wellman et al., 2001). This relationship can be direct, adding new channels of communication, or indirect, increasing opportunities for micro-coordination of activities (Ling & Lai, 2016) and facilitating participation in other contexts and activities (voluntary groups, etc.) that support the formation and maintenance of relationships (Hampton et al., 2011). In failing to test the indirect relationship between screen time and psychological well-being through time spent with family, friends, and social activities, such as volunteering, working for pay, and extracurricular school activities, those who argue displacement may find that their findings are attributed to omitted-variable bias.

Consistent with prior work, we expect to confirm that:

H1: Time with (a) family and (b) friends as well as time spent on (c) social activities is associated with higher adolescent well-being.

However, counter to the displacement hypothesis, we do not expect to find that screen time is associated with less time spent socializing with family and friends. We expect this to be true of the direct relationship from new media use to time with family and friends, and indirectly through participation in other social activities (extracurricular sports, clubs, paid work, etc.).

H2: Time spent on new media contributes directly to time spent with (a) family and (b) friends, and contributes indirectly to time with (c) family and (d) friends through time spent on social activities.

As such, when time spent socializing is treated as a mediator, we expect that:

H3: Combining direct and indirect relationships between time spent on new media and time with family, friends and social activities, there is (a) a positive, (b) but small relationship to adolescent psychological well-being.

Although there are risks to the use of new media, not all screen time is risky, and not all digital risks are likely to result in harm. We believe that most adolescents likely benefit as a result of time spent online—from opportunities for self-exploration, social support, and, indirectly, through time spent socializing in other settings. If, as we have hypothesized, after considering mediating relationships, time on new media is associated with higher psychological well-being, or if the magnitude of any remaining negative relationship is trivial, or relatively small, the prescription of disconnection may be more than a rhetorical problem; the remedy may do more harm than good.

Disconnection

The perception of health risks is one of the primary drivers of advice to avoid, limit, or otherwise disconnect from media (Syvertsen, 2017). Parents are warned that they must aggressively control and limit screen time to provide more time for in-person interaction and reduce risks to mental health. More extreme views wax nostalgic and suggest that we would be better off without these media entirely (Hampton & Wellman, 2018). This has even led some to advocate against policies to close the digital divide, suggesting that providing better access to those with existing inequalities harms those adolescents who are already most vulnerable (Riley, 2019). These arguments ignore the more complex relationships among what young people do online, parental mediation of media, and mental health. Vanden Abeele and Mohr (2021) argue that “disconnection” has become a key concept in the study of new media. Although there are many types of disconnection, we focus on two types experienced by adolescents, acts of parental media mediation, and limits to material access, such as digital inequality.

Parental Mediation of Media

Broader parenting style tends to guide parents’ strategies to mediate media use (Livingstone et al., 2015). Approaches to the mediation of media vary, based on socioeconomic factors, parents’ personal beliefs about technology, their efficacy with media, and their childrens’ ages and gender. They are also influenced by advice shared by members of the scientific community. One common approach is “restrictive” mediation—an autonomy-restrictive approach that involves authoritarian control over time and content. Another style is “instructive” mediation or practices that rely on a more authoritative style, which focuses on having conversations about media use, developing critical media skills, and granting adolescents autonomy (Coyne et al., 2017). Parents may adopt aspects of both restrictive and instructive mediation.

Restrictive approaches to parental mediation are often found to be more successful than other approaches in reducing media use. Girls tend to be more responsive than boys (Van den Bulck & Van den Bergh, 2000). However, family environments that are high in control are associated with lower self-esteem, whereas environments that utilize more instructive approaches are associated with higher self-esteem (Ross et al., 1999). This relationship is larger for girls than boys (Heaven & Ciarrochi, 2008). Restrictive parental mediation may displace media use, but also indirectly displace

time spent with family and friends; as a result of disrupting online sociality and social withdrawal by adolescents in response to authoritarian parenting styles (Rubin & Coplan, 2004). As a result, we expect that disconnection in the form of restrictive control over media will have a negative relationship to well-being.

H4: A restrictive media parenting style has (a) a direct, negative relationship to adolescent well-being and an indirect, negative relationship through less time spent with (b) family, friends, and social activities.

Digital Inequality

“First-level” digital divides related to Internet access have narrowed in many countries, and scholarly focus has shifted primarily to the implications of “second-level” divides in skills and usage. However, attention has recently returned to the role that remaining deficits in material access has on outcomes related to well-being, including physical health, social capital (Reisdorf et al., 2020), and academic performance (Gonzales et al., 2020; Hampton et al., 2021). Along these lines, inequalities in material access, that is, the connection, devices, and software required to engage in online activities, may disrupt the benefits that can come from the culture and sociality of adolescent media use. For example, adolescents with access inequalities may be less successful in negotiating time that could be spent with family and friends. Those who substitute smartphones for fixed, home access may experience constraints on online activity, cell phone data can be spotty, congested, and data capped; smartphones afford fewer online activities than a computer (Reisdorf et al., 2020). Such constraints can be gender specific. Reddick et al. (2020) found that males self-select into media uses that are more dependent on broadband speeds, possibly to support online gaming. Not having an affordance for what has become a ubiquitous activity for many adolescents may be more isolating for boys, whereas other material deficits may be problematic for girls.

H5: Inequalities in Internet access have (a) a direct negative relationship to psychological well-being and an indirect relationship through less time spent with (b) family, friends, and social activities.

Pharmakon: When the Remedy is the Poison

If, after considering the mediating role of time spent socializing, screen time does not exhibit a large, negative relationship to self-esteem, then we need to address the possibility that for most adolescents, disconnection is not innocuous. We address an additional, major shortcoming of research on screen time and adolescent psychological well-being. We compare the magnitude of any relationship between screen time, and conversely, disconnection, on psychological well-being.

H6: We expect the relationship between disconnection in terms of (a) parenting style and (b) material access to have a larger, negative relationship to adolescent psychological well-being than heavy use of any new media.

Methods

Sample

Studying disconnection, especially due to variation in access, can be challenging. In the global north, few who have the socioeconomic means to purchase broadband, home Internet access

choose not to. Lack of access is often synonymous with poverty and racial inequality. Analytically, this makes it difficult to separate inequalities in access from other socioeconomic variables, even when statistically controlled (Gordon, 1968). Studies that lack variability in material access may inadvertently confound the relationship between socioeconomic status and well-being. As such, disconnection has often been studied in experimental settings in which subjects are temporarily separated from their devices or asked to reduce media use (e.g., Hunt et al., 2018). Although experimental studies can observe short-term effects, such studies rarely study actual adolescents, and it is unclear if experimental manipulation results in outcomes that are similar to what would be observed in the real world. We utilize a unique, natural, social setting to observe disconnection.

Rural areas provide a unique opportunity to study the relationship between psychological well-being and disconnection. In contrast to urban areas, rural areas are more likely to suffer from gaps in the infrastructure to provide fixed broadband (Hampton et al., 2021). If Internet access is available, it is often slower than broadband speeds. Although poverty is also prevalent in these areas, many young people live in households that would purchase high-speed, home Internet access if it were available. Inequalities in the physical availability of broadband Internet in rural areas make access inequalities less likely to be concurrent with socioeconomic inequalities. Because of the variety of circumstances that cause youth to have no or poor access (socioeconomic factors and geographic factors), a study focused on a rural population is better able to identify outcomes that are related to variation in physical disconnection.

Data for this analysis come from a study of adolescents who live in 15, predominately rural, school districts in Michigan.¹ Between May and June 2019, 3258 students, aged 13 and older, across 21 schools and 173 classrooms completed a twenty-minute, pen-and-paper survey. They represented 70.6% of students enrolled in public schools in grades eight through eleven.

Measures

As an indicator of adolescent psychological well-being, participants completed a multidimensional measure of adolescent self-esteem, the Self-Esteem Questionnaire (SEQ). The SEQ has been validated as an assessment of global feelings of self-worth that includes dimensions of body image, peer relations, family, school, and sports/athletics self-esteem (DuBois et al., 1996). It positively predicts perceived social support and negatively predicts daily stressors/hassles and negative life events. The SEQ includes eight questions on a four-point scale, ranging from “strongly disagree” to “strongly agree.” Examples of questions include, “I am happy with myself as a person,” and “I sometimes think I am a failure (a ‘loser’)” (reverse coded) (0–3; $M = 1.82$, $SD = .60$, $\alpha = .88$).

Participants were asked about their parents’ or guardians’ parenting practices related to a range of new and traditional media. A measure of perceived, restrictive mediation was created based on the average of participants responses to five questions, on a four-point scale, from “never” to “often” (0–3; $M = .66$, $SD = .67$, $\alpha = .81$). They were asked to report how often their parents/guardians limit the amount of time or times of day when they can “go online,” “watch TV,” and how often they take away their “cell phone,” “internet privileges,” and “television privileges.” Perceived instructive mediation was measured as the average response to four questions on the same scale ($M = .72$, $SD = .75$, $\alpha = .84$): how often parents/guardians talk to them about what is appropriate or inappropriate “to do online,” “to watch on TV,” “to listen to,” and to read in “books or magazines.”

Participants reported whether they had “fast” home Internet access, slower access, whether they had Internet access only at home through a smartphone, or had no access. Self-reports were validated with data from an optional homework assignment that provided a speed test to measure

actual home Internet speed (Hampton et al., 2020). The average speeds of those who reported that they had “fast” home Internet access exceeded the minimum requirements set by the Federal Communications Commission for “broadband” speeds (25mbps download, 3mbps upload). They were also significantly higher than those speeds reported as “slow.” Thus, we classify adolescents’ Internet connectivity as either broadband (the reference category; 57.2%), a slower home connection (22.6%), dependent on a cell phone with a wireless data plan (14.4%), or having no home Internet access (5.8%).²

Time spent on different digital media, time spent with family and friends, and time spent in other social activities were measured as time per typical weekday: none, <1hr., 1–2 hours, 2–3 hours, 3–4 hours, 4–5 hours, 5 or more hours. Time was recoded in hours based on the mid-point; watching movies and videos on mobile devices (e.g., YouTube, Netflix) ($M = 2.40$, $SD = 1.74$); playing video games on a computer, console, or mobile device ($M = 1.59$, $SD = 1.78$); surfing the Web ($M = 1.17$, $SD = 1.41$); chatting online or using social media (e.g., Instagram, Snapchat, Discord) ($M = 2.62$, $SD = 1.92$); hanging out or socializing with your friends ($M = 2.53$, $SD = 1.85$); spending time with your family ($M = 2.61$, $SD = 1.76$); participating in sports activities at or outside of school ($M = 2.02$, $SD = 1.80$); participating in band, student government, or other clubs or organized activities at or outside of school ($M = 0.87$, $SD = 1.40$); working for pay not including chores or jobs you do around your house ($M = 1.56$, $SD = 2.04$); and unpaid volunteer work ($M = 0.63$, $SD = 1.14$). Traditional media continue to play a role in adolescent culture, arguably displacing time spent with family or friends. Therefore, we also included a measure for time spent watching television ($M = 1.34$, $SD = 1.48$).

Control variables were included for contextual and individual differences identified in the literature as predictive of adolescent self-esteem. Most notably, prior research suggests that girls, minorities, members of low-income families, and those with lower academic performance tend to report lower self-esteem (Demo & Acock, 1996). Participants were closely divided by gender identity (female = 52.3%). Academic performance was recorded as grade point average (GPA) (range 0.00–4.00; $M = 3.08$, $SD = 0.90$). Fifteen percent of students in the sample had an Individualized Education Plan (IEP)—a formal school plan for accommodations or special education services. Family income was assessed as a dichotomy: whether a student was eligible for a free or a reduced-price school lunch as part of the School Lunch Program (35.5%).³ Socioeconomic status was further controlled through parental education, measured as the highest level of education completed by a parent/guardian ($M = 14.70$ years, $SD = 2.92$). Thirty-three percent of students lived with a single parent. Twenty-two percent of students identified as non-white, predominately Native American, or of mixed-race. Responses were closely split by year (grades 8 = 25.4%, 9 = 27.2%, 10 = 26.0%, 11 = 21.4%).

Analysis

Using maximum likelihood estimation, regression analysis was performed on a path model in MPlus v8.4. The model included direct and indirect relationships from Internet connectivity and parenting style to time spent on media, to social activities, to time spent with family and friends, and to self-esteem (Figure 1).⁴ This model contrasts with most research on the displacement hypothesis that does not model mediation, but assumes only a direct, negative relationship between time on media and self-esteem. Our model tests prior assumptions that the relationship between screen time and self-esteem is direct, and not mediated by the time adolescents spend in social activities and with friends and family.

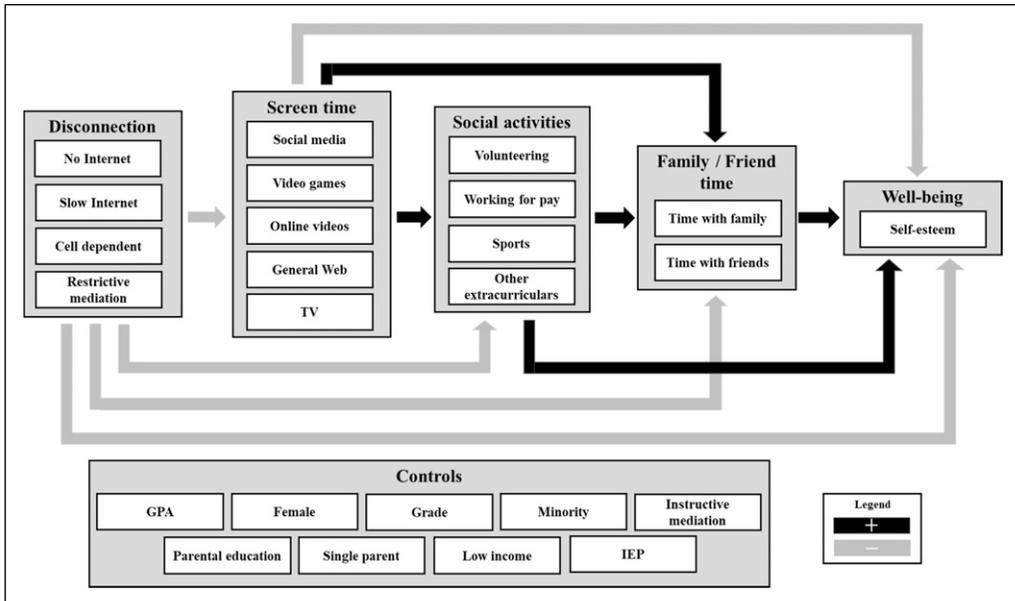


Figure 1. Theoretical model.

We use the approach suggested by Gelman (2008) to interpret the magnitude of relationships in our model. This approach aids in the interpretation of binary predictors. We transform non-binary variables (but not the outcome variable of self-esteem) by taking the value of the variable, subtracting the mean, and dividing the difference by *two times its standard deviation* (SD). We operationalize media use as two SD above the mean as heavy or “excessive” use. The resulting transformations (β) are directly comparable to binary predictors. However, we also note that for relatively rare subsets of the sample (e.g., the segment of rural adolescents with no home Internet access at all), this approach could underestimate the importance of the predictor in the regression, although it is superior to alternative approaches to scaling.

The rate of missing values was low for most variables (0–5%), but higher for self-esteem (9%) and parent education (8%). We found no patterns in the data to suggest that the missing values were not missing at least at random. A Markov Chain Monte Carlo method was used to impute missing values. It produced 10 imputed datasets that were combined for the analysis and which reflect the uncertainty due to missing values (Yuan, 2000). Multiple imputation is considered a best practice relative to the alternative—bias that can be introduced using list-wise or pair-wise deletion. The delta method based on “normal-theory” was used to test indirect relationships (Muthén & Muthén, 2018).⁵

Existing research suggests that some of our hypothesized relationships may be larger in magnitude for girls or boys, such as the relationship between social media use and self-esteem (Twenge et al., 2018), parental mediation (Van den Bulck & Van den Bergh, 2000), or inequalities in access (Reddick et al., 2020). To avoid possible misspecification, a multiple group analysis was performed to identify gender-specific relationships. Thus, when reporting our findings, we generally report coefficients from a model that includes gender as a control variable (see Online Supplement, Table S1 and Table S2), but when the multiple group analysis identifies a coefficient that is statistically significant for only boys or girls, or when a Wald test of boys and girls combined

direct and indirect coefficients is different from zero, we report the gender-specific coefficients (see Online Supplement, Table S3). Unstandardized coefficients are used for ease of interpretation and to report the direction of a relationship, whereas standardized coefficients are used to report the magnitude of relationships.

Findings

Socializing and Self-Esteem

Time with family (H1a) and friends (H1b) has a positive relationship to self-esteem, although the relationship from other social activities is mixed (H1c). As reported in Table S1, each hour spent with family is associated with .04 ($p < .001$) higher self-esteem, whereas each hour with friends is associated with .02 ($p < .01$) higher self-esteem. Time spent volunteering, working for pay, and participating in sports, but not other extracurricular activities, is associated with more time spent with friends and family (each hour spent on social activities is related to .07–.17 more hours spent with each of family and friends) and indirectly contributes to self-esteem. The relationship to self-esteem is also direct and positive for extracurricular sports (.03, $p < .001$), but negative for other extracurricular activities ($-.02$, $p < .01$). As reported in Table S2, combining direct and indirect relationships through time with family and friends, one hour spent in each of the following is associated with self-esteem: sports (.04, $p < .001$), volunteering (.01, $p < .001$), other extracurricular activities ($-.02$, $p < .01$), and, for boys only, working for pay (.01, $p < .001$, Table S3).

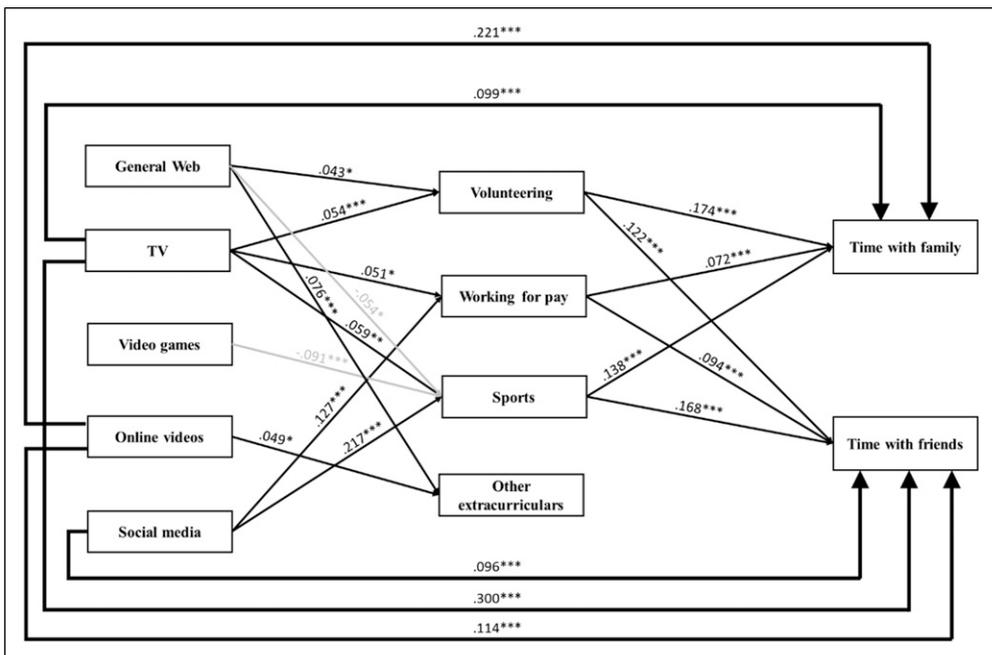


Figure 2. Segment of path model showing test of the displacement hypothesis, solid lines represent direct relationships (unstandardized coefficients).

The Displacement Hypothesis

As outlined in Table S1, and shown in Figure 2, time spent using various media is positively and directly associated with time spent socializing with family (H2a) and friends (H2b).

One hour watching online videos (.10, $p < .001$) or television (.22, $p < .001$) is associated with more time spent with family. We find mixed support for the expected, positive, indirect relationship between media use and family time through participation in other social activities, although the general pattern is in support of the hypothesis (H2c). As reported in Table S2, although video game use ($-.01$, $p < .001$) has a small, negative relationship through time spent on sports, social media use has a positive relationship to family time through sports and paid work (.04, $p < .001$). Traditional television viewing is also positively associated with family time through sports and volunteering (.02, $p < .001$). Combining direct and indirect relationships, as shown in Figure 3 and reported in Table S2, social media use (.04, $p < .001$), online videos (.10, $p < .001$), and television (.24, $p < .001$) are associated with more time with family. Our multiple group analysis finds that the negative relationship between video game use and family time (Wald $p < .05$, Table S3) is larger for boys ($-.07$, $p < .01$) than girls ($-.01$, $p < .05$).

As shown in Table S1 and Figure 2, watching videos online (.10, $p < .001$) and traditional television (.11, $p < .001$) are positively related to time spent with friends, as is time on social media (.30, $p < .001$). The same, mixed pattern of indirect relationships between media use and other social activities for time with family was also found for friends. Again, the overall pattern supports the expected positive, indirect relationship between media use and time with friends through social activities (H2d). Combining direct and indirect relationships, as reported in Table S2 and Figure 3, social media use (.35, $p < .001$), online videos (.10, $p < .001$), and television (.13, $p < .01$) are

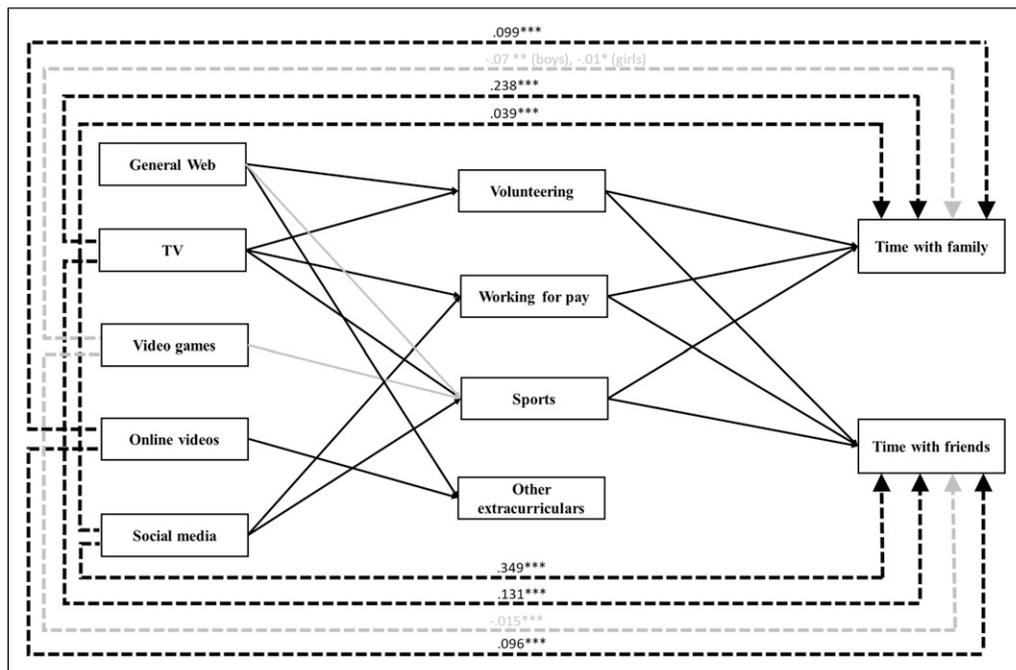


Figure 3. Segment of path model showing test of the displacement hypothesis, dotted lines represent total indirect relationships (unstandardized coefficients).

positively associated with time spent with friends, whereas video game use is negatively associated with time spent with friends ($-.02, p < .001$).

We find very little support for the argument that most screen time displaces time spent with family or friends. The only exception was a small negative relationship from video games to time with family; approximately half a minute less per hour of game play for girls, and four minutes less for boys; and for friends, approximately one minute less per hour of use. In contrast, one hour of online videos supported six additional minutes spent with each of family and friends (slightly less than time watching TV), whereas social media use is associated with substantively more time spent with friends; approximately 21 minutes for each hour of social media; and two minutes with family per hour of social media.

Misattribution and Omitted-Variable Bias

In the naive model, as documented in Figure 4 and reported in Table S1, where displacement is assumed but not formally tested through mediation, the evidence erroneously suggests that one hour of watching online videos per day is associated with $-.03$ ($p < .001$) self-esteem, and one hour of general Web use is associated with $-.02$ ($p < .05$) self-esteem. A multiple group analysis indicates a direct, negative relationship between social media use and self-esteem for girls ($-.03, p < .001$, see Table S3), but not for boys. There is no evidence of a direct relationship between television viewing or video game play and self-esteem.

As discussed, to facilitate a comparison of the magnitude of relationships, independent variables that were not dichotomies are transformed to represent change at two SD from the mean. In the naive model, identifying as female ($\beta = -.31, p < .001$) and academic performance ($\beta = .24, p < .001$) are the two strongest, direct predictors of adolescent self-esteem. The magnitude of online videos ($\beta = -.09, p < .001$), Web use ($\beta = -.06, p < .05$), and, for girls only, social media (β

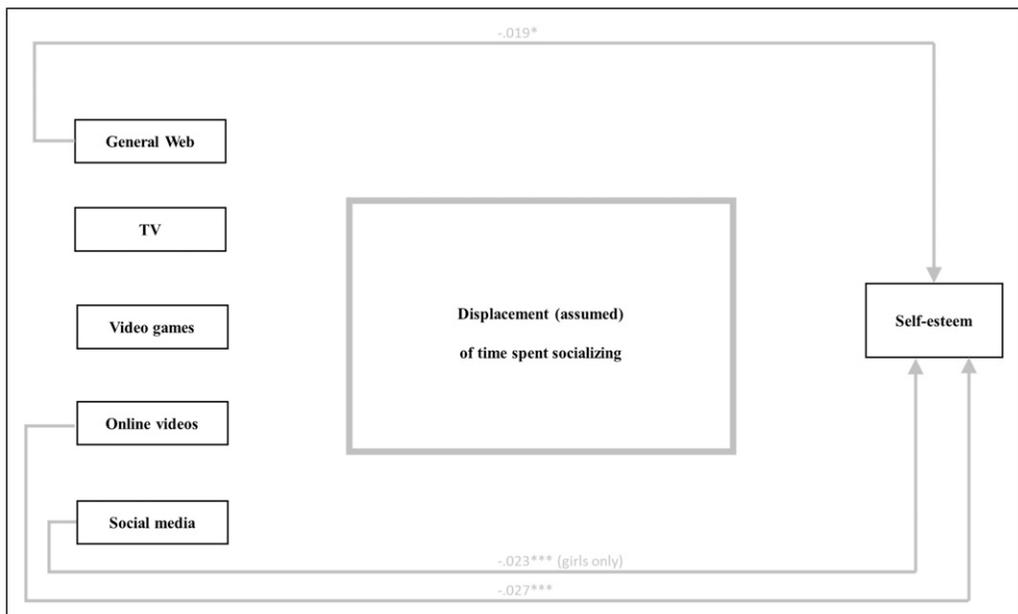


Figure 4. Segment of path model showing relationship between media use and self-esteem, solid lines represent direct relationships (unstandardized coefficients).

= $-.12, p < .001$), are less substantive. For example, heavy social media use by girls (at two SD above the mean or approximately 6 hrs. and 45 min. per day) is roughly one-third the magnitude of the direct relationship of gender on self-esteem. Only in a hypothetical example based not only on heavy use of one medium but the absolute extreme of an adolescent girl who was a heavy user of all media (i.e., a total of 16 + hours every day combined of online videos, general Web use, and social media), would the magnitude of the relationship to self-esteem approach that of gender or academic performance. In this naive model, media use would need to approach, not just heavy use, but very extreme use to match the magnitude of the strongest predictors of self-esteem. However, this model is based on what we argue is a spurious relationship to psychological well-being. This model suffers from omitted-variable bias, it fails to formally model the displacement hypothesis consisting of the mediating role of time spent with family and friends and in other social activities.

In our model depicted in Figure 5, where potential displacement is formally modeled, we find limited support for the hypothesis that the combined direct and indirect relationships between new media use through time spent with family, friends, and in social activities on self-esteem are positive (H3a). However, the addition of these moderators alters the direction and magnitude of many of the relationships between screen time and self-esteem. A negative relationship from Web use to self-esteem persists ($-.02, p < .05$, Table S1). The negative relationship between online videos and self-esteem, is now specific to girls ($-.03, p < .05$, Table S3). There is now a significant, negative relationship between video games and self-esteem ($-.003, p < .05$), but it too is limited to girls. The negative relationship between social media use and self-esteem for girls persists ($-.02, p < .01$), although we now find a positive relationship between social media use and self-esteem for boys ($.02, p < .001$).⁶

Accounting for the mediating role of time spent socializing, we find support for the hypothesis that the relationship between screen time and self-esteem is small (H3b). Academic performance

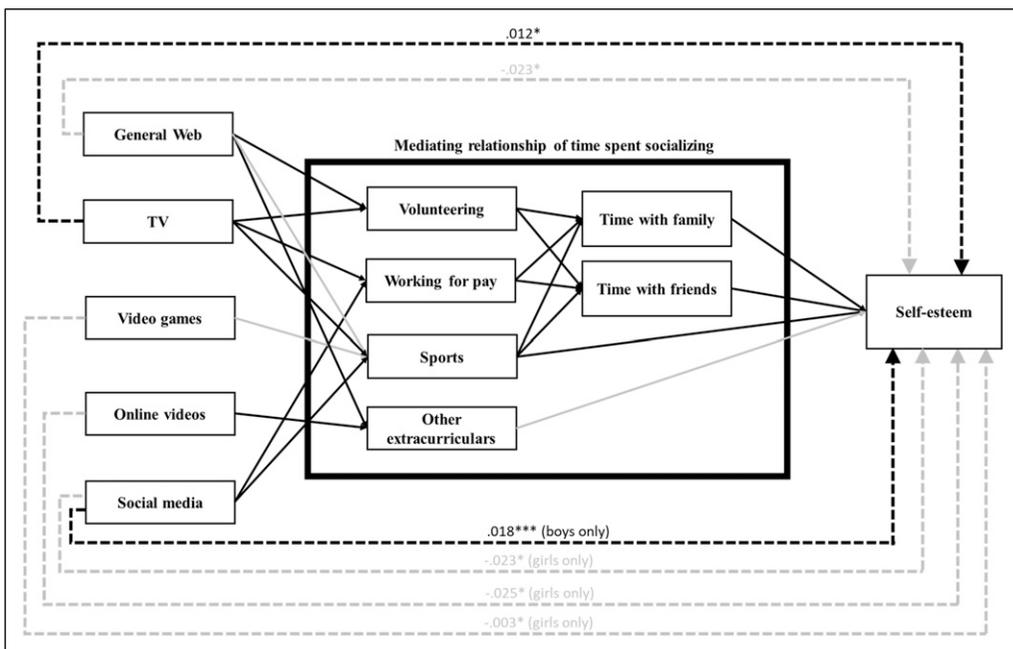


Figure 5. Segment of path model showing relationship between media use and self-esteem, dotted lines represent total indirect relationships (unstandardized coefficients).

($\beta = .28, p < .001$, Table S2) and gender ($\beta = -.33, p < .001$) retain their position as the largest predictors of self-esteem. As a reminder, to facilitate a comparison to binary variables, in these models continuous variables were transformed at two SD above the mean (Gelman, 2008), this procedure augments the size of our standardized coefficients to represent heavy media use, this is unlike standard coefficients in most traditional analyses, where each unit is equal to one standard deviation. Heavy Web use ($\beta = -.07, p < .05$, Table S2), and, for girls only (Table S3), heavy use of online videos ($\beta = -.08, p < .01$), video games ($\beta = -.01, p < .01$), or social media ($\beta = -.09, p < .01$), has a small, negative relationship to self-esteem. Standardized coefficients for measures of screen time decreased with the inclusion of indirect relationships through time spent socializing, most notably girls' social media use (from $\beta = -.12$ in the naive model to $-.09$). Combining direct and indirect relationships, for girls, measures of heavy screen time are between three-one hundredths (video games) and one-third (social media) the magnitude of GPA or identifying as female on self-esteem. Boys experience a small, positive relationship from heavy social media use to self-esteem ($\beta = .06, p < .001$, Table S3), but less than one-fifth of what can be attributed to the higher self-esteem associated with identifying as male. Once again, only in an unlikely, hypothetical extreme, an adolescent girl who is a heavy user of all types of new media (i.e., combined daily use of each media at two SD above the mean), would someone tend to experience substantively lower self-esteem, but still below what can be attributed to gender or GPA alone. We also note that the relationship between television viewing and self-esteem is now positive and significant, although very small ($\beta = .04, p < .001$, see Table S2).

For girls and boys, heavy or "excessive" use of screens is a trivial to small contributor to self-esteem in comparison to other established predictors. The relationship from typical, mean use is necessarily much less and unlikely to represent considerable harm to self-esteem. We have hypothesized that disconnection, experienced as the restrictive mediation of media by parents (H4) or digital inequality (H5), has a more substantive, negative relationship to adolescent self-esteem (H6).

Parental Mediation

A multiple group analysis (Table S3) finds that the relationship between restrictive mediation and time on new media is limited to girls. A one-unit change in restrictive mediation of media for girls, but not boys, was related to less time spent on online videos ($-.20, p < .01$) and on social media ($-.34, p < .001$), but not on other media activities. Restrictive practices were more commonly reported by boys ($M = .72$ vs. $.61, p < .001$), but appear ineffective for boys.

Instructive practices were associated with less time spent on social media ($-.22, p < .001$, Table S1). The relationship between instructive parenting and video games ($-.25, p < .01$, Table S3) and watching online videos ($-.21, p < .01$) was significant for boys only. Girls reported more instructive parenting than boys ($M = .80$ vs. $.64, p < .001$), but this approach appears to be more effective on boys.

Restrictive mediation has the hypothesized, direct, negative relationship to self-esteem (H4a). As reported in Table S1, regardless of their gender, adolescents who perceive one-unit higher restrictive mediation tend to have 0.11 ($p < .001$) lower self-esteem. Counter to our expectations, the indirect relationship between restrictive practices and self-esteem through time spent socializing with family, friends, and in social activities (H4b) is small, and when combined, they are not statistically significant. There was a small, positive, indirect relationship between instructive parenting and self-esteem ($.01, p < .01$, Table S2).

Material Access

As hypothesized (H5a), inequalities in material access are directly related to lower self-esteem. Compared to those with broadband, adolescents who depend on a cell phone ($-.13, p < .001$, Table S1) and boys who have no Internet access ($-.18, p < .05$, Table S3) or slower than broadband access have lower self-esteem ($-.17, p < .001$).

In partial support of our hypothesis (H5b), compared to those with broadband home Internet, cell phone dependence is related to less family time ($-.03, p < .05$, Table S1). Having no access is related to less family time, but only for girls ($-.05, p < .05$, Table S3), whereas slow access is related to less family time for boys ($-.25, p < .05$). Similarly, boys and girls who depend on a cell phone for Internet access report less time spent with friends ($-.02, p < .05$, Table S1), whereas having no access ($-.05, p < .05$, Table S3) or slow access is related only to less time spent with friends for girls ($-.36, p < .05$). Regardless of gender, the indirect relationship to self-esteem is relatively trivial. Only the relationship from slower home Internet access carries through to self-esteem ($-.01, p < .01$, Table S1).

Combining direct and indirect relationships, compared to those with broadband access, adolescents who are dependent on a cell phone ($-.13, p < .001$, Table S2) and boys who have no ($-.18, p < .05$, Table S3) or slower than broadband access ($-.17, p < .001$) have lower self-esteem.

Disconnection versus Heavy Media Use

As hypothesized, disconnection, in the form of restrictive parental mediation (H6a) and digital inequality (H6b), has larger relationships to self-esteem than heavy or “excessive” screen time.

The relationship between heavily restrictive parental mediation of media and self-esteem has a standardized coefficient of $-.15$ ($p < .001$, Table S2). Heavy restrictive mediation practices have among the largest relationships to adolescent self-esteem, exceeded only by identifying as female ($\beta = -.33, p < .001$) and GPA ($\beta = .28, p < .001$). Heavy use (at two SD from the mean) of the Web ($\beta = -.07, p < .05$), social media (boys, $\beta = .06, p < .001$; girls, $\beta = -.09, p < .01$), video games (girls only, $\beta = -.01, p < .01$), or online videos (girls only, $\beta = -.09, p < .01$), has a much smaller relationship to adolescent self-esteem, three-fifths or less the magnitude of restrictive mediation. In contrast, heavy instructional parenting has a small, but positive relationship to adolescent self-esteem ($\beta = .07, p < .01$). Heavy restrictive parental mediation of media seems especially harmful to adolescent self-esteem in comparison to heavy, new media use.

Inequalities in access rank next to restrictive media parenting as among the largest contributors to adolescent self-esteem. Compared to those with broadband home Internet, adolescents who are dependent on a cell phone for their Internet access report substantively lower self-esteem ($\beta = -.13, p < .001$). Boys who have slow ($\beta = -.17, p < .001$) or no home Internet ($\beta = -.17, p < .05$) report similar deficits in self-esteem. For girls, the magnitude of the relationship from cell phone dependence exceeds the relationship between heavy use of any new media and self-esteem (heavy screen time ranges by media from $\beta = -.01$ to $-.09$). For boys, the relationship is larger for all types of inequality in access, exceeding heavy Web use (the one established, negative relationship from new media use to self-esteem for boys, $\beta = -.07$) by a factor of at least two. Adolescents, especially boys, who have less than broadband, home Internet access tend to report self-esteem that is substantively lower than that what is experienced through heavy screen time on any new media.

Heavy parental mediation and inequalities in Internet access have roughly equivalent, negative relationships to self-esteem. An adolescent who experiences both limits on material access and heavy parental mediation of their media would typically experience the negative

self-esteem equivalent to having an overall school GPA that is two SD below that of their peers, roughly parallel in magnitude to the additional negative self-esteem associated with identifying as female. In comparison, only for girls, and only in the uncommon scenario of a girl who was a heavy user of all media (i.e., over 20 hours every day combined of online videos, general Web use, video games, and social media), would we expect to find that the magnitude of the relationship from screen time to self-esteem approaches that of gender or academic performance.

Discussion

This paper addresses a body of research that purports to have found that the time adolescents spend on new media is associated with lower psychological well-being by displacing time spent with family and friends. That work often suggests that “disconnection,” formulated as parents who impose restrictive control over media use or adolescents who have no or poor home Internet access, protects young people from harm to their psychological well-being. Although the displacement hypothesis is often argued, it had not been formally tested in relation to a measure of adolescent psychological well-being, such as self-esteem. In a similar way, although disconnection is presented as an appropriate intervention, this position often overlooks that some approaches to parental mediation of media could be more harmful to adolescent well-being than even heavy screen time. New media are deeply embedded in the culture and sociability of young people. Pundits who hope simply to wish it away would ignore the cost to adolescents who are separated from these activities.

We verified that young people who spend less time with family, friends, and in most other social activities (e.g., volunteering) report lower levels of self-esteem (H1). However, we found no meaningful displacement in time spent with family or friends in relation to time spent on screens (H2). New media generally supplement time spent socializing. Adolescents who spend more time on social media also tend to spend more time on activities, such as sports, which further contributes to time spent with family and friends. Those who spend more time on social media spend substantively more time with friends (approximately 21 minutes for each hour on social media) and a small amount of additional time with family (approximately two minutes/hour). Similar, small, supportive relationships were found for watching videos online and traditional television and time with both family and friends (approximately six minutes/hour). There was evidence of a small displacement in family time that was larger for boys than girls (one-half minute/hour of play for girls, four minutes/hour for boys), and time with friends (one minute per hour of play) related to video games.

When time spent socializing is modeled as a mediator, it changes the direction, magnitude, and specificity of many of the relationships between screen time and self-esteem. This confirms our expectation of misattribution related to omitted-variable bias. Counter to our hypothesis (H3a), some negative relationships between screen time and adolescent self-esteem persisted. We noted substantial variation based on gender. Notably, we found a negative relationship between time on social media and self-esteem for girls but a positive relationship for boys. However, we find support for our hypothesis that for adolescents who spend heavy amounts of time on new media, the relationship to self-esteem, depending on the specific medium, is trivial to small (H3b). Heavy use of any of the media that we explored has a trivial to small relationship to self-esteem when compared to known predictors, such as gender and academic performance. The magnitude of the relationship to average use is necessarily even smaller.

Our interpretation of this finding is consistent with what has been argued more broadly in the field. The focus on screen time and displacement distracts from more nuanced arguments about the mechanisms through which differentiated use of new media may be damaging, such as girl's body

dissatisfaction (Roberts et al., 2022), or even beneficial, such as social support (Lu & Hampton, 2017) or the vicarious joy and comfort one receives as a result of awareness of other's positive experiences (Shin & Hampton, 2021). More attention should be placed on pre-established threats to adolescent well-being, such as impression management and social comparison (Roberts et al., 2022), and factors such as person-specific susceptibility (Beyens et al., 2020), propensity for harm during different stages within adolescence (Orben et al., 2022), and the role of social context (Livingstone, 2018).

We found that disconnection in the form of restrictive, media parenting and inequalities in Internet access is negatively and substantively related to adolescent self-esteem. Adolescents who report that their parents utilize more restrictive, media practices have considerably lower self-esteem (H4). An alternative practice, instructive media parenting, had the opposite relationship: it was supportive of self-esteem. Compared to adolescents who have broadband, Internet access, those who are dependent on a cell phone and boys who have slower or no home Internet access have lower self-esteem (H5). The magnitude of the relationship between restrictive, mediation practices and self-esteem and the one between inequalities in access and self-esteem rank among the largest contributors to adolescent psychological well-being—far greater than what can be attributed to heavy use of any new media (H6).

This work could be improved in several ways. Notably, our focus on self-reported time on media and with family and friends lacks nuance. There are well established biases inherent in this approach (Hampton, 2017). Time diaries and experience sampling are generally more accurate than asking about time spent on a “typical weekday,” but the demands of these approaches made them less appropriate for this study. Future research that captures information about the quality of family and peer interactions, including the potential role of “technoference” in disrupting social interactions (Stockdale et al., 2018), could explain additional variation in adolescent well-being. The cross-sectional nature of our work does not empirically establish causal order. For example, the finding of displacement in family time for boys who spend time on video games could also be interpreted as video games provide an activity for boys who are isolated from their families. Future longitudinal work is also needed to disentangle the complex relationship from new media use to well-being from the pre-existing structure of adolescent networks (Hampton & Chen, 2021; Lu & Hampton, 2017).

The sample of rural adolescents used in this study provided unique variability in home Internet access that would have been difficult if not impossible to obtain through a representative sample of adolescents in the United States. This sampling strategy provided variability that helped separate socioeconomic inequalities that are interrelated with digital inequalities in access in most other settings. We believe that our key findings—that new media use does not displace time with family and friends, that screen time has a relatively small relationship to self-esteem, and that disconnection can be more harmful to adolescents' psychological well-being than heavy media use—are generalizable to other populations in the global north. But we also recognize that our sample is not representative. Minorities are underrepresented in research on adolescent use of social media and mental health, the unique experiences and context of minority adolescence may diverge from our findings (Campos-Castillo et al., 2021). It may also be that the implications of disconnection are more severe for rural youth. Rural youth may be more vulnerable to lower self-esteem because of higher rates of isolation, fewer educational and recreational opportunities, and lower access to health resources (Rhodes et al., 2004). Thus, the cost to psychological well-being due to disconnection, especially inequality in Internet access, may be more acute in rural areas. If so, this work also speaks to the potentially dire costs to rural adolescents of failures to address gaps in the broadband infrastructure for rural connectivity.

The tenuous claim that social media use or time spent on screens of various types is problematic for the psychological well-being of most adolescents is perpetuated through low-quality studies

that fail adequately to explore the role of third variables and do not report the magnitude of effects. Perpetuating these missteps may do real harm to the very people reported to be at greatest risk. It is fantasy to wish new media away, because they are firmly baked into adolescents' everyday lives. Helping adolescents manage their digital world rather than disconnecting them from it prepares them better for the future. Instructive mediation may be effective in reducing risk and supporting well-being. This approach helps adolescents recognize the risks of specific online activities, such as sexting, cyber-bullying, and social comparison, but it can also recognize the ever present and often supportive role of new media in the lives of today's youth. To maintain the myth that there is commonly substantive injury related to average or even heavy amounts of time spent online serves only to embolden a cycle of media reporting that stimulates a moral panic. This panic amplifies parental concerns about new media and gives voice to pundits, who harken for "the good old days" that were never so good anyway (Hampton & Wellman, 2021). It distracts from long established cleavages that are clearly related to adolescent well-being, notably, as we have again found here, those related to gender and academic performance. Rhetoric claiming widespread harm from new media contributes to a "techlash" that may lead to bans and regulation of technologies that contribute to benefits in other domains, such as human and social capital (Hampton et al., 2021). This does not imply that social media platforms are benign, but there is currently no coherent, consistent research supporting their widespread, damaging effects to adolescents.

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Supplemental Material

Supplemental material for this article is available online

Notes

1. Michigan townships that are predominately urban have an average population density of 1609 people per square mile, the participating districts had densities between 12 and 225 people per square mile. (2010 U.S. Decennial Census).
2. Nearly all had a cell phone, and nearly all who had home Internet had a computer. Those without fixed access did not. Multicollinearity prevented us from including variation in material access to devices in our analysis.
3. In 2018–19, a student from a family of three earning less than \$27,014/year was eligible for a free meal, whereas those with an income below \$30,451/year qualified for a reduced-price meal.

4. Ideally, multilevel modeling would be used to control for the interdependence of cases. However, as a result of the small number of groups in this sample, standard errors are likely to be biased (Maas & Hox, 2004).
5. Bootstrapping is often a preferred approach when testing for indirect relationships, but techniques to incorporate bootstrapping into multiple imputation are not well established (Hayes, 2017).
6. While the Wald statistic was significant for the direct relationship alone, it was not for the combined direct and indirect relationship. However, Wald tests if the coefficients for boys and girls are different from zero. Because the coefficients for the combined relationships are nearly identical but in the opposite directions, they have the same distance from zero but the relationships are divergent.

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