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Screen Time and the Psychological Well-Being of U.S. Teenagers: An Exploratory Re-Analysis of Data from the Youth Risk Behavior Survey

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SCREEN TIME AND THE PSYCHOLOGICAL WELL-BEING OF U.S. TEENAGERS: AN EXPLORATORY RE-ANALYSIS OF DATA FROM THE YOUTH RISK BEHAVIOR SURVEY

by

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Abstract

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Advisor: Bruce Homer

Numerous studies, notably secondary analyses of survey data, have examined the possibility of adverse effects from teenagers' use of digital screen-based media--with correspondingly diverse findings. One research group in particular, led by Jean M. Twenge, has been prolific and forceful in associating adolescents' screen time with reported increases in depression, suicidal ideation, and attempted suicide. Others have pointed to small effect sizes, construct validity issues, and other methodological problems in the Twenge research. However, one characteristic of the group's analyses of survey data, including data from the CDC's Youth Risk Behavior Survey (YRBS), has remained unexplored: the use of metric methods to analyze dichotomous and ordinal data. By way of example, this study deployed binomial and ordinal regression to re-analyze data from seven administrations of YRBS between 2007 and 2019, a sample comprising 103,525 high-school students. The demonstration revealed that YRBS data provide no evidence of a relationship between non-television screen time and psychological well-being, except at an indeterminately high level of daily use, calling into question the widely publicized claims of the Twenge group.

Keywords: digital media, screen media, screen time, mental health, depression, suicide

Dedication

For my mother, who would have been particularly proud to know I earned my Ph.D. at Altman's

Acknowledgments

When an earlier attempt at dissertating crashed on the shoals of corporate secrets and software incompatibility, I thought a sidestep to secondary data analysis would be the famous walk in the park. I'd still be fumbling through that high grass were it not for the aid and guidance of many with ample reason to leave me for lost.

The producers at Scholastic Media set me on this path by rescinding a plum job offer when they learned I had no Ph.D. I thank them and, in my old world of kids' media, my comrade/mentors David Kleeman, Barbara Biggins, Firdoze Bulbulia, Denielle Bertarelli-Webb, Anne-Sophie Brieger, Jan-Willem Bult, Beth Carmona, Greg Childs, Marion Creely, Ellen Doherty, Amy Friedman, Tom Ascheim, Sam Gibbon, Cheryl Gotthelf, Anna Home, Shravan Kumar, Dixie Laite, Adrian Mills, Larry Mirkin, Ellen Reynolds, Jonathan Rosenbloom, Fahmid Shantonu, Beth Spezia, Scott Traylor, and the doctors whose ranks I now join: Carl Wynter, Rosemarie Truglio, Jeanette Steemers, Carla Seal-Wanner, Istar Schwager, Naomi Sakr, Glenda Revelle, Melissa Morgenlander, Dafna Lemish, Helle Strandgaard Jensen, Rebecca Hains, Yuval Gozansky, Maya Götz, Sholly Fisch, Màire Messenger Davies, Sherri Hope Culver, Warren Buckleitner, Bettina Brinkmann, the sorely missed Joel Schneider and, in the first place, Rob Madell, who showed me how to get to Sesame Street.

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Ultimately, immeasurably, incalculably and inexpressibly, my relieved and joyous thanks go to Betsy Schmidt Stoeber, who's kept my heart full and my brain balanced throughout this ordeal--and will continue to do so, I know, in perpetuity.

Figures often beguile me, particularly when I have the arranging of them myself; in which case the remark attributed to Disraeli would often apply with justice and force: 'There are three kinds of lies: lies, damned lies, and statistics.'

—Mark Twain

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Chapter 1: Introduction

Throughout history, the introduction of new communications media has been accompanied by uneasiness regarding their cognitive, behavioral, or emotional effects on young people. Plato (ca. 360 B.C.E./n.d.) expressed concern over the effects of reading on young people's memories. Millennia later, critics would indict morally corrosive dime novels, movies, radio programs, and comics (Critcher, 2008). Television was blamed for child obesity (for example, Crespo et al., 2001; De Jong et al., 2013); both television and video games for real-life violence (for example, Ferguson & Kilburn, 2009; Wilson et al., 2002). Such anxiety has often been accompanied by conflicting findings in social research (for example, with respect to television, Primack et al., 2009; Mathers et al., 2009; with respect to video games, Anderson & Dill, 2000; Cunningham et al., 2011; Kühn et al., 2019).

More recently, researchers in the U.S. have associated a reported decline in adolescents' psychological well-being during the 2010s to teens' use of digital screen devices. They have attributed psychological distress to a variety of phenomena including screen time in general (Twenge, 2019; Twenge et al., 2017; Twenge, Joiner et al., 2018); time with specific screen-based experiences, including texting, gaming, and social networking (Twenge, 2013; Twenge, Martin et al., 2018; Twenge & Farley, 2020; Twenge, Blake, Haidt & Campbell, 2020); relationships with screen media differing on the basis of gender (Twenge, Blake et al., 2020; Twenge & Farley, 2020; Twenge, Joiner et al., 2020; Twenge & Martin, 2020); the contemporaneous rise of mobile technologies (Twenge, 2017); an increase in screen time at the level of generational cohorts, rather than individuals (Twenge, Joiner et al., 2018; Twenge, Joiner et al. 2020); and, more broadly, a media-rich "technological environment" (Twenge, 2020a). The group's principal researcher, Jean M. Twenge, summarized this line of scholarship for the popular magazine *The Atlantic* under the title "Have smartphones destroyed a generation?" (Twenge, 2017)

The Twenge group has made two claims in particular. First, its papers propose a dose-response relationship between the simple duration of an adolescent's experiences with media, irrespective of content or purpose, and various measures of emotional ill-health, including suicidality, depression, and low self-esteem (Twenge, Joiner et al., 2018; Twenge, Martin et al., 2018; Twenge & Campbell, 2019). Analyzing data from a variety of national surveys conducted in the United States and Great Britain, including the U.S. government's Youth Risk Behavior Survey, 2009-2015, they have charted a U-shaped association: Adolescents who use electronic devices for an hour or so a day are least at risk of emotional distress; risk increases moderately on one side for teens who spend less than an hour with devices, but continuously and dramatically on the other as screen time extends beyond an hour.

The second claim, advanced in two 2018 papers, is that a dramatic generational rise in psychological distress among adolescents can be attributed to an increase in teens' use of electronic devices since the introduction of the smartphone. "[I]t seems likely," wrote Twenge, Joiner et al (2018, p. 15), "that the concomitant rise of screen time and adolescent depression and suicide is not coincidental."

Twenge and colleagues are far from the only researchers to document associations between digital media and adolescent depression or anxiety (for a review, see Hoge et al., 2017). Przybylski and Weinstein (2017) identified a similarly non-linear association of screen time with distress, albeit with considerably higher risk thresholds, e.g., 4.25 hours of harm-free recreational computer use rather than one. The work of the Twenge group has nonetheless been notable, not only for its dissemination in the popular press, but also for the questions raised with respect to its analyses, its conclusions, and the validity of its constructs (Daly, 2018; Marino, 2018; Heffer et al., 2019; Ophir et al., 2019). Orben and Przybylski (2019), like the Twenge group reviewing data from multiple national surveys including the Youth Risk Behavior Survey (YRBS), reached conclusions very different from those of Twenge, Joiner et al. (2018), Twenge, Martin et al. (2018), or Twenge and Campbell (2019). They found the association of psychological well-being with screen time to be decidedly smaller, especially when compared to its associations with other common behaviors.

Silberzahn et al. (2018) have proposed that it is all but inevitable that two groups examining the same data will come to different conclusions, due to the number of decisions required in the course of any analysis. This proposition informed the strategy of Orben and Przybylski (2019): a specification curve analysis reporting the median coefficient of association between adolescents' technology use and psychological well-being for all defensible sets of specifications in three surveys, including 372 specification sets for YRBS. However, even this study, as its authors acknowledged, rested on a critical flaw: In order to facilitate comparison between their findings and those of Twenge, Joiner et al. (2018) and Twenge, Martin et al. (2018), the authors overlooked the dichotomous and ordinal character of the survey data.

By treating ordinal data as if they were metric and continuous, Twenge, Joiner et al. (2018) and Twenge, Martin et al. (2018)--as well as later publications including an analysis of adolescent media consumption by Twenge, Martin et al. (2019), a reanalysis of national surveys by Twenge and Campbell (2019), and a response to Orben and Przybylski by Twenge, Blake et al. (2020)--introduced claims of precision beyond the scope of the response options young people were offered. For instance, by assigning integer quantifications to ordered categorical responses, each of which covers a range of durations, then summing and averaging across items, Twenge, Martin et al. (2019) reported that mean daily use of the Internet by 8th graders rose from 1.42 hours in 2013 to 1.66 hours in 2016. The item in question only offered a response of "one to two hours." A similar example in another paper involved items on psychological well-being: Twenge, Martin et al. (2018) reported a mean decline in 8th graders' happiness ratings from 2.07 in 2012 to 2.03 in 2016 on the basis of an item offering only 1, 2, or 3 as rating options.

This second example illustrates a further problem: the assumptions of equal difference in emotional valence between successive ordered pairs of psychological self-assessment options within each item and of similar valence among all psychological distress items included in a compiled measure. These assumptions underlay a four-item “suicide-related outcome” index used by Twenge and Campbell (2019). The index treated "yes" responses to YRBS items on extended periods of sadness, suicidal thinking, planning suicide, and actually attempting suicide as equivalent reports of distress.

National surveys like YRBS provide data from large, meticulously assembled samples. However, their few pertinent items and limited response structures permit only a dim picture of either media use or psychological distress among adolescents. It should nonetheless be possible to do better than abuse of dichotomous and ordinal data--especially when one claims to have identified both a historical turning point and a dose-response relationship which parents, school personnel, pediatricians, journalists and policy-makers might incorporate into advice on the governance of adolescents' leisure time.

It is also reasonable to treat survey data with appreciation of its sources and character. Data from an initiative like the Youth Risk Behavior Survey constitute direct evidence of neither screen time nor psychological distress among U.S. adolescents, but only--in a narrower, more phenomenologically sound sense--of teenagers' selection among a limited set of alternate responses to individual questions whose alignment, overlap, and reflection of personal experience may not be perceived identically by each respondent, much less each secondary data analyst. Nor does YRBS documentation frame any items as indirect measurements of latent variables. In short, from the standpoints of both quantitative practice and shared meaning, it remains unclear whether YRBS data bridging the advent of the mobile age have documented a dramatic increase in the consumption of screen media, a clinically relevant increase in psychological distress, or an association worthy of concern.

The present study, while performed in the context of the debate over a relationship between screen time and adolescent mental health, had a single objective: to determine whether YRBS data, treated appropriately, in fact provide the evidence asserted by the Twenge group. No new hypotheses involving media use or emotional distress were advanced. Rather, the data were comprehensively explored to determine whether response proportions or associations among responses, determined through proper categorical analysis, confirmed the earlier researchers' claims. Data from seven consecutive administrations of YRBS, from 2007 to 2019, were subject to this exploratory reanalysis.

In the spirit of multiverse analysis (Steegen et al., 2016) and guided by the recommendations of Weston et al. (2019) for transparency in the analysis of preexisting data sets, the study eschewed combination or binning of data either from multiple items or from multiple response options within an item (apart from a single item involving number of suicide attempts where limited data made response binning necessary for computation). As suggested above, this approach served to respect the categorical nature of the response data, to avoid *ex post facto* imposition of a measurement model, and to avoid researcher assumptions about respondents' intended meanings as they selected among a discrete set of options. The goal was to draw the narrowest possible interpretations of the meanings expressed by those selections in search of evidence of the two phenomena discussed by Przybyski and Weinstein (2017), Twenge, Joiner et al. (2018), Twenge and Campbell (2019), Twenge and Martin (2020), Orben and Przybylski (2019), Orben (2020), and Vuorre et al. (2021): a dose-response relationship between screen time and generational decline in psychological well-being and its attribution to increased consumption of screen media since the introduction of mobile devices.

The data were analyzed at three levels:

- Analyses across all seven cohorts addressed the broadest claim: that these data provide evidence of association between screen time and psychological distress.

- Analyses of cohort-level sub-samples from successive biennial administrations of YRBS explored changes over time that, as proposed by the Twenge group, may have been affected by the introduction and wide adoption of mobile digital technologies,
- Analyses of single-sex subsamples, both across the seven cohorts and separately for each, explored differences associable to respondents' self-identified sex.

To minimize prejudgment, relationships between screen time and psychological distress was explored bi-directionally. That is, while one set of analyses addressed the directional relationship proposed by the Twenge group, a second set addressed the possibility that screen time and mental health might indeed be associated, but in the opposite direction. An important tool here was the Goodman-Kruskal tau (discussed below, with results documented in Appendix C), an asymmetric statistic uniquely available to categorical analysis which indicates both strength and direction of relationship in pairs of ordinal or dichotomous variables (Goodman & Kruskal, 1954).

Chapter 2: Literature Review

The literature on screen time and related constructs, including use of digital or electronic media all together; use of phones, tablets, or mobile devices; use of social media; and connected game play, is extensive and continually expanding. A 2018 overview of reviews and meta-analyses on the associations of mental health and psychosocial constructs in children and youth with screen media identified 11 systematic reviews addressing 786 screen-time studies, with another 71 systematic reviews addressing such overlapping constructs as social media, gaming, Internet use, smartphone use, cyberbullying, sexting, and "problematic/addictive" Internet use (Dickson et al., 2018). The following review is therefore necessarily incomplete; it has been constructed as a narrative introduction to methods and concepts used to study, contextualize, and illuminate the media experience of U.S. adolescents in the first two decades of the 21st century.

Psychological Distress Among U.S. Adolescents in the Mobile Age

The first iPhone entered the market in 2007 (Apple, 2007). The subsequent broad adoption of mobile devices fully integrated with the Internet thereby coincided with reports of decline in the psychological well-being of U.S. adolescents during the second decade of the 21st century. Mojtabai et al.(2016) reported a significant increase in the prevalence and treatment of depression among people aged 12 through 20 between 2005 and 2014. Keyes et al. (2019) reviewed adolescents' self-reports of depressive symptoms in the annual Monitoring the Future survey (Miech et al., 2018) from 1991 to 2018. They found that girls reported fewer symptoms from 1991 through 2011, then increasing numbers of symptoms through 2018, with a similar, though more nuanced, pattern for boys.

Johnson et al. (2017) used Monitoring the Future data to assess changes in adolescent well-being following the 2008 economic recession. Comparing cohorts of 8th and 10th graders from 2009 through 2014 to 2008 cohorts, they found increased reports of depressive symptoms, together with decreased indicators of self-esteem. On the other hand, they found reduced risk-taking, interpersonal aggression, and participation in property crimes, as well as increased time spent on homework, expectations of earning a bachelor's degree, student employment during the school year, volunteering at least once a month, and going out at night for fun. In all cases, they reported small effect sizes.

Beyond reports of depression, both Curtin et al. (2017) and Miron et al. (2019) reported increasing rates of adolescent suicide from 2007 to 2017, with faster growth in the later years. However, Kann et al. (2016), reporting on the 2015 Youth Risk Behavior Survey, found overall declines in suicidal thinking and behavior between the introduction of the relevant items (four in 1991, a fifth in 1999) and 2015. Kann et al. found no overall trend in reports of extended sadness or hopelessness, but reports of seriously considering suicide, making a suicide plan, or actually attempting suicide declined significantly and in linear fashion from 1991 to 2015, albeit with upticks in 2011 and 2013 in reports of consideration of suicide and suicide planning.

Concerns About Screen Time

The second decade of the 21st century witnessed mounting concern about the amounts of time young people spent with screen media, including both devices and the services delivered by those devices, especially social networking services (Best et al., 2014; George & Odgers, 2015; Nesi & Prinstein, 2015; Reid Chassiakos et al., 2016;

Nesi et al.,, 2017; Sarmiento et al., 2018; Orben et al., 2019; Coyne et al.,, 2020; Barthorpe et al., 2020) and online/mobile video games (Hellström et al., 2015; Halbrook et al., 2019; Pine et al., 2020; Johannes et al., 2021). Researchers explored associations between, on one side, screen time or related constructs--including electronic media use all together, mobile device use, social networking, and connected game play--and, on the other side, undesirable factors including obesity (Gebremariam et al., 2013; Goldfield et al., 2015, Kenney & Gortmaker, 2017), low school grades (Snelling et al., 2014; Sampasa-Kanyinga et al., 2019), school avoidance (Hughes et al., 2015), sleep problems (Cain & Gradisar, 2010; Oshima et al., 2012; Carter et al.,, 2016; Woods & Scott, 2016; Sampasa-Kanyinga et al., 2018; Twenge et al., 2017; Scott et al., 2019; Twenge, Hisler et al., 2019; Orben & Przybylski, 2020) and, most pertinent to this study, psychological distress: depression, anxiety, and loneliness.

Association of Screen Time with Psychological Distress

The coincidence of reported increases in adolescent distress and teenagers' access to mobile devices prompted numerous studies hypothesizing either a dose- or a threshold-response relationship between hours of daily screen time and indicators of psychological well-being. Broadly speaking, findings have fallen into four clusters:

- an inverse relationship between screen time and psychological well-being;
- a non-linear "digital Goldilocks" effect in which some optimal quantity of digital experience is considered unproblematic with ill effects at the extremes;
- insignificant or no association at all; and, if least often,
- modest positive association.

In several cases, papers analyzing the same data have reached different conclusions. Such differences may have resulted from inconsistent operationalizations of predictor constructs like "screen time" and/or psychological health outcomes; inconsistent methods of quantification and binning; or disparate statistical approaches (although see Silberzahn et al., 2018, for evidence that such varying results may be inevitable).

Overviews have traced this landscape. Liu et al. (2016), for example, reviewing 12 cross-sectional and four longitudinal studies published before May 2015, concluded that an hour's daily screen time minimized the risk of depression in children and adolescents, whereas less or more screen time increased the risk in fairly linear dose-response relationships. Sarmiento et al. (2018), reviewing 77 studies of adolescents' social media use published between 2000 and 2016, found consistent associations with depression, anxiety, and loneliness, variously moderated by gender, popularity, perceived social support, age, personality, and previous experience.

However Best et al. (2014) found associations of adolescents' use of online technology with both benefits to and impairment of mental health in 43 papers published between January 2003 and April 2013: perception of social support, increased self-esteem and social capital, and opportunities for identity experimentation and self-disclosure, but also depression, social isolation, and cyberbullying. This variety notwithstanding, they reported, most papers offered mixed or null findings; none offered robust causal evidence. Orben (2020), reviewing more than 80 reviews and meta-analyses of the relationship between digital technology and adolescents' psychological well-being published through May 2019, found very small negative associations at worst, with reported effects in both directions. Odgers and Jensen (2020), reviewing six meta-analyses covering 29 distinct studies, two sets of large-scale survey findings, and four studies involving daily assessment of technology use, all published between 2014 and 2019, came to a similar conclusion: Amid a confusion of small positive, small negative, and null findings, they were not only unable to systematically distinguish cause from effect, but could identify no findings likely to be of clinical or practical value.

Dose or threshold response to hours of daily or weekly screen time was investigated in numerous longitudinal studies during the second decade of the century (Romer et al., 2013; Nesi & Prinstein, 2015; Gunnell et al., 2016; Babic et al., 2017; Frison & Eggermont, 2017; Nesi et al., 2017; George et al., 2018; Houghton, et al., 2018; Boers et al., 2019; Khouja et al., 2019; Boers et al., 2020; Coyne et al., 2019; Heffer et al., 2019; Jensen et al., 2019; Orben et al., 2019). The association has also been explored in single-data-set cross-sectional studies (Busch et al., 2013; Casiano et al., 2012; Kremer et al., 2014; Booker et al., 2015; Hellström et al., 2015; Maras et al., 2015; Khan & Burton, 2017; Przybylski & Weinstein, 2017; Kelly et al., 2018; Bélair et al., 2018; Barthorpe et al., 2020; Boer et al., 2020; Kardefelt-Winther et al., 2020; Kreski et al., 2021); in cross-sectional studies collecting time-use diaries as well as computer-readable responses (Orben & Przybylski, 2019b; Barthorpe et al., 2020); in technology-assisted real-time research (George et al., 2018; Rozgonjuk et al., 2018; Jensen et al., 2019); and in studies seeking either to identify long-term trends or to confirm a hypothesized relationship between screen time and adolescents' psychological well-being by examining data from multiple administrations of regularly scheduled surveys such as YRBS (Messias et al., 2011; Wang et al., 2018, Twenge, Joiner, et al., 2018; Twenge & Campbell, 2019; Orben & Przybylski, 2019a). While information about teens' behavior and emotional health has also been sought from parents and caregivers (Twenge & Campbell, 2018; Przybylski et al., 2019), the studies reviewed here involved data collected directly from teenagers.

Longitudinal Studies

Overall Screen Time. Romer et al. (2013) analyzed the responses of a cohort of 719 young people, ages 14-24, to a U.S. telephone survey, the National Annenberg Survey of Youth, first in 2008, then in 2009. Participants reported time spent and frequency of use for each of several media. Internet and TV use were reported on a weekday/weekend basis with five ordinal response alternatives: less than one hour, one to two hours, three to five hours, six to eight hours, or more than eight hours. Romer et al. summed and weight-averaged weekday and weekend consumption to calculate daily means. Video gaming was reported as time spent on a "typical" day. For specific uses of the Internet, reading books, reading periodicals, watching TV news, watching movies on TV or in theatres, and "following shows" on TV, respondents chose from a four-point scale: most days, some days, less often, or never during the week. Among other behavioral variables, depression was assessed with a single dichotomous item borrowed from the Youth Risk Behavior Survey.

Romer et al. (2013) clustered mean Internet, TV, and video game data into three levels: low (less than one hour per day), medium (from one to just under four hours per day), and high (four or more hours per day). On this basis, they found a negative relationship between low- and medium-level use of the Internet and video games, on one hand, and depression on the other, with a bi-directional positive relationship between increased depression and high levels of Internet and video game use.

Khouja et al. (2019) conducted a larger study in the U.K. between 2007 and 2009, reviewing self-reports of 1,869 respondents to the Avon Longitudinal Study of Parents and Children. At age 16, as with Romer et al. (2013), participants were offered ordinal response alternatives for weekday and weekend use of distinct media activities -- in this case, watching TV, using computers, and texting -- with three choices: less than one hour, one to two hours and three or more hours. At age 18, participants responded to a standard assessment of anxiety and depression. No association was found between TV watching or texting at age 16 and anxiety or depression at 18. The authors found a small association between time spent using a computer at 16 and symptoms of anxiety at 18, but this association disappeared when time spent alone was introduced as a covariate. No association was found between weekday use of a computer and depression, but a small association was found between depression and using a computer on the weekend.

Gunnell et al. (2016) analyzed data collected from 1,160 adolescents annually or biennially for up to seven years, starting between 2006 and 2010 with 7th and 9th graders, as part of a longitudinal study conducted in Ontario, Canada, called Research on Eating and Adolescent Lifestyles. This study bridged at least three screen-media milestones: the introductions of the smartphone in 2007 and the tablet in 2010 as well as a dramatic growth in streaming video from 2011. Participants reported weekday and weekend use of three media activities on a six-point ordinal scale: watching TV, playing video games, and using a computer. Weekday and weekend ratings for the three activities were combined and weight-averaged as a single index of screen time. Depression and anxiety were assessed with standard inventories.

By means of latent growth modeling, Gunnell et al. (2016) constructed an 11-year trajectory, from age 11 to age 21, for each participant. Controlling for sex, birth year, parents' education, school location, and standardized body-mass index, they found that initial screen time did not predict change in symptoms of anxiety or depression over the course of the trajectory. Nor did initial anxiety or depression predict change in screen time. There was, however, an association between higher initial symptoms of both anxiety and depression and higher initial screen time.

Two longitudinal studies conducted in Australia resulted in conflicting findings on a dose-response relationship between screen time and teenagers' psychological well-being. Babic et al. (2017) assessed recreational screen time, non-recreational (school) screen time, psychological well-being, and psychological difficulties among 322 seventh-graders in eight Catholic parochial schools in New South Wales during the second and fourth quarters of the 2014 school year. Screen time was operationalized as a single index: the average of 7 days' self-reported daily use of television, DVDs, computers, and mobile devices (tablets and phones). Psychological well-being was assessed with an instrument called the Flourishing Scale, measuring self-esteem, engagement, relationships, and senses of meaning, purpose, and optimism (Diener et al., 2010). Psychological difficulties were measured by summing the scores of four of the five subscales in the Strength and Difficulties Questionnaire (Goodman, 1997): emotional symptoms, conduct problems, hyperactivity/inattention, and peer relationship problems.

Babic et al. (2017) found a small but significant negative association between recreational screen time and physical self-concept (ß= -0.09, *p*=0.048); a larger negative association between use of mobile devices and physical self-concept (ß= -0.18, *p*<0.001); negative relationships between both recreational screen time (ß= -0.2, *p*=0.001) and computer use (ß= -0.23, *p*=0.003) and psychological well-being; as well as an association between TV/DVD viewing and psychological difficulties (ß=0.16, *p*=0.015). No relationship was discerned between non-recreational screen time and mental health.

In a three-year online study involving 1,749 adolescents, initially in grades 5, 7, and 9, in Perth, Houghton et al. (2018) came to a different conclusion. Students reported weekday and weekend screen time on a continuous scale and completed the Children's Depression Inventory (Kovacs, 2015) as many as six times over the three years of the study. Houghton et al. used latent growth curve models to identify three trajectories of depression, then fit a random intercept cross-lagged panel model to explore associations between depression symptoms and screen time on an annual basis. They found no consistent support for a longitudinal association between screen time and symptoms of depression, noting that a student would have had to increase screen time by 13 hours a day to move from the average to the clinical range of the depression trajectories.

A pair of papers mined a longitudinal randomized study in Montréal, Canada, designed to test a school-based substance-abuse prevention program, for associations between screen time, depression, anxiety, and self-esteem. The four-year study followed 3,826 adolescents from Grade 7 through Grade 11, assessing time spent in four screen categories--social media, video games, TV and streaming video, and "other activities"--on a four-point ordinal scale.

Boers et al. (2019) found that every hour spent with social media above the four-year group mean was associated with a 0.64 unit increase in depression and an 8.47 unit decline in self-esteem. Each hour of "other" computer use above the group mean was associated with a 0.22 unit increase in depression and a 4.88 unit decline in self-esteem. But an additional hour of television or streaming video corresponded to a 0.22 unit decline in depression and a 2.39 unit rise in self-esteem. For video game play, no group-level association was found with depression, but each hour above the four-year gaming mean was associated with a 3.15 unit decline in self-esteem. At the individual level, a one-hour average annual increase above an individual's four-year mean use of social media was associated with a 0.41 unit increase in depression and 3.32 unit decrease in self-esteem for that year. An added hour of video viewing was associated with a 0.18 increase in depression above the individual's four-year mean, as well as a 9.8 unit decrease in self-esteem. Boers et al. (2020) reviewed the same study in terms of anxiety symptoms, finding no grou*p*-level association at all between screen media and anxiety. However, video games excepted, each hour of average annual media use above an individual's four-year mean resulted in a temporary increase in anxiety for that year: 0.21 units for social media, 0.15 units for video and 0.11 units for other computer use. These temporary increases disappeared when an individual's screen time returned to mean level.

Social Media. Three longitudinal studies published in 2019 addressed teenagers' use of social media in particular, finding little or no association between the amount of time spent and mental health. Coyne et al. (2020) conducted an 8-year longitudinal study involving 500 respondents between ages 12 and 20 in one northwestern U.S. city. Each year, participants reported "typical" daily social media use in one of nine categories ranging from none to more than 8 hours. They also responded to the Spence Child Anxiety Inventory (Spence, 1988) and the Center for Epidemiological Studies Depression Scale for Children (Weissman et al., 1980). Coyne et al. found no relationship between increases in an individual's time on social media and increases in depression or anxiety. Orben et al. (2019) analyzed categorical data on social media use and life satisfaction from an 8-year longitudinal panel dataset, Understanding Society, the U.K. Household Longitudinal Study, involving 12,672 participants ages 10 to 15. They found only small, inconsistent bidirectional associations between social media use and psychological ill-being; the associations were somewhat larger in girls than in boys. Heffer et al. (2019) found that social media use did not predict depression in 597 middle-school students surveyed over two years in Ontario, Canada. Reports of weekday and weekend use on a five-point ordinal scale, weight-averaged and entered into an autoregressive cross-lagged path analysis with a wide range of covariates, indicated conversely that, among girls only, higher levels of depression predicted increased use of social media.

A fourth 2019 study came to a different conclusion. Riehm and colleagues (2019) extracted data on social media use and on expression of internalizing and externalizing symptoms from the Population Assessment of Tobacco and Health, a three-year, three-wave project in the U.S.; the final sample constituted 6,595 participants who were ages 12-15 as the study began. Covariates assessed in the first year, social media use in the second year and mental health concerns in the third were analyzed in both unadjusted models and models adjusted for sex, age, race, parental education, parent-reported body mass index, life history of internalizing and externalizing problems and self-reported lifetime use of marijuana and alcohol.

Riehm et al. (2019) found that social media use uniformly increased relative risk of both internalizing problems and comorbid internalizing and externalizing problems, though not of externalizing problems alone, and that this risk increased with amount of use. In their adjusted analysis, for example, at 30 minutes or less of daily use, the relative risk ratio was 1.3 for internalizing problems, `1.39 for comorbid problems. For use up to 3 hours, the relative risk ratio was 1.89 for internalizing problems, 2.34 for comorbid problems. For use between 3 and 6 hours, the relative risk ratio for internalizing was 2.47; for comorbid problems, 3.15. For greater than 6 hours' daily use, the relative risk ratio for internalizing rose to 2.83, while that for comorbid problems rose to 4.29.

A six-year study of Finnish adolescents, on the other hand, found a relationship in the opposite direction. Puukko et al. (2020) tracked a total of 2,891 participants at five points between age 13-14 and age 18-19, analyzing their data, like Houghton et al. (2018) with random intercept cross-lagged panel models. They found that depression very weakly predicted small increases in self-reported social media use at every check-in, with no association in the other direction.

Cross-Sectional Studies

Overall Screen Time. The mix of findings regarding association of screen time with adolescent mental health in longitudinal research is paralleled by mixed findings in cross-sectional studies. Most of these analyzed subsets of data from large-scale, multi-topic surveys. For instance, Booker et al. (2015) extracted data on gaming, social media use, and

TV viewing from the 2009 administration of Understanding Society, the U.K. Household Longitudinal Study, the survey whose complete longitudinal data Orben et al. (2019) reviewed for evidence of association between social media use and psychological well-being. Unlike Orben et al., Booker et al. found that 10- to 15-year-olds who spent one to three hours a day on social media had substantively lower odds of being happy and greater odds of experiencing social-emotional difficulties than those who spent less than an hour on social media. The effects grew even stronger for those who spent more than four hours a day on social media. Parallel effects were found for time spent playing digital games or watching TV. These single-medium effects persisted, at somewhat lower levels, when the authors added covariates such as household income, parental education, age, gender, and sports participation--but also time spent with other screen media--to regression models. Booker et al. also created a single screen-time measure called the SBM (screen-based media) index, summing each participant's responses from the 5-point ordinal scale used to report time spent with each individual medium. This composite further indicated association between total daily screen time and psychological ill-being: A unit increase in SBM was associated with a happiness odds ratio of 0.76, 0.8, or 0.9 (depending on which covariates were included in a model), while the odds ratio for social-emotional difficulties rose to 1.27 or 1.29.

Casiano et al. (2012) reviewed data collected in 2000-2001 from 9,137 participants ages 12-19 as part of the Canadian Community Health Survey. Hours per week watching TV or videos, playing video games, and "computer/Internet use" were each reported on an 8-point ordinal scale. Casiano et al. found little association between the media measures and health outcomes, including depression, alcohol dependence, binge drinking, suicidal ideation, hel*p*-seeking behavior, and risky sexual activity. Exceptions included frequent TV/video use, associated with obesity; frequent video-game play, negatively associated with depression and risky sexual behavior; and frequent computer/Internet use, negatively associated with alcohol dependence.

Busch et al. (2013) studied media use among 2,425 Dutch high school students, described as a convenience sample assembled for the Utrecht Healthy School study. Reports of time spent watching TV, using the Internet, and playing video games were each parceled into two levels: more than 14 hours per week, labeled "excessive," and 14 hours or less. Media use was compared with a composite index of general self-efficacy (GSE) assessing self-esteem, social anxiety, and assertiveness, as well as the emotional problems and conduct problems subscales of the Strengths and Difficulties Questionnaire (Goodman, 1997), along with assessments of physical health and unhealthy behaviors. Boys who used the Internet "excessively" were found to have odds ratios of 1.38 for conduct problems and 1.85 for low GSE; girls to have a 1.55 odds ratio for conduct problems and a 1.86 odds ratio for low GSE. Boys who played video games excessively had an odds ratio of 2.33 for conduct problems. But no association was found between excessive use of any screen medium and the emotional problems measures.

Kremer et al. (2014) considered factors associated with depression among children and adolescents in Australia, analyzing data on 8,256 10- to 16-year-olds from a 30-community survey called the Healthy Neighbourhoods Study. Along with depressive symptoms, physical activity, and participation in clubs, sports, and organizations in and outside school, participants reported media use in two categories, TV and computers/video games. School-day and weekend-day hours were separately reported on a 6-point ordinal scale, then averaged and binned into essentially the same two thresholded levels used by Busch et al. (2013): two hours or more per day and fewer than two hours per day. Participants who used media for two hours or more were found more likely to report symptoms of depression. The authors stressed the non-directionality of this finding, observing that already depressed adolescents might choose to spend more time with screen media.

Five years' data on screen time, depression and anxiety from Research on Eating and Adolescent Lifestyles, the 2006-2010 Canadian study treated longitudinally by Gunnell et al. (2016), were treated as a single cross-sectional sample by Maras et al. (2015). Like Gunnell et al., Maras et al. controlled for covariates including age, sex, parental education, and body-mass index. With weekday and weekend day use of TV, video games, and computers reported on a 6-point ordinal scale, then compiled into a set of weighted daily averages, Maras et al. found that both total screen time and video-game time, considered separately, were significantly associated with severity of depression and of anxiety symptoms; computer time, with severity of depression. These findings aligned with the Gunnell et al. finding that screen time and symptoms of depression and anxiety were associated at the beginning of an 11-year growth model. However, the cross-sectional treatment of data did not address Gunnell and colleagues' further finding: that screen time at the start of an 11-year growth model failed to predict later depression or anxiety.

Like Maras et al. (2015), Przybylski and Weinstein (2017) fit linear regression models to cross-sectional data, in this case from about 120,000 15-year-old respondents to the 2014 What About YOUTH? survey, conducted by the Health and Social Care Information Center of the U.K. Data Service (Ipsos MORI, 2015). However, these authors found that quadratic regression provided better model fit. They identified non-linear dose-response relationships between mental well-being and each of four screen-time variables: watching TV and movies, playing video games, using computers, and using smartphones. (The authors chose not to sum the screen-time estimates, pointing to evidence that teenagers often use more than one screen at a time.) In each case, an index of mental health rose slowly as screen time increased from zero to a statistical maximum, then slowly declined, supporting what Przybylski and Weinstein called "the Goldilocks hypothesis." Optima differed for different screen experiences: 1.67 hours a day for video games, nearly two hours for smartphone use, 3.67 hours for TV and video, and just over 4.25 hours for recreational computer use. Przybylski and Weinstein noted that the mean effect size (Cohen's *d*) for screen times above the mental-health maximum points was only -0.18, prompting the observation that pediatrician and caregiver concern about media use and mental health might be misplaced. "[T]he possible deleterious relation between media use and well-being may not be as practically significant as some researchers have argued," the authors concluded, proposing "a careful cost-benefit analysis of existing professional advice" (p. 213).

A study from UNICEF and the London School of Economics sought to incorporate voices from less-developed countries into the conversation around screen time and well-being. Kardefelt-Winther et al. (2020) analyzed ordinal self-report data from children between 9 and 17 in Bulgaria (n=1,000), Chile (n=1,000), Ghana (n=2,060) and the Philippines (*n*=1,873), collected by Global Kids Online, an ongoing survey of children who use the Internet across the global South. As an outcome variable, Kardefelt-Winther et al. used an 11-point scale of life satisfaction known as Cantril's ladder (Cantril, 1966). To represent screen time, they created a daily use index, treating data from the eight ordered screen-time options (none, 30 minutes; 1, 2, 3, 4, 5, or 6 hours; 7 hours or more) as numeric; and summing responses for weekday, multiplied by five and weekend day, multiplied by two. They then created six alternative predictor variables, processing the index data as a continuous numeric variable, in quintile bins, and as ordinal variables with three-, 5-, 7-, 10-hour intervals. They found no association between young people's Internet use and life satisfaction in Ghana or the Philippines but a weak association between increasing levels of Internet time and declining life satisfaction in Bulgaria and Chile.

Social Media. An even broader multinational study, reported by Boer et al. (2020), concentrated on social media use and its relationship with factors including life satisfaction, psychological distress, school satisfaction, and support from family and friends, among 155 thousand 11-13-year-olds in 29 countries across Europe, North America, and the Middle East: data derived from the 2017/2018 wave of Health Behavior in School-aged Children, a study conducted every four years since 1983. Data from an ordinal measure of daily online contact with friends and acquaintances, the Cantril's ladder measure of life satisfaction, and four-category scales of school satisfaction and social well-being were treated as numeric in a set of hierarchical linear regression models. Respondents who selected "almost all the time during the day" from the 5-category item on daily online contact were classified as "intense users." In countries where intense use was prevalent, intense users were found to have reported more family support and greater life satisfaction than others, with no difference in levels of psychological distress. In countries where intense use was less common however, intense users reported lower levels of life satisfaction and family support with greater psychological distress.

Kreski et al. (2021) mined eight years of data (2009-2017) from Monitoring the Future (MtF) to assess association between daily social media use and depression among the 8th and 10th grade U.S. respondents. As has been typical with analyses of MtF data, they summed responses to four psychological-distress items as an index of depression. These index statistics were then log-transformed and composed into five alternative outcome variables: a continuous variable and four dichotomous measures of high vs. less-than-high depression with cut scores at the 75th, 90th, and 95th percentiles. For a predictor, the authors collapsed responses to a five-option item on frequency of social media use into a dichotomous measure: daily vs. non-daily use of social media. They also composed an index of depression risk from responses to 26 other MtF items with correlations greater than .10 to the depression index, binned into five levels of risk. Association between daily social media use and depression was then explored through regression: either linear, for the continuous outcome, or logistic, for the dichotomous outcomes, with adjustment and, in one set of regressions, stratification for level of depression risk. Covariates included race/ethnicity, grade, parent education, city residence, academic performance, and the particular MtF version received by each respondent.

Across their complex findings, Kreski et al. (2021) found virtually no association of daily social media use with depression. While a small association (ß=.027, 95% CI: .009, .045) was found among girls in 2009-2010, that association disappeared in administrations from 2011 through 2017. Among boys at the highest and lowest levels of depression risk, daily social media use was associated with reduced risk--an apparent protective effect.

Video Games. While most studies of psychological effects of video games have been concerned with aggression or addiction (for reviews, see Huesmann, 2007; Zastrow, 2017), a few have considered whether gaming might affect psychological well-being more generally. As discussed above, Romer et al. (2013) found a bi-directional relationship between increased depression and high levels of video game use, but a negative relationship for low and medium levels. In a narrative review, Halbrook et al. (2019) reported that online multiplayer games and games promoting exercise could both reduce players' depressive symptoms. With respect to screen time, however, these authors stressed that such effects depend upon "gaming in moderation" (p. 1100). The 13 studies reviewed by Pine et al. (2020) addressed association between anxiety or depression and so-called "casual" games, the small, relatively simple games found within social media platforms or downloaded to smartphones. Twelve of the 13 found casual-gameplay more successful in reducing anxiety than waitlist controls, medications, or placebos; and better at relieving stress and improving mood than relaxation activities, web-surfing, or a passive break. Two reports explored the use of casual games to reduce symptoms of depression; both found improvement in outcomes. In screen-time terms, Pine et al. found that benefit followed about a half-hour of continuous play. Unlike Romer et al. or Halbrook et al., they did not address effects of extended play.

Screen Time as a Proxy. Many studies have deployed screen-time measures to operationalize a different construct, "sedentary activity" (Hoare et al., 2016, provided a review). Bélair et al. (2018) operationalized the sedentary activity of 9,702 14- to 15-year-olds, contacted between 1996 and 2009 in Canada's National Longitudinal Survey of Children and Youth, by means of response to a single six-point ordinal item asking how much time the respondent spent watching TV or videos or playing video games each day. As in the studies of Manders and de Leeuw (2012) and Kremer et al. (2014), two hours of daily screen time was treated as a threshold; youngsters who reported more than two hours were classified as sedentary. Controlling for covariates including age, sex, ethnicity, chronic health problems, life stress, and parental education, Bélair et al. found that sedentary participants experienced increased odds of both severe and moderate symptoms of depression and anxiety with respect to non-sedentary participants. When an index of physical activity was included as a covariate, however, the sedentary classification was associated only with moderate symptoms. Khan and Burton (2017) identified a similar relationship between screen time and physical activity in their study of 898 Bangladeshi adolescents. Using the same two-hour threshold, they found symptoms of depression in a quarter of "high recreational screen time" respondents. Among the high-screen-time respondents, those who also failed to meet guidelines for minimum physical activity were substantially more likely to experience depression than those who met the guidelines, with an odds ratio of 2.37.

Youth Risk Behavior Study. The Youth Risk Behavior Survey (YRBS), conducted biennially since 1991 by the Centers for Disease Control and Prevention, has proven to be an important source of cross-sectional data on the behavior and attitudes of adolescents in the United States. As detailed below, YRBS has for many years included a single item assessing screen time on an average school day, excluding television time, with a seven-position ordinal scale. Messias et al. (2011) compared this item in the 2007 and 2009 administrations of YRBS to five items indicating psychological distress: three dichotomous questions on extended daily sadness, consideration of suicide, and suicidal planning; a ordinal item on number of suicide attempts; and a categorical item on the need for a doctor's or nurse's response to a suicide attempt. Adjusting for covariants including gender, race/ethnicity, age, and smoking, they found no statistical difference between the odds of extended sadness for students reporting two to three hours a day of screen time and for those reporting no screen time at all. Students reporting up to an hour's daily screen time had lower odds of sadness than those reporting none (odds ratios of 0.8 in 2007; 0.9 in 2009). At the other extreme, students reporting five hours or more daily screen time were more likely to have experienced extended sadness (odds ratios of 1.7 in 2007; 2.1 in 2009) and to have thought about (odds ratios of 1.4 in 2007; 1.7 in 2009) or planned (odds ratios of 1.8 in 2007; 1.5 in 2009) suicide in the previous two years. Yet in both years, students reporting any screen time at all were less likely to have attempted suicide than students reporting none.

Wang et al. (2018) dichotomized responses to the same YRBS non-television screen time item from the 2009, 2011, 2013, 2015, and 2017 administrations of YRBS, treating three or more hours as the threshold for "elevated use of electronic devices" (EUED). They also created a three-point index of psychological distress by compiling responses to three dichotomous questions on sadness, suicidal thinking, and suicide planning. Through propensity score matching, Wang et al. found that EUED youth were more likely than others to report high psychological distress in each of the five administrations, with adjusted odds ratios ranging from 1.33 to 1.58. Notably, those ratios did not rise in sequence from one biennial administration to the next: They fell from 1.47 to 1.33 in 2011, rose to 1.58 in 2013, then returned to 1.47 in 2015 and 1.48 in 2017.

Other Research

Time-Use Diaries. Some large-scale surveys have begun to collect not only computer-readable responses, but also time-use diaries from their respondents. Orben and Przybylski (2019b) considered both types of data in survey cross-sections from Ireland, the U.S., and the U.K: the 2011-2012 wave of Growing Up in Ireland, including about 5,000 children, almost all age 13; a sample of 790 U.S. children ages 12-15 from the 2014-2015 Panel Study of Income Dynamics; and a sample of about 12,000 13- to 15-year-old respondents to the 2015 wave of the U.K.'s Millennium Cohort Study. They found differences between retrospective computer-readable reports of screen time and the real-time data in diaries as well as varying patterns of association in different countries. For Irish respondents, both retrospective and diary reports of screen time correlated negatively with those of psychological well-being. In the U.S. sample, retrospective reports revealed no significant associations, but diary reports of screen time an hour before bedtime were negatively associated with well-being. In the U.K., small, though significant, negative associations with well-being were found among retrospective measures, but small significant positive associations in diary data. By way of example, and counter to the U.S. finding, young British diarists reported positive associations of well-being with screen time 30 minutes before bedtime on weekdays and one or two hours before bedtime on weekends.

Barthorpe et al. (2020) analyzed the same 2015 wave of the U.K. Millennium Cohort Study as Orben and Przybylski (2019b), but only data from time-use diaries, and only reports of social media use, available from 4,032 adolescents. In addition to the psychological well-being scales considered by Orben and Przybylski (2019b), they explored association between screen time and self-harm. This analysis found associations between screen time and risks of depression, self-harm and low self-esteem in girls, but not in boys.

Mobile Applications. Mobile technologies have been not only a subject, but also a tool of research. Rozgonjuk et al. (2018) investigated iPhone use and depression in 101 undergraduates, average age 19.53. A mobile application installed in participants' phones provided objective measures of both screen time and the number of times screens were unlocked over the course of a week. Depressive mood was self-reported daily on the subsequent day. The authors found no association in either direction between screen time and reports of depression. A negative correlation between depression and the number of screen unlocks suggested that frequency of phone use might be a useful indicator, treating phone avoidance, an example of reduced social contact, as a symptom of depression. This interpretation is consistent with earlier research on online communication among distressed adolescents (e.g., Selfhout et al., 2009; Dolev-Cohen & Barak, 2013) as well as with another real-time observational study published the following year (Jensen et al., 2019).

Jensen et al. (2019) conducted a baseline survey of 2,104 North Carolina middle-school children in mid-2015. Between eight and 18 months later, a subset of 388, at this point between 12- and 15-years old, participated in a two-week "ecological momentary assessment," or EMA. Three times each day, participants' mobile phones delivered surveys on recent technology use, behavior, and mood. Depression and anxiety (as well as inattention, hyperactivity, and conduct problems) were assessed in all three daily check-ins. Screen time, surveyed every evening, was reported in four categories: school work, entertainment, communication, and content creation, including posting to social media.

Jensen et al. (2019) found virtually no associations between screen time and psychological distress either across the group or, on a daily basis, within participants. But consistent with the observation by Rozgonjuk et al. (2018) of a relationship between depression and fewer screen unlocks, they found that students who reported more frequent texting also reported fewer depressive symptoms. They also found opposing Goldilocks relationships with respect to the creation of digital content. A standard U-shaped quadratic Goldilocks curve--high at extremes, low in the "just-right" middle--associated time devoted on any given day to content creation, on the X-axis, with indicators of depression on the Y-axis. But when the X-axis denoted *average* time creating content, the Goldilocks curve turned upside-down: Participants who spent the most time, on average, creating content, reported the lowest levels of depression.

Beyens et al. (2020) found that the effects of passive social media use on well-being varied dramatically from one individual to the next. Over a one-week period, 63 Dutch 14- and 15-year-olds were polled six times a day via smartphone experience sampling (a method similar to ecological momentary assessment). They reported use during the previous hour of three of five popular platforms, the three selected for each participant based on individual preference: YouTube, Instagram, WhatsApp, Snapchat and chat within games. Time spent reading posts was measured separately from time spent posting, with well-being assessed along a 7-point happiness scale. Modeling their data categorically, Beyens and colleagues found no association between either overall social media use or active social media use and happiness. However, the effects of passive use on happiness varied widely. More than 44% reported either small or no effect. About 46% reported a positive effect, whether weak or strong. About 10% reported a weak or moderate negative effect. Modeling their metric data as continuous, these researchers found effect sizes that varied among individuals from as low as -.24 and as high as .68.

A more detailed examination of individual difference and social media use was undertaken by Calandri et al. (2021). These authors not only explored the relationships among depression, affective well-being, life satisfaction and social media use, but also considered two possible moderators: gender and emotional self-efficacy. In self-report data collected from 336 Italian early adolescents (mean age, 13; 48% female), they found that greater use of social media, assessed on a 4-point scale, had different associations in girls with low and high emotional self-efficacy. In girls with lower emotional self-efficacy, more time with social media was associated with more symptoms of depression, lower affective well-being and lower life satisfaction; in girls with higher emotional self-efficacy, with less depression, higher affective well-being and higher life-satisfaction. No such associations were found for boys, irrespective of emotional self-efficacy.

Subpopulations. A number of studies have either sought out or come upon associations between screen time and psychological distress within adolescent subpopulations defined by specific activities, by personal characteristics, or by gender. A study by Frison and Eggermont (2017) serves as an example. These authors addressed not social media broadly defined, but the use of Instagram in particular by adolescents in Belgium. In a two-year, two-wave panel study, they found that Instagram browsing at Time 1 predicted depressed mood at Time 2, whereas depressed mood at Time 1 predicted Instagram posting at Time 2. The authors' interpretations of these findings were grounded in the specific Instagram experience. Based on the first finding, they proposed that browsing images posted by others brings adolescents in contact with large numbers of strangers, prompting negative self-comparison and, eventually, depression. Based on the second finding, they proposed that teens already experiencing depression might post more frequently attempting to improve their mood through "strategic self-presentation" (p. 607).

Personal Characteristics. Selfhout et al. (2009) designed a study exploring associations of adolescent depression and social anxiety to two different kinds of online activity--visiting websites and instant messaging--with a particular personal characteristic in mind: respondents' perception of the quality of their best friendship. About 307 Dutch adolescents participated in the study, submitting sets of responses on two occasions, one year apart. Psychological distress indicators were compared with indices of web surfing and instant messaging composed from participant reports of frequency and time spent with each activity; perceived friendship quality was treated as a moderator.

Among participants who considered their best friendship to be of high or medium quality, the authors found no association among online activities and distress indicators. They proposed a social ceiling effect for these young people: For them, online communication might offer no improvement upon real-life social rewards. But for young people who perceived the quality of their best friendships to be low, instant messaging predicted less depression--that is, improved mood--while web surfing predicted consistent levels of both depression and social anxiety. The authors proposed that online communication might benefit these respondents, eliminating conditions that make face-to-face contact difficult and thereby providing opportunities to enhance social skills and feelings of self-worth. Simply surfing websites might not provide such long-term gratification.

George et al. (2018) conducted a phone-based longitudinal study among adolescents whose parents reported the presence of at least three externalizing factors from among behavioral difficulties, inattention, hyperactivity, substance use, or exposure to substances. They surveyed these "high risk" 11-15-year-olds twice, 18 months apart. During the month after the first survey, the adolescents participated in an ecological momentary assessment (EMA), responding via smartphone to behavior surveys three times daily and logging digital technology use every night. The technology log included number of hours on social media, on the Internet, texting, and on all digital technologies combined, as well as number of texts sent.

George et al. (2018) found small but robust effects in their sample of 151 adolescents. On any given day within the EMA period, more time online and/or more texting was associated with fewer symptoms of anxiety. More texting was also associated with fewer depressive symptoms. Attention-deficit symptoms on one day were associated with more time online the next day, but no association was found in the opposite direction. But more technology use--more time online and texting than average--during the EMA period predicted an increase in conduct and self-regulation problems by the time of the follow-up assessment.

Several studies have explored relationships among electronic media and adolescent depression and/or anxiety in the context of sleep problems. Parent et al. (2016) surveyed parents of 210 adolescents contacted through Amazon's Mechanical Turk; Lemola et al. (2015) questioned 320 teens in northwest Switzerland; while Li et al. (2019) analyzed data on 2,865 15-year-old participants in a longitudinal birth-cohort study. All three found that sleep problems mediated the relationship between adolescents' media use and symptoms of depression or anxiety.

Two longitudinal studies by Nesi and Prinstein (2015) and Nesi et al. (2017) considered technology-associated depression as a function of individual differences in online behavior. In the first study, a sample of about 780 students (after attrition and exclusions for non-use of social media or missing data) was assessed twice: in seventh or eighth grade, then a year later in eighth or ninth grade. Nesi and Prinstein assessed four media variables--voice communication, Facebook use, Instagram use and other non-voice cellphone use--as well as in-person communication, each on a seven-point time-use scale. These were treated not as predictors of depression, but as covariate controls, along with measures of real-life reassurance seeking and prior depression. The authors treated as predictors of depression the extent to which respondents engaged in social comparison or sought interpersonal feedback online (SCFS). Popularity among classmates was treated as a moderator. Having accounted for time spent with media, real-life reassurance seeking, and history of depression, they found that SCFS was indeed associated with depressive symptoms, the associations strengthened by low popularity and among girls. In a second similar study, Nesi et al. (2017) again found SCFS above a typical adolescent baseline to be associated with depression. The longitudinal nature of this second study indicated that higher depressive symptoms predicted later SCFS behavior, but only among boys.

Gender. Nesi et al.'s longitudinal studies (2015, 2017), like that of Heffer et al. (2019) and like several analyses of large-scale survey data (Booker et al., 2018; Kelly et al., 2018; Orben et al., 2019; Twenge & Farley, 2020; Kreski et al., 2021) found gender differences in the association of adolescents' media use, and of social media use in particular, and psychological distress. Kelly and colleagues (2018) found a stronger association of social media use and depression for girls than for boys in data from the Millennium Cohort Study, as did Twenge and Farley (2020); the latter also found a stronger association for girls than for boys with respect to social media use and self-harm, as well as stronger negative associations for girls than for boys with respect to social media use and both life satisfaction and self-esteem. The patterns of greater distress for girls than for boys recurred in Twenge and Farley's findings associating Internet use and watching television with each of the well-being variables, as well as in associations between playing video games and self-harm. Heffer et al. (2019) found that depressive symptoms predicted social media use for girls, but not for boys, in their Ontario middle and high school sample. While Kreski et al. (2021) found virtually no association of social media use and depression across eight MtF administrations, the two associations they did find, in 2009 and 2010, applied only to girls, while for boys with the highest and lowest levels of risk for depression, social media use seemed to serve as a protective factor. Both Booker et al. (2018) and Orben et al. (2019) found that social media use predicted decline in life satisfaction over time for girls responding to Understanding Society, although Orben and colleagues urged caution regarding the small size of the effect.

Plainly, findings of association between adolescents' screen time and their psychological distress have varied widely. Longitudinal studies have identified in some cases bidirectional relationships between high levels of video game or social media use and depression (Romer et al., 2013; Orben et al., 2019); in some cases small relationships between weekend computing (Khouja et al., 2019), all computer use, video viewing, or total screen time (Babic et al., 2017; Boers et al., 2019; Boers et al., 2020), and various measures of distress; and in other cases no relationships at all between television, texting, or weekday computer use (Khouja et al., 2019), social media (Heffer et al., 2019; Coyne et al., 2019), or total screen time (Gunnell et al., 2016; Houghton et al., 2018), and anxiety or depression. George et al. (2018) conversely found positive value in increased time online and texting for at-risk youth: Increased time online on a day-to-day basis was associated with reduction in anxiety, while increased daily texting was associated with reduced anxiety and depression. Jensen et al. (2019) found texting to be associated with lower depression for all middle-school students, while Kreski et al. (2021) found that social media provided protection against depression for boys at high and low levels of depression risk.

Cross-sectional studies have found implicitly directional and explicitly non-directional threshold-based association (Messias et al., 2011; Kremer, et al., 2014; Booker et al. 2015; Khan & Burton 2017; Bélair et al., 2018; Wang et al., 2018), linear (Maras et al, 2015; Kelly et al., 2018; Orben & Przybylski, 2019b; Barthorpe et al., 2020) and non-linear (Przybylski & Weinstein, 2017) dose-response association, or no association at all (Casiano et al., 2012; Busch et al., 2013) between screen time, whether as a whole, by device, or by use, and psychological-distress constructs including depression, anxiety, suicidal thought, and actual self-harm. Meanwhile the characteristics of a specific screen environment, the activity or passivity of experience during screen time, individual differences, and gender have all been identified as moderators, as limiting factors or as definitional of subpopulations to which the associations might be limited. One additional factor has been advanced as a cause, or at least an explanation, of screen time's putative association with psychological distress: the advent of connected mobile digital devices.

Change in the Smartphone Era?

Two papers published in 2018 introduced this new variable. Prior reports had incorporated diverse operationalizations of screen time--different bins and combinations of television time; DVD time; time watching streaming video; time playing video games or texting; time using social media; time with mobile devices; internet use and computer use; weekdays and weekends. None suggested that the impact of screen time on mental health might vary with change over calendar time in teens' screen technology preferences.

The papers published by Twenge, Martin et al. (2018) and Twenge, Joiner et al. (2018) proposed this new discriminating principle.

Twenge, Martin, et al. (2018), relying on MtF data from 1991 through 2015, argued not only that screen time and psychological distress were related, but that quantitative and qualitative change in screen times were associated with a decline in psychological well-being among U.S. adolescents beginning in 2012, identified as the first year when most Americans used smartphones. Twenge, Joiner, et al. (2018), using data from both Monitoring the Future and the Youth Risk Behavior Survey (1991-2015), moved the inflection point back to 2010. (More recently, Twenge, 2020b, returned to the 2012 benchmark.)

Both 2018 papers followed Przybylski and Weinstein (2017) in reporting non-linear dose-response relationships between screen time and psychological distress: curves charting a decline in happiness (Twenge, Martin et al., 2018) and an increase in suicidality (Twenge, Joiner et al., 2018) among teens who spent more than an hour a day with screen devices. Aligning exposure-response correlations with outside reports that adolescents in the 2010s spent more time with electronic devices than had previous generations, these authors concluded that increased screen time, facilitated by the rise of smartphones, was "the most likely culprit" for generational distress (Twenge, Martin et al., 2018, p. 776). However, no data on smartphone adoption were analyzed. The authors cautioned that their findings were correlational.

Twenge, Martin et al. (2018) and Twenge, Joiner et al. (2018) differed with Przybylski and Weinstein (2017) in two important respects, one quantitative, the other interpretive. While both reported higher psychological distress among teens who consumed less than an hour of screen time each day, Twenge and colleagues identified that one-hour mark as threshold beyond which well-being began to decline again on the basis of dosage; Przybylski and Weinstein found different thresholds for different screen activities ranging from 1.67 to 4.25 hours a day. From the standpoint of interpretation, Przybylski and Weinstein took the small mean effect size they found (Cohen's d = -0.18) to indicate that the risk associated with teenagers' screen time might be so small as to be unworrisome. Twenge, Martin et al. argued to the contrary that the "rapid adoption of smartphone technology in the early 2010s may have had a marked negative impact on adolescents' psychological well-being" (p. 778).

These conflicting views came into sharp contrast the following year, when a paper from the Twenge group took direct aim at the Przybylski and Weinstein (2017) interpretation. Concerned that "Przybylski and Weinstein suggest that the effect of digital media on well-being is so weak that medical professionals should reconsider giving parents advice about screen time" (p. 312), Twenge and Campbell (2019) undertook a re-analysis of the 2014 What About YOUTH data addressed by Przybylski and Weinstein. They also re-analyzed data from four-administration subsets of the YRBS (2009-2015) and MtF (2013-2016), cohorts previously considered by Twenge, Joiner et al. (2018).

The two analyses of U.K. What About YOUTH data are not strictly comparable, in that the analysts made different choices along the way. For instance, Twenge and Campbell (2019) created daily mean screen-time data by assigning an integer value to each ordinal response option, then weight-averaging responses to the separate weekday- and weekend-use items; Przybylski and Weinstein (2017) maintained distinct weekday and weekend data. Przybylski and Weinstein graphed their data along a continuous, uniform-unit-of-screen-time axis; Twenge and Campbell treated WAY-items' ordinal responses as equal units on the axis, even though the differences between the first, second and third items were "about a half-hour" while other items were set at full-hour increments.

Perhaps most important, as noted above, Przybylski and Weinstein based their interpretation on the effect sizes of screen time above the duration optimally associated with well-being. Twenge and Campbell proposed an alternate criterion: the differences in percentage of respondents reporting psychological ill-being among three thresholded subsets: teens who reported less than an hour a day with any given device, teens who reported three hours a day and teens who reported seven or more hours a day--"heavy users." By this criterion, in the WAY study, heavy smartphone users were 52% more likely than three-hour users and 171% more likely than light users to experience psychological distress. Heavy users of computers were 15% more likely to experience psychological distress than three-hour users, 113% more likely than light users. Applying the criterion to data from the Youth Risk Behavior Survey and Monitoring the Future, Twenge and Campbell determined from YRBS data that heavy users of electronic devices were 42% more likely than three-hour users and 71% more likely than light users to experience depression; from MtF data, that heavy users of social media were 31% more likely than three-hour users and 83% more likely than light users to be unhappy. (They acknowledged that the response options in each of these surveys implied a different definition of "heavy use": five or more hours a day in YRBS, treated by Twenge and Campbell as five hours; 40 or more hours a week in MtF, treated by Twenge and Campbell as 5.7 hours a day).

The finding by Przybylski and Weinstein (2017) that only a small percentage of variance in adolescents' psychological distress could be attributed to screen time was irrelevant, Twenge and Campbell (2019) contended: "The question clinicians and laypeople want answered instead is, 'What is the difference in well-being associated with this activity?'" (p. 327). They argued that screen time's negative effect on mental health, if mathematically small, was comparable in scale to the positive effects of "several well-established intentional treatments for depression" (p. 327). Moreover, they observed, screen time is voluntary and mutable, whereas factors which control larger percentages of variance in depression or anxiety, such as genetic make-up, are beyond social or behavioral influence.

A fourth attempt to mine YRBS for insight into associations between screen time and psychological health in the era of connected mobile devices was undertaken by Orben and Przybylski (2019a), here exploring data from five YRBS cohorts (2007-2015) -- a range similar to that of Wang et al. (2018), but broader than Messias et al. (2011), Twenge, Joiner et al. (2018), or Twenge and Campbell (2019). Like Twenge and Campbell, these authors included two other data sets: MtF cohorts from 2008-2016 and the 2015 U.K. Millennium Cohort Study. Orben and Przybylski found that all three surveys confirmed the finding of Przybylski and Weinstein (2017). In none did association with technology use account for more than 0.4% of the variation in adolescent well-being.

The analyses of Orben and Przybylski (2019a) differed from those by Twenge and Campbell (2019) not only in terms of cohorts studied and interpretive emphases--stressing partitioned variance rather than difference in well-being at the extremes--but also in adhering to a studied neutrality about analytic decision-making. The authors noted that multiple analyses of the same large data set are prone to arrive at conflicting results, due in part to the fact that analysts necessarily make subjective decisions about such technical matters as binning and averaging data; choosing whether to analyze individual-item responses or to create composite indices; selecting (and sometimes combining) items as operationalizations of variables like screen time and well-being; and selecting covariates.

Orben and Przybylski therefore began by specifying multiple operationalizations, within each data set, of the variables "technology use" and "adolescent well-being" and of available covariates. They proceeded to explore every defensible combination of specifications, including 372 combinations for YRBS (as well as 40,966 combinations for MtF and more than 600 million for the UK Millennium Cohort data). They modeled a linear regression for each combination, building a specification curve for each data set. Then they reported, for each survey, a median standardized ß coefficient for the full set of possibilities, as well as statistics for particular subsets, such as the median effect of non-TV electronic-device time--a single YRBS item--on well-being.

Orben and Przybylski (2019a) also took advantage of additional data available in each survey to compare the association of screen time with psychological well-being to parallel associations for other behaviors. They found, for example, that according to YRBS data, screen time's negative association with mental health (median $ß = -0.049$) was smaller than that of having asthma (median ß = -0.066) and almost exactly equal to that of eating potatoes (median ß = -0.042).

Vuorre et al. (2021) returned yet again to YRBS data, along with data sets from Monitoring the Future and Understanding Society, the U.K. Household Longitudinal Study (UndSoc), in a paper whose title told all: "There is no evidence that associations between adolescents' digital technology engagement and mental health problems have increased." Four different mental health indices--a depression index derived from MtF data; conduct and emotional problems indices from UndSoc; and a "suicidal ideation and behavior" index derived from YRBS data--were modeled against three technology predictors--a social-media index composed from MtF and UndSoc data, and the two screen time variables in YRBS; the analysis covered the period from 1991, when the earliest YRBS television and MtF depression data were collected, to 2017. Only two associations were found to have changed over that period: those of television viewing and the composite social-media index to depression: Both were found to have weakened, not worsened, over time.

Administration by administration, Vuorre et al. (2021) found associations between two YRBS-derived variables, the "other screens" item and the "suicidal ideation and behavior" index, to be occasionally significant, but statistically similar to those reported in earlier papers and universally small. Those two variables encompass the five items under consideration for this study, which prompts the question: Might Vuorre et al. not deserve the last word? The answer involves concerns substantially independent of screen media, time, well-being, or adolescence.

Issues in Analysis of Survey Data

The analytic neutrality of specification curves notwithstanding, Orben and Przybylski (2019a) made no claim to definitively documenting the relationship of screen time to psychological well-being through their analysis of survey data. They cited several reasons for this reluctance, including the inherently low quality of retrospective self-report data. More strikingly, they acknowledged a number of problematic procedural decisions. They used null hypothesis testing to assess statistical significance, despite recognizing that small differences in large data sets can result in unwarranted rejection of the null under the $p < 0.05$ standard. They modeled linear regressions, despite previous findings of non-linear relationships between screen time and psychological health. They assumed normal, unskewed data distributions, even though their own examination found cases in which the distributions of values were skewed. Last but not least, they knowingly treated ordinal, dichotomous, and categorical data as continuous. Orben and Przybylski maintained that these decisions were made "for the sake of simplicity and comparison" (p. 179), in particular with prior analyses by Twenge, Joiner et al. (2018) and Twenge, Martin et al. (2018).

The methodological issues named by Orben and Przybylski (2019a) apply equally to those prior analyses, as well as to Twenge and Campbell (2019), to Twenge, Martin et al. (2019), an effort to document qualitative and quantitative change in adolescents' use of electronic media during the first two decades of the 21st century, and to Twenge and Martin (2020), whose findings indicate more dire effects of screen time above a half-hour a day for girls than for boys. They also apply substantially to Vuorre et al.'s 2021 re-analysis of YRBS data. The concerns fall into two categories:

- treatment of ordinal, dichotomous, and categorical data and
- decisions regarding constructs, operationalization, and reporting which bear on the studies' central concerns: change in adolescent screen time since 2007, coincident change in reports of psychological well-being, and a dose-response relationship between the two.

Treatment of Ordinal, Dichotomous, and Categorical Data

Surveys like the Youth Risk Behavior Survey are composed of multiple-choice items. For some items assessing psychological well-being, the response options offered are a simple dichotomous yes or no. Some well-being items offer ordered Likert-style options. Others offer options in terms of frequency of a particular behavior, such as a YRBS item gauging suicide attempts. With respect to screen time, items almost universally offer choice among ordered ranges of duration, with overall range varying from one item to the next and with the breadths of smaller ranges varying from one response option to the next (Centers for Disease Control and Prevention, 2018b). This approach to item construction results in data that are either ordered or simply categorical, but never numeric. Nevertheless, Twenge, Joiner et al. (2018), Twenge, Martin et al. (2018), Twenge, Martin et al. (2019), Twenge and Campbell (2019), Twenge and Martin (2020), Vuorre et al. (2021) and, as noted, Orben and Przybylski (2019a) treated survey data as if they were numeric reports along a continuous dimension.

Liddell and Kruschke (2017) documented numerous problems with using numeric, or "metric," methods to analyze ordinal data, from Type I and Type II errors to systematic inversion of apparent effects. Attempting to average across ordinal data can exacerbate such errors. The reason is straightforward: Ordinal data lack two characteristics essential for metric calculation. On their face, although numerical values may appear within ordinal responses, these data indicate ordered preferences, not quantities. More subtly, ordinal data may not involve same-sized units. The intervals represented by any two ordinal options can be unequal. In Likert-type items, the psychological valence of, and the distance between, response options can be entirely subjective, a matter of judgment for each respondent. In duration items, the intervals offered can be not only varied but alternately restrictive or entirely indeterminate. Options offered by YRBS items assessing time watching television on an average school day provide an example: "I do not watch TV on an average school day ," "Less than 1 hour per day," "1 hour per day," "2 hours per day," "3 hours per day," "4 hours per day," and "5 or more hours per day." (Centers for Disease Control and Prevention, 2019).

Though such survey data are unsuited for calculation, the findings of Twenge, Joiner et al. (2018), Twenge, Martin et al. (2018), Twenge, Martin et al. (2019), and Twenge and Campbell (2019) all rested on calculation. The authors enabled summing, averaging and applying other statistical formulas through what they called "recoding" (Twenge, Martin et al., 2018, p. 769): assigning a discrete quantity to each ordinal response. For example, respondents to YRBS report screen time by choosing from among approximate durations or ranges of duration of screen time, with lower and upper extremes. Twenge and colleagues simply assigned a quantity to each approximation, range or extreme. Where YRBS offered a “less than 1 hour per day” option; it was quantified as 0.5. Options for 1-, 2-, 3- and 4-hours per day were treated as whole-number quantities. The option "5 or more hours per day" was arbitrarily quantified as 6.

In studies where options named ranges of duration, the authors quantified with the mean of the range; for certain calculations in Twenge and Farley (2020), those eight purported screen-time means were further collapsed into four bins. If averaging was impossible, Twenge and colleagues peremptorily assigned values. In analysis of Monitoring the Future data, for instance, "an hour or less" was quantified as 0.5, "1 to 2 hours" as 1.5, and so on up to 8.5, but "9 or more hours" was quantified as 10 (and "none," naturally, as 0). Nor were such quantifications uniform across data sets. The response "1 hour per day" to the YRBS television item was recoded as 1, but a MtF respondent who watched an hour a day would choose "an hour or less," recoded as 0.5. A respondent who watched for a half-hour a day would report "less than one hour" in YRBS, recoded as 0.5, but "half-hour or less" in MtF, recoded as 0.25. For items involving weekly, rather than daily, screen time, the Twenge group quantified in two steps. First, they averaged across ranges or assigned an arbitrary value (the MtF option "30 hours or more" became 35; the option "40 hours or more," 45). They then divided the assigned value by 7 "to obtain a daily estimate" (Twenge & Campbell, 2019, p. 317).

Had Twenge and colleagues interpreted these "recodings" as ordered indices, they might yet have provided somewhat realistic rough estimates of screen time. Instead, summing, averaging, and applying statistical formulas designed for continuous numeric data led the authors to report findings with a degree of precision unsupported by the original data. As noted above, Twenge, Martin et al. (2018) reported that mean daily use of the Internet by 8th graders responding to Monitoring the Future rose from 1.42 hours in 2013 to 1.66 hours in 2016., though the respondents had only been offered a "one to two hours" response. Responses to ordinal items involving psychological well-being were similarly treated as numeric. One Monitoring the Future item asked eighth graders, "Would you say you're very happy, pretty happy, or not too happy these days?" Coding the responses as 1, 2, or 3, Twenge, Martin et al. (2018) reported a mean decline in eighth graders' happiness from 2.07 in 2012 to 2.03 in 2016, with a Cohen's *d* effect size of 0.07, significant at $p < 0.5$"--despite the fact that no eighth grader could possibly have reported a happiness level higher than 2 ("pretty") but lower than 3 ("very").

Decisions Regarding Constructs and Operationalizations

At the heart of any inquiry into the relationship of screen time and psychological well-being lies the ill-defined construct "screen time." The term appears in the title of the paper by Twenge, Martin et al. (2018), though they name increase in a different, perhaps associated construct, "electronic communication," as their "likely culprit" (p. 776). Orben and Przybylski (2019a) eschewed "screen time," preferring "technology use." So did Vuorre et al. (2021), discussing "digital technology engagement." Twenge and Campbell (2019) referred to "media use" or "digital media use." Twenge, Joiner et al. (2018) qualified the phrase as "new media screen time" in their title but returned to "screen time," unmodified, in the body of their report. "Screen time" recurred in the title of Twenge and Farley (2020).

Irrespective of the chosen term, these papers operationalized screen experience either in terms of time -- hours per day or week -- or of number: use-occasions per day, week, month or year. Each operationalization rested on the researchers' selection among survey items. In YRBS, for example, screen time is dichotomized as either TV time or time with all other screen technologies--in both cases, on an "average school day." Monitoring the Future assesses hours spent in a variety of activities requiring the Internet--"e-mailing, instant messaging, gaming, shopping, searching, downloading music, etc."-- in a single item. In the mind of any given respondent, that item might or might not overlap with an item assessing hours "playing electronic games on a computer, TV, phone, or other device"; either of two items assessing hours texting and talking on cellphones; items assessing video chat and social networking; or, in the context of streaming video, items assessing time watching TV. The Millennium Cohort Study asks four questions about time spent with screen media, inquiring about videos/movies/television, electronic games, social media/messaging, and out-of-school Internet (with no specified exclusion of time with social media, streaming video, or online games). Such categorization recalls a concern mentioned by Przybylski and Weinstein (2017): Since many adolescents use multiple devices simultaneously, comparisons of time spans reported in multiple items are problematic.

Furthermore, most survey data fail to shed light on reasons for spending a given amount of time with a given device or platform, on the roles the devices and platforms play in private or social lives, on the people with whom screens are used to communicate, or on teens' relationships with those people. Each of these matters might be meaningfully associated, in one direction or another, with psychological well-being. By way of example, researchers have for years distinguished the social and emotional effects of active chatting, messaging, and liking on social networks from those of passive lurking, browsing, scrolling, and reading others' posts (Ellison et al., 2007; Burke et al., 2010; Verduyn et al., 2015; Burke & Kraut, 2016; Verduyn et al. 2017; Orben, 2020, Beyens et al., 2020)--distinctions unavailable when experience with an electronic device is assessed merely in terms of duration, much less when experience with multiple devices for multiple purposes is reported in a single response choice, as with the YRBS item referring to "time spent playing games, watching videos, texting, or using social media on your smartphone, computer, Xbox, PlayStation, iPad, or other tablet" (Centers for Disease Control and Prevention, 2019).

Several of these papers failed even to take advantage of all the information actually available in surveys, particularly with respect to the central issue of adolescents' use of mobile phones after 2010. Twenge, Joiner et al. (2018), while pointedly associating smartphones with depression and other mental health issues, overlooked MtF items on talking and texting with phones, included since 2010, and on video-chatting, included since 2013 (Miech et al., 2018). They relied instead on the omnibus non-TV screen technologies item in YRBS, an item whose text has mentioned smartphones only since 2013 and only in the middle of a parenthetical list including handheld, console, and online electronic games, tablets, YouTube, social networks, and anything else on the Internet. Twenge, Martin et al. (2018), whose title referred to "the rise of smartphone technology," included the items on texting and video chat, but not on talking, in their analyses of MtF data. Twenge and Campbell (2019) included MtF's item on texting, but not those on talking or video chat.

Similar issues characterized the operationalization of psychological constructs. Among the dozens of items in YRBS, five bear on psychological well-being. Three dichotomous yes/no items probe emotion and behaviors over the previous 12 months:

- Did you ever feel so sad or hopeless almost every day for two weeks or more that you stopped doing some usual activities?
- Did you ever seriously consider attempting suicide?
- Did you ever make a plan about how you would attempt suicide?

The fourth item, "How many times did you actually attempt suicide?", offers five ordinal responses, though all the papers addressing YRBS recoded this as a dichotomous yes/no. The fifth item, asking whether a suicide attempt had been serious enough to require medical help, offers three categorical responses: Yes, no, and no suicide attempt. Only Orben and Przybylski (2019a) and Vuorre et al. (2021) included this last item, recoded in both cases as dichotomous.

Twenge, Joiner et al. (2018) and Twenge and Campbell (2019) treated the four YRBS items on extended sadness or hopelessness, suicidal thinking, suicide planning, and attempted suicide as a single factor: A yes to any of the four was indexed as "at least one suicide-related outcome" (p. 6). In other words, despite obvious psychological distance among the items, and in contradiction of the finding by Messias et al. (2011) that screen users were less likely to have attempted suicide than non-users, they treated reports of hopelessness, thinking about, planning, and actually attempting suicide as equivalent indicators of psychological distress. (In accompanying tables, Twenge and Campbell did provide statistics for each individual item, flatly characterizing these as similar to the four-item index).

Decisions with Respect to Reporting

As noted above, several analyses of screen-time data have omitted or erased through combination items which may have been relevant to the authors' hypotheses. Lacunae in, and methods of calculation of, the statistics for included items raise a parallel concern. Twenge and Campbell (2019), taking the position that the critical question in media effects research is "What is the difference in well-being associated with this activity?'" (p. 327), framed their answer in terms of the percentage of respondents reporting a given range of screen time who selected a particular response to each psychological-distress item. In that surveys like YRBS employ complexly weighted stratified cluster sampling (West et al., 2018), these percentages prompt the question: percentage of what whole? The authors combine data from multiple administrations over a multi-year period -- six years, in the case of YRBS -- into a single "sample" for each item analyzed. They do not report weightings or a method for reconstructing a hypothetical population from the combined sample data.

The composition of screen-time-reporting segments and the correlation of psychological data with these segments is worthy of remark. Twenge and Campbell (2019) reported percentages of association of time spent with a screen medium to "low well-being" (p. 331) in each of three groups: "heavy users" who selected the upper-extreme response for the screen-time item; three-hour-a-day users; and those who reported less than an hour a day with that screen medium. For YRBS, they treated an affirmative response to any of four items classified as "suicide-related" as an equivalent indicator of low well-being.

Twenge and Campbell (2019) documented the psychological effects of screen time in a set of charts reporting percentage of low well-being in each of these three duration-based user groups for each screen-time item; the authors neither explained how these percentages were calculated nor provided pre-calculation statistics. On the basis of these percentages, they compared low-well-being within pairs of the user groups (less than an hour/heavy use, less than an hour/three hours of use, three hours/heavy use). Finally, they reported the "relative difference" within each pair. For example, with respect to the YRBS omnibus non-television screen-time item, the authors identified either 28.2% (in Table 2) or 28.3% (in Table 1) of less-than-an-hour users as having reported low well-being--that is, as having responded in the affirmative to one of four suicide-related items--compared to 34.9% of three-hour users and either 48.1% (Table 3) or 48.2% (Table 1) of heavy users. They might next have reported direct differences among the use levels in percentage of low well-being: For instance, the increase in reports of low well-being from less-than-an-hour's average-school-day non-TV screen time (28.2%) to three hours' use (34.9%) was about 6.7%; the increase from less-than-an-hour's use to heavy use (48.2%), about 20%. In place of such direct differences, the authors reported "relative difference" within each pair: the portion of the lower-screen-time group's low-well-being percentage represented by the *difference* in the two groups' percentages. The statistics resulting from this calculation were considerably more dramatic: not a 6.7% difference as teens moved from less than an hour to three hours of screen time but a 23% relative difference; not a 20% difference, but a 70% relative difference as they moved from less than an hour to "heavy use."

Apart from concerns with quantification and calculation of ordinal data, interpretation of these twice-processed statistics is difficult. First, there is a problem of context. Without knowing either how many respondents or what percentage of all respondents (or of an equivalent hypothetical simple random sample) was in each screen-time group to begin with, the implications of a 48% "low well-being" rate for heavy users are difficult to discern. If heavy users comprised 100% of all respondents, the rate would indeed be disturbing, with nearly half of U.S. teens reporting ill-being. But if only 5% were heavy users (with 48% of them, or 2.4% of the total, reporting low well-being), 50% were three-hour users (with 34.9%, or 17.5% of the total, reporting low well-being), and the remaining 45% used screens for less than an hour on an average school day (with 28.2% of these, or 12.7% of the total, reporting low well-being), the share of unhappy teens in the U.S. population would in any event amount to about a third -- irrespective of respondents' screen-time discipline.

Second, given the hypothesized U-shaped relationship between screen time and psychological distress (Przybylski & Weinstein, 2017; Twenge, Joiner et al., 2018; Twenge, Martin et al., 2018), meaningful comparison of low well-being in screen-time-quantity groups should report the distinct rate for each ordinal response option. Without information about the percentage of low well-being among 1-, 2- and 4-hour users, the 6.7% leap in low well-being from less-than-an-hour to 3 hours, followed by a leap of 13.3% from 3 hours to 6 (the Twenge group's quantification of the 5-or-more hours ordinal response option), seems surprisingly monotonic.

Simple comparisons among low, middle, and high screen-time-quantity groups also elide potentially important differences in spread. Actual screen times among members of the low-use group (half-hour or less, with a floor of 0) fell across a 30-minute spread. Given the choices available to respondents, screen time in the 3-hour group arguably ranged between 1.5 and 2.5 hours, a one-hour spread. Among 5-or-more-hour users, the spread was technically infinite. Though Twenge and Campbell (2019) quantified this last response choice as 6 hours, the group might well have included teens who consumed 7, 8, even 10 hours of screen time each day, inflating the apparent risk to well-being of those who did spend 6—or only 5--hours daily with screens.

Gaps in the statistics reported reveal another concern: the authors' prejudgment of cause and effect. Comparing percentages of uniformly low well-being across screen-time categories implies directionality. To more fully apprehend "the difference in well-being associated with" screen activities, it would be useful to turn things around: to explore as well the distribution of screen-time quantities within each level of well-being.

Decisions with Respect to Calendar Time

Central to the Twenge group papers is the contention that the introduction of the smartphone in 2007 fueled a rise in adolescents' screen time -- and especially in their use of social media -- which, given the reportedly negative impact of screen time on psychological well-being, caused a decline in mental health across the population. The argument, of course, presupposes not only a decline in mental health which has been contested (Kann et al., 2016; Mojtabai et al., 2016; Johnson et al., 2017; Keyes et al., 2019), but also teenagers' adoption of smartphones, universal growth in their use of social media in the smartphone era, and an essentially universal boom in adolescents' screen time during the years in question. Twenge and colleagues employ various means to establish these prerequisites.

The Smartphone Era. There are no questions concerning use or ownership of smartphones in the U.S. surveys studied. YRBS only began to mention smartphones in 2013 and only in a parenthetical list of examples appended to the omnibus question on use of screen devices other than television. Twenge and Campbell (2019) analyzed data from the UK What About YOUTH study which did include an item on hours of smartphone use, but while the authors presented correlations between quantified, averaged ordinal data on hours of use and psychological well-being indicators, they reported no information about the actual levels of smartphone use documented in the study. Rather, they supported their claim about rapid smartphone adoption (and its deleterious effect) by quoting the conclusion of an earlier study whose authors, unnamed by Twenge and Campbell, were Twenge, Martin et al. (2018).

Twenge, Joiner et al. (2018) supported their claims of teen smartphone use with overall U.S. smartphone adoption data, and since data were only available from 2011, the authors "assumed linear growth between 2007 and 2010" (p. 7). On the basis of these data, published by the Pew Research Center, they asserted that smartphones had either "gained market saturation" (p. 4) or were being used by half the U.S. population (p. 14) by 2012. In particular, they claimed, citing the Pew study, that "by 2015, 92% of teens and young adults owned a smartphone" (p.14). In its source, the 92% statistic refers to respondents ages 18 through 29 (Smith, 2017).

In Twenge, Martin et al. (2018), a study whose title references "the rise of smartphone technology," the only statistic cited with respect to teen smartphone use is considerably lower than 92%. Here the authors claimed that another Pew study found that 73% of teens owned smartphones in 2015. Once again, a look at the original report proves the citation to be flawed. In context, the 73% statistic described access to, not ownership of, smartphones. While this Pew study did report that 92% of teens used the Internet daily by 2015, it also noted that 68% did not use mobile devices to go online (Lenhart, 2015). Consistent with these Pew findings, the 2015 Common Sense Census of adolescent media use found that only 40% of teenagers used smartphones to access social media in 2015, and only 22% used phones to browse other websites, in spite of the fact that around two-thirds (as opposed to the 73% or 92% claimed by Twenge and colleagues) actually owned smartphones by March 2015 (Rideout, 2015).

Studies like the Common Sense Census cast doubt on the contention that growth in "electronic communication such as social media and the Internet" (Twenge, Martin et al., 2018, p. 767) mediated the relationship of increased smartphone use with increased psychological distress. Some of the earliest available data on teenagers' use of smartphones were published in 2010 in the Kaiser Family Foundation's report, *Generation M2: Media in the Lives of 8- to 18-Year-Olds* (Rideout et al., 2010). While the word "smartphone" does not appear in the report, *Generation M2* found that 15- to 18-year-olds, on average, used mobile phones to watch 22 minutes of video, play games for 22 minutes, and listen to 23 minutes of music -- though only 48% of teens used a phone for any of these. Although *Generation M2* did consider teen social networking, finding that 15-18s spent an average of 26 minutes a day with social media, no social media time was associated with mobile phones. *Generation M2* did report two other forms of electronic communication associated with cellphones: The older teens spent an average of 43 minutes talking and nearly two hours (1:51) texting.

The first Common Sense Census (Rideout, 2015), five years later, was not directly comparable with *Generation M2* for a variety of methodological reasons, above all the decision to group teens 13-18, rather than 15-18. The Census also assessed texting in terms of number of texts per day, rather than minutes spent texting, a less useful measure in the screen-time context. The Census provided smartphone use data separately for the population as a whole and for the smartphone-using segment: For purposes of comparison with survey data, Census statistics cited here refer only to the whole-population data.

In 2015, the Census found, average total time with smartphone media, excluding talking or texting, was two hours, 42 minutes. About 28% of this time, or 45 minutes, was spent with social media. Another 41 minutes were spent listening to music. Fifteen minutes each were devoted to games, browsing websites, and watching online videos, with an additional eight minutes for "watching TV," six minutes for video chatting, and 13 minutes for "anything else." In that the data are not comparable with the *Generation M2* data, it is impossible to assess growth in "electronic communication" from 2010 to 2015. However, a second Census, conducted in 2019, offered some perspective.

The 2019 Census (Rideout & Robb, 2019) indeed found substantial growth in smartphone time across the population--a rise from 2:42 to an average 4:45 per day. But only around a fifth of the increase could be attributed to electronic communication. Out of the additional two hours, social media accounted for 15 minutes; Internet browsing, for nine. (Video chat, a communication tool not addressed by Twenge and colleagues, also grew by 10 minutes.) The bulk of the increase came from entertainment, not communication: Video viewing grew by 38 minutes, listening to music by 30 minutes, and gaming by 6 minutes, totalling 1:14 of the two-hour rise in daily smartphone use.

Social Media. Twenge and Campbell (2019) reported that heavy users of social media were 83% more likely than light users to be unhappy. Assuming this to be an accurate finding, population-level growth in daily hours with social media would indeed raise a mental health concern. However, the authors offered no evidence of such growth during the period of data collection, 2013-2015. Twenge, Martin et al. (2019) did calculate increases in frequency of use across 8th, 10th, and 12th grades, as well as in average daily social media time--from 1.34 hours (1:20) across all three grades in 2013 to 1.58 hours (1:35) across all three grades in 2016, an increase of about 14 minutes, but a total well below the "heavy use" threshold in Twenge and Campbell (2019). A year earlier, the 2015 Common Sense Census, informed by direct reporting rather than calculation from quantified ordinal data, found average daily time spent by teens with social media totaled 1:11--only 11 minutes above Twenge and Campbell's light-use threshold (Rideout, 2015). With data more recent than those reported by Twenge and colleagues, the 2019 Census suggested a trend quite different from runaway growth:

Between 2015 and 2019, average daily social media time among 13-18s declined one minute to 1:10 (Rideout & Robb, 2019).

Overall Screen Time. The contention that adolescents' screen time increased substantially following the introduction of the smartphone rests on Twenge, Martin et al.'s (2019) analysis of MtF data from as far back as 1976, but primarily from 2010-2016. Time-report items included an omnibus internet item, cellphone texting (but not conversation on phones or video chat), and gaming across multiple platforms. Social media use was reported in terms of number of occasions per day, week, month, or year for the full period and, from 2013 (the year MtF added the item), in hourly terms. The authors also reported TV-watching data, quantified and averaged from ordinal responses, under the separate heading of "legacy media." As in other studies from this research group, means, standard deviations, and Cohen's *d* effect sizes were provided for MtF data, implying continuous normal data and residuals.

In the text of their paper, Twenge, Martin et al. (2019) reported, by way of example, that 12th graders' screen time rose from about 2:30 a day during the late 1970s, when "screen time" meant TV time, to just under 8 hours a day in 2016, including TV, Internet, texting, and social media. More pertinent to the rise of smartphones and social media might be the data for 2013-2016, the period during which MtF reported on all four of those screen-time components. Based on Twenge, Martin et al.'s own averaged quantifications of the ordinal data, total 12th grade screen time rose less than 6%, or around 26 minutes, during this period; total 10th grade screen time rose around 0.6%, or 2 minutes, 24 seconds; while total 8th grade screen time declined by about 5%, or 19 minutes. For the extended smartphone-available period 2010-2016, summing averages for texting, Internet, and TV (since social media data were unavailable from 2010-2012), the 12th grade total increased by around 16 minutes, or less than 5%; the 10th grade total declined by around a minute, or 0.4%; and the 8th grade total declined by around 14 minutes, or 4.6%.

Comparison of the Twenge, Martin et al. (2019) statistics to Common Sense Census data requires a different selection of items, since Twenge and colleagues excluded video chat, content creation, and e-reading, all tracked by the Census, while the Census did not include texting time. The figures compared here therefore include TV/video watching, social media, gaming, and visiting other websites. On that basis, the mean of Twenge, Martin et al.'s 8th, 10th, and 12th grade overall screen-time calculations for 2015 was 6.86 hours (6:52) per day. The Common Sense Census found 13-18s devoting less time than that to screen media--5.82 hours (5:49) per day. Indeed, Twenge, Martin et al.'s 2015 approximation was 40 minutes higher than the total four years later in the 2019 Common Sense Census, 6.37 hours (6:22), even though the 2019 statistic included about 18 minutes' more video viewing and 14 minutes' more gaming than in 2015.

Summary and Study Objectives

Researchers have argued, and caregivers, educators, and policy-makers have become concerned, that a dose-response relationship exists between screen time and psychological distress and that consequently an increase in adolescents' screen time since the introduction of the smartphone in 2007 has resulted in a population-level decrease in teenagers' psychological health. Such concerns rest on four matters of fact:

- the extent to which durations of adolescent screen time changed after 2007;
- the extent to which prevalence of adolescent psychological distress changed after 2007;
- the extent to which statistical associations exist between screen-time measures and measures of psychological distress among adolescents; and
- the directionality of such associations, should they exist.

These matters of fact have been considered in a dizzying variety of longitudinal, cross-sectional, and real-time observational studies with mixed results. More often than not, researchers have turned to national surveys for population-level evidence of both the dose-response relationship and the change over calendar time in patterns of screen time and psychological distress.

A review of survey analyses suggests that the degree to which these surveys document either growth in adolescents' screen time or increase in psychological distress since 2007 remains uncertain. This uncertainty is due in part to the number and quality of survey items, in part to inconsistency in analysts' operational definitions, but also to inappropriate use of metric methods to analyze the ordinal, dichotomous and categorical data these surveys provide.

Independent of the facts themselves, researchers have differed on the question of *which* facts are most relevant to social and educational policy. Orben and Przybylski (2019a) and others have contended that the small effect sizes of associations between screen time and psychological distress dictate that pediatricians and policy-makers seeking to improve adolescents' lives and prospects would do best to look elsewhere. Twenge and colleagues have retorted that the small scale of effect sizes is made irrelevant by the size of the affected population, the speed with which screen experiences have entered the lives of the adolescents, and the relative tractability of screen time, compared to other risk factors.

A re-analysis of survey data cannot directly address the policy debate, but it can help sort out some of the underlying facts. Re-analysis cannot improve the inherently low quality of survey data, but it can improve the clarity and specificity of inferences from that data without unsupported claims of precision. Appropriate statistical techniques can be applied to the limited ordinal data at hand. Items and response options whose distinctions might have been differently understood by respondents than they are by researchers can be considered without conflation. Analyses can account for differences in response distributions from one item to another, as well as differing effects of each level of a predictor on each of the response options made available. In short, a principled re-analysis can tease as much information out of even low-quality survey data as they may possibly supply, without implicit or unintended distortion. Such information might bolster or disconfirm existing hypotheses on the effects of adolescents' time with screen media and, to that extent, help to inform public policy.

The study reported here offers an example of such an approach, re-analyzing data from four administrations of the Youth Risk Behavior Survey (2009-2015) treated in papers from the Twenge group, together with data from one earlier and two later administrations (2007, 2017, 2019): a sample of 103,525 ninth, tenth, eleventh, and twelfth graders over a period of 13 years. (The sample overlaps, as well, with those treated by Messias et al., 2011; Wang et al., 2018; Orben & Przybylski, 2019a; and Vuorre et al., 2021.) The study was conducted with two objectives:

- to demonstrate appropriate ordinal analysis of ordinal research data
- to collect evidence bearing on the following research questions:
  - Since 2007, YRBS has asked respondents to report hours spent on an "average school day...play[ing] video or computer games or us[ing] a computer for something that is not school work" --an omnibus construct further defined in 2007 to include "activities such as Nintendo, Game Boy, PlayStation, Xbox, computer games, and the Internet" and updated biennially to include by 2019 "watching videos, texting, or using social media on your smartphone, computer, Xbox, PlayStation, iPad, or other tablet" (Centers for Disease Control and Prevention, 2018b). To what extent did reports of such non-television, non-school screen time change between 2007, the year widespread marketing of connected mobile devices began, and 2019?
  - To what extent did reporting of psychological distress change between 2007 and 2019?
  - To what extent were reports of screen time and psychological distress associated
    - among all responses collected between 2007 and 2019?
    - cohort by cohort from 2007 through 2019?
    - within the sub-sample of respondents who self-identified as female?
    - within the sub-sample of respondents who self-identified as male?

Chapter 3: Methods

Sample

The Youth Risk Behavior Survey (YRBS), administered by the Centers for Disease Control and Prevention (CDC), a unit of the United States Department of Health and Human Services, as part of its Youth Risk Behavior Surveillance System, engages students in public and private schools, grades nine through 12, every two years. YRBS tracks health risks and experiences including sexual behaviors; alcohol, tobacco, and drug use; diet; physical activity; mental health; school participation; and media use. Each administration surveys between 14,000 and 16,000 students (Centers for Disease Control and Prevention, 2007; 2008; 2009; 2010; 2011; 2012; 2013a; 2014; 2015; 2016; 2017a; 2018a; 2019; 2020).

YRBS selects its sample at the levels of school and classroom. Schools are selected systematically from a frame including every state and the District of Columbia; the probabilities of selection are proportional to enrollment. Within each school, classes are selected through systematic equal-probability sampling with a random start from the set of classes in a subject required by the school or meeting at a certain time of day (Centers for Disease Control and Prevention, 2008; 2010; 2012; 2013b; 2014; 2016; 2018a; 2020).

The survey employs a three-stage cluster sample design. Schools, the primary sampling units, are stratified by racial/ethnic concentration and metropolitan-statistical-area status. At the student level, YRBS adjusts for nonresponse and for oversampling of Black and Latino students by assigning each respondent a sampling weight based on self-identified sex, race/ethnicity, and grade level. Scaling results in a weighted sample equal in size to the actual participant count, but with proportions of students in each grade equal to proportions in the U.S. population. (Centers for Disease Control and Prevention, 2008; 2010; 2012; 2013b; 2014; 2016; 2018a; 2020)

The present study addressed a sample of YRBS data combined in accordance with CDC guidelines (Centers for Disease Control and Prevention, 2018c) from the administrations of 2007, 2009, 2011, 2013, 2015, 2017, and 2019. This period bridges at least three screen-media milestones: the introduction in 2007 of the first mass-market smartphone with full Internet connection, the iPhone (Apple, 2007); the introduction in mid-2010 of the first mass-market connected tablet device, the iPad (Apple, 2010); and the dramatic growth in video streaming following the relaunch of Netflix as an online-only service later in 2010 (Worden, 2010). Within this combined sample, the number of participating schools varied by administration, including as few as 136 schools in 2019 and as many as 158 in 2009 and 2011. The combined sample totaled 103,525 respondents; cohort subsamples varied from a low of 13,872 students in 2019 to a high of 16,460 in 2009.

While numerous students may have responded to two administrations of YRBS, for instance, in both 9th and 11th or both 10th and 12th grades, repeated measures data is unavailable, so these hypothetical repeat respondents are necessarily treated as if they were distinct students in different grades each year. Not only sample sizes, but response rates also varied from administration to administration and from item to item at the levels of schools, students, and items (Centers for Disease Control and Prevention, 2008; 2010;

2012; 2014; 2016; 2018a; 2020). Unweighted respondent demographics are reported in Table A1. School and student response rates are reported in Table A2. Items analyzed are reported in Table A3, with item response rates in Table A4.

Materials

Measures

The analyses here involved six items which recurred, in virtually identical form, in all seven of the YRBS administrations addressed. The actual texts of the items are provided in Table A3, with published statistics on unweighted frequencies, and weighted percentages of response in Table A4. The six include:

- an item assessing recreational television viewing on a typical school day in terms of seven ordered response options (hereafter referred to as "TV");
- an item assessing time spent with other screen media on a typical school day in terms of seven ordered response options ("non-TV screen time");
- four items involving indicators of psychological distress, comprising
    - three dichotomous (yes/no) items on respondents'
        - experience of extended, debilitating sadness ("extended sadness");
        - having seriously considered suicide ("consideration of suicide");
        - having made plans to commit suicide ("suicide planning"); and
    - an item tallying suicide attempts with five response options ranging from none to six or more ("attempted suicide").

The screen time items are phrased in the present tense ("...how many hours do you..."). Psychological distress items are in the past tense, referring to experience over the past 12 months.

Reliability and validity of the YRBS questionnaire for grades 9-12 were discussed in a 2013 CDC publication (2013b). The publication reports that reliability studies were conducted in 1992, then again in 2000, by administering the survey to convenience samples twice in two weeks. In 1992, most items were found highly reliable, with kappa coefficients ranging from 61% to 100% and without statistically significant difference in prevalence estimates from one administration to the next. In 2000, however, ten items, or 14% of the questionnaire, were found to have kappa statistics below 61%, as well as significantly different prevalence estimates from one administration to the next. These items were revised or removed from subsequent questionnaires. None was included in the present study.

At the time of that publication, no comprehensive study of the validity of the self-report data collected in YRBS had been conducted. A study in 2000 of the validity of YRBS body-type responses found that, on average, respondents overstated their height by 2.7 inches while understating their weight by 3.5 pounds. Three years later, CDC reviewed literature involving cognitive and situational factors that might influence adolescents' reports of the sorts of behaviors assessed in YRBS. The review found significant variability in the extent to which some items could be validated, with no objective methods at all for validation of many others. The authors advised policy-makers to take such variety into account in interpreting YRBS data (Centers for Disease Control and Prevention, 2013b).

YRBS is designed to collect information interpretable on its face. None of the *National YRBS Data User Manual*s consulted for this study associates individual items with an underlying measurement model. To the extent that certain issues are addressed in multiple items, CDC edits completed questionnaires for logical consistency. Where responses to two items involving the same behavior or attitude (as opposed to requests for demographic information) conflict, both items are treated as unanswered. A relevant example involves the item on suicide attempts and an item in which respondents who attempted suicide are queried about subsequent medical treatment. The selection of "none" in response to the attempts item is considered logically inconsistent with selection of either "yes" or "no" to the medical treatment item; only selection of "I did not attempt suicide during the past 12 months" is considered consistent. None of the user manuals consulted reported such a consistency check among the four psychological distress items under consideration here (Centers for Disease Control and Prevention, 2008; 2010; 2012; 2014; 2016; 2018; 2020): For example, a “no” answer on the extended sadness or suicide planning item did not disqualify a positive response to the suicide attempts item, suggesting that responses to these items were intended to be treated independently.

Software

In light of YRBS's complex survey design, CDC regularly publishes guides to "Software for the Analysis of YRBS Data" (for instance, Centers for Disease Control and Prevention, 2017b). Consistent with the recommendation of these guides, data in this study were analyzed in the R software environment (R Core Team, 2021), primarily using the "survey" package (Lumley, 2020) and its associated packages for dichotomous and ordinal regression, "VGAM" (Yee & Moler, 2021) and "svyVGAM" (Lumley, 2021). These packages facilitate inference from complex survey data by accounting in their calculations for primary sampling units, strata, and respondent weights. To compensate for missingness in the raw YRBS data, five imputations of the sample data were created, each synthesizing substitutes for missing responses, but retaining the sample's size and complexity; these were created with the "mice" package for multiple imputation in R (van Buuren, 2021), then passed to "survey," "svyVGAM," "VGAM", and their associated package "mitools" (Lumley, 2019) for regression analysis (with on-the-fly adjustment for survey-data complexity) and pooling of the five resulting sets of inferential statistics. Analysis was complicated by the fact that the “survey” package in R produces distinct sets of descriptive statistics for each missing-data imputation, but not a single pooled set of pooled descriptive statistics. Workarounds for this challenge, described in the Descriptive Statistics section below, in part involved the production of a separate set of multiple imputations using a different software package recommended in YRBS documentation, the BBDESIGN function of IVEware (Raghunathan et al., 2016). Imputation in BBDESIGN accounts not for missingness, but for complexity, including clustering and weights, in the raw survey data.

Procedures

Regression Modeling

Non-TV screen time was explored as a predictor of dichotomous psychological distress items with binomial regression models in “VGAM.” Distress indicators as predictors of screen time, as well as screen time as a predictor of the multiple-choice suicide attempts item in YRBS, were explored with sequential models, introduced by Tutz (1990) as a means of modeling ordinal outcomes with respect for nested successive levels. The sequential approach models a set of distinct latent continuous random variables centered around the thresholds of transition from the lower to the higher of each successive pair of response options. As explained by Bürkner and Vuorre (2019), "a higher response category is possible only after all lower categories are achieved" (p. 6). The model therefore suits both YRBS screen-time items, in which, for example, the response "2 hours" implies having passed through the alternatives of "less than 1 hour" and "1 hour" and the YRBS suicide-attempts item, in which a response of "2 or 3" encompasses the alternative of one attempt.

Ordinal regression of data with *j* responses operates by comparing each of *j-1* responses to a selected reference condition. The sequential modeling option in "svyVGAM" produces a distinct ß coefficient for each of the *j-1* responses of interest in context of one of *k-1* levels of the predictor. The approach enables examination of respondents' actual selections from among the response alternatives offered by YRBS without artificial binning or quantification. The binomial regression modeling option in "svyVGAM" similarly enables analysis of dichotomous responses.

Analytic Decisions in Modeling

Key to ordinal regression in general is the "proportional odds assumption," which assumes that all response categories bear identical relationships to the predictor: a uniform ß coefficient for all. In light of the non-equivalent distinctions among response options in some YRBS items (for instance, differences in the breadths of time-range options and in the relative relevance of those options to published data surveying adolescents' actual screen-time propensities), modeling in this study took advantage of the "parallel=FALSE" argument in "VGAM," which waives the proportional-odds assumption (or "parallelism"), enabling calculation of distinct coefficients for each response under condition of each predictor level (Yee, 2010).

Under the constraints of the structure of YRBS data, the analyses here were conducted in the spirit of exploratory multiverse analysis (Steegen et al., 2016). Multiverse analysis has been described as analysis across all data sets that might "arise from different reasonable choices" (Steegen et al., 2016, p. 703). The present analysis avoided many such choices, rooted in grouping assumptions, by treating each individual item as a native variable with a unique set of response options. Data was organized into multiple subsamples for analysis, some distinct, some overlapping, each embodying a hypothesis about loci of difference or change. These included individual cohort subsamples, subsamples grouped by the variable "sex," and, within each, subsets of data grouped by variables of interest.

In one case, that of the suicide attempts item, computational challenges forced a reframing of response data. Small frequencies of selection for reports of two or more suicide attempts, as well as the presence of only a single primary sampling unit within certain strata of the original data for certain cohorts (unspecified in error messages), obstructed inference treating specific numbers of suicide attempts as an outcome. Data for this item were therefore treated as ordinal for basic descriptive statistics and for treatment as a predictor, but reconfigured as dichotomous for treatment as a possible outcome of screen time.

As the multiverse approach prescribes, the same analyses--correlation, then either sequential/ordinal or binomial regression, as appropriate to each item's response structure--were "performed across all the alternatively constructed data sets" (Steegen et al., 2016, p. 707). The results reported here may therefore be construed as contributing to a larger multiverse of YRBS results, one encompassing previous analyses with all their own choices and assumptions.

Descriptive Statistics

As noted above, the “survey” package in R produces a set of descriptive statistics for each missing-data imputation, not a single pooled set of descriptive statistics. The study addressed this challenge with three workarounds. First, decomplexified frequency statistics for the full sample and for each cohort were calculated by applying the weighted percentages provided in YRBS documentation to raw sample sizes. Second, sets of contingencies and chi-square statistics were calculated with “survey” for each of the five missing-data imputations. In practice, the statistics in the five sets varied very slightly, with occasional differences of ±.01; many of these probably resulted from rounding. In each case, therefore, statistics for the first of the five missing-data imputations are reported in Appendix B.

The third workaround involved Goodman-Kruskal tau statistics, discussed below. The “survey” package in R, which accounts for complexity in survey data on the fly during calculation, does not produce these statistics. Instead, decomplexified versions of the YRBS data were created with BBDESIGN in IVEware for processing with the "GoodmanKruskal" package in R (Pearson, 2020). Twenty-five imputations were created; then, as a test, Goodman-Kruskal tau statistics for the pairing of screen time with extended sadness in the full sample were calculated for all 25 and compared. Here again, the statistics were found to be nearly identical, so further Goodman-Kruskal tau statistics were calculated using the first imputation in the set of 25. A setting in the "GoodmanKruskal" package accounted for missing data.

Response Distributions. The study involves two groups of YRBS items: levels of screen time and psychological-distress indicators. During the administrations included here, YRBS offered two screen-time items, one involving television viewing on an average school day and the other assessing non-school use of other screen devices on an average school day. Each bears a problematic relationship to the research questions of this study. Television viewing has not generally been considered in the literature associating screen time with psychological well-being; it was therefore not modeled as a predictor or an outcome in this study. Descriptions of distributions of responses on TV viewing, however, are included to provide context, and in particular historical context, for the statistics describing the use of "other screens" in the years following the introduction of connected mobile devices.

With its "other screens" item, YRBS asked respondents to summarize time spent with a grab-bag of devices whose varied and shifting uses over the study period were indicated by the parenthetical list of examples provided in each administration: Devices ranged from home computers and console video games to smartphones and tablets; uses ranged from web surfing, email, texting, voice chat and video chat to merely monitoring or actively participating in social media, conducting research via Google or YouTube, and streaming the long-form video products formerly accessible only with television or in cinemas. Its expansiveness notwithstanding, this omnibus item has been treated as primary evidence in previous analyses of YRBS data.

With respect to indicators of psychological distress, this study adopted the approach of Messias et al. (2011), exploring each item separately rather than composing a three-point index (Wang et al., 2018), assuming that yes to one equals yes to all (Twenge, Joiner et al., 2018; and Twenge & Campbell, 2019); formulating a variety of combined specifications (Orben & Przybylski, 2019a); or treating the set of dichotomous indicators as a single hierarchical "suicidal ideation and behavior" index (Vuorre et al., 2021). The approach is consistent with the absence of discussion of a measurement model or reference to latent variables in YRBS documentation.

The absence of a measurement model in YRBS documentation is particularly relevant to previous analysts' reframing of response data into indices, whether treating responses as equivalent, as in the case of the Twenge group, or as hierarchical, as in the case of Vuorre et al. (2021). The latter wrote that "analyzing the items separately would risk spurious findings because of multiple comparisons" (Vuorre et al., 2021, p. 5). This was a semantic judgment, or perhaps a retrospective theoretical assumption, presented as a statistical concern. Although YRBS included these four questions one after another in the same order in every administration, respondents were not advised to approach them as a nested set but, implicitly, as independent inquiries. That they did so may be indicated by the response-frequency statistics of the original raw sample data. The first item, on extended sadness, was skipped by 1,281 respondents over seven administrations. The second, on serious consideration of suicide, was skipped by a few less, 1,238. For item three, on planning suicide, skipping rose by about a third, to 1,643. But 17,163 respondents skipped the item on suicide attempts (see Table A4).

Why did an additional 405 respondents skip the planning question, rather than choosing "no" with respect to planning? Why did 15,520 more--15% of the seven-cohort sample—skip the attempts question, rather than choosing "none" for suicide attempts? The answer is of course indeterminable. Perhaps some subset did interpret the four questions (or, anyway, the latter three) as dependent upon one another, responding in nested consistency. Perhaps others interpreted the questions that way but instead of delivering up nested, overlapping data, as the "multiple comparisons" concern would suggest, they demurred and moved on. Absent a close examination of within-subject response patterns, it seemed prudent to refrain from assumptions about respondents' reading of the "set" and rather to treat each item as independent, with its own idiosyncratic universe of response: to investigate whether screen time might have had distinct associations with each of four adolescent experiences, some evidently more common than others. The absence of reference items in the *National YRBS Data User Manual*s not only to a measurement model, but also to "consistency checks" among these four items, bolsters the logic of this approach.

Item response distributions are reported for each cohort in the seven-administration sample, for the sample as a whole, and for the two categories denominated by YRBS as sex, analogous to what most published literature refers to as "gender" (raw sample data, Table A4; distributions adjusted to population percentages, Appendix B). The breakout distributions are important for assessment of claims that both the phenomena under investigation, screen time and reports of psychological distress, increased over the period of study and that girls' experience over the period was different from that of boys.

Association of Non-TV Screen Time with Indicators of Psychological Distress. The results here document the distribution across all seven cohorts of pairs of responses including an ordinal level of the non-TV screen time variable and a dichotomous or ordinal level of each psychological-distress variable. Frequencies and proportions are reported along with two assessment statistics, chi-square and the Goodman-Kruskal tau. Chi-square statistics, in principle assessing overall strength of association for the pairing, are reported with degrees of freedom and *p*-values, but without reference to significance. As Lin et al. (2013) have cautioned, large samples like the data here can quickly drive *p*-values toward zero, making them uninformative. Goodman-Kruskal tau statistics (GKT) are reported as measures of effect size (Berry et al., 2006) in Appendix C.

As an asymmetric statistic, the GKT assesses strength of association directionally: here, the extent to which reports of screen time predict reports of distress and, separately, the extent to which reports of a distress symptom predict levels of screen time (Goodman & Kruskal, 1954). GKTs run between 0 and 1. According to Pearson (2020, March 18), a GKT of 1 indicates that information about variable X enables perfect prediction of variable Y; a GKT of 0, that information about X provides no information about Y. Pearson's guidelines describe .85 as a GKT denoting strong predictive capability, .36 as moderate capability, .14 as weak capability, and .05 or lower as essentially indicating X's inability to predict Y.

Change in Patterns of Association over Time. The results here provide cohort-level versions of the pairings in the previous one. Comparison among these statistics is central to an assessment of the claim that not only did screen time and psychological distress grow during the study period, but the effects of screen time on symptoms of distress increased as well. Particular attention is called to comparisons between associations in 2009 and associations in 2015, the earliest and latest YRBS cohorts reviewed in Twenge, Joiner et al., 2018; Twenge and Campbell, 2019; Twenge and Martin, 2019; and Twenge and Martin, 2020. Goodman-Kruskal tau statistics are reported for each pairing within each cohort. Because the numbers of respondents reporting each category of suicide attempts (1, 2-3. 4-5, and 6 or more) within each cohort were small, statistics are reported for the dichotomized reframing of attempted suicide.

Difference in Patterns of Association by Sex. The results here distinguish the experiences of girls over the full study period from those of boys.

Change in Patterns of Association Over Time, by Sex. The results here provide cohort-by-cohort versions of the pairings for girls and boys, documenting any change in those associations over time.

Ordinal and Binomial Regression Modeling

Ordinal and binomial regression modeling have been at the heart of this study since its inception: using appropriate statistical methods to mine YRBS data for evidence bearing on the much-debated effects of screen time on psychological distress and, conversely, on any possible effects such distress might have on the amount of time adolescents spend with digital screen devices. As the descriptive statistics reported here indicate, YRBS data provides scant evidence of correlation among these phenomena, much less significant effects. Nonetheless, claims have been made and widely disseminated on the basis of precisely these data: claims resting on regression of combined, pooled and binned versions of the data, regressions treating this ordinal data as numeric, and unidirectional regressions treating screen time, but rarely distress, as the predictor. A responsive re-analysis demanded comparable, appropriate regression modeling.

Model Construction. The statistics reported here were modeled with the "svyVGAM" (Lumley, 2021) and "VGAM" (Yee & Moler, 2021) packages in R (R Core Team, 2021), then pooled with the "MIcombine" function of the "mitools" package (Lumley, 2019). The acronym "VGAM" stands for "vector generalized additive modeling", a flexible framework for categorical data analysis. The "VGAM" package accommodates a wide variety of link functions for the transformation of categorical/ordinal data, including logit for binomial modeling and complementary log-log, recommended by Bürkner and Vuorre (2019) for modeling ordinal data in which each successive category subsumes previous categories. The "parallel=FALSE" option in "VGAM" waives the proportional odds assumption, enabling models to produce distinct ß coefficients for each level of response at each level of a predictor.

For dichotomous outcomes, models incorporated binomial regression with data transformed to a normal distribution by the logit link function. Where outcomes included more than two categories, sequential models were run, with data transformed by the complementary log-log link function, as recommended by Bürkner and Vuorre (2019). However, "svyVGAM" failed to produce multinomial models for the four levels of suicide-attempt responses for the 2017 and 2019. Error messages reported that only one primary sampling unit was available within a particular, but unspecified, stratum, defeating the algorithm used to treat complex survey data as population-balanced samples. To enable comparison across the seven cohorts, the data on suicide attempts were reframed as dichotomous and treated in binomial regression models with logit.

Interpretation of Regression Coefficients. Intercept coefficients in ordinal regression provide a link-function-transformed sense of the baseline probability that respondents will select a particular response under a particular predictor condition—odds, in the case of binomial regression, or hazard rate, in the case of sequential models. Effects coefficients correspond to ratios of increase or decrease in the odds or hazard of a respondent's choosing each response category under each predictor condition.

Response option "A. I do not play video or computer games or use a computer for something that is not school work " was selected as reference category for the non-TV screen time item, allowing each effects coefficient to represent a level of screen time. Response option "A. 0 times” was selected as reference category for both the original ordinal framing and the dichotomous reframing of the suicide attempts item, allowing effects coefficients to represent reported attempts. Option "B. No" was programmed as the reference category for extended sadness, consideration of suicide and suicide planning, allowing effects coefficients to represent affirmative responses.

Regressions Modeled. Two sets of regressions were modeled: a set with non-TV screen time as predictor of each psychological distress indicator and a set with psychological distress indicators as predictors of screen time. Each set includes, for each screen-time/distress-indicator pair, models of the full seven-cohort data set, models for each of the seven cohorts, and models enabling comparison on the basis of sex.

Chapter 4: Results

Descriptive Analyses

Distributions of Responses

Three versions of YRBS data were explored in this study. Population-adjusted response frequencies were calculated by applying the weighted percentages reported by YRBS (Table A4) to raw sample sizes ("usable forms," Table A2). Statistics describing the proportional relationships among variables, as well as inferential statistics, were calculated using 5 missing-data imputations of the original YRBS complex survey data. Goodman-Kruskal tau statistics were calculated with 25 versions of the YRBS data, multiply imputed to synthesize population weights, but not for missingness.

Distribution of Responses on Television Viewing. As documented in Table B2, the television-time category most frequently selected over the full study period was 2 hours. More than twice as many respondents (17%) selected the no-TV-at-all category as the 5-hours-or-more category (8%), while 19% reported watching less than 1 hour as opposed to only 14% watching 4 hours or more (including responses of 5 hours or more).

The totals at the extremes derive from a decline in reported TV use over the period of study (Table B3). In 2007, only 9% of respondents selected the no-TV category. That proportion more than doubled (to .19) by 2015. By 2019, nearly a third of respondents (28%) reported watching no TV at all on an average school day. Conversely, the proportion selecting the 5-hours-or-more category dropped from .11 in 2007 to .07 in 2015 and .08 in 2017 and 2019. In similar fashion, the proportion selecting the less-than-

1-hour category for TV grew and those for 1, 2, 3 and 4 hours per average school day declined over the period.

Distribution of Responses on Non-TV Screen Time. Patterns of response regarding non-TV screen time (Table B4) were quite different from TV patterns: 17% of the full seven-cohort sample chose options reporting no use or less than 1 hour; 16% chose 2 hours or 5 or more hours; 14% chose 1 hour; and 13% chose 3 hours. The outlying category was 4 hours per average school day, chosen by only 8% of all respondents. This similarity in full-sample proportions concealed contrasts of stability and change across the seven cohorts.

The Twenge group has posited that adolescents' use of non-TV digital screens exploded between 2007, the year the iPhone came to market, and 2015, the last year they studied. This generalization drew some support from the current study, with the proportions of response at 5 hours or more use per day growing from .08 in 2007 (as well as in 2009, the first cohort considered by the Twenge group) to .20 in 2015 (the last Twenge-group cohort), then to .22 in 2017, ending at .21 in 2019. The next two categories, 3 hours and 4 hours per day, grew less sharply. The 3-hour category rose from .11 in 2007 (and 2009) to .13 in 2015 to .15 by 2019. The 4-hour category rose from .05 in 2007 to .06 in 2009, then to .09 in 2015, but inched up only .01 (to .10) by 2019. At the same time about a fifth of respondents consistently refrained from any screen use at all on the average school day, not only during the Twenge time frame (.17 in 2007; .18 in 2015) but through to 2019 (.18). Another consistent proportion of respondents reported a moderate 2 hours of daily use (.17 in 2007 and 2009, .16 in 2019). The shift in non-TV screen time following the introduction of smartphones was therefore far from uniform across the teen population. It took place at the extremes of daily use, with a proportion reporting less than 2 hours' daily use in 2019 half the size of the 2007 or 2009 proportions, while more than two and a half times the 2007 or 2009 proportions reported 5 or more hours in 2019.

Distributions of response by sex (Table B5) were similarly revealing, in light of concerns about girls' growing use of social media. Across the entire sample, girls were half again more likely than boys to spend no time on other screens at all (.21 for girls, .13 for boys). They were overall slightly less likely than boys to use screens five or more hours per day (.15 vs. .16).

Cohort to cohort, the proportion of girls who eschewed non-TV screen devices all together dipped to .15 in 2011, but soon climbed back and held steady: .24 in 2007, .22 in 2009, .23 in 2019. Proportions among boys were similarly stable: 14% reported no use on the average school day in 2007, 13% in 2009, 12% in 2019.

Among the majority of teens who did use digital screens, there was indeed an upward shift across the period: In 2009, 23% of girls used non-TV screen devices for less than an hour a day, 17% for 1 hour, 16% for 2 hours. By 2019, those proportions had fallen to .09, .08 and .13, respectively. Meanwhile proportions for higher categories--3 hours, 4 hours, and 5 or more hours respectively--rose from .10 to .14, from .05 to .10, and from .06 to .21. The pattern among boys was similar, with comparable less-than-1-hour (.23) and maximum-use (.10) proportions in 2009, ending in 2019 with a 50% decline at less than an hour (to .11) and a doubling at 5 hours or more (to 20).

Distribution of Responses on Extended Sadness. From 2007 through 2019, about a third of all YRBS respondents reported having felt extended, debilitating sadness for two weeks or more during the previous year (Table B6). Dramatic growth came only after the Twenge group's period of interest: From 2007 to 2009, extended sadness had declined from .29 to .26, rising to only .01 above the 2007 level in 2015 (.30), then leaping to .37 in 2019. Girls' and boys' proportions differed: 39% of girls in the full sample, but only 22% of boys, reported extended sadness (Table B7) with girls comprising 63% of all respondents reporting this experience.

Cohort to cohort, proportions of girls reporting extended sadness had declined from .36 in 2007 to .34 in 2009, the start of the Twenge group's period of interest, rising to .40 in 2015, then to .47 by 2019. Proportions among boys had also declined by the first cohort studied by the Twenge group, from .21 in 2007 to .19 in 2009; they returned to the 2007 level at the end of the Twenge group's period of interest; then, like the girls' proportions, grew substantially (.06) from 2015 to 2019. Cohort by cohort, boys' proportions were consistently smaller than girls', from .21 in 2007 (vs. .36 of girls) to .27 in 2019 (vs. .47 of girls).

Distribution of Responses on Consideration of Suicide. Across the entire sample, 16% of respondents reported having seriously considered suicide—about half the proportion reporting extended sadness (Table B8). The proportion reporting serious consideration of suicide rose a point or two from cohort to cohort, from .14 in 2007 and 2009 to .18 in 2015, then .19 in 2019, in each case about half the proportion of respondents reporting extended sadness. As with sadness, girls across the full sample reported seriously considering suicide in larger proportion than boys (.21 vs. .12, again about half the proportions of sadness: Table B9). Girls made up 61% of respondents reporting serious consideration of suicide, and their proportions grew more than boys' across the study period. In 2007, 19% of girls reported having seriously considered suicide, as opposed to 10% of boys. Girls' proportion declined to 17% in 2009, the first year considered by the Twenge group, but rose to 23%, as opposed to 13% of boys, by 2015. In 2017, the proportions declined 1% for both sexes, then rose 2% in 2019.

Distribution of Responses on Suicide Planning. Overall, the proportion of respondents who reported having made a suicide plan (.13) was .03 smaller than that reporting serious consideration (Table B10). The proportion of girls reporting suicide planning was considerably larger than that of boys (.16 as opposed to .10) and grew more than twice as much from 2007/2009 to 2019 (.07 as opposed to .03: Table B11). The gap between reporting consideration of suicide and reporting actual planning was also larger overall for girls (.05) than for boys (.02). Over time, that gap first closed, then held steady for girls (.06 in 2007; .04 in 2009, 2015 and 2019), while it opened a bit wider for boys (.01 in 2007, .02 in 2009, .03 in 2015, .02 in 2019).

Distribution of Responses on Suicide Attempts. As noted above, substantially fewer respondents provided responses to this item than to the three dichotomous psychological distress items. Of those who did, 92%, including 90% of girls and 95% of boys, reported no attempts (Tables B12 and B13). Over the seven administrations, the no-attempts proportion declined slightly, from .93 in 2007 to .91 in 2019 (Table B12b), but there was no clear pattern of increase among the four options reporting suicide attempts in any administration or either sex. Among girls, 5-6% consistently reported a single attempt; 3-4%, 2-3 attempts; and no more than 1% either of the higher categories (Table B13c). Among boys, 3% reported a single attempt in every administration except 2019 (4%), and with one exception (2% reporting 2-3 attempts in 2017), no more than 1% reported a higher category in any administration (Table B13d).

Association of Non-TV Screen Time with Indicators of Psychological Distress

Association of Non-TV Screen Time and Extended Sadness. The chi-square statistic for association of non-TV screen time and extended sadness in the full sample was 15,003 ($df = 6$, $N = 103{,}525$, $p < .001$).

Non-TV Screen Time as Predictor of Extended Sadness. The full-sample proportions of extended sadness at each level of non-TV screen time appear in Table B14. In most cases, the proportions were smaller than or equal to the proportion of extended sadness in the sample as a whole (.30). The two highest screen time categories were exceptions. The proportion of sadness in the 4-hours category (.34) was .04 larger than that in the overall sample. The proportion in the 5-hours-or-more category (.42) was .12 larger than the overall sample. The Goodman-Kruskal tau statistic for this relationship was .014, indicating the inability of non-TV screen-time data in this sample to predict reporting of extended sadness (Table C1).

Extended Sadness as Predictor of Non-TV Screen Time. The proportions of non-TV screen time levels within the subsample reporting extended sadness appear in Table B15. These proportions were at or below overall full sample proportions for all categories below 4 hours, suggesting greater use of digital screens by those who reported extended sadness. The proportion reporting extended sadness and four hours of average school-day screen time (.09) was .01 larger than the proportion in the full sample (.08). Only the proportion selecting the five-hours-or-more category (.21) was substantially larger than the proportion in the full sample (.16). The Goodman-Kruskal tau statistic for this relationship was .003, indicating the inability of extended sadness data in this sample to predict screen time (Table C3).

Association of Non-TV Screen Time and Consideration of Suicide. The chi-square statistic for association of non-TV screen time and consideration of suicide in the full sample was 1,128.2 ($df = 6$, $N = 103{,}525$, $p < .001$).

Non-TV Screen Time as Predictor of Consideration of Suicide. The proportions of respondents at each screen time level who reported consideration of suicide appear in Table B16. The proportions at no screen time (.15), less-than-1 hour (.14), 1 hour (.13) and 2 hours of use (.15) on an average school day were all smaller than the overall sample proportion (.16). The proportion at 3 hours (.13) matched that of the full sample; the proportion at 4 hours was .01 greater than that of the full sample. Only the proportion at 5 hours or more (.24) was substantially greater than the full sample. The Goodman-Kruskal tau statistic for this relationship was .01, indicating the inability of non-TV screen-time data in this sample to predict consideration of suicide (Table C1).

Consideration of Suicide as Predictor of Non-TV Screen Time. The proportions of each screen-time category within the segment of the full sample reporting consideration of suicide appear in Table B17. Respondents who reported consideration of suicide also reported screen time below or equal to full-sample proportions at all levels under four hours

(.15 vs. .17 selected no use, .14 vs. .17 selected less than 1 hour, .11 vs. .14 selected 1 hour, .15 vs. .16 selected 2 hours, while .13 of both the subsample and the full sample selected 3 hours), suggesting greater use of digital screens by those who reported this distress indicator. A proportion .01 larger than the sample proportion selected the 4-hour category (.09 vs. .08). Only the proportion of those reporting serious consideration of suicide who also reported screen time in the indeterminate range 5 or more hours (.24) substantially exceeded the proportion in the full sample (.16). The Goodman-Kruskal tau statistic for this relationship was .002, indicating inability of serious consideration of suicide to predict non-TV screen time (Table C3).

Associations of Non-TV Screen Time and Suicide Planning. The chi-square statistic for association of screen time with suicide planning in the full sample was 1,057.2 ($df = 6$, $N = 103{,}525$, $p < .001$).

Non-TV Screen Time as Predictor of Suicide Planning. The proportions of reports of suicide planning within each screen-time category appear in Table B18. At all levels under 4 hours, a proportion smaller than or equal to that in the full sample (.13) reported planning suicide (.12 at no use, .11 at less than 1 hour, .10 at 1 hour, .12 at 2 hours, .13 at 3 hours). Among those who selected the 4-hour option, a proportion .01 larger than the sample proportion reported suicide planning (.14). Only the proportion of those in the indeterminate range 5 or more hours (.21) substantially exceeded the proportion reporting suicide planning in the full sample. The Goodman-Kruskal tau statistic for this relationship was .009, indicating inability of non-TV screen-time to predict suicide planning (Table C1).

Suicide Planning as Predictor of Non-TV Screen Time. The proportions of each screen-use category within the segment of the sample reporting suicide planning appear in Table B19. Respondents who reported planning suicide also reported screen time below or equal to proportions in the overall sample in all categories under five hours (.15 vs. .17 at no use, .14 vs .17 at less than one hour, .10 vs .14 at one hour, .14 vs. .16 at two hours, .13 and .8 at three hours and four hours respectively both among suicide planners and in the broader sample). Here again, those reporting suicide planning apparently spent more time with screens than the sample at large. Only the proportion of those reporting suicide planning who also reported screen time in the indeterminate range five or more hours (.25) exceeded the proportion in the full sample (.16). The Goodman-Kruskal tau statistic for this relationship was .002, indicating inability of suicide planning to predict use of non-TV screen devices (Table C3).

Association of Non-TV Screen Time and Suicide Attempts. The chi-square statistic for association of screen time with reports of suicide attempts in the full sample was 824.61 ($df = 6$, $N = 103{,}525$, $p < .001$).

Non-TV Screen Time as Predictor of Suicide Attempts. The proportions of reports of suicide attempts within each screen-time category appear in Table B20. In each category of actual use below the maximum, the proportions of respondents reporting suicide attempts were smaller than or equal to proportions in the full sample. Only among respondents who chose either no screen time at all or the indeterminate range 5 or more hours were proportions a point or two larger than those in the full sample. The Goodman-Kruskal tau statistic for this relationship was .009, indicating inability of screen time data to predict suicide attempts (Table C1).

Suicide Attempts as Predictor of Non-TV Screen Time. The proportions of each screen-time category within the segment of the sample reporting suicide attempts appear in Table B21. As with other psychological distress indicators, these statistics suggest greater use of screen devices by those reporting distress than by the full sample: Respondents who reported suicide attempts also reported use of non-TV screen devices at or below full-sample levels in all but five of the 35 possible associations. The proportion of respondents who reported a single suicide attempt together with non-TV screen time at the indeterminate level of 5 hours or more was, on the other hand, .20: 25% larger than the sample proportion of .16. Among those reporting 2-3 attempts, 25% selected the 5-or-more hour category, a proportion .09 larger than the proportion of the full sample reporting 5 or more hours. Among respondents reporting 4-5 suicide attempts, 26% selected the 5-or-more-hours category, as opposed to 16% of the sample as a whole; 19% reported no use at all, as opposed to 17% of the full sample. Of respondents who reported 6 or more suicide attempts, 43% reported 5 or more hours of screen time, 27% more than in in the full sample. The Goodman-Kruskal tau statistic for this relationship was .003, indicating inability of suicide attempts data to predict screen time (Table C3).

Change in Patterns of Association Over Time

Non-TV Screen Time and Extended Sadness.

Change in Non-TV Screen Time as Predictor of Extended Sadness. Proportions of reports of extended sadness within each screen-time category, cohort by cohort, appear in Table B22. The proportion of respondents reporting extended sadness grew steadily across the study period; after declining from .28 in 2007 to .26 in 2009, proportions rose to .3 at the Twenge group's endpoint in 2015 and to .36 in 2019. All categories of non-TV screen time reflected this growth. Proportions of sadness were larger than full-cohort proportions in 5-hours-or-more category for all cohorts; in the 4-hour category for all cohorts except 2011; in the 3-hour category until 2013; and in the no-use category for 2007 and 2009. Goodman-Kruskal tau statistics, cohort by cohort, ranged from .006 in 2011 to .021 in 2019, in no case indicating the ability of non-TV screen time to predict extended sadness (Table C1).

Change in Extended Sadness as Predictor of Non-TV Screen Time. Proportions of reports of screen time among respondents reporting extended sadness, cohort by cohort, appear in Table B23. Overall, and consistent with patterns in the full sample, from 2007 through 2019, shrinking proportions of sad respondents selected less than 1 hour, 1 hour, or 2 hours of use; increasing proportions selected 3, 4, or 5-or-more hours. Proportions reporting no use at all rose and fell, landing in 2019 .04 below the 2007 level, but only .01 smaller than in 2009. Among sad respondents who did use non-TV screen devices, the proportions reporting 3 hours of use held at or below full-cohort levels until 2019; proportions reporting 4 hours or more stayed within .01 of full-cohort levels; but proportions at the indeterminate 5-hours-or more level consistently exceeded those in full cohorts. Goodman-Kruskal tau statistics, cohort by cohort, ranged from .001 in 2009 and 2011 to .005 in 2015 and 2019, in no case indicating the ability of extended sadness to predict non-TV screen time (Table C3).

Non-TV Screen Time and Consideration of Suicide.

Change in Non-TV Screen Time as Predictor of Consideration of Suicide. Proportions of reports of serious consideration of suicide within each screen-time category, cohort by cohort, appear in Table B24. Across the study period, respondents who selected the highest screen-time category, 5 hours or more, were most commonly those who reported consideration of suicide, in proportions larger than those of each cohort sample. Consideration of suicide was also more common in the 4-hour category, where proportions were greater than full-cohort proportions in five of the seven cohorts (although smaller than full-cohort proportions in two). The proportion of non-users reporting consideration of suicide was relatively stable across the study period, ranging between .14 and .16. The proportion of non-users who considered suicide was larger than the full cohort proportion in 2007 and the same as the full cohort proportion in 2009; then from 2011 on, smaller. Goodman-Kruskal tau statistics, administration by administration, ranged from .04 in 2007 to .015 in 2015 (Table C1), in no case indicating the ability of non-TV screen time to predict consideration of suicide.

Change in Consideration of Suicide as Predictor of Non-TV Screen Time. Proportions of screen-time categories selected by respondents reporting serious consideration of suicide, cohort by cohort, appear in Table B25. In most cases, screen-time levels reported here were at or below full-cohort levels. The only category consistently higher than full-cohort levels was the highest, 5 hours or more. Proportions at this level rose from .11 in 2007 to level out at just under a third of those reporting serious consideration of suicide from 2013 on. Goodman-Kruskal tau statistics, cohort by cohort (Table C3), ranged from .001 in 2007, 2009 and 2011 to .004 in 2015, in no case indicating an ability of serious consideration of suicide to predict non-TV screen time.

Non-TV Screen Time and Suicide Planning

Change in Non-TV Screen Time as Predictor of Suicide Planning. Proportions of reports of suicide planning within each screen-time category, cohort by cohort, appear in Table B26. Respondents who selected the 5-hours-or-more category reported suicide planning in larger proportions than the full subsample in every cohort; those proportions rose and fell from cohort to cohort. Among those who selected the 3-hour category in 2009 and 2013 or the 4-hour category in 2007, 2011, and 2019, the proportions reporting suicide planning were also larger than cohort levels for those administrations. Among those who selected the no-use category, the proportion was larger than that in the cohort as a whole in 2009, but otherwise remained at or below cohort levels. Goodman-Kruskal tau statistics, cohort by cohort, ranged from .005 in 2007 to .013 in 2015 and 2019 (Table C1), in no case indicating ability of non-TV screen time to predict suicide planning.

Change in Suicide Planning as Predictor of Non-TV Screen Time. Proportions of reports of screen time among respondents reporting the planning of suicide, cohort by cohort, appear in Table B27. Proportions selecting categories from no use through 2 hours declined across the period, while the proportions of respondents who seriously considered suicide and selected 3 hours, 4 hours or, especially, 5 hours or more grew, following the pattern of change in selection of screen-time categories in the overall sample. However, proportions of use at 4 hours and below by those reporting suicide planning were also consistently smaller than comparable full-cohort proportions, suggesting association between this indicator and increased screen use. The only category which consistently drew proportions of respondents reporting suicide planning larger than those in respective full cohorts was 5 hours or more. Goodman-Kruskal tau statistics, cohort by cohort, ranged from .001 from 2007 through 2011 to .003 in 2015 and 2019 (Table C3), in no case indicating any ability of suicide planning to predict screen time.

Change in Association of Non-TV Screen Time and Suicide Attempts.

Change in Non-TV Screen Time as Predictor of Suicide Attempts. Proportions of reports of suicide attempts within each screen-time category, cohort by cohort, appear in Table B28. Because the proportions of reports of more than a single attempt were small, all reports of any number of attempts were summed here, reframing the data as dichotomous. Only the 5-hours-or-more category consistently exceeded cohort levels for proportions of respondents reporting suicide attempts. Respondents choosing the 4-hour level reported suicide attempts in higher-than-full-cohort proportions in 2007, 2011 and 2013, while those reporting no screen use at all on the average school day exceeded full-cohort proportions for attempted suicide in 2007 and 2011. Goodman-Kruskal tau statistics, cohort by cohort, ranged from .006 in 2007 to .015 in 2019 (Table C1), in no case indicating ability of screen time to predict suicide attempts.

Change in Suicide Attempts as Predictor of Non-TV Screen Time. Proportions of reports of screen time among respondents reporting suicide attempts, cohort by cohort, appear in Table B29. It must be remembered that the groups reporting suicide attempts are themselves small fractions of their cohorts, ranging between 7% and 9% of each cohort (Table B12).

Among respondents who reported suicide attempts, the two most frequently chosen screen-time categories were 5 hours or more and no use. The proportions of those who attempted suicide and used screens at least 5 hours a day exceeded the full-cohort proportion in each administration. The proportions selecting no-use category exceeded cohort proportions in three of the seven administrations. The only other categories chosen by a larger proportion of suicide attempters than by the full sample were less-than-1-hour in 2019, 3 hours in 2009 and 2019 and 4 hours in 2011 and 2013. The Goodman-Kruskal tau statistic for this association was .002 in 2007; .003 in 2009, 2011, 2013 and 2015; .and 004 in 2017 and 2019 (Table C3), in no case indicating ability of suicide attempts to predict use of non-TV screen devices.

Difference in Patterns of Association by Sex.

As documented in Table B5, among participants who used non-TV screens at all (that is, apart from the no-use category), there was little difference, whether in the full sample or within most cohorts, in the proportions of screen-time levels selected by girls and boys. On the other hand, across the full sample and within each cohort there were considerable differences between girls' and boys' reports of psychological distress. Within their respective full-sample subsets, 39% of girls, but only 22% of boys, reported extended sadness (Table B7); 21% of girls, but only 12% of boys, reported serious consideration of suicide (Table B9); 16% of girls, but only 10% of boys, reported having made suicide plans (Table B11); while 10% of girls, but only 5% of boys, chose a nonzero category of suicide attempts (Table B13). The results in this section address the ways patterns of association reflected these differences.

Association of Non-TV Screen Time and Extended Sadness, by Sex.

Non-TV Screen Time as Predictor of Extended Sadness. Proportions of reports of extended sadness among girls and boys selecting each category of screen time appear in Table B30. In every screen-time category, girls' reports of extended sadness exceeded boys'. About a third of girls reported extended sadness in categories from no use to 2 hours; reports increased category by category above 1 hour. About a fifth of boys reported extended sadness in categories up to 3 hours; at four hours, a quarter of boys reported extended sadness. Only in the indeterminate category of five hours or more did the percentage of boys reporting extended sadness approach one-third, while the percentage of girls selecting this category and reporting extended sadness reached 52%. Yet for neither girls (.019) nor boys (.011) did Goodman-Kruskal tau statistics indicate that screen time predicted extended sadness (Table C2).

Extended Sadness as Predictor of Non-TV Screen Time. Proportions of reports of screen time among girls and boys reporting extended sadness appear in Table B31. Among both girls and boys who reported extended sadness, the proportions who chose the top screen-time category, 5 or more hours, exceeded the proportions choosing that category in the same-sex subsets of the full sample (.21 vs. .16 for girls, .22 vs. .16 for boys). But in all other categories, respondents of both sexes who reported extended sadness selected levels of screen time in proportions at or close to those in the full sample. For neither sex did the Goodman-Kruskal tau statistic indicate that the extended sadness data in this sample could predict screen time (.004 for girls, .002 for boys: Table C4).

Association of Non-TV Screen Time and Consideration of Suicide, by Sex.

Non-TV Screen Time as Predictor of Consideration of Suicide. Proportions of reports of consideration of suicide by girls and boys at each level of screen time appear in Table B32. At every level of screen time, girls reported serious consideration of suicide in proportions 150% to 200% the size of boys' proportions. About a fifth of girls reported consideration of suicide within screen-time categories up to 3 hours, with the percentage increasing to a quarter at 4 hours and to nearly a third at the indeterminate level of 5 hours or more. Among boys, about a tenth reported consideration of suicide at screen-time levels up to 2 hours, with small increases at 3 hours (12%) and 4 hours (13%). Only at the top, indeterminate level, did boys' reports of considering suicide approach one-fifth. Neither the Goodman-Kruskal tau statistic for girls (.013) nor that for boys (.009) indicated ability of non-TV screen time to predict serious consideration of suicide (Table C2).

Consideration of Suicide as Predictor of Non-TV Screen Time. Proportions of reports of screen time by girls and boys reporting consideration of suicide appear in Table B32. Among both girls and boys, those who reported considering suicide selected the four lower categories in proportions smaller than the overall same-sex subset, suggesting association between consideration of suicide and greater screen use. As with extended sadness, both girls and boys reporting serious consideration of suicide selected only the highest screen-time level in proportions greater than their respective subsets (.23 vs. .16

for girls, .25 vs. .16 for boys). Proportions reporting any screen use at all were similar for girls and boys reporting consideration of suicide. However, girls who reported having considered suicide also reported no screen use in a proportion about half again as large as that of boys. Goodman-Kruskal tau statistics (.002 for both girls and boys, Table C4) did not support prediction of screen time by reports of serious consideration of suicide.

Associations of Non-TV Screen Time and Suicide Planning, by Sex.

Non-TV Screen Time as Predictor of Suicide Planning. Proportions of reports of suicide planning among girls and boys reporting each level of screen time appear in Table B34. In every screen-time category, the proportion of girls reporting suicide planning was at least half again as large as that of boys. Among both sexes, suicide planning was reported in larger proportions at higher levels of screen time, but again with distinct differences. At the highest level, a quarter of girls reported suicide planning, but only 16% of boys did; this was the only level of screen time where the percentage of boys reporting suicide planning was larger than that of girls who made no use of non-TV screens at all. Neither the Goodman-Kruskal tau statistic for girls (.011) nor that for boys (.008) indicated ability of non-TV screen time to predict suicide planning (Table C2).

Suicide Planning as Predictor of Non-TV Screen Time. Proportions of reports of screen time by girls and boys reporting suicide planning appear in Table B35. The patterns here were similar to those in the subsets of girls and boys reporting extended sadness and serious consideration of suicide: Those who reported planning suicide selected the five lower categories of screen time in proportions smaller than or close to the overall same-sex subset, suggesting association between this distress indicator and more time with non-TV screen devices. Both girls and boys reporting suicide planning selected only the highest screen-time level in proportions greater than their respective subsamples (24% vs. 15% for girls, 26% vs. 16% for boys). The identical Goodman-Kruskal tau statistics for girls and boys (.002, Table C4) indicated no ability of suicide planning to predict non-TV screen time.

Association of Non-TV Screen Use and Suicide Attempts, by Sex.

Non-TV Screen Time as Predictor of Suicide Attempts. Proportions of reports of suicide attempts, in any number, among girls and boys reporting each level of screen time appear in Table B36. Consistent with their overall subset trends, girls were more likely than boys to report suicide attempts no matter what level of non-TV screen time they selected. The proportions of girls reporting suicide attempts at various levels were from 50% to more than 100% larger than those of boys. Goodman-Kruskal tau statistics for neither girls (.007) nor boys (.011) indicated any ability of suicide planning to predict non-TV screen time (Table C2).

Suicide Attempts as Predictor of Non-TV Screen Time. Proportions of reports of screen time by girls and boys reporting suicide attempts appear in Table B37. Here again, screen-time proportions suggest that those reporting the distress indicator tended to report higher levels of screen use. Approximately a quarter of girls and boys who reported attempting suicide (with a slightly larger proportion of boys than girls) reported 5 or more hours of non-TV screen time, as opposed to less than a sixth of each subset. At all other levels, both girls and boys reporting suicide attempts reported screen time in proportions smaller than or close to those in their full subsets. Identical Goodman-Kruskal tau statistics for girls and boys (.003, Table C4) indicated no ability of attempted suicide to predict non-TV screen time.

Change in Patterns of Association Over Time, by Sex

Association of Non-TV Screen Use and Extended Sadness, by Sex.

Change in Non-TV Screen Time as Predictor of Extended Sadness. Proportions of girls and boys reporting extended sadness at each screen-time level in each cohort are reported in Table B38. In every cohort, girls at every screen-time level were more likely than boys to report extended sadness. Girls' proportions, as well as boys' proportions in most screen-time categories, remained relatively stable across the seven administrations and, in particular (with the exception of a .04 increase in the 4-hour category and a .05 increase in the 5-or-more-hour-category for girls), between 2009 and 2015, the period of the Twenge group's analyses. For both sexes, the largest increases came in the 4-hour and 5-hours-or-more categories in 2019. Boys' reports of extended sadness at the 4-hour level actually declined between 2007 and 2017, returning to the 2007 level only in 2019. For no cohort did Goodman-Kruskal tau statistics indicate that non-TV screen time predicted extended sadness for either boys or girls (Table C2).

Change in Extended Sadness as Predictor of Non-TV Screen Time. Proportions of screen time by girls and boys reporting extended sadness from 2007 to 2019 are reported in Table B39. For both girls and boys reporting extended sadness, proportions of higher levels of screen time increased and proportions of lower levels of use declined over the period, consistent with trends in the overall sample. For both girls and boys, proportions reporting extended sadness were at or below subset proportions for screen-time levels 2 hours and less. Proportions for the 3-hour level for girls and for both 3 hours and 4 hours for boys were mixed with respect to subset proportions. Proportions for the highest screen-time level were larger than subset proportions—another indication of association between extended sadness and more time spent with digital screens. Goodman-Kruskal tau statistics, all .008 or smaller (Table C4), did not show extended sadness predicting levels of screen time in any year.

Association of Non-TV Screen Time and Consideration of Suicide, by Sex.

Change in Non-TV Screen Time as Predictor of Consideration of Suicide. Proportions of girls and boys reporting consideration of suicide at each screen-time level in each cohort are reported in Table B40. Proportions at higher screen-time levels grew globally across the period, with girls' proportions consistently larger than those of boys. Where about a quarter of girls using screens for 4 hours or more reported consideration of suicide in 2007, about a third did so in 2019. Yet the largest increase among girls came not at the higher screen-time levels, but at the less-than-1-hour level (.17 in 2007, .28 in 2019).

For boys, the association of consideration of suicide with higher screen-time levels was fairly stable over the period; however, the proportion of those who considered suicide rose from .09 to .13 of the no-use subset. With no Goodman-Kruskal tau higher than .019 (for girls in 2019, Table C2), non-TV screen-time did not predict consideration of suicide.

Change in Consideration of Suicide as Predictor of Non-TV Screen Time. Proportions of screen time by girls and boys reporting consideration of suicide from 2007 to 2019 are reported in Table B41. As with screen time by girls and boys reporting extended sadness, and in reflection of the overall sample, the proportions of respondents who considered suicide and spent less time with screens declined, while proportions of those who considered suicide and spent more time with screens increased over the seven administrations. Among boys, the proportion of those reporting consideration of suicide who also reported no screen use at all remained fairly stable; among girls, that proportion declined from 2007 to 2019. Here again, both girls and boys who reported having considered suicide reported lower levels of screen time in proportions smaller than those of their subsets, suggesting association between consideration of suicide and increased screen time. However, Goodman-Kruskal tau statistics, all smaller than .005 (for girls in 2019, Table C4), indicated no prediction of screen time by consideration of suicide in any year.

Association of Non-TV Screen Time and Suicide Planning, by Sex.

Change in Non-TV Screen Time as Predictor of Suicide Planning. Proportions of girls and boys reporting suicide planning at each screen-time level in each cohort are reported in Table B42. Among girls who made no use of non-TV screens on an average school day, the proportions who reported suicide planning hovered around .14 in all seven cohorts. On the other hand, girls' proportions rose over the period at every level of use, with the greatest increases at the less-than-one-hour level (from .12 in 2007 to .21 in 2019), at four hours (from .15 in 2007 to .22 in 2019), and at five-hours-or-more (from .20 in 2007 to .29 in 2019).

Among boys, proportions of suicide planning held reasonably steady across cohorts at nearly every level of screen time. Goodman-Kruskal tau statistics did not rise above .012 (for girls in 2015, Table C2), indicating no ability of non-TV screen time to predict suicide planning.

Change in Suicide Planning as Predictor of Non-TV Screen Time. Cohort-scale proportions of screen-time levels reported by girls and boys reporting suicide planning are reported in Table B43. As with girls and boys reporting extended sadness or consideration of suicide, the proportions of respondents who reported both planning suicide and lower levels of screen use declined, while proportions of those who planned suicide and spent more time with screens increased over the seven administrations. Proportions at the highest level of screen use tripled over the seven administrations among girls who reported planning suicide (.10 in 2007, .31 in 2019). Among boys in 2007, the proportion who reported suicide planning and selected the 5-hours-or-more category (.18) was larger than that of girls (.10), but boys' proportion in 2019 (.28) was smaller than that of girls (.31). Compared to their respective sex/cohort subsets, proportions among those who planned suicide were smaller at lower levels of screen use: for girls, proportions were smaller at 2 hours and below until 2013, then at 4 hours and below from 2015 through 2019; for boys, at 3 hours and below across the full period. Goodman-Kruskal tau statistics, none larger than .004 (for girls in 2019, Table C4), indicated no prediction of screen time by suicide planning in any year.

Association of Non-TV Screen Time and Attempted Suicide, by Sex.

Change in Non-TV Screen Time as Predictor of Attempted Suicide. Proportions of girls and boys reporting attempted suicide, reframed as dichotomous data, at each screen-time level in each cohort are reported in Table B44. In all cohorts, at all screen-time levels, the proportions of girls reporting attempted suicide were larger than the proportions of boys. Proportions changed little—no more than .01 or .02—from one administration to the next at most levels. The major exception among girls was the five-hours-or-more category, which began in 2007 with .10 reporting suicide attempts, rose to .16 in the first year of the Twenge group's interest, 2009, reached a high of .17 in the last year of their interest, 2015, then receded in 2017 and 2019. Exceptions among boys included the no-use category, in which 5% of respondents reported suicide attempts in 2007, rising to 7% in 2009 and 2015, and reaching 9% in 2019; the less-than-one-hour category, rising from 4% in 2007 to 6% in 2015 and 8% in 2019, and the three-hour category, rising from 4% to 6% in 2015 and to 7% in 2019. In no year, for either sex, did the Goodman-Kruskal tau statistic exceed .025 (for boys in 2019, Table C2), indicating no ability of non-TV screen time to predict suicide attempts.

Change in Attempted Suicide as Predictor of Non-TV Screen Time. Proportions of screen time among girls and boys reporting suicide planning from 2007 to 2019 are reported in Table B45. As with the other psychological-distress predictors, the proportions of respondents who attempted suicide and reported lower levels of screen time declined over the seven administrations, while proportions of those who spent more time with screens increased, not only in an absolute sense but with respect to cohort/sex subsets. Among girls, proportions of screen-time categories 2 hours and below were consistently smaller than subset proportions; from 2015 on, proportions in the 3-hour category were also smaller than subset proportions. Among boys, in almost every administration, proportions of those who reported attempted suicide and screen-time levels up to 4 hours were smaller than subset proportions. The indeterminate 5-hours-or-more level was the sole category consistently selected by both boys and girls in proportions larger than the subset. However, boys who reported attempted suicide also selected the no-use category in proportions larger than the cohort/sex subset in 2009, then in each administration from 2013 through 2019. Goodman-Kruskal tau statistics did not exceed .005 for either sex in any year (Table C4), indicating no prediction of screen time by attempted suicide.

Inferential Analyses: Ordinal and Binomial Regression Modeling

The Goodman-Kruskal tau statistics reported in the previous section are asymmetric and can therefore serve as evidence that one of a pair of categorical variables does or does not serve to predict the other. As reported above, in no case did a tau statistic identify non-TV screen time as a predictor of any psychological distress indicator in the YRBS, nor vice versa. This might seem to obviate any further need to model the data. However, two concerns militated in favor of regression modeling. The first was the possibility that, while screen-time levels as a whole may not predict psychological distress, one or more levels of use indeed might. This, of course, would be essential to dose-response analyses of screen time and psychological distress. The second concern is more technical: In that numerous studies have inappropriately treated YRBS data as if they were metric and continuous, deploying calculations to bolster claims about the effects of screen time on adolescents' mental health, the task of proper ordinal and binomial modeling of the data remained open. The following sections report the results of that modeling.

Non-TV Screen Time as Predictor of Psychological Distress

The use of the seven-option non-TV screen-time item as predictor of psychological distress outcomes was modeled in terms of a binomial distribution with the logit link function, using the no-screen-time option as reference category, producing coefficients for the effects of each level of screen time on a "yes" response to each distress outcome. These effects coefficients were exponentiated to calculate odds ratio as a measure of effect size. Three of the outcome variables modeled originated as dichotomous in the YRBS data. Due to computational challenges, responses to the five-category item on attempted suicide were reframed and modeled as dichotomous data as well.

Effects Across All Seven Cohorts.

Extended Sadness. The overall effects of levels of non-TV screen time on reporting of extended sadness are presented in Table D1. The intercept coefficient (ß= -0.88, p=.000, 95% CI [-0.93, -0.83]) represents baseline odds of .41 for selection of the "yes" response by respondents who reported no use of non-TV screen devices. Coefficients for the effects of three predictor levels were statistically significant at $p \leq .001$:

- Less than 1 hour: ß= -0.22, p=.000, 95% CI [-0.29, -0.15]
- 4 hours: ß= 0.23, p=.000, 95% CI [0.15, 0.31]
- 5 hours or more: ß= 0.53, p=.000, 95% CI [0.47, 0.60]

The negative coefficient in the first case represents a reduction in odds that respondents who selected less than 1 hour would report extended sadness (odds of .33 [.41 x .8]). The positive coefficients represent increased odds that those who selected 4 hours or 5 hours or more would report extended sadness (odds, respectively, of .52 [.41 x .1.26] and .7 [.41 x .1.71]).

Consideration of Suicide. The overall effects of levels of non-TV screen time on reporting of consideration of suicide are presented in Table D2. The intercept coefficient (ß= -1.74, *p*=.000, 95% CI [-1.80, -1.68]) represents baseline odds of .18 for selection of the "yes" response by respondents who reported no use of non-TV screen devices. Effects coefficients for three predictor levels were statistically significant at $p \leq .001$:

- 1 hour: ß= -0.18, *p*=.000, 95% CI [-0.27, -0.09]
- 4 hours: ß= 0.24, *p*=.000, 95% CI [0.14, 0.35]
- 5 hours or more: ß= 0.63, *p*=.000, 95% CI [0.55, 0.71]

The negative coefficient represents reduced odds that respondents who selected 1 hour would report consideration of suicide (odds of .15 [.18 x .84]). The positive coefficients represent increased odds that those who selected 4 hours or 5 hours or more would report consideration of suicide (odds, respectively, of .23 [.18 x .1.28] and 0.34 [.18 x 1.88]).

***Suicide Planning*.** The overall effects of levels of non-TV screen time on reporting of suicide planning are presented in Table D3. The intercept coefficient (ß= -.1.99, *p*=.000, 95% CI [-2.06, -1.93]) represents baseline odds of .14 for selection of the "yes" response by respondents who reported no use of non-TV screen devices. Effects coefficients for three predictor levels were statistically significant at $p \leq .001$:

- 1 hour: ß= -0.19, *p*=.000, 95% CI [-0.28, -0.09]
- 4 hours: ß= 0.21, *p*=.000, 95% CI [0.10, 0.31]
- 5 hours or more: ß= 0.66, *p*=.000, 95% CI [0.57, 0.74]

The negative coefficient represents reduced odds that respondents who selected 1 hour would report planning suicide (odds of .12 [.14 x .83]). The positive coefficients represent increased odds that those who selected 4 hours or 5 hours or more would report planning suicide (odds, respectively, of .17 [.14 x .1.23] and .27 [.14 x .1.93]).

***Attempted Suicide*.** The overall effects of levels of non-TV screen time on reporting of attempted suicide are presented in Table D4. The intercept coefficient (ß= -2.44, *p*=.000, 95% CI [-2.52, -.2.36]) represents baseline odds of .09 for selection of the "yes" response by respondents who reported no use of non-TV screen devices. Effects coefficients for four predictor levels were statistically significant at $p \leq .001$:

- Less than 1 hour: ß= -0.25, *p*=.000, 95% CI [-0.36, -0.14]
- 1 hour: ß= -0.33, *p*=.000, 95% CI [-0.45, -0.20]
- 2 hours: ß= -0.20, *p*=.000, 95% CI [0.30, 0.10]
- 5 hours or more: ß= 0.46, *p*=.000, 95% CI [0.35, 0.56]

The negative coefficients represent reduced odds that respondents who selected less than 1 hour, 1 hour or 2 hours would report attempted suicide (odds, respectively, of .07 [0.09 x .78], .06 [0.09 x 0.72] and .07 [.09 x .82]). The positive coefficient represents increased odds that those who selected 5 hours or more would report attempted suicide (odds of .14 [.09 x .1.58]).

Effects by Cohort and by Sex.

***Extended Sadness*.** The effects of non-TV screen time on reporting of extended sadness in each cohort and distinguished by sex are summarized in Table D5. Full statistics by cohort are presented in Table D6. Full statistics by sex are presented in Table D7.

Although combined data from all seven administrations suggest that the upper two levels of screen time were both significantly associated with selection of the "yes" response for extended sadness, the only predictor level whose effects coefficients indicated a statistically significant ($p \leq .001$) effect in every cohort, increasing the odds of extended sadness, was the highest level, “5 hours or more.” Four other predictor levels had inconsistent effects on extended sadness: In 2007, less than 1 hour reduced the odds, as did 1 hour in 2007 and 2017, while 4 hours increased the odds in 2019.

In subsets by sex, baseline odds for girls, .53 (ß= -0.63, *p*=.000, 95% CI [0.69, 0.56]), were higher than those of the full sample (.41); odds were increased by the three upper screen-time categories. The 3-hour category was associated with odds of .68 (.53 x 1.29; ß= 0.25, *p*=.000, 95% CI [0.16, 0.35]), the 4-hour category with odds of .86 (.53 x 1.62; .53 x 2.06; ß= 0.48, *p*=.000, 95% CI [0.38, 0.58]), and the 5-hours-or-more category with odds of 1.09 (.53 x 2.06; ß= 0.72, *p*=.000, 95% CI [0.64, 0.81])—making this the only category for which odds of reporting extended sadness were at or above those of selecting the “no extended sadness” response. No level of screen time reduced the odds of extended sadness for girls.

Baseline odds for boys were about half those of girls at .26 (ß= -1.37, *p*=.000, 95% CI -1.45, -1.28]), with the two lowest screen-time levels reducing the odds--albeit with *p*-levels above the significance threshold—to .21 for less than 1 hour (.26 x .82; ß=-0.19, *p*=.002, 95% CI [-0.35, -0.07]) and to .22 for 1 hour (.26 x .84; ß= -0.18, *p*=.002, 95% CI [0.35, 0.56]). The top screen-time levels increased the odds of extended sadness for boys to .32 for 4 hours (.26 x 1.25; ß= 0.22, also above the significance threshold at *p*=.002, 95% CI [0.08, 0.36]) and to .45 for 5 hours or more (.26 x 1.74; ß= 0.55, *p*=.000, 95% CI [0.44, 0.67]).

Consideration of Suicide. The effects of non-TV screen time on reporting of consideration of suicide in each cohort and distinguished by sex are summarized in Table D8.

Full statistics by cohort are presented in Table D9. Full statistics by sex are presented in Table D10.

As with extended sadness, only the highest level of screen time had a statistically significant effect in every cohort, consistently increasing the odds. The 3-hour category raised the odds in 2013; the 4-hour category in 2019. No category reduced the odds in any cohort.

Baseline odds for consideration of suicide among girls, .21 (ß= -1.55, *p*=.000, 95% CI [-1.62, -1.47]), were higher than those for the full sample (.18), and the 1-hour level reduced girls' odds very slightly to .2 (.21 x .95; ß= 0.17, *p*=.001, 95% CI [0.07, 0.26]); all levels above 1 hour increased them:

- 2 hours: odds of .25 (.21 x 1.18; ß= 0.17, *p*=.001, 95% CI [0.07, 0.26])
- 3 hours: odds of .28 (.21 x 1.32; ß= 0.28, *p*=.000, 95% CI [0.16, 0.40])
- 4 hours: odds of .32 (.21 x 1.53; ß= 0.43, *p*=.000, 95% CI [0.31, 0.55])
- 5 hours or more: odds of 0.44 (0.21 x 2.09; ß= 0.74, *p*=.000, 95% CI [0.64, 0.84]).

For boys, baseline odds of .12 were a bit over half those for girls (ß= -2.14, *p*=.000, 95% CI [-2.25, -2.03]). No level of screen time reduced those odds, but the top level doubled them to .24 (0.12 x 1.97; ß= 0.68, *p*=.000, 95% CI [0.54, 0.81).

Suicide Planning. The effects of non-TV screen time on reporting of suicide planning in each cohort and distinguished by sex are summarized in Table D11. Full statistics by cohort are presented in Table D12. Full statistics by sex are presented in Table D13.

Here again, the only predictor level regularly affecting suicide planning was the indeterminate top level, increasing the odds of suicide planning in every cohort except 2009 (p=.017). In 2009, the less-than-1-hour and 4-hour levels reduced the odds of suicide planning. The 4-hour level increased the odds in 2019.

For girls, baseline odds of .16 (ß= -1.84, p=.000, 95% CI [-1.91, -1.76]) were a bit larger the full-sample statistic (.14); boys' baseline odds of .10 (ß= -2.32, p=.000, 95% CI [-2.44, -2.20]), were somewhat smaller. The three highest screen-time levels increased girls' odds of suicide planning:

- 3 hours: odds of .21 (.16 x 1.31; ß= 0.27, p=.000, 95% CI [0.14, 0.40])
- 4 hours: odds of .23 (.16 x 1.43; ß= 0.35, p=.000, 95% CI [0.23, 0.48])
- 5 hours or more: odds of .33 (.16 x 2.09; ß= 0.74, p=.000, 95% CI [0.63, 0.84]).

The highest level raised boys' odds to 0.2 (.10 x 2.02; ß= 0.70, p=.000, 95% CI [0.56, 0.85]).

***Attempted Suicide*.** The effects of non-TV screen time on reporting of attempted suicide in each cohort and distinguished by sex are summarized in Table D14. Full statistics by cohort are presented in Table D15. Full statistics by sex are presented in Table D16.

Once more, the only screen-time level affecting the odds of this distress indicator in more than one cohort was 5 hours or more. That category increased the odds in four of the seven administrations, with no statistically significant ($p \leq .001$) effect in 2007, 2013 or 2019. In 2009, screen time of less than 1 hour reduced the odds of attempted suicide.

Among girls, baseline odds for attempted suicide were .10 (ß= -2.28, *p*=.000, 95% CI [-2.37, -2.20]), .01 greater than the full sample statistic (.09). The two highest screen-time levels increased those odds—to 0.13 (.10 x 1.34; ß= 0.29, *p*=.000, 95% CI [0.14, 0.44]) at 4 hours and to .17 (.10 x 1.73; ß= 0.55, *p*=.000, 95% CI [0.42, 0.68]) at 5 hours or more.

Baseline odds for boys were even smaller at .06 (ß= -2.74, *p*=.000, 95% CI [-2.89, -2.58]), increased only by the 5-hour-or-more category to .09 (0.06 x 1.57; ß= 0.45, *p*=.000, 95% CI [0.27, 0.63]). On the other hand, the two lowest screen-time levels reduced boys':

- Less than 1 hour: odds of .04 (.06 x .68; ß= -0.39, *p*=.001, 95% CI [-0.61, -0.17])
- 1 hour: odds of 0.04 (.06 x .63; ß= -0.46, *p*=.000, 95% CI [-0.70, -0.21])

Psychological Distress Indicators as Predictors of Non-TV Screen Time

The effects of the dichotomous psychological distress indicators, as well as the five-category suicide attempts item, as predictors of non-TV screen-time were explored through sequential modeling (Tutz, 1990). The approach is suited to discrete time-to-event outcomes (Bürkner & Vuorre, 2019) and therefore to the screen-time categories in YRBS. Sequential modeling produces an effects coefficient for each predictor at each of *k-1* distinct intercepts, or thresholds marking the transition points from one category to the next, quantifying effect size. Exponentiation of the coefficients, in this case, provides hazard, rather than odds, ratios.

Effects Across All Seven Cohorts. Results of the regressions exploring extended sadness, consideration of suicide, suicide planning, number of suicide attempts, and the dichotomously reframed attempted-suicide variable as independent predictors of non-TV screen time in the full sample are presented in Tables E1, E2, E3, E4, and E5, respectively. In every case where $p \leq .001$, effects coefficients for psychological-distress predictors at all screen-time levels were negative, with associated hazard ratios smaller than 1. That is, all four indicators of psychological distress reduced the hazard, or probability of stopping screen use at the upper threshold of each time range, increasing the probability that respondents would continue to spend time with screens past that threshold on an average school day. In short, psychological distress predicted increased screen time for YRBS respondents.

A separate regression model explored all four dichotomous distress indicators as simultaneous predictors of screen time. The results are presented in Table E6. Negative coefficients with $p \leq .001$, corresponding to hazard ratios smaller than 1, characterized the effects of extended sadness on all levels except less-than-1-hour; the effects of consideration of suicide on the less-than-1-hour and 2-hour levels; and the effects of suicide planning on 2-hours, 3-hours, and 5-hours-or-more. This model also produced the one statistically significant ($p \leq .001$) positive effect of a psychological distress predictor on a screen-time level: Attempted suicide, framed dichotomously as one of four simultaneous predictor variables, increased the probability that respondents would report the less-than-1-hour level, relative to those who did not attempt suicide (ß= 0.20, p=.000, 95% CI [0.11, 0.28]). However, regression modeling also revealed a pattern of missing information for attempted suicide: While 2% of information was missing for the pairing of attempted suicide with the less-than-1-hour level, 18% was missing at the pairing with 1 hour, 34% at the pairing with

2 hours, 20% at the pairing with 3 hours, 24% at the pairing with 4 hours, and 12% at the pairing with 5 hours or more.

Effects by Cohort and by Sex. Results of regressions exploring extended sadness, consideration of suicide, suicide planning, number of suicide attempts, and the dichotomously reframed attempted-suicide data as independent predictors of non-TV screen time in each cohort and distinguished by sex are summarized in Tables E7, E10, E13, E16, and E19, respectively, with full statistics by cohort in Tables E8, E11, E14, E17, and E20, and full statistics by sex in Tables E9, E12, E15, E18, and E21. Cohort-by-cohort and within each sex, independent psychological distress predictors produced patterns of hazard ratios similar to the pattern in the full sample.

A separate set of models explored the dichotomous distress indicators as simultaneous predictors of screen time cohort-by-cohort and within each sex. The results are summarized in Table E22, with full statistics by cohort in Table E23, and full statistics by sex in Table 24. Only a smattering of regression coefficients in the cohort-by-cohort and sex-by-sex simultaneous-predictor models achieved statistical significance at $p \leq .001$; most of these specified the effects of extended sadness. Hazard ratios in the simultaneous-predictor models were somewhat larger than those in independent-predictor models; general patterns of effects nonetheless followed those in the independent-predictor models.

Chapter 5: Discussion

This study examined one set of survey data bearing on the relationship between digital screen time and the psychological well-being of teenagers in the United States during the first two decades of the 21st century. Previous papers have advanced the claim that an increase in adolescents' use of digital screen devices since the introduction of the smartphone in 2007 resulted in a population-level decline in teenagers' psychological health. Several of these turned for evidence to the Youth Risk Behavior Survey, a biennial program of the Centers for Disease Control and Prevention. However, their analyses, like most analysis of survey data on screen time and psychological well-being, were most often conducted with metric methods inappropriate to the dichotomous and ordinal nature of YRBS data. By describing, then applying proper binomial and ordinal regression to, data from the 2007-2019 cohorts of the YRBS, this study re-analyzed a widely used body of evidence to explore association between screen time and psychological well-being and, in so doing, to provide a methodological example for further research. In particular, the study sought insight into:

- the extent to which adolescent screen time increased after 2007;
- the extent to which prevalence of adolescent psychological distress increased after 2007;
- the extent to which associations exist between screen time and psychological distress among adolescents; and
- the directionality of such associations, should they exist.

Key Findings

Proper analysis of ordinal and binomial data from YRBS reveals that change in both adolescents' use of non-TV digital screen devices and their psychological well-being during the study period was more complex than previous analyses have acknowledged. Contrary to the narrative of universal swelling of screen time driven by the availability of smartphones, the data show that substantial proportions of the adolescent population consistently reported either moderate use or complete abstinence from use of non-TV screen devices on the average school day. Prevalence of psychological distress did increase across the study period, but at different rates and to different degrees for indicators of differing severity, and differently among girls than among boys. While associations can be drawn between screen use and psychological distress, these do not amount to a simple dose-response relationship. They reveal neither cause, nor effect, nor even predictive direction. At best, they describe a very weak "digital Goldilocks" relationship in which moderate amounts of screen time are associated with marginally less reporting of distress and, conversely, reports of distress are associated with both low and high extremes of screen use.

Screen Time Grew Unevenly Among U.S. Adolescents

While YRBS data confirmed an increase in adolescents' screen time overall, change was limited to the extremes. The proportion reporting a moderate level of screen time, 2 hours per average school day, held stable from cohort to cohort at around .16. Meanwhile. about a fifth of adolescents consistently refrained from screen use altogether on the average school day. Proportions grew only at higher and declined only at lower levels of daily use.

Psychological Distress Indicators Differed in Prevalence and Degree of Change

Previous studies treated the set of four psychological distress indicators available in YRBS as a single index of "suicide-related" distress. The current study revealed that both prevalence and growth in prevalence of the indicators differed markedly in the sample as a whole, by sex, and in terms of change across the study period. In the sample as a whole, 30% of respondents reported extended periods of sadness, while only 16% reported suicidal thinking, 13% reported having made suicide plans, and 8% reported suicide attempts. Among girls, 39% reported extended sadness, 21% reported serious consideration of suicide, 16% reported suicide planning, and 10% reported attempted suicide; among boys, the corresponding percentages were considerably lower, at 22%, 12%, 10%, and 5%. Across the study period, reports of extended sadness grew from 29% of the 2007 cohort to 37% of the 2019 cohort. Both consideration of suicide and suicide planning were reported and grew at a smaller scale, from 14% to 19% of cohorts in the first case and from 11% to 16% of cohorts in the second. Attempted suicide was reported and grew at about half the scale of consideration and planning, from 7% of the 2007 cohort to 10% of the 2019 cohort.

Psychological Distress Grew Primarily at the Extremes of Screen Use

In line with previous findings (Mojtabai et al., 2016; Keyes et al., 2019), proportions of respondents reporting symptoms of distress at most levels of screen time rose across the study period, though less so at moderate levels and least for the indicators of greatest severity, suicide planning and attempted suicide. Reports of extended sadness grew by .08 overall from 2007 to 2019, but they grew to that degree or higher only at the extremes of use: less than 1 hour (.08) and 5 hours or more (.10). Reports of consideration of suicide grew .05 overall, a degree of increase characterizing the 3-hour level as well, while less-than-1-hour and 5-hours-or-more each grew by .06. But consideration of suicide grew by only .01 at the 2-hour level and among 1-hour users, not at all. Reports of suicide planning grew .05 overall, but reached that degree of growth only at 5 hours or more and exceeded it (.06) only at less than 1 hour. Reports of attempted suicide grew .03 across the seven administrations, but reached that degree of growth only at 5 hours or more, exceeding it (.04) at less than 1 hour.

In terms of probability, the odds of reporting extended sadness, consideration of suicide and planning suicide in the full sample were higher than baseline among respondents at the top two screen-time levels, 4 hours and 5 hours or more. Cohort to cohort, the odds of reporting distress consistently exceeded baseline only among those reporting 5 hours or more of average school-day screen time.

Psychological Distress May Have Driven Increased Screen Time

While screen time was associated with increased odds of psychological distress only at its highest levels, each of the four psychological distress indicators was associated with reduced hazard--the probability of stopping screen use--at every screen-time level. Distress thereby increased the probability that respondents would spend more time with screens. This finding corresponded to the proportions of screen use within subsets of the sample reporting each indicator of distress: smaller-than-full-sample proportions at lower levels of screen time, proportions equal to or larger than full-sample proportions at the two highest levels.

No Certain Causal Association Between Screen Time and Distress Indicators

Effects coefficients in regression indicated that the high levels of screen time reported by around a quarter of U.S. adolescents increased the odds of psychological distress. Complementarily, hazard ratios indicated that any report of distress increased the probability of more screen use. However, when Goodman-Kruskal tau statistics on the correlation of categorical and ordinal variables, which are asymmetric and predict direction of influence, were calculated for screen-time/distress-indicator pairings, they in no instance supported the notion that either variable could predict the other.

More Distress Among Girls Than Boys, Not Associated With Screen Time

Numerous studies have found greater psychological distress among U.S. girls in the early 21st century than among U.S. boys. The current analyses contribute evidence to that finding. Girls uniformly reported extended sadness, consideration of suicide, planning suicide and attempted suicide in proportions as large as twice those of boys', including higher proportions at every level of screen time.

It would be unreasonable, however, to propose non-TV screen time as the driver of girls' emotional distress. While reporting distress indicators in greater proportion than boys, girls were, at one extreme, half again more likely than boys to spend no time at all with non-TV screen devices and, at the other, no more likely than boys to report screen time of 5 or more hours on the average school day. The relative proportions of screen abstinence among girls and boys held within the segments reporting extended sadness, consideration of suicide, and suicide planning; girls who reported attempted suicide reported no screen time in a proportion about a third larger than boys. Girls' reporting of all four distress indicators grew from cohort to cohort across the study period (and in the cases of extended sadness and suicide planning grew more rapidly than boys'), but here too, increase was not uniform: The greatest increases in proportions for extended sadness came at the less-than-1-hour and 4-hour levels (.11), for consideration of suicide at less-than-1-hour (.11), and for suicide planning at less-than-1 and 5-or-more hours (.09).

Weakening of the "Digital Goldilocks" Hypothesis

Several researchers, including the Twenge group, have framed the association of screen time and psychological distress as a "digital Goldilocks" or "exposure-response" (Twenge & Campbell, 2019) relationship with an emotionally optimal level of daily screen time at the low point of a U-shaped curve. In the Twenge version, the curve declines from moderate levels of distress at low levels of screen use to minimal distress at the 1-hour level, then climbs quickly to high levels of distress as screen time grows to levels far more common among U.S. adolescents. Przybylski and Weinstein (2017) proposed a more nuanced model including separate daily optima and response curves for different screen experiences.

The results here do not entirely belie the digital Goldilocks hypothesis, but neither do they strengthen it, much less support Goldilocks screen-time optima as prescriptions for adolescents' emotional safety. At issue are the increments of change in "response" to each successively larger (or smaller) "dose": the differences in proportions and odds of distress from each screen-time level to the next.

In the full sample, extended sadness was reported by .25 of respondents reporting 1 hour or less of daily non-TV screen time. The proportion rose in increments of .03-.04, to .29 among non-users on one side and, on the other, to .27 at 2 hours, .30 at 3 hours, and .34 at 4 hours, before leaping to .42 at the indeterminate level, 5 hours or more. In terms of probability, odds of reporting extended sadness were lowest (.33) at the less-than-1-hour and 1-hour levels, increasing by different amounts at successive screen-time levels—by .08 (to .41) in the transition from less-than-1-hour to the no-use baseline and, on the other side, by .05 (to .38) in the transition to 2 hours, by .05 again (to .43) in the transition to 3 hours, nearly doubling to .09 (to .52) in the transition to 4 hours, then doubling again with an increment of .18 (to .7) in the transition to 5 hours or more.

But the scale of incremental change was different with the other three distress indicators. When the indicator of interest was consideration of suicide, the smallest proportion of distress was .13 and the lowest odds were .15, both at 1 hour of screen time. In a kind of miniature Goldilocks pattern, proportions increased by .01 or .02 in transitions to both lower and higher levels except the very highest, while odds increased by .01, .02, or .03 per level, except at the top. Suicide planning and attempted suicide followed the same pattern: increments of .01 or .02 in both proportions and odds, much larger increase at 5 hours or more.

The increments for indicators of greater severity are noteworthy not only because they happen to be smaller than those for extended sadness. As discussed above, the proportions in question, reported in Appendix B, represent one of five alternate imputations of the original YRBS data. The odds derive from pooling of statistics from all five imputations. In almost every case where statistics varied among the five imputations, they differed by ±.01.

Unlike the extended-sadness increments, beginning at .03-.04, then doubling at higher levels, the smaller and more consistent increments in association of the other indicators with non-TV screen-time may simply be artifacts of calculation, due in the case of contingencies to reporting of one arbitrarily chosen imputation and in the case of odds to the process of pooling. This possibility leaves only one YRBS screen-time category of inarguable concern: the top one, at which proportions and odds of distress were regularly substantially larger -- but in which amounts of screen time may have varied considerably among respondents. All together, these patterns of increment weaken the hypothesis of a durable Goldilocks relationship between doses of screen time and responses of psychological distress.

On Effect Size

The odds ratios in Appendix D document adolescent screen time as predictor of the four distress indicators reported in YRBS from 2007, the year the smartphone was introduced, through 2019. While these ratios quantify the effects, they may not express the real-world "difference in well-being associated with" non-TV screen time which Twenge and Campbell (2019) asserted to be the matter of concern to "clinicians and laypeople" (p. 327). Twenge and Campbell argued that effect sizes, characterized as exculpatory by authors like Orben and Przybylski (2019a), must be balanced against the size of affected populations and the speed with which smartphones, tablets, and the experiences they transmit have achieved ubiquity in young people's lives.

Discussions of effect size with reference to dichotomous and ordinal survey data is complicated by reference to Cohen's *d*, conceived as a measure of effects in continuous data. Twenge and Campbell (2019), having “recoded” dichotomous and ordinal YRBS data as metric, conducted segmented regression analyses to quantify the “difference in well-being associated with” different amounts of non-TV screen time: that is, the slopes of segments leading from one level of screen time (on the x-axis) to another. They derived three sets of Cohen’s *d* statistics: a set documenting the difference in effect of less-than-1-hour’s and 5 hours’ or more daily screen use; another comparing the effects of less-than-1-hour’s and 3 hours’ use; and a set comparing the effects of 3 hours’ and 5 hours’ use or more. They addressed each of the four YRBS psychological distress indicators as well as their one-out-of-four “suicide-related outcome” index. For differences in individual indicators, they used data from their full sample of four YRBS administrations, 2009-2015. For differences in the index indicator, they calculated a Cohen’s *d* for 2009-2015 and another for 2013-2015; the reason was not provided, but this may have been intended to focus more tightly on a period during which screen time purportedly burgeoned. These statistics are summarized in Table F1.

In discussing these statistics, Twenge and Campbell (2019) engaged the thorny matters of effect size and its real-world effect. Taking advantage of the widespread use of Cohen’s *d*, they proposed three alternative *d*-statistic cut-points for judging the influence of screen time. Two were borrowed from assessment of treatment for adolescent depression: Twenge and Campbell cited d=.24 as a guidepost for effective online cognitive behavioral therapy (CBT) and d=.34 as the criterion for effective psychotherapy. Their third and highest threshold, d >.40, rested on the “recommended minimum effect size” of .41 proposed by Ferguson (2012). Ferguson described this as “representing a ‘practically’ significant effect for social science data" (p.533). Twenge and Campbell elided his further stipulation that a moderate effect would produce a *d* of at least 1.15.

As documented in Table F1, the only difference *d*-statistics reported by Twenge and Campbell (2019) that met Ferguson's minimum effect size were the two describing their "suicide-related outcome" index. The statistics characterizing difference between the effects on extended sadness of 5 or more hours' and less than 1 hour's use reached the threshold of effective psychotherapy. Those characterizing this difference in effects on consideration of suicide, suicide planning and attempted suicide, as well as those comparing the effects of 5 or more hours' to 3 hours' use on extended sadness and on the "suicide-related outcome" index, met the lowest bar, that set by online CBT. Twenge and Campbell themselves characterized these effect sizes as "small to moderate" (p. 318), but concluded nonetheless that "well-being peaked…at light use" (p. 326).

How do the effects reported by Twenge and Campbell (2019) compare with the current findings? None of the three effect sizes reported in this study, the Goodman-Kruskal tau for descriptive associations, odds ratios for dichotomous outcomes, and hazard ratios for ordinal outcomes, is directly comparable with the Cohen's *d* statistics reported by Twenge and Campbell (2019), nor have consensus guidelines been established for interpreting them as measures of "difference in well-being." However, Chinn (2000) proposed a method for converting odds ratios to rough *d*-equivalents, dividing the ratios' natural logarithms by the square root of the variance of the standard logistic distribution, $\pi^2/3$. For comparison with the findings of—and the criteria proposed by--Twenge and Campbell (2019), statistically significant ($p \leq .001$) coefficients for the effects of screen time on psychological distress in this study were divided by $\pi/\sqrt{3}$, rounded to 1.81. Analogous to Twenge and Campbell's segmented regression slopes, *d*-equivalents at each of the three ordinal levels (less than 1 hour, 3 hours and 5 or hours or more) were then compared by subtraction. Both the rough *d*-equivalents and the difference scores are presented in Appendix F.

As the tables in Appendix F indicate, this study corroborated Twenge and Campbell (2019)'s unheralded finding that the effects of screen time on psychological distress rarely meet Ferguson's minimum. Only the indeterminate highest use level, 5 hours or more, reached *d*-equivalents of 0.41 for consideration of suicide or suicide planning, and only for the girls' subsample. The indeterminate level reached Twenge and Campbell's intermediate threshold, the one based on effective psychotherapy for teen depression, in its effects on extended sadness in the girls' subsample and for the 2015 cohort; on consideration of suicide and suicide planning for the full sample and for the boys' subsample, as well as for each of those indicators in four of the seven cohorts. At the lowest cut-point, 5 hours or more predicted increased reports of extended sadness and attempted suicide in the full sample; of attempted suicide for girls; of extended sadness and attempted suicide for boys; and of various dichotomous indicators in several individual cohorts. The effects of one other screen-time level, 4 hours, reached this lowest cut-point on extended sadness and consideration of suicide for girls, as well as for consideration of suicide in 2019. Last but not least, if that lowest cut-point indeed indicates a meaningful effect, then 1 hour of screen time reduced the odds of attempted suicide for boys.

Difference scores among the effects of 5 hours or more, 3 hours and less than 1 hour, modeled on those in Twenge and Campbell (2019) were no more substantial. For the full sample, differences between the effects on distress of 5 hours or more and less than one hour met the Ferguson criterion for extended sadness and the intermediate criterion for consideration of suicide, as well as the Ferguson criterion for attempted suicide among boys. Differences between the effects of 5 hours or more and 3 hours met the intermediate criterion for extended sadness, consideration of suicide and suicide planning among girls.

In short, an assessment of effect size treating appropriately derived statistics from YRBS with the method and criteria of Twenge and Campbell (2019) fortifies the emerging conclusion that the only YRBS screen-time level of inarguable concern is the highest: the indeterminate level 5 hours or more, by whose selection respondents might be reporting six, eight, ten or more hours of non-TV screen time on an average school day—a situation which parents, teachers, and mental health professionals might find troubling in the absence of any statistical research.

Limitations

The fundamental limitation of this study as a contribution to understanding of the relationship between non-TV screen time and psychological distress is YRBS itself, surveying young people's use of screens and their distress with items that are coarse, somewhat arbitrary, and of questionable ecological validity. Its broad categories of response and, in particular, the omnibus nature of its non-TV screen-time item, can certainly not capture the rich realities of adolescent experience, even the subset of experience defined by the bezel of a digital screen.

A related limitation is the problematic convention of using simple duration as a proxy construct for screen experience in the first place. Ellis (2019) has written incisively on the problem of conflating “smartphone use” with the range of experience a smartphone can mediate: passive or active, solitary or social, merely entertaining or undertaken with sharp intention, existentially engaging or simply vicarious, expanding a teenager’s horizons or constricting them. Valkenburg et al. (2022) conducted an umbrella review of research on the effects of adolescent social media use conducted between 2019 and mid-2021, including seven meta-analyses, nine systematic reviews and nine narrative reviews, as well as several research reports including three of the studies discussed above: Twenge et al. (2018), Orben and Przybylski (2019), and Kreski et al. (2021). Finding that most reviewers, like Orben and Przybylski, and Kreski et al. found effects to be "weak" or "inconsistent," while a few, like the Twenge group, characterized them as "serious," "substantial" and "detrimental," they zeroed in on the distinction between the frequently similar effect sizes reported and the authors' interpretations of those statistics. Both optimistic and pessimistic views might be valid, they proposed, because social media effects are profoundly person-specific.

Absent assessment of individual differences, like those considered by Selfhout et al. (2009), Nesi and Prinstein (2015), Nesi et al. (2017), George et al. (2018), Beyens et al. (2020) and Calandri et al. (2021), much less clarification of any particular adolescent’s reasons for using a particular device *at* a particular time *for* a particular amount of time, it seems foolhardy to propose a relationship between time spent with a lump of hardware and psychological well-being. Less loftily, Foster and Jackson (2019) have noted that, by confining the item to the school day, a survey like YRBS ignores what may be the period of most ample screen time, the weekend.

At another level, YRBS self-report data has a credibility problem. Although validity information has not been published, a CDC paper on the YRBS methodology (2013b) reported a study finding that respondents misstated basic personal information, overstating height and underreporting weight. Another review was unable to identify any objective methods for validating many YRBS items; its authors cautioned policy-makers to take care in interpreting YRBS data. The validity of retrospective self-reporting has been of special concern in studies of technology use. In 2020, a meta-analysis by Parry et al. concluded that self-reports rarely corresponded to log-based measures of time spent with digital devices. Orben and Przybylski (2019b) reported correlations between retrospective self-reports and real-time use diaries as no greater than r=. 18 and as low as r= .05.

Finally, but obviously not least, the confusion of association with causation lurks behind secondary analysis of any survey data. Notwithstanding the usefulness of the asymmetrical Goodman-Kruskal tau or the precise directionality in regression modeling, mooting a causal relationship based on YRBS data on screen time and psychological distress would be a risky proposition—cushioned in the current study, perhaps, by the few and small associations identified.

Implications for Research, Policy and Practice

The most valuable contribution a study like this can make is to model statistical methods appropriate to the structure of the data being studied. Yet even appropriate analysis of multiple-choice retrospective self-report survey data may leave the relationships of interest nearly as obscure as ever. Unless a survey's items have been designed for the purpose, secondary analysis can be a blunt instrument yielding little information. Resulting claims are easily distorted by a secondary analyst's interpretive preconceptions. This study sought to provide a counter-example by entertaining both the possibility that screen use drives psychological distress and the possibility that use levels are driven by psychological distress.

As suggested by the above discussion of effect size and *d*-statistic cut-points, the interpretation of even properly calculated statistics can fall victim to researcher preconceptions. Researchers can hope to modulate the influence of their biases by scrupulously examining the ecological validity of their categories, constructs, measures, hypotheses of relationship and available data. We should probably also be as candid as possible with respect to our personal prejudices: As a veteran (alas, even a pioneer) in the development of interactive media for young people, I hope I have effectively conveyed my own on the acknowledgments page of this dissertation.

Findings like those reported here may hint at the effects of common daily behaviors, but in the end the usefulness of quantitative analysis of retrospective self-report survey data turns out to be as indeterminate as the 5-hours-or-more category in YRBS. A simple first step toward more useful self-report data might be probing a bit deeper to understand what drives young people's digital engagement and why. We might start by distinguishing not only among digital activities--social media engagement, video or music streaming, gaming--but among the contents of those activities: casual vs. multiplayer or competitive vs. open-ended games; entertainment movies and TV vs. spectator e-sports, snack-size humorous TikTok videos or how-to lessons on YouTube; chat about personal matters in Snapchat or about specific interests on Discord.

Meanwhile, the very technologies under investigation hold promise for moving beyond the undependability of self-report. They can capture nuanced, accurate and illuminating data unconstrained by multiple-choice item construction, the biases in self-report, or the vagaries of retrospection. Existing technology allows precise alignment of screen-time measures with specific applications, counts of socially informative behaviors like screen unlocks, simultaneous collection of data from multiple devices during multitasking, and interactive data-gathering techniques such as ecological momentary assessment. Studies which have already taken advantage of these possibilities include George et al. (2018), Rozgonjuk et al. (2018), Jensen et al. (2019) and Beyens et al. (2020).

Data gathered in real time and mined cross-sectionally or longitudinally will enable multifaceted exploration of the interaction of adolescents' cognitive, emotional, and attitudinal profiles with technological affordances in all the varieties of digitally mediated experience. Beyond bespoke studies employing ecological momentary assessment or experience sampling with participants' smartphones, a critical source of such data already exists in the privately held servers of the corporations that mediate all digital activity. A bipartisan proposal in the U.S. Senate would require technology companies to release data for research purposes through the National Science Foundation (Horwitz, 2021). Meanwhile researchers in the European Union have developed a framework for "data donation" leveraging the EU's General Data Protection Regulation, through which individual users retain control of personal data collected in corporate storage (Boeschoten et al., 2020). The approach might facilitate the aggregation of vast collections of digital trace data for social science research.

Methodology aside, the weak associations documented by this study carry important implications for public understanding and policy involving the use of non-television digital-screen devices by U.S. adolescents. They help to discredit both a notional dose-response relationship between screen time and mental health--even one cloaked in garb as benign as the digital Goldilocks hypothesis--and the widely publicized claim that the ubiquity of the smartphone in teens' lives has resulted in increased experience of psychological distress at population scale. This study's critical implication for policy-makers is that available data, properly analyzed and proving absolutely no causal effect, provide no basis for recommending personal behaviors, framing public policy, much less governing. Its critical implication for parents, caregivers, and educators is that the bill of goods they've been sold by credentialed fearmongers will not help them relieve their children's suffering.

We are left without evidence that non-TV screen use, measured at the grain size of surveys like YRBS, bears responsibility for well-being outcomes. Neither the omnipresence of mobile digital devices in adolescents' lives nor the construct of screen time can, in and of itself, specify the aspects of teens' experience which do bear that responsibility; still less can they much inform family or public policy governing teens' use of screen media. We must take up the recommendation of Przybylski and Weinstein (2017), Odgers and Jensen (2020), Orben (2020), and so many others that researchers look beyond mere quantification of screen time for causes of variation in teens' psychological health.

Appendix A
YRBS Summary Data

Table A1

Respondent Demographics, YRBS 2007-2019

	2007		2009		2011	
	Unweighted Frequency	Weighted Percentage	Unweighted Frequency	Weighted Percentage	Unweighted Frequency	Weighted Percentage
Age						
12 or younger	22	0.1	28	0.1	44	0.2
13	8	0.1	17	0.1	24	0.1
14	1361	11.2	1634	11.3	1561	11.7
15	3239	26.1	3701	24.8	3470	24.7
16	3606	25.8	4135	25.9	4061	26.1
17	3575	23.3	4230	24.2	3921	23.8
18 or older	2169	13.4	2595	13.6	2282	13.3
Missing	61		70		62	
Sex						
Female	7036	49.5	8280	47.8	7708	48.4
Male	6992	50.5	8065	52.2	7656	51.6
Missing	13				61	
Grade						
Grade 9	3467	29.0	4153	28	3774	27.6
Grade 10	3482	26.2	3926	26.2	3693	25.8
Grade 11	3480	23.4	4092	23.5	4133	23.8
Grade 12	3529	21.3	4137	22.2	3699	22.6
Ungraded or other	14	0.1	16	0.1	27	0.2
Missing	69		86		99	
Race/Ethnicity						
American Indian/Alaska Native	297	1.0	139	0.6	293	0.9
Asian	428	3.5	751	3.4	476	3.2
Black or African American	103	0.8	2832	14.4	2767	14.2
Hawaiian/ Pacific Islander	2931	15.1	180	0.8	125	0.9
White	5775	60.3	6889	58.7	6171	56.9
Hispanic/Latino	2008	8.6	3037	11	2227	9.2
Multiple/Hispanic	1868	8.3	1722	7.6	2400	10.8
Multiple/Non-Hispanic	383	2.5	559	3.6	651	4

Missing	248		301		315	

	2013		2015		2017	
	Unweighted Frequency	Weighted Percentage	Unweighted Frequency	Weighted Percentage	Unweighted Frequency	Weighted Percentage
<u>Age</u>						
12 or younger	26	0.2	43	0.2	59	0.3
13	18	0.1	17	0.1	22	0.1
14	1368	10	1684	10	1922	11.6
15	3098	24.1	3817	26.1	3586	25
16	3203	25.3	4033	25.1	3688	25.4
17	3473	24.6	3833	23.7	3611	24.2
18 or older	2320	15.6	2131	14.8	1796	13.4
Missing	77		66		81	
<u>Sex</u>						
Female	6621	50	7757	48.7	7526	50.7
Male	6950	50	7749	51.3	7112	49.3
Missing	12		118		127	
<u>Grade</u>						
Grade 9	3588	27.3	4003	27.2	3921	27.3
Grade 10	3152	25.7	3938	25.7	3715	25.6
Grade 11	3184	23.8	3930	23.9	3602	23.9
Grade 12	3557	23.1	3601	23.1	3383	23
Ungraded or other	23	0.1	35	0.2	30	0.2
Missing	79		117		114	
<u>Race/Ethnicity</u>						
American Indian/Alaska Native	121	0.7	163	0.6	137	0.5
Asian	491	3	627	3.8	648	3.5
Black or African American	2993	14.3	1667	13.6	2796	13.4
Native Hawaiian/Other Pacific Islander	135	0.8	100	0.7	116	0.8
White	5449	55.6	6849	54.5	6261	53.5
Hispanic/Latino	1734	10.4	2365	9.9	1543	9.8
Multiple/Hispanic	1661	10.7	2756	12.3	2104	13.1
Multiple/Non-Hispanic	681	4.4	739	4.6	823	5.5
Missing	318		358		337	

	2019	
	Unweighted Frequency	Weighted Percentage
Age		
12 or younger	60	0.3
13	27	0.1
14	1699	11.9
15	3473	24.8
16	3628	25.6
17	3102	23.7
18 or older	1616	13.7
Missing	72	
Sex		
Female	6885	49.4
Male	6641	50.6
Missing	151	
Grade		
Grade 9	3637	26.6
Grade 10	3717	25.5
Grade 11	3322	24.2
Grade 12	2850	23.5
Ungraded or other	39	0.2
Missing	112	
Race/Ethnicity		
American Indian/Alaska Native	145	0.6
Asian	618	5.1
Black or African American	2040	12.2
Native Hawaiian/Other Pacific Islander	69	0.3
White	6668	51.2
Hispanic/Latino	1009	9.2
Multiple/Hispanic	2029	16.9
Multiple/Non-Hispanic	661	4.5
Missing	438	

Note. Data from *National YRBS Data Users Manuals* for each administration (Centers for Disease Control and Prevention, 2008; 2010; 2012; 2014; 2016; 2018a; 2020)

Table A2

Survey Response Rates, YRBS 2007-2019

	Schools sampled	Schools participating	School RR[1]	Students sampled	Students responding	Usable forms[2]	Student RR[1]	Overall RR[1]
2007	195	157	81%	16,662	14,103	14,041	84%	68%
2009	196	158	81%	18,573	16,460	16,410	88%	71%
2011	194	158	81%	17,672	15,503	15,425	87%	71%
2013	193	148	77%	15,480	13,633	13,583	88%	68%
2015	180	125	69%	18,165	15,713	15,624	86%	60%
2017	192	144	75%	18,324	14,956	14,765	81%	60%
2019	181	136	75%	17.025	13,872	13,677	80%	60%

Notes: 1. RR indicates response rate. Student RRs are based on usable forms, not participation. Overall RR is calculated as School RR * Student RR. 2. Usable forms indicates questionnaires found usable after data editing. Data from *National YRBS Data Users Manuals* for each administration (Centers for Disease Control and Prevention, 2008; 2010; 2012; 2014; 2016; 2018a; 2020)

Table A3

Items Assessed in This Study

Television viewing

On an average school day, how many hours do you watch TV?

a. I do not watch TV on an average school day
b. Less than 1 hour per day
c. 1 hour per day
d. 2 hours per day
e. 3 hours per day
f. 4 hours per day
g. 5 or more hours per day

Non-TV screen time

On an average school day, how many hours do you play video or computer games or use a computer for something that is not school work? (Include activities such as Nintendo, Game Boy, PlayStation, Xbox, computer games, and the Internet.)

a. I do not play video or computer games or use a computer for something that is not school work
b. Less than 1 hour per day
c. 1 hour per day
d. 2 hours per day
e. 3 hours per day
f. 4 hours per day
g. 5 or more hours per day

Extended Sadness

During the past 12 months, did you ever feel so sad or hopeless almost every day for two weeks or more in a row that you stopped doing some usual activities?   Yes/No

Consideration of Suicide

During the past 12 months, did you ever seriously consider attempting suicide?   Yes/No

Suicide Planning

During the past 12 months, did you make a plan about how you would attempt suicide?   Yes/No

Attempted Suicide

During the past 12 months, how many times did you actually attempt suicide?

a. 1 time
b. 2-3 times
c. 4-5 times
d. 6 or more times

Note. Source: *National YRBS Data Users Manuals* for each administration (Centers for Disease Control and Prevention, 2008; 2010; 2012; 2014; 2016; 2018a; 2020)

Table A4

Item Response Rates, YRBS 2007-2019

	2007		2009		2011	
	Unweighted Frequency	Weighted Percentage	Unweighted Frequency	Weighted Percentage	Unweighted Frequency	Weighted Percentage
<u>Television Viewing</u>						
I do not . . .	1192	8.8	1576	9.8	1744	11.5
Less than 1 hour per day	2148	16.7	2723	18.7	2449	17.1
1 hour per day	2064	16.6	2340	15.7	2164	15.9
2 hours per day	2978	22.5	3641	23	3298	23
3 hours per day	2308	16.3	2619	15.2	2470	15.4
4 hours per day	1262	7.9	1405	8	1203	7.2
5 or more hours per day	1873	11.1	1822	9.6	1682	9.8
Missing	216		284		415	
<u>Non-TV Screen Time</u>						
I do not . . .	2827	18.5	2957	17	2093	12.7
Less than 1 hour per day	3019	22.9	3695	23.9	2886	20.5
1 hour per day	2245	16.7	2741	17.6	2417	17.3
2 hours per day	2282	17.0	2659	16.6	2670	18.4
3 hours per day	1504	11.0	1734	10.9	1947	12.7
4 hours per day	743	5.5	891	5.6	1034	6.6
5 or more hours per day	1197	8.5	1447	8.4	1950	11.8
Missing	224		286		428	
<u>Extended Sadness</u>						
Yes	4153	28.5	4525	26.1	4537	28.5
No	9692	71.5	11707	73.9	10732	71.5
Missing	196		178		156	
<u>Consideration of Suicide</u>						
Yes	2092	14.5	2349	13.8	2424	15.8
No	11767	85.5	13871	86.2	12869	84.2
Missing	182		190		132	
<u>Suicide Planning</u>						
Yes	1648	11.3	1873	10.9	2015	12.8
No	12154	88.7	14340	89.1	13263	87.2
Missing	239		197		147	

	2013		2015		2017	
Attempted Suicide						
0 times	11482	93.1	13556	93.7	12335	92.2
1 time	537	3.8	546	3.3	633	4.1
2-3 times	301	2.1	310	1.9	335	2.2
4-5 times	59	0.4	68	0.4	76	0.5
6 or more times	105	0.6	129	0.8	135	1
Missing	1557		1801		1911	

	2013		2015		2017	
	Unweighted Frequency	Weighted Percentage	Unweighted Frequency	Weighted Percentage	Unweighted Frequency	Weighted Percentage
Television Viewing						
I do not . . .	1840	14.4	2871	19.2	3565	26.3
Less than 1 hour per day	2168	17.7	2978	20.3	2799	20.6
1 hour per day	1750	14.4	2297	15.9	1905	13.9
2 hours per day	2705	21	2958	19.9	2521	18.6
3 hours per day	2139	15.3	2030	12.6	1473	10.4
4 hours per day	1048	7.4	844	5.2	654	4.4
5 or more hours per day	1595	9.8	1146	6.9	950	5.9
Missing	338		500		898	
Non-TV Screen Time						
I do not . . .	1993	14.7	2799	17.9	2878	19.6
Less than 1 hour per day	1918	15.4	1999	13.7	1617	12
1 hour per day	1619	13	1616	10.8	1397	10.3
2 hours per day	2056	15.7	2235	15.8	1963	15.1
3 hours per day	1782	13	1957	13.4	1757	13
4 hours per day	1134	8.4	1400	8.9	1214	8.6
5 or more hours per day	2753	19.9	3172	19.4	3013	21.5
Missing	328		446		926	
Extended Sadness						
Yes	4083	29.9	4789	29.9	4631	31.5
No	9409	70.1	10666	70.1	9896	68.5
Missing	88		169		238	
Consideration of Suicide						
Yes	2259	17	2808	17.7	2571	17.2
No	11232	83	12626	82.3	11982	82.8
Missing	92		190		212	

Suicide Planning						
Yes	1874	13.6	2331	14.6	2030	13.6
No	11611	86.4	12810	85.4	12511	86.4
Missing	98		483		224	
Attempted Suicide						
0 times	10967	92	11364	91.4	9849	92.6
1 time	516	4	631	4.6	411	3.6
2-3 times	322	2.6	374	2.5	278	2.4
4-5 times	76	0.6	79	0.7	63	0.5
6 or more times	101	0.8	119	0.8	85	0.8
Missing	1601		3057		4079	

	2019 Unweighted Frequency	Weighted Percentage
Television Viewing		
I do not . . .	3637	28.3
Less than 1 hour per day	2633	20.7
1 hour per day	1829	14.6
2 hours per day	2101	16.7
3 hours per day	1251	9.6
4 hours per day	563	4.4
5 or more hours per day	783	5.8
Missing	881	
Non-TV Screen Time		
I do not . . .	2426	17.7
Less than 1 hour per day	1439	10.4
1 hour per day	1357	10.1
2 hours per day	2024	15.8
3 hours per day	2019	15.4
4 hours per day	1287	10.1
5 or more hours per day	2625	20.6
Missing	500	
Extended Sadness		
Yes	4926	36.7
No	8495	63.3
Missing	256	

Consideration of Suicide		
Yes	2633	18.8
No	10804	81.2
Missing	240	
Suicide Planning		
Yes	2151	15.7
No	11271	84.3
Missing	255	
Attempted Suicide		
0 times	9453	91.1
1 time	604	4.9
2-3 times	319	2.7
4-5 times	67	0.6
6 or more times	77	0.7
Missing	3157	

Note. Data from *National YRBS Data Users Manuals* for each administration (Centers for Disease Control and Prevention, 2008; 2010; 2012; 2014; 2016; 2018a; 2020)

Appendix B

Descriptive Statistics

Table B1

Frequencies/Sizes and Proportions of Population-Adjusted Sample and Cohort/Sex Subsets

a. By Cohort

Cohorts	Sizes	Proportions of Sample
2007	14041	.14
2009	16410	.16
2011	15425	.15
2013	13583	.13
2015	15624	.15
2017	14765	.14
2019	13677	.13
Full sample	103525	

b. By Sex

Sex	Frequencies	Proportions of Sample
Girls	50653	.49
Boys	52872	.51

c. By Sex and Cohort

Cohorts	Sex	Frequencies	Proportions of Cohort
2007	Girls	6942	.49
	Boys	7099	.51
2009	Girls	7816	.48
	Boys	8594	.52
2011	Girls	7446	.48
	Boys	7979	.52
2013	Girls	6780	.50
	Boys	6803	.50
2015	Girls	7551	.48
	Boys	8073	.52
2017	Girls	7428	.50
	Boys	7337	.50
2019	Girls	6690	.49
	Boys	6987	.51

Table B2

Response Frequencies and Proportions, Population-Adjusted Sample

a. TV Use, Average School Day

	Frequencies	Proportions
No TV	17327	.17
Less than 1 hour	19500	.19
1 hour	15849	.15
2 hours	21473	.21
3 hours	14054	.14
4 hours	6602	.06
5 hours or more	8719	.08

b. *Non-TV Screen Time, Average School Day*

	Frequencies	Proportions
No non-TV screen time	17443	.17
Less than 1 hour	17691	.17
1 hour	14271	.14
2 hours	16935	.16
3 hours	13144	.13
4 hours	7895	.08
5 hours or more	16145	.16

c. YRBS Dichotomous Items-Psychological Distress

	Frequencies	Proportions
Extended sadness	31111	.30
No extended sadness	72414	.70
Considered suicide	16977	.16
Did not consider suicide	86548	.84
Planned suicide	13681	.13
Did not plan suicide	89844	.87

d. Suicide Attempts

	Frequencies	Proportions
None	95486	.92
1 attempt	4393	.04
2-3 attempts	2335	.02
4-5 attempts	520	.01
6 or more attempts	791	.01

Table B3

Responses by Cohort, Population-Adjusted Sample: TV Use, Average School Day

a. Frequencies

	Full sample	2007	2009	2011
No TV	17327	1236	1608	1774
Less than 1 hour	19500	2345	3069	2638
1 hour	15849	2331	2576	2453
2 hours	21473	3159	3774	3548
3 hours	14054	2289	2494	2375
4 hours	6602	1109	1313	1111
5 hours or more	8719	1559	1575	1512

	2013	2015	2017	2019
No TV	1956	3000	3883	3871
Less than 1 hour	2404	3172	3042	2831
1 hour	1956	2484	2052	1997
2 hours	2852	3109	2746	2284
3 hours	2078	1969	1536	1313
4 hours	1005	812	650	602
5 hours or more	1331	1078	871	793

b. Proportions

	Full sample	2007	2009	2011
No TV	.17	.09	.10	.12
Less than 1 hour	.19	.17	.19	.17
1 hour	.15	.17	.16	.16
2 hours	.21	.23	.23	.23
3 hours	.14	.16	.15	.15
4 hours	.06	.08	.08	.07
5 hours or more	.08	.11	.10	.10

	2013	2015	2017	2019
Less than 1 hour	.14	.19	.26	.28
1 hour	.18	.20	.21	.21
2 hours	.14	.16	.14	.15
3 hours	.21	.20	.19	.17
4 hours	.15	.13	.10	.10
5 hours or more	.07	.05	.04	.04

Table B4

Responses by Cohort, Population-Adjusted Sample: Non-TV Screen Time, Average School Day

a. Frequencies

	Full sample	2007	2009	2011
No non-TV screen time	17443	2602	2794	1959
Less than 1 hour	17691	3209	3919	3153
1 hour	14271	2345	2886	2673
2 hours	16935	2391	2725	2844
3 hours	13144	1537	1780	1951
4 hours	7895	771	920	1021
5 hours or more	16145	1186	1385	1825

	2013	2015	2017	2019
No non-TV screen time	1989	2795	2896	2408
Less than 1 hour	2085	2140	1773	1413
1 hour	1766	1682	1526	1393
2 hours	2127	2472	2218	2157
3 hours	1767	2090	1914	2104
4 hours	1148	1393	1263	1378
5 hours or more	2700	3052	3175	2823

b. Proportions

	Full sample	2007	2009	2011
No non-TV screen time	.17	.19	.17	.13
Less than 1 hour	.17	.23	.24	.20
1 hour	.14	.17	.18	.17
2 hours	.16	.17	.17	.18
3 hours	.13	.11	.11	.13
4 hours	.08	.05	.06	.07
5 hours or more	.16	.08	.08	.12

	2013	2015	2017	2019
No non-TV screen time	.15	.18	.20	.18
Less than 1 hour	.15	.14	.12	.10
1 hour	.13	.11	.10	.10
2 hours	.16	.16	.15	.16
3 hours	.13	.13	.13	.15
4 hours	.08	.09	.09	.10
5 hours or more	.20	.20	.22	.21

Table B5

Responses by Sex and Cohort, Population-Adjusted Sample: Non-TV Screen Time, Average School Day

a. Frequencies: Girls

	Full subset	2007	2009	2011
No non-TV screen time	10657	1642	1692	1103
Less than 1 hour	8480	1674	1911	1686
1 hour	6708	1125	1330	1352
2 hours	7588	1072	1226	1320
3 hours	5832	620	777	846
4 hours	3577	358	373	422
5 hours or more	7811	452	506	717

	2013	2015	2017	2019
No non-TV screen time	1177	1665	1832	1546
Less than 1 hour	991	831	752	636
1 hour	865	777	665	595
2 hours	1009	1046	983	931
3 hours	800	961	914	915
4 hours	509	655	615	645
5 hours or more	1430	1616	1667	1423

b. Frequencies: Boys

	Full subset	2007	2009	2011
No non-TV screen time	6786	960	1102	856
Less than 1 hour	9212	1535	2008	1467
1 hour	7563	1220	1556	1322
2 hours	9347	1319	1498	1523
3 hours	7312	917	1003	1105
4 hours	4318	413	547	599
5 hours or more	8334	734	878	1108

	2013	2015	2017	2019
No non-TV screen time	812	1130	1064	863
Less than 1 hour	1094	1309	1021	776
1 hour	901	905	861	798
2 hours	1118	1426	1235	1226
3 hours	967	1130	1000	1189
4 hours	639	739	648	733
5 hours or more	1271	1435	1507	1400

c. Proportions: Girls

	Full subset	2007	2009	2011
No non-TV screen time	.21	.24	.22	.15
Less than 1 hour	.17	.24	.24	.23
1 hour	.13	.16	.17	.18
2 hours	.15	.15	.16	.18
3 hours	.12	.09	.10	.11
4 hours	.07	.05	.05	.06
5 hours or more	.15	.07	.06	.10

	2013	2015	2017	2019
No non-TV screen time	.17	.22	.25	.23
Less than 1 hour	.15	.11	.10	.10
1 hour	.13	.10	.09	.09
2 hours	.15	.14	.13	.14
3 hours	.12	.13	.12	.14
4 hours	.08	.09	.08	.10
5 hours or more	.21	.21	.22	.21

d. Proportions: Boys

	Full subset	2007	2009	2011
No non-TV screen time	.13	.14	.13	.11
Less than 1 hour	.17	.22	.23	.18
1 hour	.14	.17	.18	.17
2 hours	.18	.19	.17	.19
3 hours	.14	.13	.12	.14
4 hours	.08	.06	.06	.08
5 hours or more	.16	.10	.10	.14
	2013	**2015**	**2017**	**2019**
No non-TV screen time	.12	.14	.14	.12
Less than 1 hour	.16	.16	.14	.11
1 hour	.13	.11	.12	.11
2 hours	.16	.18	.17	.18
3 hours	.14	.14	.14	.17
4 hours	.09	.09	.09	.10
5 hours or more	.19	.18	.21	.20

Table B6

Responses by Cohort, Population-Adjusted Sample: Extended Sadness

	Full sample	2007	2009	2011
Frequencies-Yes	31111	4006	4397	4286
Proportions-Yes	.30	.29	.29	.26
Frequencies-No	72414	10035	11028	12124
Proportions-No	.70	.71	.71	.74
	2013	**2015**	**2017**	**2019**
Frequencies-Yes	4071	4667	4651	5033
Proportions-Yes	.30	.30	.32	.37
Frequencies-No	9512	10957	10114	8644
Proportions-No	.70	.70	.68	.63

Table B7

Responses by Sex and Cohort, Population-Adjusted Sample: Extended Sadness

a. Girls

	Full subset	2007	2009	2011
Frequencies-Yes	19637	2488	2645	2680
Proportions-Yes	.39	.36	.34	.36
Frequencies-No	31016	4454	5171	4766
Proportions-No	.61	.64	.66	.64

	2013	2015	2017	2019
Frequencies-Yes	2649	2998	3053	3124
Proportions-Yes	.39	.40	.41	.47
Frequencies-No	4132	4553	4375	3566
Proportions-No	.61	.60	.59	.53

b. Boys

	Full subset	2007	2009	2011
Frequencies-Yes	11474	1518	1641	1717
Proportions-Yes	.22	.21	.19	.22
Frequencies-No	41398	5581	6953	6262
Proportions-No	.78	.79	.81	.78

	2013	2015	2017	2019
Frequencies-Yes	1422	1669	1598	1909
Proportions-Yes	.21	.21	.22	.27
Frequencies-No	5380	6405	5739	5078
Proportions-No	.79	.79	.78	.73

Table B8

Responses by Cohort, Population-Adjusted Sample: Consideration of Suicide

	Full sample	2007	2009	2011
Frequencies-Yes	16977	2271	2444	2316
Proportions-Yes	.16	.14	.14	.16
Frequencies-No	86548	12009	14139	12981
Proportions-No	.84	.86	.86	.84

	2013	2015	2017	2019
Frequencies-Yes	2316	2781	2551	2581
Proportions-Yes	.17	.18	.17	.19
Frequencies-No	11267	12843	12214	11096
Proportions-No	.83	.82	.83	.81

Table B9

Responses by Sex and Cohort, Population-Adjusted Sample: Consideration of Suicide

a. Girls

	Full subset	2007	2009	2011
Frequencies-Yes	10647	1296	1362	1436
Proportions-Yes	.21	.19	.17	.19
Frequencies-No	40007	5646	6453	6010
Proportions-No	.79	.81	.83	.81

	2013	2015	2017	2019
Frequencies-Yes	1519	1770	1645	1618
Proportions-Yes	.22	.23	.22	.24
Frequencies-No	5261	5780	5783	5073
Proportions-No	.78	.77	.78	.76

b. Boys

	Full subset	2007	2009	2011
Frequencies-Yes	6330	736	909	1008
Proportions-Yes	.12	.10	.11	.13
Frequencies-No	46542	6362	7685	6971
Proportions-No	.88	.90	.89	.87
	2013	2015	2017	2019
Frequencies-Yes	797	1011	906	963
Proportions-Yes	.12	.13	.12	.14
Frequencies-No	6005	7062	6432	6024
Proportions-No	.88	.87	.88	.86

Table B10

Responses by Cohort, Population-Adjusted Sample: Suicide Planning

	Full sample	2007	2009	2011
Frequencies-Yes	13681	1593	1786	1980
Proportions-Yes	.13	.11	.11	.13
Frequencies-No	89844	12448	14624	13445
Proportions-No	.87	.89	.89	.87
	2013	2015	2017	2019
Frequencies-Yes	1849	2296	2017	2160
Proportions-Yes	.14	.15	.14	.16
Frequencies-No	11734	13328	12748	11517
Proportions-No	.86	.85	.86	.84

Table B11

Responses by Sex and Cohort, Population-Adjusted Sample: Suicide Planning

a. Girls

	Full subset	2007	2009	2011
Frequencies-Yes	8296	933	1032	1114
Proportions-Yes	.16	.13	.13	.15
Frequencies-No	42357	6010	6784	6332
Proportions-No	.84	.87	.87	.85

	2013	2015	2017	2019
Frequencies-Yes	1146	1463	1272	1337
Proportions-Yes	.17	.19	.17	.20
Frequencies-No	5635	6088	6156	5353
Proportions-No	.83	.81	.83	.80

b. Boys

	Full subset	2007	2009	2011
Frequencies-Yes	5385	661	755	866
Proportions-Yes	.10	.09	.09	.11
Frequencies-No	47487	6438	7839	7113
Proportions-No	.90	.91	.91	.89

	2013	2015	2017	2019
Frequencies-Yes	703	833	745	823
Proportions-Yes	.10	.10	.10	.12
Frequencies-No	6100	7240	6593	6164
Proportions-No	.90	.90	.90	.88

Table B12

Responses by Cohort, Population-Adjusted Sample: Suicide Attempts

a. Frequencies

	Full sample	2007	2009	2011
No	95486	13046	15330	14209
1 attempt	4393	563	582	665
2-3 attempts	2335	292	306	328
4-5 attempts	520	54	67	74
6 or more attempts	791	87	126	148
Any attempts	8039	13046	15330	14209

	2013	2015	2017	2019
No	12487	14301	13645	12469
1 attempt	574	732	586	690
2-3 attempts	341	376	345	348
4-5 attempts	78	98	74	76
6 or more attempts	103	118	115	93
Any attempts	12487	14301	13645	12469

b. Proportions

	Full sample	2007	2009	2011
No	.92	.93	.93	.92
1 attempt	.04	.04	.04	.04
2-3 attempts	.02	.02	.02	.02
4-5 attempts	.01	.00	.00	.00
6 or more attempts	.01	.01	.01	.01
Any attempts	.08	.07	.07	.07

	2013	2015	2017	2019
No	.92	.92	.92	.91
1 attempt	.04	.05	.04	.05
2-3 attempts	.03	.02	.02	.03
4-5 attempts	.01	.01	.01	.01
6 or more attempts	.01	.01	.01	.01
Any attempts	.08	.09	.08	.10

Table B13

Responses by Sex and Cohort, Population-Adjusted Sample, Suicide Attempts

a. Frequencies-Girls

	Full subset	2007	2009	2011
No	45684	6301	7175	6722
1 attempt	2757	369	367	400
2-3 attempts	1606	195	191	230
4-5 attempts	291	41	35	41
6 or more attempts	314	36	48	52
Any attempts	4969	641	641	724

	2013	2015	2017	2019
No	6074	6699	6737	5976
1 attempt	373	467	379	402
2-3 attempts	251	263	231	246
4-5 attempts	43	54	41	36
6 or more attempts	40	67	40	30
Any attempts	706	851	690	715

b. Frequencies-Boys

	Full subset	2007	2009	2011
No	49802	6744	8155	7487
1 attempt	1635	194	215	265
2-3 attempts	729	96	115	99
4-5 attempts	229	13	31	32
6 or more attempts	477	51	78	96
Any attempts	3070	354	439	492

	2013	2015	2017	2019
No	6413	7601	6907	6494
1 attempt	201	265	208	288
2-3 attempts	90	113	114	102
4-5 attempts	35	44	33	40
6 or more attempts	63	51	75	64
Any attempts	390	472	430	493

c. Proportions--Girls

	Full subset	2007	2009	2011
No	.90	.91	.92	.91
1 attempt	.05	.05	.05	.05
2-3 attempts	.03	.03	.02	.03
4-5 attempts	.01	.01	.00	.01
6 or more attempts	.01	.01	.01	.01
Any attempts	.10	.09	.08	.09

	2013	2015	2017	2019
No	.89	.89	.90	.89
1 attempt	.05	.06	.05	.06
2-3 attempts	.04	.03	.03	.04
4-5 attempts	.01	.01	.01	.01
6 or more attempts	.01	.01	.01	.00
Any attempts	.11	.11	.10	.11

d. Proportions--Boys

	Full subset	2007	2009	2011
No	.95	.95	.95	.94
1 attempt	.03	.03	.03	.03
2-3 attempts	.01	.01	.01	.01
4-5 attempts	.00	.00	.00	.00
6 or more attempts	.01	.01	.01	.01
Any attempts	.05	..05	.05	.05

	2013	2015	2017	2019
No	.94	.94	.94	.93
1 attempt	.03	.03	.03	.04
2-3 attempts	.01	.01	.02	.01
4-5 attempts	.01	.01	.00	.01
6 or more attempts	.01	.01	.01	.01
Any attempts	.06	.06	.06	.07

Table B14

Proportions, Reports of Extended Sadness Within Levels of Non-TV Screen Time, Average School Day

	Extended sadness (.30 of full sample)
No non-TV screen time	.29
Less than 1 hour	.25
1 hour	.25
2 hours	.27
3 hours	.30
4 hours	.34
5 hours or more	.42

$\chi 2$ (6, N = 103,525) = 1500.3, $p < .001$

Note. Frequencies and proportions were calculated for all 5 reweighted missing-data imputations. A small number of proportions varied ±0.01 among the imputations. Since proportions could not be pooled, imputation 1 is reported by way of example.

Table B15

Proportions, Levels of Non-TV Screen Time, Average School Day, Within Reports of Extended Sadness

	Full sample non-TV screen-time levels	Non-TV screen-time levels among respondents reporting extended sadness
No non-TV screen time	.17	.16
Less than 1 hour	.17	.14
1 hour	.14	.11
2 hours	.16	.15
3 hours	.13	.13
4 hours	.08	.09
5 hours or more	.16	.21

$\chi 2$ (6, N = 103,525) = 1500.3, $p < .001$

Note. Frequencies and proportions were calculated for all 5 reweighted missing-data imputations. A small number of proportions varied ±0.01 among the imputations. Since proportions could not be pooled, imputation 1 is reported by way of example.

Table B16

Proportions, Reports of Consideration of Suicide Within Levels of Non-TV Screen Time, Average School Day

	Considered suicide (.16 of full sample)
No non-TV screen time	.15
Less than 1 hour	.14
1 hour	.13
2 hours	.15
3 hours	.16
4 hours	.18
5 hours or more	.25

$\chi 2$ (6, N = 103,525) = 1128.2, p < .001

Note. Frequencies and proportions were calculated for all 5 reweighted missing-data imputations. A small number of proportions varied ±0.01 among the imputations. Since proportions could not be pooled, imputation 1 is reported by way of example.

Table B17

Proportions, Levels of Non-TV Screen Time, Average School Day, Within Reports of Consideration of Suicide

	Full sample non-TV screen-time levels	Non-TV screen-time levels among respondents reporting consideration of suicide
No non-TV screen time	.17	.15
Less than 1 hour	.17	.14
1 hour	.14	.11
2 hours	.16	.15
3 hours	.13	.13
4 hours	.08	.09
5 hours or more	.16	.24

$\chi 2$ (6, N = 103,525) = 1128.2, $p < .001$

Note. Frequencies and proportions were calculated for all 5 reweighted missing-data imputations. A small number of proportions varied ±0.01 among the imputations. Since proportions could not be pooled, imputation 1 is reported by way of example.

Table B18

Proportions, Reports of Suicide Planning Within Levels of Non-TV Screen Time, Average School Day

	Planned suicide (.13 of full sample)
No non-TV screen time	.12
Less than 1 hour	.11
1 hour	.10
2 hours	.12
3 hours	.13
4 hours	.14
5 hours or more	.21

$\chi 2$ (6, N = 103,525) = 1057.2, $p < .001$

Note. Frequencies and proportions were calculated for all 5 reweighted missing-data imputations. A small number of proportions varied ±0.01 among the imputations. Since proportions could not be pooled, imputation 1 is reported by way of example.

Table B19

Proportions, Levels of Non-TV Screen Time, Average School Day, Within Reports of Suicide Planning

	Full sample non-TV screen-time levels	Non-TV screen-time levels among respondents reporting suicide planning
No non-TV screen time	.17	.15
Less than 1 hour	.17	.14
1 hour	.14	.10
2 hours	.16	.14
3 hours	.13	.13
4 hours	.08	.08
5 hours or more	.16	.25

$\chi 2$ (6, N = 103,525) = 1057.2, $p < .001$

Note. Frequencies and proportions were calculated for all 5 reweighted missing-data imputations. A small number of proportions varied ±0.01 among the imputations. Since proportions could not be pooled, imputation 1 is reported by way of example.

Table B20

Proportions, Reports of Suicide Attempts Within Levels of Non-TV Screen Time, Average School Day

	No attempts	1 attempt	2-3 attempts	4-5 attempts	6 or more attempts
Full sample	.92	.04	.02	.01	.01
No non-TV screen time	.92	.05	.02	.01	.01
Less than 1 hour	.94	.04	.02	.00	.01
1 hour	.94	.04	.02	.00	.00
2 hours	.93	.04	.02	.00	.00
3 hours	.93	.04	.02	.00	.00
4 hours	.92	.05	.03	.01	.00
5 hours or more	.88	.06	.04	.01	.02

$\chi 2$ (24, N = 103,525) = 824.61, p < .001

Note. Frequencies and proportions were calculated for all 5 reweighted missing-data imputations. A small number of proportions varied ±0.01 among the imputations. Since proportions could not be pooled, imputation 1 is reported by way of example.

Table B21

Proportions, Levels of Non-TV Screen Time, Average School Day, Within Reports of Suicide Attempts

	Full sample	No attempts	1 attempt	2-3 attempts	4-5 attempts	6 or more attempts	Any attempts
No non-TV screen time	.17	.17	.18	.16	.19	.16	.17
Less than 1 hour	.17	.17	.14	.15	.14	.12	.14
1 hour	.14	.14	.11	.11	.10	.07	.10
2 hours	.16	.17	.15	.13	.12	.10	.14
3 hours	.13	.13	.12	.12	.12	.08	.12
4 hours	.08	.08	.08	.09	.08	.04	.08
5 hours or more	.16	.15	.20	.25	.26	.43	.25

$\chi 2$ (24, N = 103,525) = 824.61, p < .001 (for individual attempts categories)
$\chi 2$ (6, N = 103,525) = 546.36, p < .001 (for dichotomous "any attempts")

Note. Frequencies and proportions were calculated for all 5 reweighted missing-data imputations. A small number of proportions varied ±0.01 among the imputations. Since proportions could not be pooled, imputation 1 is reported by way of example. "Any attempts" statistics derive from a separate dichotomous analysis.

Table B22

Proportions, Reports of Extended Sadness Within Levels of Non-TV Screen Time, Average School Day, by Cohort

	2007	2009	2011	2013	2015	2017	2019
Full cohort	.28	.26	.29	.30	.30	.32	.36
No non-TV screen time	.31	.27	.28	.28	.27	.31	.34
Less than 1 hour	.25	.22	.26	.24	.23	.27	.33
1 hour	.25	.24	.25	.26	.25	.24	.28
2 hours	.27	.26	.28	.26	.26	.28	.32
3 hours	.29	.27	.30	.31	.27	.31	.35
4 hours	.37	.29	.29	.32	.33	.34	.43
5 hours or more	.38	.37	.38	.41	.43	.40	.48

2007	$\chi 2$ (6, N = 14041) = 138.62, p < .001
2009	$\chi 2$ (6, N = 16410) = 133.84, p < .001
2011	$\chi 2$ (6, N = 15425) = 97.621, p < .001
2013	$\chi 2$ (6, N = 13583) = 218.67, p < .001
2015	$\chi 2$ (6, N = 15624) = 375.58, p < .001
2017	$\chi 2$ (6, N = 14765) = 170.88, p < .001
2019	$\chi 2$ (6, N = 13677) = 254.44, p < .001

Note. Frequencies and proportions were calculated for all 5 reweighted missing-data imputations. A small number of proportions varied ±0.01 among the imputations. Since proportions could not be pooled, imputation 1 is reported by way of example.

Table B23

Proportions, Levels of Non-TV Screen Time, Average School Day, Within Reports of Extended Sadness, by Cohort

	2007		*2009*		*2011*		*2013*	
	2007 cohort	Non-TV screen-time levels among respondents who reported extended sadness	2009 cohort	Non-TV screen-time levels among respondents who reported extended sadness	2011 cohort	Non-TV screen-time levels among respondents who reported extended sadness	2013 cohort	Non-TV screen-time levels among respondents who reported extended sadness
No non-TV screen time	.19	.20	.17	.17	.13	.12	.15	.14
Less than 1 hour	.23	.20	.24	.20	.20	.19	.15	.12
1 hour	.17	.15	.18	.16	.17	.15	.13	.11
2 hours	.17	.16	.17	.16	.18	.18	.16	.14
3 hours	.11	.11	.11	.11	.13	.13	.13	.13
4 hours	.05	.07	.06	.06	.07	.07	.08	.09
5 hours or more	.08	.11	.08	.12	.12	.16	.20	.27

	2015		*2017*		*2019*	
.	2015 cohort	Non-TV screen-time levels among respondents who reported extended sadness	2017 cohort	Non-TV screen-time levels among respondents who reported extended sadness	2019 cohort	Non-TV screen-time levels among respondents who reported extended sadness
No non-TV screen time	.18	.16	.20	.19	.18	.16
Less than 1 hour	.14	.10	.12	.10	.10	.09
1 hour	.11	.09	.10	.08	.10	.08
2 hours	.16	.14	.15	.13	.16	.13
3 hours	.13	.12	.13	.13	.15	.15
4 hours	.09	.10	.09	.09	.10	.12
5 hours or more	.20	.28	.22	.27	.21	.27

2007	$\chi 2$ (6, N = 14041) = 138.62, p < .001
2009	$\chi 2$ (6, N = 16410) = 133.84, p < .001
2011	$\chi 2$ (6, N = 15425) = 97.62, p < .001
2013	$\chi 2$ (6, N = 13583) = 218.67, p < .001
2015	$\chi 2$ (6, N = 15624) = 375.58, p < .001
2017	$\chi 2$ (6, N = 14765) = 170.88, p < .001
2019	$\chi 2$ (6, N = 13677) = 254.44, p < .001

Note. Frequencies and proportions were calculated for all 5 reweighted missing-data imputations. A small number of proportions varied ±0.01 among the imputations. Since proportions could not be pooled, imputation 1 is reported by way of example.

Table B24

Proportions, Reports of Consideration of Suicide Within Levels of Non-TV Screen Time, Average School Day, by Cohort

	2007	2009	2011	2013	2015	2017	2019
Full cohort	.14	.14	.16	.17	.18	.17	.19
No Non-TV Screen Time	.15	.14	.15	.14	.16	.15	.16
Less than 1 hour	.13	.11	.14	.14	.14	.13	.19
1 hour	.13	.12	.14	.13	.14	.12	.13
2 hours	.14	.15	.15	.15	.16	.14	.15
3 hours	.13	.14	.16	.19	.15	.18	.18
4 hours	.20	.15	.18	.16	.16	.20	.23
5 hours or more	.20	.23	.23	.25	.28	.25	.26

2007	$\chi 2$ (6, N = 14041) = 54.13, p < .001
2009	$\chi 2$ (6, N = 16410) = 139.43, p < .001
2011	$\chi 2$ (6, N = 15425) = 97.545, p < .001
2013	$\chi 2$ (6, N = 13583) = 166.97, p < .001
2015	$\chi 2$ (6, N = 15624) = 251.78, p < .001
2017	$\chi 2$ (6, N = 14765) = 202.17, p < .001
2019	$\chi 2$ (6, N = 13677) = 184.04, p < .001

Note. Frequencies and proportions were calculated for all 5 reweighted missing-data imputations. A small number of proportions varied ±0.01 among the imputations. Since proportions could not be pooled, imputation 1 is reported by way of example.

Table B25

Proportions, Levels of Non-TV Screen Time, Average School Day, Within Reports of Consideration of Suicide, by Cohort

	2007		*2009*		*2011*		*2013*	
	2007 cohort	Non-TV screen-time levels among respondents who reported considering suicide	2009 cohort	Non-TV screen-time levels among respondents who reported considering suicide	2011 cohort	Non-TV screen-time levels among respondents who reported considering suicide	2013 cohort	Non-TV screen-time levels among respondents who reported considering suicide
No non-TV screen time	.19	.19	.17	.17	.13	.12	.15	.12
Less than 1 hour	.23	.21	.24	.19	.20	.18	.15	.12
1 hour	.17	.15	.18	.15	.17	.15	.13	.10
2 hours	.17	.17	.17	.18	.18	.17	.16	.14
3 hours	.11	.10	.11	.11	.13	.13	.13	.15
4 hours	.05	.07	.06	.06	.07	.08	.08	.08
5 hours or more	.08	.11	.08	.14	.12	.17	.20	.29

	2015		*2017*		*2019*	
	2015 cohort	Non-TV screen-time levels among respondents who reported considering suicide	2017 cohort	Non-TV screen-time levels among respondents who reported considering suicide	2019 cohort	Non-TV screen-time levels among respondents who reported considering suicide
No non-TV screen time	.18	.16	.20	.17	.18	.15
Less than 1 hour	.14	.11	.12	.09	.10	.10
1 hour	.11	.08	.10	.07	.10	.07
2 hours	.16	.14	.15	.13	.16	.13
3 hours	.13	.12	.13	.13	.15	.14
4 hours	.09	.09	.09	.10	.10	.12
5 hours or more	.20	.30	.22	.31	.21	.29

2007	$\chi 2$ (6, N = 14041) = 54.13, p < .001
2009	$\chi 2$ (6, N = 16410) = 139.43, p < .001
2011	$\chi 2$ (6, N = 15425) = 97.545, p < .001
2013	$\chi 2$ (6, N = 13583) = 166.97, p < .001
2015	$\chi 2$ (6, N = 15624) = 251.78, p < .001
2017	$\chi 2$ (6, N = 14765) = 202.17, p < .001
2019	$\chi 2$ (6, N = 13677) = 184.04, p < .001

Note. Frequencies and proportions were calculated for all 5 reweighted missing-data imputations. A small number of proportions varied ±0.01 among the imputations. Since proportions could not be pooled, imputation 1 is reported by way of example.

Table B26

Proportions, Reports of Suicide Planning Within Levels of Non-TV Screen Time, Average School Day, by Cohort

	2007	2009	2011	2013	2015	2017	2019
Full cohort	.11	.11	.13	.14	.15	.14	.16
No non-TV screen time	.11	.12	.12	.11	.13	.12	.13
Less than 1 hour	.10	.08	.12	.12	.12	.11	.16
1 hour	.10	.09	.10	.11	.11	.10	.11
2 hours	.11	.10	.11	.12	.13	.12	.13
3 hours	.11	.13	.13	.15	.12	.13	.15
4 hours	.14	.11	.16	.12	.15	.14	.17
5 hours or more	.18	.19	.21	.19	.23	.20	.23

2007	$\chi 2$ (6, N = 14041) = 63.75, p < .001
2009	$\chi 2$ (6, N = 16410) = 139.23, p < .001
2011	$\chi 2$ (6, N = 15425) = 136.60, p < .001
2013	$\chi 2$ (6, N = 13583) = 112.24, p < .001
2015	$\chi 2$ (6, N = 15624) = 219.76, p < .001
2017	$\chi 2$ (6, N = 14765) = 143.67, p < .001
2019	$\chi 2$ (6, N = 13677) = 168.28, p < .001

Note. Frequencies and proportions were calculated for all 5 reweighted missing-data imputations. A small number of proportions varied ±0.01 among the imputations. Since proportions could not be pooled, imputation 1 is reported by way of example.

Table B27

Proportions, Levels of Non-TV Screen Time, Average School Day, Within Reports of Suicide Planning, by Cohort

	2007		*2009*		*2011*		*2013*	
	2007 cohort	Non-TV screen-time levels among respondents who reported considering suicide	2009 cohort	Non-TV screen-time levels among respondents who reported considering suicide	2011 cohort	Non-TV screen-time levels among respondents who reported considering suicide	2013 cohort	Non-TV screen-time levels among respondents who reported considering suicide
No non-TV screen time	.19	.18	.17	.19	.13	.12	.15	.12
Less than 1 hour	.23	.20	.24	.18	.20	.18	.15	.14
1 hour	.17	.15	.18	.15	.17	.14	.13	.11
2 hours	.17	.17	.17	.15	.18	.16	.16	.13
3 hours	.11	.11	.11	.12	.13	.13	.13	.14
4 hours	.05	.07	.06	.05	.07	.08	.08	.08
5 hours or more	.08	.13	.08	.15	.12	.19	.20	.28

	2015		2017		2019	
	2015 cohort	Non-TV screen-time levels among respondents who reported suicide planning	2017 cohort	Non-TV screen-time levels among respondents who reported suicide planning	2019 cohort	Non-TV screen-time levels among respondents who reported suicide planning
No non-TV screen time	.18	.16	.20	.17	.18	.15
Less than 1 hour	.14	.12	.12	.10	.10	.10
1 hour	.11	.08	.10	.08	.10	.07
2 hours	.16	.15	.15	.13	.16	.13
3 hours	.13	.11	.13	.12	.15	.15
4 hours	.09	.09	.09	.09	.10	.11
5 hours or more	.20	.30	.22	.32	.21	.30

2007 $\chi 2$ (6, N = 14041) = 63.75, p < .001

2009 $\chi 2$ (6, N = 16410) = 139.23, p < .001

2011 $\chi 2$ (6, N = 15425) = 136.60, p < .001

2013 $\chi 2$ (6, N = 13583) = 112.24, p < .001

2015 $\chi 2$ (6, N = 15624) = 219.76, p < .001

2017 $\chi 2$ (6, N = 14765) = 143.67, p < .001

2019 $\chi 2$ (6, N = 13677) = 168.28, p < .001

Note. Frequencies and proportions were calculated for all 5 reweighted missing-data imputations. A small number of proportions varied ±0.01 among the imputations. Since proportions could not be pooled, imputation 1 is reported by way of example.

Table B28

Proportions, Reports of Attempted Suicide (Dichotomous) Within Levels of Non-TV Screen Time, Average School Day, by Cohort

	2007	2009	2011	2013	2015	2017	2019
Full cohort	.07	.07	.07	.08	.09	.08	.10
No non-TV screen time	.08	.07	.09	.08	.09	.08	.09
Less than 1 hour	.06	.05	.07	.06	.08	.06	.10
1 hour	.06	.05	.06	.06	.06	.05	.07
2 hours	.07	.05	.07	.06	.08	.06	.08
3 hours	.06	.07	.08	.08	.07	.06	.08
4 hours	.08	.06	.09	.09	.07	.07	.09
5 hours or more	.10	.13	.13	.12	.13	.12	.13

2007 $\chi 2$ (6, N = 14041) = 28.61, p = .001

2009 $\chi 2$ (6, N = 16410) = 140.18, p < .001

2011 $\chi 2$ (6, N = 15425) = 95.24, p < .001

2013 $\chi 2$ (6, N = 13583) = 82.74, p < .001

2015 $\chi 2$ (6, N = 15624) = 84.83, p < .001

2017 $\chi 2$ (6, N = 14765) = 121.56, p < .001

2019 $\chi 2$ (6, N = 13677) = 62.13, p < .001

Note. Frequencies and proportions were calculated for all 5 reweighted missing-data imputations. A small number of proportions varied ±0.01 among the imputations. Since proportions could not be pooled, imputation 1 is reported by way of example.

Table B29

Proportions, Levels of Non-TV Screen Time, Average School Day, Within Reports of Attempted Suicide (Dichotomous), by Cohort

	2007		*2009*		*2011*		*2013*	
	2007 cohort	Non-TV screen-time levels among respondents who reported attempting suicide	2009 cohort	Non-TV screen-time levels among respondents who reported attempting suicide	2011 cohort	Non-TV screen-time levels among respondents who reportted attempting suicide	2013 cohort	Non-TV screen-time levels among respondents who reported attempting suicide
No non-TV screen time	.19	.21	.17	.20	.13	.14	.15	.15
Less than 1 hour	.23	.19	.24	.17	.20	.17	.15	.12
1 hour	.17	.15	.18	.14	.17	.13	.13	.10
2 hours	.17	.17	.17	.14	.18	.17	.16	.12
3 hours	.11	.10	.11	.12	.13	.13	.13	.13
4 hours	.05	.06	.06	.05	.07	.08	.08	.09
5 hours or more	.08	.12	.08	.17	.12	.20	.20	.29

	2015		*2017*		*2019*	
	2015 cohort	Non-TV screen-time levels among respondents who reported attempting suicide	2017 cohort	Non-TV screen-time levels among respondents who reported attempting suicide	2019 cohort	Non-TV screen-time levels among respondents who reported attempting suicide
No non-TV screen time	.18	.18	.20	.20	.18	.17
Less than 1 hour	.14	.12	.12	.09	.10	.11
1 hour	.11	.08	.10	.06	.10	.08
2 hours	.16	.15	.15	.11	.16	.13
3 hours	.13	.10	.13	.11	.15	.13
4 hours	.09	.07	.09	.09	.10	.10
5 hours or more	.20	.28	.22	.34	.21	.28

2007 $\chi 2$ (6, N = 14041) = 28.61, p = .001

2009 $\chi 2$ (6, N = 16410) = 140.18, $p < .001$

2011 $\chi 2$ (6, N = 15425) = 95.24, $p < .001$

2013 $\chi 2$ (6, N = 13583) = 82.74, $p < .001$

2015 $\chi 2$ (6, N = 15624) = 84.83, $p < .001$

2017 $\chi 2$ (6, N = 14765) = 121.56, $p < .001$

2019 $\chi 2$ (6, N = 13677) = 62.13, $p < .001$

Note. Frequencies and proportions were calculated for all 5 reweighted missing-data imputations. A small number of proportions varied ±0.01 among the imputations. Since proportions could not be pooled, imputation 1 is reported by way of example.

Table B30

Proportions, Reports of Extended Sadness Within Levels of Non-TV Screen Time, Average School Day, by Sex

	Full sample (.30 overall)	Proportions, girls reporting extended sadness at each level of non-TV screen time (.39 overall)	Proportions, boys reporting extended sadness at each level of non-TV screen time (.22 overall)
No non-TV screen time	.29	.35	.20
Less than 1 hour	.25	.33	.17
1 hour	.25	.33	.18
2 hours	.27	.36	.20
3 hours	.30	.41	.21
4 hours	.34	.46	.24
5 hours or more	.42	.52	.31

Girls $\chi 2$ (6, N = 50653) = 1026.10, $p < .001$

Boys $\chi 2$ (6, N = 52872) = 587.15, $p < .001$

Note. Frequencies and proportions were calculated for all 5 reweighted missing-data imputations. A small number of proportions varied ±0.01 among the imputations. Since proportions could not be pooled, imputation 1 is reported by way of example.

Table B31

Proportions, Levels of Non-TV Screen Time, Average School Day, Within Reports of Extended Sadness, by Sex

	Non-TV screen-time: all respondents reporting extended sadness	Non-TV screen-time: all girls	Non-TV screen-time: girls reporting extended sadness	Non-TV screen-time: all boys	Non-TV screen-time: boys reporting extended sadness
No non-TV screen time	.16	.21	.19	.13	.12
Less than 1 hour	.14	.17	.14	.17	.14
1 hour	.11	.13	.11	.14	.12
2 hours	.15	.15	.14	.18	.17
3 hours	.13	.12	.12	.14	.14
4 hours	.09	.07	.08	.08	.09
5 hours or more	.21	.15	.21	.16	.22

Girls $\chi 2$ (6, N = 50653) = 1026.10, $p < .001$

Boys $\chi 2$ (6, N = 52872) = 587.15, $p < .001$

Note. Frequencies and proportions were calculated for all 5 reweighted missing-data imputations. A small number of proportions varied ±0.01 among the imputations. Since proportions could not be pooled, imputation 1 is reported by way of example.

Table B32

Proportions, Reports of Consideration of Suicide Within Levels of Non-TV Screen Time, Average School Day, by Sex

	Full sample (.16 overall)	Girls reporting consideration of suicide at each non-TV screen-time level (.21 overall)	Boys reporting consideration of suicide at each non-TV screen-time level (.12 overall)
No non-TV screen time	.15	.18	.11
Less than 1 hour	.14	.18	.09
1 hour	.13	.17	.09
2 hours	.15	.20	.11
3 hours	.17	.22	.12
4 hours	.18	.25	.13
5 hours or more	.25	.31	.19

Girls $\chi 2$ (6, N = 50653) = 702.05, $p < .001$

Boys $\chi 2$ (6, N = 52872) = 496.29, $p < .001$

Note. Frequencies and proportions were calculated for all 5 reweighted missing-data imputations. A small number of proportions varied ±0.01 among the imputations. Since proportions could not be pooled, imputation 1 is reported by way of example.

Table B33

Proportions, Levels of Non-TV Screen Time, Average School Day, Within Reports of Consideration of Suicide, by Sex

	Non-TV screen-time: all respondents reporting consideration of suicide	Non-TV screen-time: All girls	Non-TV screen-time: girls reporting consideration of suicide	Non-TV screen-time: All boys	Non-TV screen-time: boys reporting consideration of suicide
No non-TV screen time	.15	.21	.18	.13	.11
Less than 1 hour	.14	.17	.15	.17	.14
1 hour	.13	.13	.11	.14	.11
2 hours	.15	.15	.14	.18	.16
3 hours	.16	.12	.12	.14	.14
4 hours	.18	.07	.08	.08	.09
5 hours or more	.25	.15	.23	.16	.25

Girls $\chi 2$ (6, N = 50653) = 702.05, $p < .001$

Boys $\chi 2$ (6, N = 52872) = 496.29, $p < .001$

Note. Frequencies and proportions were calculated for all 5 reweighted missing-data imputations. A small number of proportions varied ±0.01 among the imputations. Since proportions could not be pooled, imputation 1 is reported by way of example.

Table B34

Proportions, Reports of Suicide Planning Within Levels of Non-TV Screen Time, Average School Day, by Sex

	Full sample (.13 overall)	Girls reporting suicide planning at each non-TV screen-time level (.17 overall)	Boys reporting suicide planning at each non-TV screen-time level (.10 overall)
No non-TV screen time	.12	.14	.09
Less than 1 hour	.11	.14	.08
1 hour	.10	.13	.08
2 hours	.12	.15	.09
3 hours	.13	.17	.10
4 hours	.14	.19	.11
5 hours or more	.21	.25	.17

Girls $\chi 2$ (6, N = 50653) = 608.58, $p < .001$

Boys $\chi 2$ (6, N = 52872) = 509.33, $p < .001$

Note. Frequencies and proportions were calculated for all 5 reweighted missing-data imputations. A small number of proportions varied ±0.01 among the imputations. Since proportions could not be pooled, imputation 1 is reported by way of example.

Table B35

Proportions, Levels of Non-TV Screen Time, Average School Day, Within Reports of Suicide Planning, by Sex

	Non-TV screen-time: all respondents who reported planning suicide	Non-TV screen-time: All girls	Non-TV screen-time: girls who reported planning suicide	Non-TV screen-time: All boys	Non-TV screen-time: boys who reported planning suicide
No non-TV screen time	.15	.21	.18	.13	.11
Less than 1 hour	.14	.17	.15	.17	.14
1 hour	.10	.13	.11	.14	.11
2 hours	.14	.15	.14	.18	.15
3 hours	.13	.12	.12	.14	.14
4 hours	.08	.07	.08	.08	.09
5 hours or more	.25	.15	.24	.16	.26

Girls $\chi 2$ (6, N = 50653) = 608.58, $p < .001$

Boys $\chi 2$ (6, N = 52872) = 509.33, $p < .001$

Note. Frequencies and proportions were calculated for all 5 reweighted missing-data imputations. A small number of proportions varied ±0.01 among the imputations. Since proportions could not be pooled, imputation 1 is reported by way of example.

Table B36

Proportions, Reports of Attempted Suicide (Dichotomous) Within Levels of Non-TV Screen Time, Average School Day, by Sex

	Full sample (0.08 overall)	Girls reporting attempted suicide at each non-TV screen-time level (.10 overall)	Boys reporting attempted suicide at each non-TV screen-time level (.06 overall)
No Non-TV screen time	.08	.09	.06
Less than 1 hour	.06	.09	.04
1 hour	.06	.08	.04
2 hours	.07	.09	.05
3 hours	.07	.09	.05
4 hours	.08	.12	.05
5 hours or more	.12	.15	.09

Girls $\chi 2$ (6, N = 50653) = 335.24, $p < .001$

Boys $\chi 2$ (6, N = 52872) = 291.48, $p < .001$

Note. Frequencies and proportions were calculated for all 5 reweighted missing-data imputations. A small number of proportions varied ±0.01 among the imputations. Since proportions could not be pooled, imputation 1 is reported by way of example.

Table B37

Proportions, Levels of Non-TV Screen Time, Average School Day, Within Reports of Attempted Suicide (Dichotomous), by Sex

	Non-TV screen-time: all respondents who reported attempted suicide	Non-TV screen-time: All girls	Non-TV screen-time: girls who reported attempted suicide	Non-TV screen-time: All boys	Non-TV screen-time: boys who reported attempted suicide
No non-TV screen time	.17	.21	.19	.13	.14
Less than 1 hour	.14	.17	.14	.17	.14
1 hour	.10	.13	.10	.14	.10
2 hours	.14	.15	.13	.18	.15
3 hours	.12	.12	.11	.14	.13
4 hours	.08	.07	.08	.08	.07
5 hours or more	.25	.15	.24	.16	.27

Girls $\chi 2$ (6, N = 50653) = 335.24, $p < .001$

Boys $\chi 2$ (6, N = 52872) = 291.48, $p < .001$

Note. Frequencies and proportions were calculated for all 5 reweighted missing-data imputations. A small number of proportions varied ±0.01 among the imputations. Since proportions could not be pooled, imputation 1 is reported by way of example.

Table B38

Change Over Time: Reports of Extended Sadness Within Levels of Non-TV Screen Time, Average School Day , by Sex

a. Proportions, Girls Reporting Extended Sadness

	2007	2009	2011	2013	2015	2017	2019
No non-TV screen time	.35	.32	.35	.35	.33	.36	.38
Less than 1 hour	.32	.30	.32	.32	.34	.38	.43
1 hour	.33	.31	.33	.34	.33	.35	.40
2 hours	.35	.34	.36	.34	.36	.39	.42
3 hours	.41	.40	.39	.41	.38	.41	.45
4 hours	.45	.41	.41	.45	.46	.44	.56
5 hours or more	.51	.46	.47	.51	.54	.50	.60

b.Proportions, Boys Reporting Extended Sadness

	2007	2009	2011	2013	2015	2017	2019
No non-TV screen time	.24	.20	.18	.17	.19	.21	.25
Less than 1 hour	.17	.14	.20	.17	.16	.19	.24
1 hour	.17	.17	.18	.18	.18	.16	.20
2 hours	.21	.19	.21	.19	.19	.20	.24
3 hours	.21	.18	.23	.22	.17	.21	.27
4 hours	.30	.20	.20	.21	.22	.25	.31
5 hours or more	.31	.32	.31	.29	.31	.28	.35

	Girls	Boys
2007	$\chi 2$ (6, N =6,942) = 96.88, p < .001	$\chi 2$ (6, N = 7,099) = 82.22 p < .001
2009	$\chi 2$ (6, N =7,816) = 129.10, p < .001	$\chi 2$ (6, N = 8,594) = 72.94, p < .001
2011	$\chi 2$ (6, N = 7,446) = 86.20, p < .001	$\chi 2$ (6, N = 7,979) = 64.99, p < .001
2013	$\chi 2$ (6, N =6,780) = 79.30, p < .001	$\chi 2$ (6, N = 6,803) = 142.95, p < .001
2015	$\chi 2$ (6, N = 7,551) = 128.71, p < .001	$\chi 2$ (6, N = 8,073) = 216.73, p < .001
2017	$\chi 2$ (6, N = 7,428) = 66.21, p < .001	$\chi 2$ (6, N = 7,337) = 92.88, p < .001
2019	$\chi 2$ (6, N = 6,690) = 85.42, p < .001	$\chi 2$ (6, N = 6,987) = 189.65, p < .001

Note. Frequencies and proportions were calculated for all 5 reweighted missing-data imputations. A small number of proportions varied ±0.01 among the imputations. Since proportions could not be pooled, imputation 1 is reported by way of example.

Table B39

Change Over Time: Levels of Non-TV Screen Time, Average School Day, Within Reports of Extended Sadness, by Sex

a. *Proportions, Non-TV Screen Time Among Girls*

	2007		*2009*		*2011*		*2013*	
	2007 subset	Non-TV screen-time levels among respondents who reported extended sadness	2009 subset	Non-TV screen-time levels among respondents who reported extended sadness	2011 subset	Non-TV screen-time levels among respondents who reported extended sadness	2013 subset	Non-TV screen-time levels among respondents who reported extended sadness
No non-TV screen time	.24	.23	.22	.20	.15	.14	.17	.16
Less than 1 hour	.24	.21	.24	.22	.23	.20	.15	.12
1 hour	.16	.15	.17	.16	.18	.16	.13	.11
2 hours	.15	.15	.16	.16	.18	.18	.15	.13
3 hours	.09	.10	.10	.12	.11	.12	.12	.12
4 hours	.05	.06	.05	.06	.06	.07	.08	.09
5 hours or more	.07	.09	.06	.09	.10	.13	.21	.27

	2015		*2017*		*2019*	
	2015 subset	Non-TV screen-time levels among respondents who reported extended sadness	2017 subset	Non-TV screen-time levels among respondents who reported extended sadness	2019 subset	Non-TV screen-time levels among respondents who reported extended sadness
No non-TV screen time	.22	.18	.25	.22	.23	.19
Less than 1 hour	.11	.09	.10	.09	.10	.09
1 hour	.10	.09	.09	.08	.09	.08
2 hours	.14	.13	.13	.12	.14	.12
3 hours	.13	.12	.12	.12	.14	.13
4 hours	.09	.10	.08	.09	.10	.12
5 hours or more	.21	.29	.22	.28	.21	.27

b. *Proportions, Non-TV Screen Time Among Boys*

	2007		*2009*		*2011*		*2013*	
	2007 subset	Non-TV screen-time levels among respondents who reported extended sadness	2009 subset	Non-TV screen-time levels among respondents who reported extended sadness	2011 subset	Non-TV screen-time levels among respondents who reported extended sadness	2013 subset	Non-TV screen-time levels among respondents who reported extended sadness
No non-TV screen time	.14	.15	.13	.13	.11	.09	.12	.10
Less than 1 hour	.22	.17	.23	.18	.18	.17	.16	.13
1 hour	.17	.14	.18	.16	.17	.14	.13	.11
2 hours	.19	.18	.17	.17	.19	.18	.16	.15
3 hours	.13	.13	.12	.11	.14	.14	.14	.15
4 hours	.06	.08	.06	.07	.08	.07	.09	.10
5 hours or more	.10	.15	.10	.17	.14	.20	.19	.26

	2015		*2017*		*2019*	
	2015 subset	Non-TV screen-time levels among respondents who reported extended sadness	2017 subset	Non-TV screen-time levels among respondents who reported extended sadness	2019 subset	Non-TV screen-time levels among respondents who reported extended sadness
No non-TV screen time	.14	.13	.14	.14	.12	.11
Less than 1 hour	.16	.13	.14	.12	.11	.10
1 hour	.11	.10	.12	.09	.11	.08
2 hours	.18	.17	.17	.15	.18	.15
3 hours	.14	.12	.14	.13	.17	.17
4 hours	.09	.09	.09	.10	.10	.12
5 hours or more	.18	.27	.21	.27	.20	.26

	Girls	Boys
2007	$\chi 2$ (6, N =6,942) = 96.88, p < .001	$\chi 2$ (6, N = 7,099) = 82.22 p < .001
2009	χ2 (6, N =7,816) = 129.10, p < .001	χ2 (6, N = 8,594) = 72.94, p < .001
2011	χ2 (6, N = 7,446) = 86.20, p < .001	χ2 (6, N = 7,979) = 64.99, p < .001
2013	χ2 (6, N =6,780) = 79.30, p < .001	χ2 (6, N = 6,803) = 142.95, p < .001
2015	χ2 (6, N = 7,551) = 128.71, p < .001	χ2 (6, N = 8,073) = 216.73, p < .001
2017	χ2 (6, N = 7,428) = 66.21, p < .001	χ2 (6, N = 7,337) = 92.88, p < .001
2019	χ2 (6, N = 6,690) = 85.42, p < .001	χ2 (6, N = 6,987) = 189.65, p < .001

Note. Frequencies and proportions were calculated for all 5 reweighted missing-data imputations. A small number of proportions varied ±0.01 among the imputations. Since proportions could not be pooled, imputation 1 is reported by way of example.

Table B40

Change Over Time: Reports of Consideration of Suicide Within Levels of Non-TV Screen Time, Average School Day, by Sex

a. *Proportions, Girls Reporting Consideration of Suicide*

	2007	2009	2011	2013	2015	2017	2019
No non-TV screen time	.18	.15	.18	.19	.20	.18	.17
Less than 1 hour	.17	.15	.17	.19	.21	.19	.28
1 hour	.16	.15	.17	.18	.18	.17	.16
2 hours	.20	.20	.18	.20	.22	.20	.22
3 hours	.18	.18	.22	.26	.21	.23	.23
4 hours	.24	.22	.22	.21	.23	.26	.29
5 hours or more	.25	.29	.29	.31	.34	.30	.33

b. *Proportions, Boys Reporting Consideration of Suicide*

	2007	2009	2011	2013	2015	2017	2019
No non-TV screen time	.09	.11	.11	.08	.11	.11	.13
Less than 1 hour	.09	.07	.11	.09	.10	.08	.12
1 hour	.18	.08	.11	.08	.10	.08	.10
2 hours	.11	.11	.12	.11	.12	.10	.10
3 hours	.09	.11	.11	.14	.10	.12	.13
4 hours	.15	.11	.15	.11	.10	.14	.17
5 hours or more	.17	.19	.19	.17	.21	.19	.19

	Girls	Boys
2007	$\chi 2$ (6, N =6,942) = 47.17, $p < .001$	$\chi 2$ (6, N = 7,099) = 31.15, $p < .001$
2009	$\chi 2$ (6, N =7,816) = 103.08, $p < .001$	$\chi 2$ (6, N = 8,594) = 79.91, $p < .001$
2011	$\chi 2$ (6, N = 7,446) = 62.38, $p < .001$	$\chi 2$ (6, N = 7,979) = 64.54, $p < .001$
2013	$\chi 2$ (6, N =6,780) = 75.54, $p < .001$	$\chi 2$ (6, N = 6,803) = 94.67, $p < .001$
2015	$\chi 2$ (6, N = 7,551) = 108.13, $p < .001$	$\chi 2$ (6, N = 8,073) = 126.17, $p < .001$
2017	$\chi 2$ (6, N = 7,428) = 92.36, $p < .001$	$\chi 2$ (6, N = 7,337) = 108.60, $p < .001$
2019	$\chi 2$ (6, N = 6,690) = 70.69, $p < .001$	$\chi 2$ (6, N = 6,987) = 138.26, $p < .001$

Note. Frequencies and proportions were calculated for all 5 reweighted missing-data imputations. A small number of proportions varied ±0.01 among the imputations. Since proportions could not be pooled, imputation 1 is reported by way of example.

Table B41

Change Over Time: Levels of Non-TV Screen Time, Average School Day, Within Reports of Consideration of Suicide, by Sex

a. Proportions, Non-TV Screen Time Among Girls

	2007		*2009*		*2011*		*2013*	
	2007 subset	Non-TV screen-time levels among respondents who reported considering suicide	2009 subset	Non-TV screen-time levels among respondents who reported considering suicide	2011 subset	Non-TV screen-time levels among respondents who reported considering suicide	2013 subset	Non-TV screen-time levels among respondents who reported considering suicide
No non-TV screen time	.24	.23	.22	.19	.15	.13	.17	.14
Less than 1 hour	.24	.22	.24	.21	.23	.20	.15	.12
1 hour	.16	.14	.17	.15	.18	.16	.13	.10
2 hours	.15	.16	.16	.18	.18	.17	.15	.13
3 hours	.09	.09	.10	.10	.11	.13	.12	.14
4 hours	.05	.07	.05	.06	.06	.07	.08	.07
5 hours or more	.07	.09	.06	.11	.10	.14	.21	.29

	2015		2017		2019	
	2015 subset	Non-TV screen-time levels among respondents who reported considering suicide	2017 subset	Non-TV screen-time levels among respondents who reported considering suicide	2019 subset	Non-TV screen-time levels among respondents who reported considering suicide
No non-TV screen time	.22	.18	.25	.20	.23	.17
Less than 1 hour	.11	.10	.10	.08	.10	.11
1 hour	.10	.08	.09	.07	.09	.06
2 hours	.14	.13	.13	.17	.14	.13
3 hours	.13	.11	.12	.13	.14	.13
4 hours	.09	.09	.08	.10	.10	.12
5 hours or more	.21	.31	.22	.30	.21	.29

b. Proportions, Non-TV Screen Time Among Boys

	2007		2009		2011		2013	
	2007 subset	Non-TV screen-time levels among respondents who reported considering suicide	2009 subset	Non-TV screen-time levels among respondents who reported considering suicide	2011 subset	Non-TV screen-time levels among respondents who reported considering suicide	2013 subset	Non-TV screen-time levels among respondents who reported considering suicide
No non-TV screen time	.14	.11	.13	.14	.11	.09	.12	.08
Less than 1 hour	.22	.18	.23	.16	.18	.16	.16	.12
1 hour	.17	.17	.18	.14	.17	.14	.13	.10
2 hours	.19	.17	.17	.18	.19	.17	.16	.15
3 hours	.13	.11	.12	.12	.14	.13	.14	.17
4 hours	.06	.08	.06	.06	.08	.09	.09	.09
5 hours or more	.10	.17	.10	.18	.14	.22	.19	.28

	2015		*2017*		*2019*	
	2015 subset	Non-TV screen-time levels among respondents who reported considering suicide	2017 subset	Non-TV screen-time levels among respondents who reported considering suicide	2019 subset	Non-TV screen-time levels among respondents who reported considering suicide
No non-TV screen time	.14	.12	.14	.13	.12	.12
Less than 1 hour	.16	.13	.14	.09	.11	.10
1 hour	.11	.09	.12	.08	.11	.08
2 hours	.18	.17	.17	.14	.18	.12
3 hours	.14	.12	.14	.13	.17	.16
4 hours	.09	.07	.09	.10	.10	.13
5 hours or more	.18	.29	.21	.32	.20	.28

	Girls	Boys
2007	$\chi 2$ (6, N =6,942) = 47.17, p < .001	$\chi 2$ (6, N = 7,099) = 31.15, p < .001
2009	χ2 (6, N =7,816) = 103.08, p < .001	χ2 (6, N = 8,594) = 79.91, p < .001
2011	χ2 (6, N = 7,446) = 62.38, p < .001	χ2 (6, N = 7,979) = 64.54, p < .001
2013	χ2 (6, N =6,780) = 75.54, p < .001	χ2 (6, N = 6,803) = 94.67, p < .001
2015	χ2 (6, N = 7,551) = 108.13, p < .001	χ2 (6, N = 8,073) = 126.17, p < .001
2017	χ2 (6, N = 7,428) = 92.36, *p* < .001	χ2 (6, N = 7,337) = 108.60, *p* < .001
2019	χ2 (6, N = 6,690) = 70.69, p < .001	χ2 (6, N = 6,987) = 138.26, p < .001

Note. Frequencies and proportions were calculated for all 5 reweighted missing-data imputations. A small number of proportions varied ±0.01 among the imputations. Since proportions could not be pooled, imputation 1 is reported by way of example.

Table B42

Change Over Time: Reports of Suicide Planning Within Levels of Non-TV Screen Time, Average School Day ,by Sex (Decomplexified Data)

a. Proportions, Girls Reporting Suicide Planning

	2007	2009	2011	2013	2015	2017	2019
No non-TV screen time	.13	.13	.15	.14	.16	.14	.14
Less than 1 hour	.12	.11	.14	.15	.21	.15	.21
1 hour	.12	.11	.12	.14	.14	.14	.14
2 hours	.14	.13	.13	.14	.18	.17	.18
3 hours	.14	.16	.17	.20	.16	.18	.18
4 hours	.15	.16	.19	.15	.21	.17	.22
5 hours or more	.20	.22	.24	.23	.28	.24	.29

b. Proportions, Boys Reporting Suicide Planning

	2007	2009	2011	2013	2015	2017	2019
No non-TV screen time	.08	.11	.09	.07	.08	.10	.10
Less than 1 hour	.08	.06	.09	.09	.07	.08	.11
1 hour	.08	.08	.08	.08	.08	.07	.08
2 hours	.08	.07	.10	.09	.10	.08	.08
3 hours	.09	.10	.09	.11	.09	.08	.12
4 hours	.12	.07	.14	.10	.10	.11	.13
5 hours or more	.16	.17	.18	.15	.18	.16	.17

	Girls	Boys
2007	$\chi 2$ (6, N =6,942) = 53.28, p <.001	$\chi 2$ (6, N = 7,099) = 27.71, p < .001
2009	χ2 (6, N =7,816) = 117.05, p < .001	χ2 (6, N = 8,594) = 59.80, p < .001
2011	χ2 (6, N = 7,446) = 94.07, p < .001	χ2 (6, N = 7,979) = 71.06, p < .001
2013	χ2 (6, N =6,780) = 52.20, p < .001	χ2 (6, N = 6,803) = 64.23, p < .001
2015	χ2 (6, N = 7,551) = 111.50, p < .001	χ2 (6, N = 8,073) = 110.73, p < .001
2017	χ2 (6, N = 7,428) = 76.19, *p* < .001	χ2 (6, N = 7,337) = 72.23, *p* < .001
2019	χ2 (6, N = 6,690) =60.14, p < .001	χ2 (6, N = 6,987) = 119.85, p < .001

Note. Frequencies and proportions were calculated for all 5 reweighted missing-data imputations. A small number of proportions varied ±0.01 among the imputations. Since proportions could not be pooled, imputation 1 is reported by way of example.

Table B43

Change Over Time: Levels of Non-TV Screen Time, Average School Day, Within Reports of Suicide Planning, by Sex

a. Proportions, Non-TV Screen Time Among Girls

	2007		*2009*		*2011*		*2013*	
	2007 subset	Non-TV screen-time levels among respondents who reported suicide planning	2009 subset	Non-TV screen-time levels among respondents who reported suicide planning	2011 subset	Non-TV screen-time levels among respondents who reported suicide planning	2013 subset	Non-TV screen-time levels among respondents who reported suicide planning
No non-TV screen time	.24	.22	.22	.21	.15	.14	.17	.14
Less than 1 hour	.24	.22	.24	.21	.23	.21	.15	.14
1 hour	.16	.14	.17	.14	.18	.14	.13	.11
2 hours	.15	.16	.16	.16	.18	.15	.15	.12
3 hours	.09	.10	.10	.12	.11	.13	.12	.14
4 hours	.05	.06	.05	.06	.06	.07	.08	.06
5 hours or more	.07	.10	.06	.11	.10	.15	.21	.29

	2015		*2017*		*2019*	
	2015 subset	Non-TV screen-time levels among respondents who reported suicide planning	2017 subset	Non-TV screen-time levels among respondents who reported suicide planning	2019 subset	Non-TV screen-time levels among respondents who reported suicide planning
No non-TV screen time	.22	.18	.25	.20	.23	.17
Less than 1 hour	.11	.12	.10	.09	.10	.10
1 hour	.10	.07	.09	.07	.09	.06
2 hours	.14	.13	.13	.12	.14	.13
3 hours	.13	.10	.12	.12	.14	.12
4 hours	.09	.09	.08	.08	.10	.10
5 hours or more	.21	.30	.22	.31	.21	.31

b. Proportions, Non-TV Screen Time Among Boys

	2007		*2009*		*2011*		*2013*	
	2007 subset	Non-TV screen-time levels among respondents who reported suicide planning	2009 subset	Non-TV screen-time levels among respondents who reported suicide planning	2011 subset	Non-TV screen-time levels among respondents who reported suicide planning	2013 subset	Non-TV screen-time levels among respondents who reported suicide planning
No non-TV screen time	.14	.12	.13	.17	.11	.09	.12	.08
Less than 1 hour	.22	.18	.23	.16	.18	.15	.16	.14
1 hour	.17	.15	.18	.16	.17	.13	.13	.10
2 hours	.19	.17	.17	.14	.19	.18	.16	.15
3 hours	.13	.13	.12	.13	.14	.12	.14	.15
4 hours	.06	.08	.06	.05	.08	.10	.09	.10
5 hours or more	.10	.18	.10	.20	.14	.24	.19	.28

	2015		*2017*		*2019*	
	2015 subset	Non-TV screen-time levels among respondents who reported suicide planning	2017 subset	Non-TV screen-time levels among respondents who reported suicide planning	2019 subset	Non-TV screen-time levels among respondents who reported suicide planning
No non-TV screen time	.14	.08	.14	.10	.12	.10
Less than 1 hour	.16	.07	.14	.08	.11	.11
1 hour	.11	.08	.12	.07	.11	.08
2 hours	.18	.10	.17	.08	.18	.08
3 hours	.14	.09	.14	.08	.17	.12
4 hours	.09	.10	.09	.11	.10	.13
5 hours or more	.18	.18	.21	.16	.20	.17

	Girls	Boys
2007	$\chi2$ (6, N =6,942) = 53.28, p = .001	$\chi2$ (6, N = 7,099) = 27.71, p = .001
2009	χ2 (6, N =7,816) = 117.05, p < .001	χ2 (6, N = 8,594) = 59.80, p < .001
2011	χ2 (6, N = 7,446) = 94.07, p < .001	χ2 (6, N = 7,979) = 71.06, p < .001
2013	χ2 (6, N =6,780) = 52.20, p < .001	χ2 (6, N = 6,803) = 64.23, p < .001
2015	χ2 (6, N = 7,551) = 111.50, p < .001	χ2 (6, N = 8,073) = 110.73, p < .001
2017	χ2 (6, N = 7,428) = 76.19, *p* < .001	χ2 (6, N = 7,337) = 72.23, *p* < .001
2019	χ2 (6, N = 6,690) =60.14, p < .001	χ2 (6, N = 6,987) = 119.85, p < .001

Note. Frequencies and proportions were calculated for all 5 reweighted missing-data imputations. A small number of proportions varied ±0.01 among the imputations. Since proportions could not be pooled, imputation 1 is reported by way of example.

Table B44

Change Over Time: Reports of Attempted Suicide (Dichotomous) Within Levels of Non-TV Screen Time, Average School Day, by Sex

a. Proportions, Girls Reporting Attempted Suicide

	2007	2009	2011	2013	2015	2017	2019
No non-TV screen time	.09	.08	.10	.10	.10	.08	.09
Less than 1 hour	.08	.06	.08	.08	.11	.09	.12
1 hour	.08	.07	.07	.08	.09	.08	.09
2 hours	.10	.07	.08	.07	.11	.06	.10
3 hours	.09	.09	.11	.12	.08	.08	.08
4 hours	.12	.09	.12	.13	.10	.10	.13
5 hours or more	.10	.16	.16	.14	.17	.14	.15

b. Proportions, Boys Reporting Attempted Suicide

	2007	2009	2011	2013	2015	2017	2019
No non-TV screen time	.05	.07	.06	.06	.07	.07	.09
Less than 1 hour	.04	.03	.05	.04	.06	.04	.08
1 hour	.05	.03	.05	.05	.04	.02	.06
2 hours	.05	.04	.06	.05	.06	.05	.06
3 hours	.04	.05	.06	.05	.06	.06	.07
4 hours	.06	.03	.06	.06	.05	.05	.06
5 hours or more	.10	.11	.12	.09	.08	.10	.11

	Girls	Boys
2007	$\chi 2$ (6, N =6,942) = 43.86, p = .001	$\chi 2$ (6, N = 7,099) = 10.52, p = .10
2009	$\chi 2$ (6, N =7,816) = 113.92, p < .001	$\chi 2$ (6, N = 8,594) = 59.37 p < .001
2011	$\chi 2$ (6, N = 7,446) = 64.96, p < .001	$\chi 2$ (6, N = 7,979) = 50.70, p < .001
2013	$\chi 2$ (6, N =6,780) = 33.90, p < .001	$\chi 2$ (6, N = 6,803) = 50.26, p < .001
2015	$\chi 2$ (6, N = 7,551) = 29.30, p = .004	$\chi 2$ (6, N = 8,073) = 62.15, p < .001
2017	$\chi 2$ (6, N = 7,428) = 75.13, p < .001	$\chi 2$ (6, N = 7,337) = 56.10, p < .001
2019	$\chi 2$ (6, N = 6,690) = 34.12, p < .001	$\chi 2$ (6, N = 6,987) = 40.25, p < .001

Note. Frequencies and proportions were calculated for all 5 reweighted missing-data imputations. A small number of proportions varied ±0.01 among the imputations. Since proportions could not be pooled, imputation 1 is reported by way of example. +2007 boys' and 2015 girls' statistics in this table are not statistically significant at $p < .001$ based on chi-square statistic. See, however, the discussion of problematic large-sample *p*-values all together on page 82.

Table B45

Change Over Time: Levels of Non-TV Screen Time, Average School Day, Within Reports of Attempted Suicide (Dichotomous) by Sex

a. *Proportions, Non-TV Screen Time Among Girls*

	2007		*2009*		*2011*		*2013*	
	2007 subset	Non-TV screen-time levels among respondents who reported attempting suicide	2009 subset	Non-TV screen-time levels among respondents who reported attempting suicide	2011 subset	Non-TV screen-time levels among respondents who reported attempting suicide	2013 subset	Non-TV screen-time levels among respondents who reported attempting suicide
No non-TV screen time	.24	.24	.22	.21	.15	.16	.17	.17
Less than 1 hour	.24	.21	.24	.19	.23	.19	.15	.12
1 hour	.16	.14	.17	.16	.18	.13	.13	.09
2 hours	.15	.18	.16	.14	.18	.16	.15	.11
3 hours	.09	.09	.10	.12	.11	.13	.12	.13
4 hours	.05	.07	.05	.06	.06	.07	.08	.09
5 hours or more	.07	.07	.06	.13	.10	.16	.21	.29

	2015		*2017*		*2019*	
	2015 subset	Non-TV screen-time levels among respondents who reported attempting suicide	2017 subset	Non-TV screen-time levels among respondents who reported attempting suicide	2019 subset	Non-TV screen-time levels among respondents who reported attempting suicide
No non-TV screen time	.22	.20	.25	.21	.23	.19
Less than 1 hour	.11	.11	.10	.10	.10	.10
1 hour	.10	.08	.09	.07	.09	.07
2 hours	.14	.13	.13	.09	.14	.13
3 hours	.13	.09	.12	.10	.14	.11
4 hours	.09	.08	.08	.09	.10	.11
5 hours or more	.21	.31	.22	.33	.21	.29

b. Proportions, Non-TV Screen Time Among Boys

	2007 subset	Non-TV screen-time levels among respondents who reported attempting suicide	2009 subset	Non-TV screen-time levels among respondents who reported attempting suicide	2011 subset	Non-TV screen-time levels among respondents who reported attempting suicide	2013 subset	Non-TV screen-time levels among respondents who reported attempting suicide
No non-TV screen time	.14	.14	.13	.19	.11	.10	.12	.13
Less than 1 hour	.22	.16	.23	.15	.18	.14	.16	.12
1 hour	.17	.16	.18	.12	.17	.13	.13	.11
2 hours	.19	.16	.17	.14	.19	.18	.16	.14
3 hours	.13	.10	.12	.13	.14	.12	.14	.12
4 hours	.06	.06	.06	.04	.08	.07	.09	.10
5 hours or more	.10	.20	.10	.23	.14	.26	.19	.29

	2015		2017		2019	
	2015 subset	Non-TV screen-time levels among respondents who reported attempting suicide	2017 subset	Non-TV screen-time levels among respondents who reported attempting suicide	2019 subset	Non-TV screen-time levels among respondents who reported attempting suicide
No non-TV screen time	.14	.16	.14	.18	.12	.15
Less than 1 hour	.16	.15	.14	.08	.11	.11
1 hour	.11	.08	.12	.05	.11	.09
2 hours	.18	.19	.17	.14	.18	.14
3 hours	.14	.13	.14	.12	.17	.15
4 hours	.09	.07	.09	.08	.10	.08
5 hours or more	.18	.23	.21	.34	.20	.28

	Girls	Boys
2007	$\chi 2$ (6, N =6,942) = 43.86, p = .001	$\chi 2$ (6, N = 7,099) = 10.52, p = .10
2009	$\chi 2$ (6, N =7,816) = 113.92, p < .001	$\chi 2$ (6, N = 8,594) = 59.37 p < .001
2011	$\chi 2$ (6, N = 7,446) = 64.96, p < .001	$\chi 2$ (6, N = 7,979) = 50.70, p < .001
2013	$\chi 2$ (6, N =6,780) = 33.90, p < .001	$\chi 2$ (6, N = 6,803) = 50.26, p < .001
2015	$\chi 2$ (6, N = 7,551) = 29.30, p = .004	$\chi 2$ (6, N = 8,073) = 62.15, p < .001
2017	$\chi 2$ (6, N = 7,428) = 75.13, p < .001	$\chi 2$ (6, N = 7,337) = 56.10, p < .001
2019	$\chi 2$ (6, N = 6,690) = 34.12, p < .001	$\chi 2$ (6, N = 6,987) = 40.25, p < .001

Note. Frequencies and proportions were calculated for all 5 reweighted missing-data imputations. A small number of proportions varied ±0.01 among the imputations. Since proportions could not be pooled, imputation 1 is reported by way of example. [+]2007 boys' and 2015 girls' statistics in this table are not statistically significant at p < .001 based on chi-square statistic. See, however, the discussion of problematic large-sample *p*-values all together on page 82.

Appendix C

Goodman-Kruskal Tau Statistics: Association Between Levels of Non-TV Screen Time and Indicators of Psychological Distress (Decomplexified Study Sample)

Table C1

Goodman-Kruskal Tau Statistics for Level of Non-TV Screen Time, Average School Day, as Predictor of Psychological Distress Indicators, Full Sample and by Cohort

Predictor	Extended sadness	Consideration of suicide	Suicide planning	Suicide attempts
Full sample	*.014*	*.01*	*.009*	*.009*
2007	.010	.004	.005	.006
2009	.008	.007	.007	.008
2011	.006	.007	.008	.007
2013	.018	.014	.010	.010
2015	.021	.015	.013	.006
2017	.011	.011	.008	.011
2019	.021	.014	.013	.015

Note. Pearson (2020)'s guidelines describe .85 as a Goodman-Kruskal tau statistic denoting strong predictive capability, .36 as denoting moderate capability, .14 as denoting weak capability, and .05 or lower as essentially indicating X's inability to predict Y.

Table C2

Goodman-Kruskal Tau Statistics for Level of Non-TV Screen Time, Average School Day, as Predictor of Psychological Distress Indicators by Sex, Full Subsets and by Cohort

a. Girls

Predictor	Extended sadness	Consideration of suicide	Suicide planning	Suicide attempts
Full sample	*.019*	*.013*	*.011*	*.007*
2007	.013	.005	.005	.005
2009	.010	.010	.006	.008
2011	.009	.008	.009	.008
2013	.023	.014	.011	.009
2015	.024	.015	.012	.005
2017	.013	.014	.010	.010
2019	.032	.019	.017	.011

b. Boys

Predictor	Extended sadness	Consideration of suicide	Suicide planning	Suicide attempts
Full sample	*.011*	*.009*	*.008*	*.011*
2007	.013	.006	.008	.008
2009	.013	.009	.011	.011
2011	.011	.008	.010	.007
2013	.016	.016	.011	.014
2015	.015	.013	.011	.009
2017	.008	.008	.006	.015
2019	.013	.012	.010	.025

Note. Pearson (2020)'s guidelines describe .85 as a Goodman-Kruskal tau statistic denoting strong predictive capability, .36 as denoting moderate capability, .14 as denoting weak capability, and .05 or lower as essentially indicating X's inability to predict Y.

Table C3

Goodman-Kruskal Tau Statistics for Psychological Distress Indicators as Predictors of Level of Non-TV Screen Time, Average School Day. Full Sample and by Cohort

Predictor	*Full sample*	2007	2009	2011	2013	2015	2017	2019
Extended sadness	*.003*	.002	.001	.001	.004	.005	.003	.005
Consideration of suicide	*.002*	.001	.001	.001	.003	.004	.003	.003
Suicide planning	*.002*	.001	.001	.001	.002	.003	.002	.003
Suicide attempts	*.003*	.002	.003	.003	.003	.003	.004	.004

Note. Pearson (2020)'s guidelines describe .85 as a Goodman-Kruskal tau statistic denoting strong predictive capability, .36 as denoting moderate capability, .14 as denoting weak capability, and .05 or lower as essentially indicating X's inability to predict Y.

Table C4

Goodman-Kruskal Tau Statistics for Psychological Distress Indicators as Predictors of Level of Non-TV Screen Time, Average School Day by Sex Within Full Subset and Within Each Cohort

a. Girls

Predictor	*Full subset*	2007	2009	2011	2013	2015	2017	2019
Extended sadness	*.004*	.002	.001	.002	.004	.007	.004	.008
Consideration of suicide	*.002*	.001	.001	.001	.003	.004	.004	.005
Suicide planning	*.002*	.001	.001	.002	.002	.003	.003	.004
Suicide attempts	*.003*	.002	.002	.003	.004	.003	.005	.005

b. Boys

Predictor	*Full subset*	2007	2009	2011	2013	2015	2017	2019
Extended sadness	*.002*	.002	.002	.002	.004	.004	.002	.003
Consideration of suicide	*.002*	.001	.002	.002	.003	.003	.002	.003
Suicide planning	*.002*	.001	.002	.002	.002	.003	.002	.003
Suicide attempts	*.003*	.003	.004	.004	.003	.004	.004	.005

Note. Pearson (2020)'s guidelines describe .85 as a Goodman-Kruskal tau statistic denoting strong predictive capability, .36 as denoting moderate capability, .14 as denoting weak capability, and .05 or lower as essentially indicating X's inability to predict Y.

Appendix D
Regression Statistics: Screen Time as Predictor

Table D1

Regression Results: Non-TV Screen Time as Predictor of Extended Sadness

	Coefficient	Odds ratio	Odds	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept)	**-.88**	--	.41	.03	-.93	-.83	.000	4%
Less than 1 hour	**-.22**	.80	.33	.04	-.29	-.15	.000	8%
1 hour	-.23	.80	.33	.04	-.30	-.15	.679	8%
2 hours	-.08	.92	.38	.03	-.15	-.02	.009	4%
3 hours	.04	1.04	.43	.04	-.03	.11	.263	5%
4 hours	**.23**	1.26	.52	.04	.15	.31	.000	5%
5 hours or more	**.53**	1.70	.70	. 03	.47	.60	.000	5%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohorts 2007-2019. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. Bold font indicates statistical significance, based on *p*-values ≤ .001.

Table D2

Regression Results: Non-TV Screen Time as Predictor of Consideration of Suicide

	Coefficient	Odds ratio	Odds	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept)	**-1.74**	--	.18	.03	-1.80	-1.68	.000	5%
Less than 1 hour	-.12	.89	.16	.04	-.20	-.04	.004	4%
1 hour	**-.18**	.84	.15	.04	-.27	-.09	.000	6%
2 hours	.00	1.00	.18	.04	-.08	.08	.972	4%
3 hours	.10	1.11	.20	.04	.02	.19	.018	4%
4 hours	**.24**	1.28	.23	.05	.14	.35	.000	7%
5 hours or more	**.63**	1.88	.34	.04	.55	.71	.000	9%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohorts 2007-2019. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. Bold font indicates statistical significance, based on p-values ≤ .001.

Table D3

Regression Results: Non-TV Screen Time as Predictor of Suicide Planning

	Coefficient	Odds ratio	Odds	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept)	**-1.99**	--	.14	.04	-2.06	-1.93	.000	4%
Less than 1 hour	-.10	.91	.13	.05	-.18	-.01	.034	4%
1 hour	**-.19**	.83	.12	.05	-.28	-.09	.000	3%
2 hours	-.03	.97	.14	.04	-.12	.05	.448	2%
3 hours	.11	1.12	.16	.05	.01	.21	.029	5%
4 hours	**.21**	1.23	.17	.05	.10	.31	.000	3%
5 hours or more	**.66**	1.93	.27	.04	.57	.74	.000	5%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohorts 2007-2019. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. Bold font indicates statistical significance, based on p-values ≤ .001.

Table D4

Regression Results: Non-TV Screen Time as Predictor of Attempted Suicide (Dichotomous)

	Coefficient	Odds ratio	Odds	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept)	**-2.44**	--	.09	.04	-2.52	-2.36	.000	3%
Less than 1 hour	**-.25**	.78	.07	.06	-.36	-.14	.000	6%
1 hour	**-.33**	.72	.06	.06	-.45	-.20	.000	16%
2 hours	**-.20**	.82	.07	.05	-.30	-.10	.000	3%
3 hours	-.13	.88	.08	.07	-.26	.01	.057	20%
4 hours	.01	1.01	.09	.07	-.12	.14	.923	6%
5 hours or more	**.46**	1.58	.14	.05	.35	.56	.000	7%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohorts 2007-2019. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. Bold font indicates statistical significance, based on *p*-values ≤ .001.

Table D5

Summaries, Cohort and Sex: Non-TV Screen Time as Predictor of Extended Sadness

a. Regression Coefficients

	2007	2009	2011	2013	2015	2017	2019	Girls	Boys
(Intercept)	**-.79**	**-1.01**	**-.97**	**-.96**	**-.99**	**-.82**	**-.68**	**-.63**	**-1.37**
Less than 1 hour	**-.31**	-.25	-.06	-.21	-.24	-.20	-.03	-.07	-0.19
1 hour	**-.34**	-.18	-.11	-.11	-.11	**-.36**	-.25	-.08	-0.18
2 hours	-.21	-.05	.01	-.08	-.04	-.10	-.08	.07	0
3 hours	-.10	.03	.10	.15	.01	.03	.06	**.25**	0.07
4 hours	.24	.12	.10	.20	.28	.17	**.42**	**.48**	0.22
5 hours or more	**.34**	**.50**	**.46**	**.59**	**.72**	**.41**	**.59**	**.72**	**0.55**

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohorts 2007-2019. Bold font indicates statistical significance, based on *p*-values ≤ .001.

b. Odds Ratios

	2007	2009	2011	2013	2015	2017	2019	Girls	Boys
Less than 1 hour	.73	.78	.81	.81	.79	.82	.97	.93	0.82
1 hour	.71	.84	.90	.90	.89	.70	.78	.92	0.84
2 hours	.81	.96	.92	.92	.96	.91	.92	1.07	1
3 hours	.90	1.04	1.16	1.16	1.01	1.03	1.07	1.29	1.07
4 hours	1.27	1.12	1.22	1.22	1.33	1.19	1.52	1.62	1.25
5 hours or more	1.41	1.65	1.80	1.80	2.05	1.51	1.80	2.06	1.74

c. Odds

	2007	2009	2011	2013	2015	2017	2019	Girls	Boys
(Intercept)	.45	.37	.38	.38	.37	.44	.51	.53	.26
Less than 1 hour	.33	.29	.36	.31	.29	.36	.49	.49	.21
1 hour	.32	.31	.34	.34	.33	.31	.40	.49	.22
2 hours	.36	.36	.38	.35	.36	.40	.47	.57	.26
3 hours	.41	.38	.42	.44	.37	.45	.55	.68	.28
4 hours	.57	.41	.42	.46	.49	.52	.78	.86	.33
5 hours or more	.63	.61	.60	.68	.76	.66	.92	1.09	.45

Table D6

Regression Results by Cohort: Non-TV Screen Time as Predictor of Extended Sadness

a.2007

	Coefficient	Odds ratio	Odds	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept)	**-.79**	--	.45	.06	-.92	-.67	.000	2%
Less than 1 hour	**-.31**	.73	.33	.07	-.44	-.18	.000	3%
1 hour	**-.34**	.71	.32	.09	-.52	-.16	.000	4%
2 hours	-.21	.81	.36	.08	-.37	-.05	.010	3%
3 hours	-.10	.90	.41	.09	-.28	.08	.273	3%
4 hours	.24	1.27	.57	.14	-.03	.51	.083	2%
5 hours or more	**.34**	1.41	.63	.10	.15	.53	.001	5%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2007. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. Bold font indicates statistical significance, based on *p*-values ≤ .001.

b. 2009

	Coefficient	Odds ratio	Odds	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept)	**-1.01**	--	.37	.06	-1.12	-.89	.000	0%
Less than 1 hour	-.25	.78	.29	.09	-.42	-.07	.007	1%
1 hour	-.18	.84	.31	.08	-.33	-.02	.023	2%
2 hours	-.05	.96	.36	.08	-.21	.12	.593	3%
3 hours	.03	1.04	.38	.09	-.14	.21	.705	0%
4 hours	.12	1.12	.41	.11	-.10	.33	.282	2%
5 hours or more	**.50**	1.65	.61	.09	.32	.69	.000	2%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2009. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. Bold font indicates statistical significance, based on *p*-values ≤ .001.

c. 2011

	Coefficient	Odds ratio	Odds	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept)	**-.97**	--	.38	.06	-1.08	-.85	.000	3%
Less than 1 hour	-.06	.94	.36	.07	-.20	.08	.382	2%
1 hour	-.11	.89	.34	.07	-.26	.03	.123	2%
2 hours	.01	1.01	.38	.08	-.14	.16	.889	2%
3 hours	.10	1.10	.42	.08	-.06	.26	.238	%
4 hours	.10	1.10	.42	.10	-.11	.30	.348	7%
5 hours or more	**.46**	1.59	.60	.07	.32	.60	.000	7%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2011. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit

d. 2013

	Coefficient	Odds ratio	Odds	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept)	**-.96**	--	.38	.07	-1.09	-.83	.000	4%
Less than 1 hour	-.21	.81	.31	.11	-.42	.00	.048	2%
1 hour	-.11	.90	.34	.10	-.30	.08	.261	1%
2 hours	-.08	.92	.35	.08	-.24	.07	.297	3%
3 hours	.15	1.16	.44	.09	-.02	.32	.088	6%
4 hours	.20	1.22	.46	.11	-.03	.42	.087	4%
5 hours or more	**.59**	1.80	.68	.08	.43	.74	.000	10%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2013. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. Bold font indicates statistical significance, based on *p*-values $\leq .001$.

e. 2015

	Coefficient	Odds ratio	Odds	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept)	**-.99**	--	.37	.07	-1.12	-.85	.000	5%
Less than 1 hour	-.24	.79	.29	.10	-.43	-.04	.017	2%
1 hour	-.11	.89	.33	.09	-.29	.06	.212	9%
2 hours	-.04	.96	.36	.09	-.22	.13	.615	3%
3 hours	.01	1.01	.37	.11	-.21	.23	.917	10%
4 hours	.28	1.33	.49	.11	.07	.50	.009	5%
5 hours or more	**.72**	2.05	.76	.08	.55	.88	.000	4%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2015. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. Bold font indicates statistical significance, based on *p*-values $\leq .001$.

f. 2017

	Coefficient	Odds ratio	Odds	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept)	**-.82**	--	.44	.08	-.98	-.66	.000	1%
Less than 1 hour	-.20	.82	.36	.10	-.40	.01	.058	3%
1 hour	**-.36**	.70	.31	.10	-.56	-.15	.001	6%
2 hours	-.10	.91	.40	.08	-.26	.07	.251	3%
3 hours	.03	1.03	.45	.08	-.13	.20	.690	3%
4 hours	.17	1.19	.52	.12	-.07	.41	.161	3%
5 hours or more	**.41**	1.51	.66	.07	.27	.55	.000	3%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2017. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. Bold font indicates statistical significance, based on *p*-values $\leq .001$.

g. 2019

	Coefficient	Odds ratio	Odds	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept)	**-.68**	--	.51	.08	-.83	-.53	.000	6%
Less than 1 hour	-.03	.97	.49	.11	-.24	.17	.764	8%
1 hour	-.25	.78	.40	.10	-.46	-.05	.014	6%
2 hours	-.08	.92	.47	.10	-.28	.11	.401	6%
3 hours	.06	1.07	.55	.10	-.14	.27	.542	3%
4 hours	**.42**	1.52	.78	.08	.26	.57	.000	4%
5 hours or more	**.59**	1.80	.92	.09	.40	.78	.000	8%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2019. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. Bold font indicates statistical significance, based on *p*-values $\leq .001$.

Table D7

Regression Results by Sex: Non-TV Screen Time as Predictor of Extended Sadness

a. Girls

	Coefficient	Odds ratio	Odds	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept)	**-.63**	--	.53	.03	-.69	-.56	.000	1%
Less than 1 hour	-.07	.93	.49	.04	-.15	.01	.076	1%
1 hour	-.08	.92	.49	.04	-.17	.00	.059	3%
2 hours	.07	1.07	.57	.04	-.01	.15	.102	3%
3 hours	**.25**	1.29	.68	.05	.16	.35	.000	1%
4 hours	**.48**	1.62	.86	.05	.38	.58	.000	3%
5 hours or more	**.72**	2.06	1.09	.04	.64	.81	.000	2%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohorts 2007-2019, girls only. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. Bold font indicates statistical significance, based on *p*-values ≤ .001.

b. Boys

	Coefficient	Odds ratio	Odds	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept)	**-1.37**	--	.26	0.04	-1.45	-1.28	.000	2%
Less than 1 hour	-0.19	.82	.21	0.06	-0.31	-0.07	.002	2%
1 hour	-0.18	.84	.22	0.06	-0.29	-0.07	.002	6%
2 hours	0	1	.26	0.06	-0.11	0.11	.972	4%
3 hours	0.07	1.07	.28	0.06	-0.05	0.18	.245	1%
4 hours	0.22	1.25	.33	0.07	0.08	0.36	.002	3%
5 hours or more	**0.55**	1.74	.45	0.06	0.44	0.67	.000	2%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2007-2019, boys only. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. Bold font indicates statistical significance, based on *p*-values ≤ .001.

Table D8

Summaries, Cohort and Sex: Non-TV Screen Time as Predictor of Consideration of Suicide

a. Regression Coefficients

	2007	2009	2011	2013	2015	2017	2019	Girls	Boys
(Intercept)	**-1.74**	**-1.84**	**-1.80**	**-1.82**	**-1.65**	**-1.70**	**-1.67**	**-1.55**	**-2.14**
Less than 1 hour	-.17	-.24	.02	-.02	-.13	-.22	.24	.05	-.16
1 hour	-.13	-.22	-.03	-.06	-.21	-.27	-.23	-.05	-.13
2 hours	-.09	.12	.06	.10	-.01	-.08	-.05	.17	.03
3 hours	-.17	.07	.14	**.39**	-.03	.14	.11	**.28**	.11
4 hours	.34	.13	.30	.13	.04	.31	**.44**	**.43**	.24
5 hours or more	.36	**.63**	**.60**	**.69**	**.67**	**.57**	**.66**	**.74**	**.68**

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohorts 2007-2019. Bold font indicates statistical significance, based on *p*-values $\leq .01$

b. Odds Ratios

	2007	2009	2011	2013	2015	2017	2019	Girls	Boys
Less than 1 hour	.85	.79	1.02	.98	.88	.80	1.27	1.05	.85
1 hour	.88	.81	.97	.94	.81	.77	.79	.95	.88
2 hours	.92	1.13	1.06	1.11	.99	.92	.95	1.18	1.03
3 hours	.84	1.07	1.15	1.48	.97	1.15	1.11	1.32	1.11
4 hours	1.40	1.14	1.35	1.13	1.05	1.36	1.56	1.53	1.27
5 hours or more	1.43	1.87	1.82	2.00	1.96	1.78	1.93	2.09	1.97

c. Odds

	2007	2009	2011	2013	2015	2017	2019	Girls	Boys
(Intercept)	.18	.16	.17	.16	.19	.18	.19	.21	.12
Less than 1 hour	.15	.13	.17	.16	.17	.14	.24	.22	.10
1 hour	.16	.13	.16	.15	.15	.14	.15	.20	.11
2 hours	.17	.18	.18	.18	.19	.17	.18	.25	.12
3 hours	.15	.17	.20	.24	.18	.21	.21	.28	.13
4 hours	.25	.18	.23	.18	.20	.24	.30	.32	.15
5 hours or more	.26	.30	.31	.32	.37	.32	.37	.44	.24

Table D9

Regression Results by Cohort: Non-TV Screen Time as Predictor of Consideration of Suicide

a.2007

	Coefficient	Odds ratio	Odds	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept)	**-1.74**	--	.18	.10	-1.94	-1.54	.000	2%
Less than 1 hour	-.17	.85	.15	.12	-.39	.06	.155	3%
1 hour	-.13	.88	.16	.13	-.38	.11	.291	1%
2 hours	-.09	.92	.17	.12	-.32	.15	.468	4%
3 hours	-.17	.84	.15	.13	-.42	.08	.182	1%
4 hours	.34	1.40	.25	.18	-.01	.69	.055	%
5 hours or more	.36	1.43	.26	.14	.09	.63	.010	3%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2007. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. Bold font indicates statistical significance, based on *p*-values ≤ .001.

b. 2009

	Coefficient	Odds ratio	Odds	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept)	**-1.84**	--	.16	.06	-1.97	-1.72	.000	2%
Less than 1 hour	-.24	.79	.13	.10	-.43	-.05	.013	3%
1 hour	-.22	.81	.13	.10	-.42	-.02	.033	6%
2 hours	.12	1.13	.18	.11	-.09	.33	.271	1%
3 hours	.07	1.07	.17	.12	-.17	.30	.583	2%
4 hours	.13	1.14	.18	.15	-.15	.42	.359	2%
5 hours or more	**.63**	1.87	.30	.11	.41	.85	.000	2%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2009. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. Bold font indicates statistical significance, based on *p*-values ≤ .001.

c. 2011

	Coefficient	Odds ratio	Odds	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept)	**-1.80**	--	.17	.09	-1.98	-1.62	.000	9%
Less than 1 hour	.02	1.02	.17	.12	-.22	.25	.881	12%
1 hour	-.03	.97	.16	.10	-.22	.15	.719	5%
2 hours	.06	1.06	.18	.12	-.17	.28	.634	9%
3 hours	.14	1.15	.20	.13	-.12	.39	.290	5%
4 hours	.30	1.35	.23	.14	.02	.58	.035	9%
5 hours or more	**.60**	1.82	.31	.12	.36	.84	.000	3%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2011. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. Bold font indicates statistical significance, based on *p*-values ≤ .001.

d. 2013

	Coefficient	Odds ratio	Odds	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept)	**-1.82**	--	.16	.16	.09	-1.99	.000	4%
Less than 1 hour	-.02	.98	.16	.98	.14	-.30	.903	4%
1 hour	-.06	.94	.15	.94	.14	-.34	.659	2%
2 hours	.10	1.11	.18	1.11	.12	-.14	.397	5%
3 hours	**.39**	1.48	.24	1.48	.11	.17	.001	4%
4 hours	.13	1.13	.18	1.13	.15	-.17	.408	3%
5 hours or more	**.69**	2.00	.32	2.00	.11	.47	.000	3%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2013. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. Bold font indicates statistical significance, based on *p*-values ≤ .001.

e. 2015

	Coefficient	Odds ratio	Odds	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept)	**-1.65**	--	.19	.07	-1.80	-1.50	.000	7%
Less than 1 hour	-.13	.88	.17	.11	-.34	.08	.233	11%
1 hour	-.21	.81	.15	.13	-.46	.04	.098	6%
2 hours	-.01	.99	.19	.11	-.22	.20	.950	11%
3 hours	-.03	.97	.18	.09	-.21	.16	.774	11%
4 hours	.04	1.05	.20	.12	-.18	.27	.697	12%
5 hours or more	**.67**	**1.96**	.37	.10	.47	.87	.000	7%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2015. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. Bold font indicates statistical significance, based on *p*-values ≤ .001.

f. 2017

	Coefficient	Odds ratio	Odds	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept)	**-1.70**	--	.18	.08	-1.85	-1.55	.000	5%
Less than 1 hour	-.22	.80	.14	.11	-.44	.00	.048	4%
1 hour	-.27	.77	.14	.13	-.52	-.01	.042	8%
2 hours	-.08	.92	.17	.11	-.30	.14	.483	4%
3 hours	.14	1.15	.21	.10	-.05	.33	.141	6%
4 hours	.31	1.36	.24	.13	.04	.57	.022	2%
5 hours or more	**.57**	1.78	.32	.10	.39	.76	.000	8%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2017. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. Bold font indicates statistical significance, based on *p*-values ≤ .001.

g. 2019

	Coefficient	Odds ratio	Odds	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept)	**-1.67**	--	.19	.09	-1.85	-1.50	.000	3%
Less than 1 hour	.24	1.27	.24	.12	.00	.48	.050	3%
1 hour	-.23	.79	.15	.14	-.50	.04	.089	1%
2 hours	-.05	.95	.18	.11	-.26	.16	.633	25%
3 hours	.11	1.11	.21	.12	-.13	.34	.368	3%
4 hours	**.44**	1.56	.30	.10	.24	.65	.000	6%
5 hours or more	**.66**	1.93	.37	.10	.46	.86	.000	3%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2019. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. Bold font indicates statistical significance, based on p-values ≤ .001.

Table D10

Regression Results by Sex: Non-TV Screen Time as Predictor of Consideration of Suicide

a. Girls

	Coefficient	Odds ratio	Odds	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept)	**-1.55**	--	.21	.04	-1.62	-1.47	.000	0%
Less than 1 hour	.05	1.05	.22	.05	-.05	.15	.336	1%
1 hour	-.05	.95	.20	.06	-.16	.06	.365	6%
2 hours	.17	1.18	.25	.05	.07	.26	.001	1%
3 hours	**.28**	1.32	.28	.06	.16	.40	.000	2%
4 hours	**.43**	1.53	.32	.06	.31	.55	.000	3%
5 hours or more	**.74**	2.09	.44	.05	.64	.84	.000	1%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohorts 2007-2019, girls only. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. Bold font indicates statistical significance, based on p-values ≤ .001.

b. Boys

	Coefficient	Odds ratio	Odds	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept)	**-2.14**	--	.12	.06	-2.25	-2.03	.000	3%
Less than 1 hour	-.16	.85	.10	.08	-.31	-.01	.035	7%
1 hour	-.13	.88	.11	.08	-.27	.02	.094	5%
2 hours	.03	1.03	.12	.08	-.13	.18	.746	2%
3 hours	.11	1.11	.13	.07	-.03	.25	.132	3%
4 hours	.24	1.27	.15	.08	.08	.40	.003	3%
5 hours or more	**.68**	1.97	.24	.07	.54	.81	.000	2%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohorts 2007-2019, bos only. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. Bold font indicates statistical significance, based on *p*-values ≤ .001.

Table D11

Summaries, Cohort and Sex: Non-TV Screen Time as Predictor of Suicide Planning

a. Regression Coefficients

	2002007	2009	2011	2013	2015	2017	2019	Girls	Boys
(Intercept)	**-2.08**	**-1.99**	**-2.02**	**-2.11**	**-1.92**	**-1.94**	**-1.92**	**-1.84**	**-2.32**
Less than 1 hour	-.11	**-.40**	.00	.13	-.07	-.18	.24	.04	-.15
1 hour	-.12	-.30	-.17	.04	-.24	-.25	-.16	-.09	-.14
2 hours	-.04	-.20	-.03	.07	.03	-.06	.00	.11	-.03
3 hours	.01	.05	.10	.36	-.03	.04	.16	**.27**	.10
4 hours	.22	**-.14**	.41	.13	.20	.12	**.33**	**.35**	.21
5 hours or more	**.57**	.54	**.66**	**.69**	**.72**	**.54**	**.71**	**.74**	**.70**

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohorts 2007-2019. Bold font indicates statistical significance, based on *p*-values ≤ .001

b. Odds Ratios (Exponentiation of Regression Coefficients)

	2007	2009	2011	2013	2015	2017	2019	Girls	Boys
Less than 1 hour	.89	.67	1.00	1.14	.93	.84	1.27	1.04	.86
1 hour	.89	.74	.85	1.04	.79	.78	.85	.92	.87
2 hours	.96	.82	.97	1.08	1.03	.94	1.00	1.11	.97
3 hours	1.01	1.05	1.11	1.44	.97	1.04	1.18	1.31	1.10
4 hours	1.25	.87	1.51	1.14	1.22	1.13	1.39	1.43	1.23
5 hours or more	1.78	1.71	1.94	2.00	2.04	1.71	2.04	2.09	2.02

c. Odds

	2007	2009	2011	2013	2015	2017	2019	Girls	Boys
(Intercept)	.12	.14	.13	.12	.15	.14	.15	.16	.10
Less than 1 hour	.11	.09	.13	.14	.14	.12	.19	.17	.09
1 hour	.11	.10	.11	.12	.12	.11	.13	.15	.09
2 hours	.12	.11	.13	.13	.15	.13	.15	.18	.10
3 hours	.12	.15	.14	.17	.15	.15	.18	.21	.11
4 hours	.15	.12	.20	.14	.18	.16	.21	.23	.12
5 hours or more	.21	.24	.25	.24	.31	.24	.31	.33	.20

Table D12

Regression Results by Cohort:Non-TV Screen Time as Predictor of Suicide Planning

a.2007

	Coefficient	Odds ratio	Odds	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept)	**-2.08**	--	.12	.12	-2.31	-1.85	.000	2%
Less than 1 hour	-.11	.89	.11	.13	-.36	.13	.374	2%
1 hour	-.12	.89	.11	.14	-.39	.14	.368	2%
2 hours	-.04	.96	.12	.14	-.32	.24	.776	7%
3 hours	.01	1.01	.12	.17	-.32	.33	.965	2%
4 hours	.22	1.25	.15	.23	-.22	.66	.327	1%
5 hours or more	**.57**	1.78	.21	.16	.26	.88	.000	1%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2007. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. Bold font indicates statistical significance, based on *p*-values ≤ .001.

b. 2009

	Coefficient	Odds ratio	Odds	SE	95% CI LL	UL	*p*	Missing information
(Intercept)	**-1.99**	--	.14	.07	-2.12	-1.86	.000	2%
Less than 1 hour	**-.40**	.67	.09	.10	-.60	-.20	.000	2%
1 hour	-.30	.74	.10	.10	-.49	-.10	.003	3%
2 hours	-.20	.82	.11	.08	-.37	-.04	.730	3%
3 hours	.05	1.05	.15	.14	-.23	.33	.334	1%
4 hours	**-.14**	.87	.12	.14	-.41	.14	.000	7%
5 hours or more	.54	1.71	.24	.08	.39	.69	.017	4%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2009. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. Bold font indicates statistical significance, based on *p*-values ≤ .001.

c. 2011

	Coefficient	Odds ratio	Odds	SE	95% CI LL	UL	*p*	Missing information
(Intercept)	**-2.02**	--	.13	.10	-2.22	-1.83	.000	4%
Less than 1 hour	.00	1.00	.13	.12	-.23	.23	.998	5%
1 hour	-.17	.85	.11	.14	-.43	.10	.224	1%
2 hours	-.03	.97	.13	.13	-.28	.22	.835	5%
3 hours	.10	1.11	.14	.14	-.17	.38	.461	3%
4 hours	.41	1.51	.20	.13	.16	.67	.002	4%
5 hours or more	**.66**	1.94	.25	.12	.42	.90	.000	1%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2011. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. Bold font indicates statistical significance, based on *p*-values ≤ .001.

d. 2013

	Coefficient	Odds ratio	Odds	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept)	**-2.11**	--	.12	.11	-2.32	-1.89	.000	3%
Less than 1 hour	.13	1.14	.14	.15	-.17	.42	.400	4%
1 hour	.04	1.04	.12	.16	-.29	.36	.826	4%
2 hours	.07	1.08	.13	.14	-.19	.34	.581	6%
3 hours	.36	1.44	.17	.13	.10	.62	.006	3%
4 hours	.13	1.14	.14	.18	-.21	.48	.447	2%
5 hours or more	**.69**	2.00	.24	.14	.42	.97	.000	3%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2013. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. Bold font indicates statistical significance, based on *p*-values ≤ .001.

e. 2015

	Coefficient	Odds ratio	Odds	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept)	**-1.92**	--	.15	.08	-2.08	-1.76	.000	3%
Less than 1 hour	-.07	.93	.14	.13	-.32	.18	.593	10%
1 hour	-.24	.79	.12	.12	-.48	.00	.052	5%
2 hours	.03	1.03	.15	.10	-.16	.22	.763	15%
3 hours	-.03	.97	.15	.12	-.27	.20	.787	2%
4 hours	.20	1.22	.18	.12	-.04	.44	.108	6%
5 hours or more	**.72**	2.04	.31	.11	.50	.93	.000	3%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2015. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. Bold font indicates statistical significance, based on *p*-values ≤ .001.

f. 2017

	Coefficient	Odds ratio	Odds	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept)	**-1.94**	--	.14	.10	-2.13	-1.75	.000	7%
Less than 1 hour	-.18	.84	.12	.14	-.45	.09	.188	12%
1 hour	-.25	.78	.11	.10	-.46	-.05	.014	17%
2 hours	-.06	.94	.13	.17	-.40	.28	.726	4%
3 hours	.04	1.04	.15	.13	-.22	.29	.776	5%
4 hours	.12	1.13	.16	.12	-.11	.36	.297	9%
5 hours or more	**.54**	1.71	.24	.12	.30	.77	.000	8%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2017. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. Bold font indicates statistical significance, based on *p*-values ≤ .001.

g. 2019

	Coefficient	Odds ratio	Odds	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept)	**-1.92**	--	.15	.10	-2.11	-1.72	.000	3%
Less than 1 hour	.24	1.27	.19	.13	-.01	.49	.063	5%
1 hour	-.16	.85	.13	.13	-.41	.09	.214	6%
2 hours	.00	1.00	.15	.12	-.22	.23	.970	6%
3 hours	.16	1.18	.18	.11	-.06	.38	.146	3%
4 hours	.33	1.39	.21	.13	.08	.58	.010	7%
5 hours or more	**.71**	2.04	.31	.11	.50	.93	.000	2%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2019. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. Bold font indicates statistical significance, based on *p*-values ≤ .001.

Table D13

Regression Results by Sex: Non-TV Screen Time as Predictor of Suicide Planning

a. Girls

	Coefficient	Odds ratio	Odds	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept)	**-1.84**	--	.16	.04	-1.91	-1.76	.000	1%
Less than 1 hour	.04	1.04	.17	.05	-.06	.15	.419	4%
1 hour	-.09	.92	.15	.06	-.20	.03	.137	5%
2 hours	.11	1.11	.18	.06	.00	.22	.061	4%
3 hours	**.27**	1.31	.21	.06	.14	.40	.000	3%
4 hours	**.35**	1.43	.23	.07	.23	.48	.000	2%
5 hours or more	**.74**	2.09	.33	.05	.63	.84	.000	1%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohorts 2007-2019, girls only. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. Bold font indicates statistical significance, based on *p*-values ≤ .001.

b. Boys

	Coefficient	Odds ratio	Odds	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept)	**-2.32**	--	.10	.06	-2.44	-2.20	.000	7%
Less than 1 hour	-.15	.86	.09	.08	-.31	.00	.057	2%
1 hour	-.14	.87	.09	.08	-.29	.01	.067	3%
2 hours	-.03	.97	.10	.07	-.17	.11	.697	2%
3 hours	.10	1.10	.11	.08	-.06	.26	.225	3%
4 hours	.21	1.23	.12	.09	.04	.37	.016	4%
5 hours or more	**.70**	2.02	.20	.07	.56	.85	.000	7%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2007-2019, boys only. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. Bold font indicates statistical significance, based on *p*-values ≤ .001.

Table D14

Summaries, Cohort and Sex: Non-TV Screen Time as Predictor of Attempted Suicide (Dichotomous)

a. Regression Coefficients

	2007	2009	2011	2013	2015	2017	2019	Girls	Boys
(Intercept)	**-2.42**	**-2.48**	**-2.45**	**-2.42**	**-2.34**	**-2.50**	**-2.31**	**-2.28**	**-2.74**
Less than 1 hour	-.31	**-.53**	-.18	-.29	-.13	-.30	.09	-.07	**-.39**
1 hour	-.26	-.46	-.36	-.30	-.37	-.39	-.31	-.17	**-.46**
2 hours	-.19	-.40	-.09	-.29	-.09	-.32	-.16	-.04	-.29
3 hours	-.36	-.10	.02	-.02	-.26	-.22	-.19	.03	-.19
4 hours	.02	-.25	.14	.08	-.20	.00	-.01	**.29**	-.25
5 hours or more	.28	**.55**	**.56**	.39	**.42**	**.48**	.33	**.55**	**.45**

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohorts 2007-2019. Bold font indicates statistical significance, based on p-values $\leq .01$

b. Odds Ratios

	2007	2009	2011	2013	2015	2017	2019	Girls	Boys
Less than 1 hour	.74	.59	1.02	.75	.88	.74	1.09	.93	.68
1 hour	.77	.63	.97	.74	.69	.68	.73	.84	.63
2 hours	.83	.67	1.06	.75	.91	.72	.85	.96	.75
3 hours	.70	.90	1.15	.98	.77	.80	.83	1.03	.82
4 hours	1.02	.78	1.35	1.08	.82	1.00	.99	1.34	.78
5 hours or more	1.33	1.74	1.82	1.48	1.52	1.62	1.39	1.73	1.57

c. Odds

	2007	2009	2011	2013	2015	2017	2019	Girls	Boys
(Intercept)	.09	.08	.17	.09	.10	.08	.10	.10	.06
Less than 1 hour	.07	.05	.17	.07	.09	.06	.11	.09	.04
1 hour	.07	.05	.16	.07	.07	.05	.07	.08	.04
2 hours	.07	.05	.18	.07	.09	.06	.09	.10	.05
3 hours	.06	.07	.20	.09	.08	.06	.08	.10	.05
4 hours	.09	.06	.23	.10	.08	.08	.10	.13	.05
5 hours or more	.12	.14	.31	.13	.15	.13	.14	.17	.09

Table D15

Regression Results by Cohort: Non-TV Screen Time as Predictor of Attempted Suicide (Dichotomous)

a. 2007

	Coefficient	Odds ratio	Odds	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept)	**-2.42**	--	.09	.11	-2.64	-2.20	.000	15%
Less than 1 hour	-.31	.74	.07	.15	-.61	.00	.046	11%
1 hour	-.26	.77	.07	.15	-.54	.03	.081	8%
2 hours	-.19	.83	.07	.15	-.48	.10	.196	21%
3 hours	-.36	.70	.06	.16	-.69	-.03	.027	27%
4 hours	.02	1.02	.09	.18	-.34	.38	.911	13%
5 hours or more	.28	1.33	.12	.17	-.05	.61	.089	16%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2007. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. Bold font indicates statistical significance, based on *p*-values ≤ .001.

b. 2009

	Coefficient	Odds ratio	Odds	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept)	**-2.48**	--	.08	.10	-2.67	-2.28	.000	18%
Less than 1 hour	**-.53**	.59	.05	.13	-.79	-.27	.000	16%
1 hour	-.46	.63	.05	.15	-.76	-.15	.003	29%
2 hours	-.40	.67	.05	.14	-.68	-.12	.005	4%
3 hours	-.10	.90	.07	.21	-.52	.31	.633	5%
4 hours	-.25	.78	.06	.21	-.67	.17	.238	6%
5 hours or more	**.55**	1.74	.14	.14	.28	.82	.000	11%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2009. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. Bold font indicates statistical significance, based on *p*-values ≤ .001.

c. 2011

	Coefficient	Odds ratio	Odds	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept)	**-2.45**	--	.17	.12	-2.69	-2.21	.000	15%
Less than 1 hour	-.18	1.02	.17	.14	-.46	.11	.881	26%
1 hour	-.36	.97	.16	.15	-.66	-.06	.719	0%
2 hours	-.09	1.06	.18	.14	-.37	.20	.634	21%
3 hours	.02	1.15	.20	.18	-.35	.38	.290	27%
4 hours	.14	1.35	.23	.20	-.25	.54	.035	32%
5 hours or more	**.56**	1.82	.31	.15	.26	.85	.000	13%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2011. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. Bold font indicates statistical significance, based on *p*-values ≤ .001.

d. 2013

	Coefficient	Odds ratio	Odds	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept)	**-2.42**	--	.09	.13	-2.67	-2.16	.000	9%
Less than 1 hour	-.29	.75	.07	.20	-.68	.10	.139	10%
1 hour	-.30	.74	.07	.22	-.72	.13	.169	7%
2 hours	-.29	.75	.07	.18	-.65	.07	.115	22%
3 hours	-.02	.98	.09	.19	-.40	.36	.929	9%
4 hours	.08	1.08	.10	.19	-.30	.45	.689	5%
5 hours or more	.39	1.48	.13	.16	.08	.71	.010	8%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2013. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. Bold font indicates statistical significance, based on *p*-values ≤ .001.

e. 2015

	Coefficient	Odds ratio	Odds	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept)	**-2.34**	--	.10	.10	-2.54	-2.13	.000	9%
Less than 1 hour	-.13	.88	.09	.14	-.41	.15	.355	18%
1 hour	-.37	.69	.07	.16	-.69	-.06	.019	3%
2 hours	-.09	.91	.09	.13	-.36	.17	.496	1%
3 hours	-.26	.77	.08	.15	-.56	.03	.075	29%
4 hours	-.20	.82	.08	.16	-.52	.12	.212	2%
5 hours or more	**.42**	1.52	.15	.13	.16	.68	.001	5%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2015. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. Bold font indicates statistical significance, based on *p*-values ≤ .001.

f. 2017

	Coefficient	Odds ratio	Odds	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept)	**-2.50**	--	.08	.12	-2.74	-2.26	.000	19%
Less than 1 hour	-.30	.74	.06	.16	-.62	.03	.066	34%
1 hour	-.39	.68	.05	.23	-.89	.11	.093	63%
2 hours	-.32	.72	.06	.18	-.69	.04	.077	25%
3 hours	-.22	.80	.06	.19	-.59	.14	.229	20%
4 hours	.00	1.00	.08	.17	-.33	.33	.981	9%
5 hours or more	**.48**	1.62	.13	.15	.19	.77	.001	27%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2017. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. Bold font indicates statistical significance, based on *p*-values ≤ .001.

g. 2019

	Coefficient	Odds ratio	Odds	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept)	**-2.31**	--	.10	.11	-2.52	-2.09	.000	3%
Less than 1 hour	.09	1.09	.11	.17	-.24	.42	.591	8%
1 hour	-.31	.73	.07	.15	-.61	-.01	.041	18%
2 hours	-.16	.85	.09	.16	-.48	.16	.304	35%
3 hours	-.19	.83	.08	.14	-.46	.08	.160	5%
4 hours	-.01	.99	.10	.14	-.29	.27	.948	18%
5 hours or more	.33	1.39	.14	.14	.07	.60	.014	15%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2019. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. Bold font indicates statistical significance, based on *p*-values ≤ .001.

Table D16

Regression Results by Sex: Non-TV Screen Time as Predictor of Attempted Suicide (Dichotomous)

a. Girls

	Coefficient	Odds ratio	Odds	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept)	**-2.28**	--	.10	.05	-2.37	-2.20	.000	2%
Less than 1 hour	-.07	.93	.09	.07	-.20	.06	.280	4%
1 hour	-.17	.84	.08	.07	-.31	-.03	.017	11%
2 hours	-.04	.96	.10	.06	-.17	.08	.514	4%
3 hours	.03	1.03	.10	.08	-.12	.18	.668	10%
4 hours	**.29**	1.34	.13	.08	.14	.44	.000	3%
5 hours or more	**.55**	1.73	.17	.07	.42	.68	.000	8%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2007-2019, girls only. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. Bold font indicates statistical significance, based on *p*-values ≤ .001.

b. Boys

	Coefficient	Odds ratio	Odds	SE	95% CI LL	95% CI UL	p	Missing information
(Intercept)	**-2.74**	--	.06	.08	-2.89	-2.58	.000	15%
Less than 1 hour	**-.39**	.68	.04	.11	-.61	-.17	.001	22%
1 hour	**-.46**	.63	.04	.12	-.70	-.21	.000	32%
2 hours	-.29	.75	.05	.11	-.50	-.08	.006	28%
3 hours	-.19	.82	.05	.11	-.42	.03	.088	19%
4 hours	-.25	.78	.05	.12	-.48	-.01	.037	10%
5 hours or more	**.45**	1.57	.09	.09	.27	.63	.000	11%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2007-2019, boys only. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. Bold font indicates statistical significance, based on p-values ≤ .001.

Appendix E

Regression Statistics (Psychological Distress Indicators as Predictors)

Table E1

Regression Results: Extended Sadness as Predictor of Non-TV Screen Time, Average School Day

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept):1	**-1.68**	--	.19	.02	-1.72	-1.64	.000	1%
(Intercept):2	**-1.39**	--	.25	.03	-1.44	-1.34	.000	0%
(Intercept):3	**-1.35**	--	.26	.03	-1.40	-1.29	.000	1%
(Intercept):4	**-.88**	--	.42	.02	-.92	-.84	.000	1%
(Intercept):5	**-.72**	--	.49	.02	-.76	-.68	.000	2%
(Intercept):6	**-.83**	--	.44	.02	-.87	-.78	.000	3%
Extended sadness:1	-.04	.96	.18	.02	-.09	.01	.105	6%
Extended sadness:2	**-.29**	.75	.19	.03	-.35	-.24	.000	4%
Extended sadness:3	**-.37**	.69	.18	.03	-.42	-.32	.000	4%
Extended sadness:4	**-.33**	.72	.30	.02	-.37	-.28	.000	2%
Extended sadness:5	**-.32**	.72	.35	.03	-.38	-.27	.000	11%
Extended sadness:6	**-.25**	.78	.34	.03	-.32	-.19	.000	7%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohorts 2007-2019. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001

Table E2

Regression Coefficients: Consideration of Suicide as Predictor of Non-TV Screen Time, Average School Day

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	95% CI UL	p	Missing information
(Intercept):1	**-1.67**	--	.19	.02	-1.71	-1.63	.000	2%
(Intercept):2	**-1.43**	--	.24	.02	-1.48	-1.38	.000	0%
(Intercept):3	**-1.39**	--	.25	.03	-1.44	-1.34	.000	1%
(Intercept):4	**-.92**	--	.40	.02	-.96	-.89	.000	1%
(Intercept):5	**-.77**	--	.46	.02	-.80	-.73	.000	1%
(Intercept):6	**-.85**	--	.43	.02	-.90	-.81	.000	1%
Considered suicide:1	**-.12**	.89	.17	.03	-.18	-.06	.000	9%
Considered suicide:2	**-.27**	.76	.18	.03	-.33	-.22	.000	3%
Considered suicide:3	**-.41**	.67	.17	.03	-.47	-.34	.000	1%
Considered suicide:4	**-.32**	.72	.29	.03	-.39	-.26	.000	1%
Considered suicide:5	**-.34**	.71	.33	.03	-.40	-.27	.000	3%
Considered suicide:6	**-.32**	.72	.31	.04	-.41	-.24	.000	2%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohorts 2007-2019.

SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit.

1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on p-values $\leq .001$.

Table E3

Regression Coefficients: Suicide Planning as Predictor of Non-TV Screen Time, Average School Day

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept):1	**-1.67**	--	.19	.02	-1.71	-1.64	.000	1%
(Intercept):2	**-1.44**	--	.24	.03	-1.49	-1.39	.000	0%
(Intercept):3	**-1.40**	--	.25	.03	-1.45	-1.35	.000	0%
(Intercept):4	**-.93**	--	.39	.02	-.97	-.89	.000	0%
(Intercept):5	**-.78**	--	.46	.02	-.81	-.74	.000	1%
(Intercept):6	**-.86**	--	.42	.02	-.90	-.81	.000	1%
Planned suicide:1	**-.12**	.88	.17	.03	-.19	-.06	.000	5%
Planned suicide:2	**-.26**	.77	.18	.03	-.32	-.19	.000	2%
Planned suicide:3	**-.41**	.66	.17	.04	-.49	-.34	.000	4%
Planned suicide:4	**-.36**	.70	.27	.03	-.43	-.30	.000	2%
Planned suicide:5	**-.34**	.71	.33	.04	-.41	-.27	.000	4%
Planned suicide:6	**-.38**	.68	.29	.04	-.46	-.30	.000	2%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohorts 2007-2019.

SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit.

1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

Table E4

Regression Results: Number of Suicide Attempts as Predictor of Non-TV Screen Time, Average School Day

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept):1	**-1.69**	--	.18	.02	-1.73	-1.66	.000	1%
(Intercept):2	**-1.45**	--	.23	.02	-1.50	-1.40	.000	0%
(Intercept):3	**-1.43**	--	.24	.03	-1.48	-1.37	.000	2%
(Intercept):4	**-.95**	--	.39	.02	-.99	-.92	.000	1%
(Intercept):5	**-.80**	--	.45	.02	-.83	-.76	.000	1%
(Intercept):6	**-.88**	--	.41	.02	-.92	-.84	.000	2%
1 suicide attempt:1	.08	1.09	.20	.05	-.02	.18	.099	4%
1 suicide attempt:2	**-.21**	.81	.19	.06	-.32	-.10	.000	12%
1 suicide attempt:3	**-.28**	.76	.18	.07	-.41	-.14	.000	28%
1 suicide attempt:4	**-.20**	.82	.32	.05	-.31	-.10	.000	5%
1 suicide attempt:5	**-.23**	.79	.36	.06	-.35	-.11	.000	9%
1 suicide attempt:6	-.20	.82	.34	.08	-.36	-.05	.008	21%
2-3 suicide attempts:1	-.02	.98	.18	.07	-.15	.11	.811	14%
2-3 suicide attempts:2	-.18	.84	.19	.08	-.32	-.03	.019	6%
2-3 suicide attempts:3	**-.38**	.69	.17	.09	-.55	-.20	.000	9%
2-3 suicide attempts:4	**-.38**	.68	.27	.07	-.53	-.24	.000	17%
2-3 suicide attempts:5	**-.41**	.66	.30	.09	-.59	-.24	.000	13%
2-3 suicide attempts:6	**-.32**	.73	.30	.09	-.50	-.13	.001	7%
4-5 suicide attempts:1	.10	1.11	.20	.15	-.20	.40	.509	6%
4-5 suicide attempts:2	-.25	.78	.18	.16	-.57	.08	.133	8%
4-5 suicide attempts:3	-.41	.66	.16	.18	-.76	-.06	.020	6%
4-5 suicide attempts:4	-.47	.63	.25	.19	-.83	-.10	.012	18%
4-5 suicide attempts:5	-.44	.64	.29	.21	-.85	-.03	.034	6%
4-5 suicide attempts:6	-.43	.65	.27	.19	-.80	-.05	.025	5%
6+ suicide attempts:1	-.07	.93	.17	.12	-.31	.16	.537	13%
6+ suicide attempts:2	**-.54**	.58	.13	.16	-.87	-.21	.001	33%
6+ suicide attempts:3	**-.84**	.43	.10	.20	-1.24	-.44	.000	20%
6+ suicide attempts:4	**-.80**	.45	.18	.18	-1.17	-.43	.000	47%
6+ suicide attempts:5	**-.99**	.37	.17	.18	-1.34	-.63	.000	12%
6+ suicide attempts:6	**-1.52**	.22	.09	.26	-2.03	-1.02	.000	19%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohorts 2007-2019. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit.

1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

Table E5

Regression Coefficients: Attempted Suicide (Dichotomous) as Predictor of Non-TV Screen Time, Average School Day

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept):1	**-1.69**	--	.18	.02	-1.73	-1.66	.000	1%
(Intercept):2	**-1.45**	--	.23	.02	-1.50	-1.40	.000	0%
(Intercept):3	**-1.43**	--	.24	.03	-1.48	-1.37	.000	2%
(Intercept):4	**-.95**	--	.39	.02	-.99	-.92	.000	1%
(Intercept):5	**-.80**	--	.45	.02	-.83	-.76	.000	1%
(Intercept):6	**-.88**	--	.41	.02	-.92	-.84	.000	2%
Attempted suicide:1	.04	1.04	.19	.04	-.03	.11	.260	2%
Attempted suicide:2	**-.23**	.79	.18	.04	-.32	-.14	.000	14%
Attempted suicide:3	**-.36**	.70	.17	.05	-.47	-.26	.000	24%
Attempted suicide:4	**-.33**	.72	.28	.05	-.42	-.24	.000	18%
Attempted suicide:5	**-.38**	.69	.31	.05	-.47	-.28	.000	14%
Attempted suicide:6	**-.38**	.68	.28	.06	-.50	-.26	.000	14%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohorts 2007-2019. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit.

1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

Table E6

Regression Results: All Dichotomous Distress Indicators as Simultaneous Predictors of Non-TV Screen Time, Average School Day

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept):1	**-1.67**	--	.19	.02	-1.71	-1.63	.000	2%
(Intercept):2	**-1.38**	--	.25	.03	-1.43	-1.33	.000	0%
(Intercept):3	**-1.33**	--	.26	.03	-1.38	-1.28	.000	1%
(Intercept):4	**-.86**	--	.42	.02	-.90	-.83	.000	1%
(Intercept):5	**-.70**	--	.49	.02	-.74	-.66	.000	2%
(Intercept):6	**-.80**	--	.45	.02	-.85	-.76	.000	3%
Extended sadness:1	.01	1.01	.19	.03	-.04	.06	.834	4%
Extended sadness:2	**-.24**	.79	.20	.03	-.30	-.18	.000	7%
Extended sadness:3	**-.27**	.77	.20	.03	-.32	-.21	.000	8%
Extended sadness:4	**-.24**	.79	.33	.03	-.30	-.19	.000	5%
Extended sadness:5	**-.23**	.79	.39	.03	-.30	-.17	.000	7%
Extended sadness:6	**-.14**	.87	.39	.04	-.21	-.07	.000	5%
Considered suicide:1	**-.13**	.88	.17	.04	-.21	-.05	.001	12%
Considered suicide:2	-.11	.90	.23	.04	-.18	-.03	.005	7%
Considered suicide:3	**-.16**	.85	.22	.04	-.25	-.07	.000	1%
Considered suicide:4	-.08	.92	.39	.05	-.17	.01	.087	3%
Considered suicide:5	-.11	.90	.44	.05	-.20	-.02	.022	3%
Considered suicide:6	-.08	.92	.41	.06	-.19	.03	.135	0%
Planned suicide:1	-.11	.89	.17	.04	-.20	-.03	.010	9%
Planned suicide:2	-.06	.94	.24	.04	-.15	.02	.159	6%
Planned suicide:3	**-.16**	.85	.22	.05	-.26	-.07	.000	8%
Planned suicide:4	**-.17**	.85	.36	.05	-.26	-.08	.000	4%
Planned suicide:5	-.11	.90	.44	.05	-.21	-.01	.028	2%
Planned suicide:6	**-.21**	.81	.36	.05	-.31	-.10	.000	2%
Attempted suicide:1	**.20**	1.22	.23	.04	.11	.28	.000	2%
Attempted suicide:2	.00	1.00	.25	.05	-.11	.10	.934	18%
Attempted suicide:3	-.03	.97	.25	.06	-.16	.10	.639	34%
Attempted suicide:4	-.05	.95	.40	.05	-.16	.05	.296	20%
Attempted suicide:5	-.12	.88	.43	.06	-.24	-.01	.031	24%
Attempted suicide:6	-.13	.88	.40	.07	-.26	.00	.042	12%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohorts 2007-2019. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

Table E7

Summaries, Cohort and Sex: Extended Sadness as Predictor of Non-TV Screen Time, Average School Day

a. Regression Coefficients

	2007	2009	2011	2013	2015	2017	2019	Girls	Boys
(Intercept):1	**-1.63**	**-1.69**	**-1.99**	**-1.81**	**-1.58**	**-1.51**	**-1.58**	**-1.37**	**-1.98**
(Intercept):2	**-1.06**	**-1.02**	**-1.28**	**-1.51**	**-1.58**	**-1.75**	**-1.93**	**-1.31**	**-1.44**
(Intercept):3	**-1.02**	**-.98**	**-1.14**	**-1.49**	**-1.66**	**-1.67**	**-1.72**	**-1.27**	**-1.40**
(Intercept):4	**-.57**	**-.61**	**-.71**	**-1.02**	**-1.02**	**-1.11**	**-1.07**	**-.85**	**-.89**
(Intercept):5	**-.44**	**-.48**	**-.59**	**-.88**	**-.79**	**-.94**	**-.74**	**-.74**	**-.71**
(Intercept):6	**-.67**	**-.58**	**-.71**	**-.92**	**-.84**	**-1.01**	**-.86**	**-.88**	**-.79**
Extended sadness:1	.14	.04	-.05	-.12	-.15	-.05	-.15	**-.19**	-.08
Extended sadness:2	**-.19**	**-.24**	-.13	**-.37**	**-.44**	**-.27**	-.22	**-.32**	**-.31**
Extended sadness:3	**-.29**	**-.25**	**-.24**	**-.33**	**-.38**	**-.49**	**-.49**	**-.42**	**-.36**
Extended sadness:4	**-.27**	**-.21**	**-.18**	**-.40**	**-.39**	**-.30**	**-.41**	**-.37**	**-.27**
Extended sadness:5	**-.31**	**-.25**	**-.19**	**-.27**	**-.48**	**-.26**	**-.39**	**-.32**	**-.31**
Extended sadness:6	-.08	**-.31**	**-.30**	**-.33**	**-.36**	-.20	-.14	**-.20**	**-.28**

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohorts 2007-2019. 1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

b. Hazard Ratios

	2007	2009	2011	2013	2015	2017	2019	Girls	Boys
Extended sadness:1	1.15	1.04	.95	.89	.86	.95	.86	.83	.93
Extended sadness:2	.83	.79	.87	.69	.65	.76	.81	.73	.74
Extended sadness:3	.75	.78	.79	.72	.69	.61	.62	.66	.70
Extended sadness:4	.76	.81	.83	.67	.67	.74	.67	.69	.77
Extended sadness:5	.73	.78	.83	.76	.62	.77	.68	.73	.73
Extended sadness:6	.92	.74	.74	.72	.69	.82	.87	.82	.76

c. Hazard Rates

	2007	2009	2011	2013	2015	2017	2019	Girls	Boys
(Intercept):1	.20	.18	.14	.16	.21	.22	.21	.25	.14
(Intercept):2	.35	.36	.28	.22	.21	.17	.15	.27	.24
(Intercept):3	.36	.38	.32	.23	.19	.19	.18	.28	.25
(Intercept):4	.56	.54	.49	.36	.36	.33	.34	.43	.41
(Intercept):5	.64	.62	.56	.41	.45	.39	.48	.48	.49
(Intercept):6	.51	.56	.49	.40	.43	.36	.43	.42	.45
Extended sadness:1	.23	.19	.13	.14	.18	.21	.18	.06	.13
Extended sadness:2	.29	.28	.24	.15	.14	.13	.12	.07	.18
Extended sadness:3	.27	.30	.25	.17	.13	.12	.11	.08	.18
Extended sadness:4	.43	.44	.41	.24	.24	.24	.23	.18	.32
Extended sadness:5	.47	.48	.46	.31	.28	.30	.33	.23	.36
Extended sadness:6	.47	.41	.36	.29	.30	.30	.37	.18	.34

Table E8

Regression Coefficients by Cohort: Extended Sadness as Predictor of Non-TV Screen Time, Average School Day

a.2007

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept):1	**-1.63**	--	.20	.06	-1.75	-1.51	.000	0%
(Intercept):2	**-1.06**	--	.35	.06	-1.18	-.94	.000	1%
(Intercept):3	**-1.02**	--	.36	.04	-1.10	-.93	.000	2%
(Intercept):4	**-.57**	--	.56	.04	-.65	-.50	.000	1%
(Intercept):5	**-.44**	--	.64	.04	-.52	-.36	.000	3%
(Intercept):6	**-.67**	--	.51	.06	-.80	-.54	.000	2%
Extended sadness:1	.14	1.15	.23	.06	.02	.25	.020	2%
Extended sadness:2	**-.19**	.83	.29	.06	-.30	-.08	.001	13%
Extended sadness:3	**-.29**	.75	.27	.05	-.38	-.20	.000	3%
Extended sadness:4	**-.27**	.76	.43	.06	-.38	-.16	.000	2%
Extended sadness:5	**-.31**	.73	.47	.06	-.43	-.19	.000	2%
Extended sadness:6	-.08	.92	.47	.13	-.33	.17	.536	2%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2007. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values $\leq .001$.

b. 2009

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	UL	*p*	Missing information
(Intercept):1	**-1.69**	--	.18	.03	-1.75	-1.62	.000	1%
(Intercept):2	**-1.02**	--	.36	.05	-1.11	-.93	.000	%
(Intercept):3	**-.98**	--	.38	.05	-1.07	-.88	.000	1%
(Intercept):4	**-.61**	--	.54	.04	-.69	-.53	.000	%
(Intercept):5	**-.48**	--	.62	.04	-.57	-.39	.000	1%
(Intercept):6	**-.58**	--	.56	.07	-.71	-.44	.000	2%
Extended sadness:1	.04	1.04	.19	.06	-.08	.16	.528	1%
Extended sadness:2	**-.24**	.79	.28	.06	-.35	-.12	.000	2%
Extended sadness:3	**-.25**	.78	.30	.05	-.35	-.15	.000	7%
Extended sadness:4	**-.21**	.81	.44	.06	-.32	-.09	.000	3%
Extended sadness:5	**-.25**	.78	.48	.07	-.38	-.11	.000	2%
Extended sadness:6	-.31	.74	.41	.10	-.50	-.11	.002	1%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2009. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

c. 2011

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	UL	p	Missing information
(Intercept):1	**-1.99**	--	.14	.04	-2.07	-1.90	.000	0%
(Intercept):2	**-1.28**	--	.28	.03	-1.35	-1.22	.000	2%
(Intercept):3	**-1.14**	--	.32	.05	-1.24	-1.05	.000	0%
(Intercept):4	**-.71**	--	.49	.04	-.79	-.63	.000	2%
(Intercept):5	**-.59**	--	.56	.04	-.65	-.52	.000	2%
(Intercept):6	**-.71**	--	.49	.06	-.83	-.60	.000	2%
Extended sadness:1	-.05	.95	.13	.05	-.15	.04	.292	4%
Extended sadness:2	-.13	.87	.24	.06	-.24	-.03	.015	2%
Extended sadness:3	**-.24**	.79	.25	.06	-.35	-.13	.000	0%
Extended sadness:4	**-.18**	.83	.41	.06	-.30	-.07	.001	2%
Extended sadness:5	**-.19**	.83	.46	.06	-.30	-.08	.001	8%
Extended sadness:6	**-.30**	.74	.36	.04	-2.07	-1.90	.000	0%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2011. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

d. 2013

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	UL	*p*	Missing information
(Intercept):1	**-1.81**	--	.16	.04	-1.90	-1.72	.000	2%
(Intercept):2	**-1.51**	--	.22	.05	-1.62	-1.41	.000	0%
(Intercept):3	**-1.49**	--	.23	.06	-1.61	-1.37	.000	1%
(Intercept):4	**-1.02**	--	.36	.04	-1.09	-.94	.000	2%
(Intercept):5	**-.88**	--	.41	.05	-.98	-.78	.000	1%
(Intercept):6	**-.92**	--	.40	.06	-1.04	-.80	.000	3%
Extended sadness:1	-.12	.89	.14	.06	-.24	.01	.062	6%
Extended sadness:2	**-.37**	.69	.15	.08	-.53	-.20	.000	2%
Extended sadness:3	**-.33**	.72	.17	.08	-.48	-.18	.000	3%
Extended sadness:4	**-.40**	.67	.24	.06	-.52	-.28	.000	2%
Extended sadness:5	**-.27**	.76	.31	.07	-.40	-.14	.000	1%
Extended sadness:6	**-.33**	.72	.29	.07	-.48	-.18	.000	6%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2013. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

e. 2015

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept):1	**-1.58**	--	.21	.04	-1.65	-1.50	.000	5%
(Intercept):2	**-1.58**	--	.21	.05	-1.68	-1.47	.000	6%
(Intercept):3	**-1.66**	--	.19	.06	-1.78	-1.53	.000	2%
(Intercept):4	**-1.02**	--	.36	.05	-1.12	-.91	.000	5%
(Intercept):5	**-.79**	--	.45	.06	-.91	-.68	.000	0%
(Intercept):6	**-.84**	--	.43	.05	-.93	-.75	.000	4%
Extended sadness:1	-.15	.86	.18	.06	-.26	-.04	.008	6%
Extended sadness:2	**-.44**	.65	.14	.09	-.61	-.26	.000	6%
Extended sadness:3	**-.38**	.69	.13	.07	-.52	-.23	.000	5%
Extended sadness:4	**-.39**	.67	.24	.07	-.53	-.26	.000	2%
Extended sadness:5	**-.48**	.62	.28	.10	-.68	-.29	.000	6%
Extended sadness:6	**-.36**	.69	.30	.04	-1.65	-1.50	.000	5%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2015. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

f. 2017

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	UL	*p*	Missing information
(Intercept):1	**-1.51**	--	.22	.04	-1.59	-1.42	.000	1%
(Intercept):2	**-1.75**	--	.17	.06	-1.86	-1.64	.000	2%
(Intercept):3	**-1.67**	--	.19	.06	-1.78	-1.56	.000	4%
(Intercept):4	**-1.11**	--	.33	.04	-1.19	-1.03	.000	1%
(Intercept):5	**-.94**	--	.39	.05	-1.03	-.85	.000	2%
(Intercept):6	**-1.01**	--	.36	.07	-1.14	-.88	.000	2%
Extended sadness:1	-.05	.95	.21	.06	-.17	.07	.423	2%
Extended sadness:2	**-.27**	.76	.13	.07	-.40	-.14	.000	6%
Extended sadness:3	**-.49**	.61	.12	.08	-.65	-.32	.000	12%
Extended sadness:4	**-.30**	.74	.24	.06	-.43	-.18	.000	0%
Extended sadness:5	**-.26**	.77	.30	.06	-.38	-.14	.000	4%
Extended sadness:6	-.20	.82	.30	.09	-.39	-.02	.027	3%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2017. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

g. 2019

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	UL	*p*	Missing information
(Intercept):1	**-1.58**	--	.21	.05	-1.68	-1.49	.000	9%
(Intercept):2	**-1.93**	--	.15	.04	-2.01	-1.85	.000	4%
(Intercept):3	**-1.72**	--	.18	.05	-1.82	-1.63	.000	2%
(Intercept):4	**-1.07**	--	.34	.04	-1.16	-.99	.000	2%
(Intercept):5	**-.74**	--	.48	.04	-.82	-.66	.000	2%
(Intercept):6	**-.86**	--	.43	.06	-.97	-.74	.000	2%
Extended sadness:1	-.15	.86	.18	.07	-.29	-.02	.026	8%
Extended sadness:2	-.22	.81	.12	.09	-.39	-.04	.015	3%
Extended sadness:3	**-.49**	.62	.11	.08	-.64	-.33	.000	3%
Extended sadness:4	**-.41**	.67	.23	.07	-.55	-.26	.000	1%
Extended sadness:5	**-.39**	.68	.33	.07	-.52	-.26	.000	1%
Extended sadness:6	-.14	.87	.37	.06	-.26	-.03	.014	5%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2019. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

Table E9

Regression Results by Sex: Extended Sadness as Predictor of Non-TV Screen Time, Average School Day

a. Girls

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept):1	**-1.37**	--	.25	.02	-1.42	-1.33	.000	0%
(Intercept):2	**-1.31**	--	.27	.03	-1.38	-1.25	.000	0%
(Intercept):3	**-1.27**	--	.28	.03	-1.34	-1.21	.000	0%
(Intercept):4	**-.85**	--	.43	.03	-.91	-.80	.000	1%
(Intercept):5	**-.74**	--	.48	.03	-.80	-.67	.000	1%
(Intercept):6	**-.88**	--	.42	.03	-.95	-.81	.000	2%
Extended sadness:1	**-.19**	.83	.06	.03	-.24	-.14	.000	3%
Extended sadness:2	**-.32**	.73	.07	.03	-.38	-.26	.000	1%
Extended sadness:3	**-.42**	.66	.08	.03	-.48	-.35	.000	2%
Extended sadness:4	**-.37**	.69	.18	.03	-.44	-.31	.000	1%
Extended sadness:5	**-.32**	.73	.23	.04	-.40	-.24	.000	1%
Extended sadness:6	**-.20**	.82	.18	.04	-.29	-.11	.000	5%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohorts 2007-2019, girls only. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

b. Boys

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept):1	**-1.98**	--	.14	.02	-2.02	-1.93	.000	5%
(Intercept):2	**-1.44**	--	.24	.03	-1.49	-1.38	.000	1%
(Intercept):3	**-1.40**	--	.25	.03	-1.46	-1.34	.000	4%
(Intercept):4	**-.89**	--	.41	.02	-.94	-.85	.000	2%
(Intercept):5	**-.71**	--	.49	.02	-.75	-.67	.000	1%
(Intercept):6	**-.79**	--	.45	.03	-.85	-.74	.000	1%
Extended sadness:1	-.08	.93	.13	.04	-.16	.01	.086	2%
Extended sadness:2	**-.31**	.74	.18	.04	-.39	-.23	.000	3%
Extended sadness:3	**-.36**	.70	.18	.04	-.44	-.28	.000	7%
Extended sadness:4	**-.27**	.77	.32	.04	-.34	-.20	.000	3%
Extended sadness:5	**-.31**	.73	.36	.04	-.38	-.24	.000	3%
Extended sadness:6	**-.28**	.76	.34	.05	-.38	-.17	.000	4%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohorts 2007-2019, boys only. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on p-values $\leq .001$.

Table E10

Summaries, Cohort and Sex: Consideration of Suicide as Predictor of Non-TV Screen Time, Average School Day

a. Regression Coefficients

	2007	2009	2011	2013	2015	2017	2019	Girls	Boys
(Intercept):1	**-1.59**	**-1.68**	**-1.98**	**-1.80**	**-1.60**	**-1.50**	**-1.60**	**-1.40**	**-1.98**
(Intercept):2	**-1.09**	**-1.04**	**-1.30**	**-1.57**	**-1.65**	**-1.77**	**-2.00**	**-1.38**	**-1.46**
(Intercept):3	**-1.07**	**-.99**	**-1.17**	**-1.52**	**-1.69**	**-1.73**	**-1.80**	**-1.34**	**-1.43**
(Intercept):4	**-.62**	**-.65**	**-.73**	**-1.07**	**-1.08**	**-1.13**	**-1.14**	**-.94**	**-.91**
(Intercept):5	**.48**	**-.51**	**-.59**	**-.95**	**-.86**	**-.97**	**-.81**	**-.80**	**-.73**
(Intercept):6	**-.70**	**-.60**	**-.76**	**-.94**	**-.86**	**-1.03**	**-.88**	**-.91**	**-.81**
Considered suicide:1	.04	-.01	-.14	-.25	-.13	-.15	**-.24**	**-.25**	-.14
Considered suicide:2	.15	**-.30**	-.15	**-.31**	**-.30**	**-.41**	-.02	**-.26**	**-.34**
Considered suicide:3	-.16	**-.38**	**-.25**	**-.42**	**-.43**	**-.52**	**-.53**	**-.43**	**-.38**
Considered suicide:4	-.18	-.14	-.25	**-.34**	**-.31**	**-.42**	**-.44**	**-.31**	**-.31**
Considered suicide:5	**-.41**	**-.30**	**-.29**	-.13	**-.45**	**-.31**	**-.41**	**-.30**	**-.36**
Considered suicide:6	-.02	**-.40**	-.25	**-.49**	**-.54**	-.23	-.18	**-.26**	**-.36**

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohorts 2007-2019. 1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values $\leq .001$.

b. Hazard Ratios

	2007	2009	2011	2013	2015	2017	2019	Girls	Boys
Considered suicide:1	1.04	.99	.87	.78	.88	.86	.79	.78	.87
Considered suicide:2	.86	.74	.86	.73	.74	.66	.98	.77	.71
Considered suicide:3	.85	.68	.78	.66	.65	.60	.59	.65	.69
Considered suicide:4	.83	.87	.78	.71	.74	.66	.65	.73	.73
Considered suicide:5	.66	.74	.75	.88	.64	.74	.67	.74	.70
Considered suicide:6	.98	.67	.78	.61	.58	.79	.84	.77	.69

c. Hazard Rates

	2007	2009	2011	2013	2015	2017	2019	Girls	Boys
(Intercept):1	.20	.19	.14	.16	.20	.22	.20	.25	.14
(Intercept):2	.34	.35	.27	.21	.19	.17	.14	.25	.23
(Intercept):3	.34	.37	.31	.22	.18	.18	.17	.26	.24
(Intercept):4	.54	.52	.48	.34	.34	.32	.32	.39	.40
(Intercept):5	.62	.60	.55	.39	.42	.38	.44	.45	.48
(Intercept):6	.50	.55	.47	.39	.42	.36	.42	.40	.44
Considered suicide:1	.21	.00	.12	.12	.18	.19	.16	.20	.12
Considered suicide:2	.29	-.11	.23	.15	.14	.11	.14	.19	.16
Considered suicide:3	.29	-.14	.24	.15	.12	.11	.10	.17	.17
Considered suicide:4	.45	-.07	.37	.24	.25	.21	.21	.28	.29
Considered suicide:5	.41	-.18	.41	.34	.27	.28	.29	.33	.34
Considered suicide:6	.49	-.22	.37	.24	.24	.28	.35	.31	.30

Table E11

Regression Results by Cohort: Consideration of Suicide as Predictor of Non-TV Screen Time, Average School Day

a. 2007

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept):1	**-1.59**	--	.20	.06	-1.70	-1.48	.000	0%
(Intercept):2	**-1.09**	--	.34	.06	-1.21	-.98	.000	0%
(Intercept):3	**-1.07**	--	.34	.04	-1.16	-.98	.000	4%
(Intercept):4	**-.62**	--	.54	.03	-.69	-.56	.000	2%
(Intercept):5	**.48**	--	.62	.03	-.54	-.42	.000	3%
(Intercept):6	**-.70**	--	.50	.05	-.80	-.59	.000	2%
Considered suicide:1	.04	1.04	.21	.09	-.14	.21	.680	1%
Considered suicide:2	.15	.86	.29	.09	-.32	.03	.103	2%
Considered suicide:3	-.16	.85	.29	.06	-.29	-.03	.013	5%
Considered suicide:4	-.18	.83	.45	.09	-.36	.00	.047	6%
Considered suicide:5	**-.41**	.66	.41	.08	-.57	-.25	.000	4%
Considered suicide:6	-.02	.98	.49	.13	-.27	.24	.898	3%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2007. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported extended sadness and less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

b. 2009

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept):1	**-1.68**	--	.19	.03	-1.74	-1.62	.000	2%
(Intercept):2	**-1.04**	--	.35	.04	-1.12	-.96	.000	0%
(Intercept):3	**-.99**	--	.37	.05	-1.08	-.90	.000	1%
(Intercept):4	**-.65**	--	.52	.04	-.72	-.57	.000	0%
(Intercept):5	**-.51**	--	.60	.04	-.58	-.43	.000	1%
(Intercept):6	**-.60**	--	.55	.06	-.72	-.48	.000	2%
Considered suicide:1	-.01	-.01	.00	.07	-.15	.12	.826	3%
Considered suicide:2	**-.30**	-.30	-.11	.07	-.43	-.17	.000	3%
Considered suicide:3	**-.38**	-.38	-.14	.08	-.54	-.22	.000	6%
Considered suicide:4	-.14	-.14	-.07	.07	-.27	.00	.046	0%
Considered suicide:5	**-.30**	-.30	-.18	.11	-.52	-.08	.000	2%
Considered suicide:6	**-.40**	-.40	-.22	.03	-1.74	-1.62	.000	2%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2009 SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported extended sadness and less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

c. 2011

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	UL	*p*	Missing information
(Intercept):1	**-1.98**	--	.14	.04	-2.06	-1.90	.000	1%
(Intercept):2	**-1.30**	--	.27	.03	-1.36	-1.24	.000	3%
(Intercept):3	**-1.17**	--	.31	.05	-1.26	-1.08	.000	0%
(Intercept):4	**-.73**	--	.48	.04	-.80	-.65	.000	2%
(Intercept):5	**-.59**	--	.55	.04	-.66	-.52	.000	3%
(Intercept):6	**-.76**	--	.47	.06	-.87	-.65	.000	1%
Considered suicide:1	-.14	.87	.12	.09	-.31	.04	.117	10%
Considered suicide:2	-.15	.86	.23	.08	-.30	.00	.050	7%
Considered suicide:3	**-.25**	.78	.24	.07	-.39	-.12	.000	2%
Considered suicide:4	-.25	.78	.37	.08	-.41	-.09	.002	3%
Considered suicide:5	**-.29**	.75	.41	.07	-.43	-.15	.000	1%
Considered suicide:6	-.25	.78	.37	.11	-.47	-.02	.029	6%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohorts 2011. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported extended sadness and less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

d. 2013

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	UL	*p*	Missing information
(Intercept):1	**-1.80**	--	.16	.04	-1.89	-1.72	.000	1%
(Intercept):2	**-1.57**	--	.21	.05	-1.66	-1.47	.000	0%
(Intercept):3	**-1.52**	--	.22	.05	-1.62	-1.41	.000	1%
(Intercept):4	**-1.07**	--	.34	.04	-1.14	-1.01	.000	1%
(Intercept):5	**-.95**	--	.39	.05	-1.04	-.86	.000	0%
(Intercept):6	**-.94**	--	.39	.05	-1.05	-.84	.000	1%
Considered suicide:1	-.25	.78	.12	.10	-.44	-.06	.010	4%
Considered suicide:2	**-.31**	.73	.15	.08	-.47	-.15	.000	4%
Considered suicide:3	**-.42**	.66	.15	.09	-.60	-.24	.000	6%
Considered suicide:4	**-.34**	.71	.24	.09	-.51	-.17	.000	3%
Considered suicide:5	-.13	.88	.34	.08	-.28	.02	.095	1%
Considered suicide:6	**-.49**	.61	.24	.12	-.72	-.25	.000	1%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2013. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported extended sadness and less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

e. 2015

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept):1	**-1.60**	--	.20	.04	-1.67	-1.53	.000	7%
(Intercept):2	**-1.65**	--	.19	.04	-1.73	-1.56	.000	5%
(Intercept):3	**-1.69**	--	.18	.06	-1.80	-1.58	.000	1%
(Intercept):4	**-1.08**	--	.34	.05	-1.18	-.98	.000	2%
(Intercept):5	**-.86**	--	.42	.05	-.97	-.76	.000	1%
(Intercept):6	**-.86**	--	.42	.04	-.94	-.78	.000	2%
Considered suicide:1	-.13	.88	.18	.07	-.27	.01	.067	10%
Considered suicide:2	**-.30**	.74	.14	.08	-.45	-.15	.000	7%
Considered suicide:3	**-.43**	.65	.12	.10	-.63	-.24	.000	8%
Considered suicide:4	**-.31**	.74	.25	.07	-.45	-.17	.000	9%
Considered suicide:5	**-.45**	.64	.27	.08	-.60	-.29	.000	10%
Considered suicide:6	**-.54**	.58	.24	.11	-.75	-.33	.000	5%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohorts 2015. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported extended sadness and less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

f. 2017

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept):1	**-1.50**	--	.22	.04	-1.57	-1.43	.000	1%
(Intercept):2	**-1.77**	--	.17	.05	-1.86	-1.67	.000	1%
(Intercept):3	**-1.73**	--	.18	.05	-1.83	-1.63	.000	2%
(Intercept):4	**-1.13**	--	.32	.04	-1.21	-1.06	.000	2%
(Intercept):5	**-.97**	--	.38	.04	-1.04	-.89	.000	4%
(Intercept):6	**-1.03**	--	.36	.06	-1.15	-.91	.000	3%
Considered suicide:1	-.15	.86	.19	.07	-.28	-.01	.029	10%
Considered suicide:2	**-.41**	.66	.11	.08	-.56	-.26	.000	1%
Considered suicide:3	**-.52**	.60	.11	.10	-.72	-.32	.000	5%
Considered suicide:4	**-.42**	.66	.21	.09	-.60	-.24	.000	3%
Considered suicide:5	**-.31**	.74	.28	.08	-.46	-.15	.000	1%
Considered suicide:6	-.23	.79	.28	.14	-.50	.04	.098	0%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2017. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported extended sadness and less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

g. 2019

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept):1	**-1.60**	--	.20	.04	-1.68	-1.51	.000	6%
(Intercept):2	**-2.00**	--	.14	.04	-2.08	-1.92	.000	2%
(Intercept):3	**-1.80**	--	.17	.04	-1.89	-1.71	.000	2%
(Intercept):4	**-1.14**	--	.32	.04	-1.23	-1.06	.000	4%
(Intercept):5	**-.81**	--	.44	.04	-.89	-.74	.000	1%
(Intercept):6	**-.88**	--	.42	.06	-.98	-.77	.000	1%
Considered suicide:1	-.24	.79	.16	.08	-.39	-.09	.002	6%
Considered suicide:2	-.02	.98	.14	.11	-.24	.20	.853	3%
Considered suicide:3	**-.53**	.59	.10	.10	-.72	-.34	.000	4%
Considered suicide:4	**-.44**	.65	.21	.09	-.61	-.26	.000	14%
Considered suicide:5	**-.41**	.67	.29	.08	-.57	-.24	.000	0%
Considered suicide:6	-.18	.84	.35	.08	-.34	-.02	.026	6%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2019. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported extended sadness and less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

Table E12

Regression Results by Sex:Consideration of Suicide as Predictor of Non-TV Screen Time, Average School Day

a. Girls

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept):1	**-1.40**	--	.25	.02	-1.44	-1.35	.000	0%
(Intercept):2	**-1.38**	--	.25	.03	-1.44	-1.32	.000	0%
(Intercept):3	**-1.34**	--	.26	.03	-1.41	-1.28	.000	0%
(Intercept):4	**-.94**	--	.39	.02	-.99	-.89	.000	1%
(Intercept):5	**-.80**	--	.45	.03	-.86	-.75	.000	0%
(Intercept):6	**-.91**	--	.40	.03	-.97	-.84	.000	2%
Considered suicide:1	**-.25**	.78	.20	.03	-.32	-.18	.000	1%
Considered suicide:2	**-.26**	.77	.19	.04	-.33	-.18	.000	3%
Considered suicide:3	**-.43**	.65	.17	.04	-.52	-.34	.000	7%
Considered suicide:4	**-.31**	.73	.28	.04	-.39	-.23	.000	4%
Considered suicide:5	**-.30**	.74	.33	.05	-.39	-.21	.000	4%
Considered suicide:6	**-.26**	.77	.31	.05	-.37	-.16	.000	1%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohorts 2007-2019, girls only. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported extended sadness and less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

b. Boys

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept):1	**-1.98**	--	.14	.02	-2.02	-1.93	.000	6%
(Intercept):2	**-1.46**	--	.23	.03	-1.51	-1.41	.000	1%
(Intercept):3	**-1.43**	--	.24	.03	-1.49	-1.37	.000	3%
(Intercept):4	**-.91**	--	.40	.02	-.96	-.87	.000	2%
(Intercept):5	**-.73**	--	.48	.02	-.77	-.69	.000	1%
(Intercept):6	**-.81**	--	.44	.03	-.86	-.76	.000	0%
Considered suicide:1	-.14	.87	.12	.06	-.25	-.03	.014	4%
Considered suicide:2	**-.34**	.71	.16	.05	-.43	-.24	.000	8%
Considered suicide:3	**-.38**	.69	.17	.05	-.48	-.28	.000	4%
Considered suicide:4	**-.31**	.73	.29	.05	-.41	-.21	.000	2%
Considered suicide:5	**-.36**	.70	.34	.05	-.46	-.25	.000	1%
Considered suicide:6	**-.36**	.69	.30	.07	-.49	-.24	.000	1%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohorts 2007-2019, boys only. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported extended sadness and less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values $\leq$ .001.

Table E13

Summaries, Cohort and Sex: Suicide Planning as Predictor of Non-TV Screen Time, Average School Day

a. Regression Coefficients

	2007	2009	2011	2013	2015	2017	2019	Girls	Boys
(Intercept):1	**-1.58**	**-1.69**	**-1.99**	**-1.81**	**-1.60**	**-1.51**	**-1.60**	**-1.41**	**-1.98**
(Intercept):2	**-1.09**	**-1.05**	**-1.30**	**-1.59**	**-1.66**	**-1.79**	**-2.00**	**-1.40**	**-1.47**
(Intercept):3	**-1.07**	**-1.01**	**-1.16**	**-1.54**	**-1.70**	**-1.75**	**-1.82**	**-1.36**	**-1.44**
(Intercept):4	**-.62**	**-.63**	**-.72**	**-1.09**	**-1.09**	**-1.16**	**-1.16**	**-.95**	**-.92**
(Intercept):5	**-.50**	**-.53**	**-.59**	**-.95**	**-.87**	**-.98**	**-.83**	**-.82**	**-.74**
(Intercept):6	**-.66**	**-.60**	**-.77**	**-.96**	**-.89**	**-1.03**	**-.86**	**-.91**	**-.81**
Planned suicide:1	-.03	.12	-.12	-.28	-.17	-.11	-.27	**-.23**	-.13
Planned suicide:2	-.16	**-.31**	-.14	-.19	-.28	**-.32**	-.05	**-.24**	**-.33**
Planned suicide:3	-.24	**-.30**	**-.37**	**-.32**	**-.51**	**-.45**	**-.49**	**-.44**	**-.38**
Planned suicide:4	-.25	**-.32**	**-.35**	**-.36**	**-.32**	-.34	**-.40**	**-.35**	**-.37**
Planned suicide:5	**-.34**	-.20	**-.38**	-.15	**-.51**	**-.33**	**-.36**	**-.30**	**-.37**
Planned suicide:6	-.28	**-.55**	-.20	**-.48**	**-.44**	**-.36**	**-.32**	**-.32**	**-.42**

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohorts 2007-2019. 1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

b. Hazard Ratios

	2007	2009	2011	2013	2015	2017	2019	Girls	Boys
Planned suicide:1	.97	1.13	.89	.76	.84	.90	.77	.79	.88
Planned suicide:2	.85	.73	.87	.83	.76	.72	.95	.79	.72
Planned suicide:3	.79	.74	.69	.72	.60	.64	.61	.64	.68
Planned suicide:4	.78	.72	.70	.70	.72	.72	.67	.71	.69
Planned suicide:5	.71	.82	.68	.86	.60	.72	.69	.74	.69
Planned suicide:6	.75	.58	.82	.62	.64	.70	.72	.72	.66

c. Hazard Rates

	2007	2009	2011	2013	2015	2017	2019	Girls	Boys
(Intercept):1	.21	.18	.14	.16	.20	.22	.20	.24	.14
(Intercept):2	.33	.35	.27	.20	.19	.17	.14	.25	.23
(Intercept):3	.34	.36	.31	.21	.18	.17	.16	.26	.24
(Intercept):4	.54	.53	.49	.34	.34	.31	.31	.39	.40
(Intercept):5	.61	.59	.56	.39	.42	.38	.43	.44	.48
(Intercept):6	.52	.55	.46	.38	.41	.36	.42	.40	.44
Planned suicide:1	.20	.20	.12	.12	.17	.20	.15	.19	.12
Planned suicide:2	.28	.26	.23	.17	.14	.12	.13	.20	.17
Planned suicide:3	.27	.27	.21	.15	.11	.11	.10	.17	.16
Planned suicide:4	.42	.38	.34	.24	.24	.22	.21	.28	.28
Planned suicide:5	.43	.48	.38	.34	.25	.27	.30	.33	.33
Planned suicide:6	.39	.32	.38	24	.26	.25	.30	.29	.29

Table E14

Regression Results by Cohort: Suicide Planning as Predictor of Non-TV Screen Time, Average School Day

a.. 2007

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept):1	**-1.58**	--	.21	.05	-1.69	-1.48	.000	0%
(Intercept):2	**-1.09**	--	.33	.06	-1.21	-.98	.000	1%
(Intercept):3	**-1.07**	--	.34	.04	-1.15	-.98	.000	4%
(Intercept):4	**-.62**	--	.54	.03	-.69	-.55	.000	1%
(Intercept):5	**-.50**	--	.61	.03	-.56	-.43	.000	3%
(Intercept):6	**-.66**	--	.52	.05	-.75	-.56	.000	2%
Planned suicide:1	-.03	.97	.20	.11	-.24	.19	.809	2%
Planned suicide:2	-.16	.85	.28	.10	-.36	.03	.092	1%
Planned suicide:3	-.24	.79	.27	.09	-.40	-.07	.006	4%
Planned suicide:4	-.25	.78	.42	.10	-.43	-.06	.010	5%
Planned suicide:5	**-.34**	.71	.43	.08	-.50	-.18	.000	4%
Planned suicide:6	-.28	.75	.39	.16	-.59	.02	.070	3%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2007. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported extended sadness and less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

b. 2009

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept):1	**-1.69**	--	.18	.03	-1.75	-1.63	.000	2%
(Intercept):2	**-1.05**	--	.35	.04	-1.13	-.97	.000	0%
(Intercept):3	**-1.01**	--	.36	.05	-1.11	-.91	.000	1%
(Intercept):4	**-.63**	--	.53	.04	-.70	-.56	.000	0%
(Intercept):5	**-.53**	--	.59	.04	-.60	-.45	.000	1%
(Intercept):6	**-.60**	--	.55	.06	-.72	-.49	.000	1%
Planned suicide:1	.12	1.13	.20	.06	.00	.25	.056	2%
Planned suicide:2	**-.31**	.73	.26	.07	-.45	-.16	.000	2%
Planned suicide:3	**-.30**	.74	.27	.08	-.46	-.15	.000	7%
Planned suicide:4	**-.32**	.72	.38	.07	-.46	-.18	.000	2%
Planned suicide:5	-.20	.82	.48	.12	-.44	.04	.103	1%
Planned suicide:6	**-.55**	.58	.32	.11	-.77	-.33	.000	6%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2009. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported extended sadness and less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

c. 2011

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	UL	*p*	Missing information
(Intercept):1	**-1.99**	--	.14	.04	-2.07	-1.90	.000	1%
(Intercept):2	**-1.30**	--	.27	.03	-1.37	-1.24	.000	3%
(Intercept):3	**-1.16**	--	.31	.05	-1.25	-1.07	.000	0%
(Intercept):4	**-.72**	--	.49	.04	-.79	-.65	.000	2%
(Intercept):5	**-.59**	--	.56	.04	-.66	-.51	.000	2%
(Intercept):6	**-.77**	--	.46	.05	-.87	-.68	.000	2%
Planned suicide:1	-.12	.89	.12	.09	-.30	.06	.203	4%
Planned suicide:2	-.14	.87	.23	.10	-.34	.06	.158	4%
Planned suicide:3	**-.37**	.69	.21	.09	-.55	-.20	.000	2%
Planned suicide:4	**-.35**	.70	.34	.07	-.49	-.21	.000	4%
Planned suicide:5	**-.38**	.68	.38	.10	-.57	-.19	.000	1%
Planned suicide:6	-.20	.82	.38	.10	-.39	-.01	.035	2%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2011. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported extended sadness and less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

d. 2013

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	UL	*p*	Missing information
(Intercept):1	**-1.81**	--	.16	.05	-1.90	-1.72	.000	1%
(Intercept):2	**-1.59**	--	.20	.05	-1.68	-1.50	.000	0%
(Intercept):3	**-1.54**	--	.21	.05	-1.65	-1.44	.000	0%
(Intercept):4	**-1.09**	--	.34	.03	-1.15	-1.02	.000	3%
(Intercept):5	**-.95**	--	.39	.05	-1.05	-.85	.000	1%
(Intercept):6	**-.96**	--	.38	.05	-1.06	-.86	.000	3%
Planned suicide:1	-.28	.76	.12	.11	-.50	-.05	.014	3%
Planned suicide:2	-.19	.83	.17	.09	-.36	-.01	.042	3%
Planned suicide:3	-.32	.72	.15	.11	-.53	-.11	.003	3%
Planned suicide:4	**-.36**	.70	.24	.09	-.55	-.18	.000	7%
Planned suicide:5	-.15	.86	.34	.09	-.33	.02	.082	3%
Planned suicide:6	**-.48**	.62	.24	.14	-.75	-.21	.000	2%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohorts 2013. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported extended sadness and less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

e. 2015

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept):1	**-1.60**	--	.20	.03	-1.66	-1.53	.000	4%
(Intercept):2	**-1.66**	--	.19	.05	-1.75	-1.57	.000	5%
(Intercept):3	**-1.70**	--	.18	.06	-1.81	-1.59	.000	1%
(Intercept):4	**-1.09**	--	.34	.06	-1.20	-.98	.000	2%
(Intercept):5	**-.87**	--	.42	.05	-.97	-.76	.000	2%
(Intercept):6	**-.89**	--	.41	.04	-.97	-.81	.000	3%
Planned suicide:1	-.17	.84	.17	.07	-.31	-.03	.016	6%
Planned suicide:2	-.28	.76	.14	.10	-.48	-.08	.006	8%
Planned suicide:3	**-.51**	.60	.11	.10	-.70	-.32	.000	6%
Planned suicide:4	**-.32**	.72	.24	.09	-.49	-.16	.000	13%
Planned suicide:5	**-.51**	.60	.25	.10	-.71	-.31	.000	3%
Planned suicide:6	**-.44**	.64	.26	.10	-.65	-.24	.000	1%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2015. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported extended sadness and less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

f. 2017

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	UL	*p*	Missing information
(Intercept):1	**-1.51**	--	.22	.04	-1.58	-1.43	.000	1%
(Intercept):2	**-1.79**	--	.17	.05	-1.89	-1.69	.000	1%
(Intercept):3	**-1.75**	--	.17	.05	-1.85	-1.65	.000	1%
(Intercept):4	**-1.16**	--	.31	.04	-1.24	-1.08	.000	2%
(Intercept):5	**-.98**	--	.38	.04	-1.05	-.91	.000	4%
(Intercept):6	**-1.03**	--	.36	.05	-1.13	-.92	.000	2%
Planned suicide:1	-.11	.90	.20	.09	-.28	.06	.201	12%
Planned suicide:2	**-.32**	.72	.12	.09	-.50	-.15	.000	5%
Planned suicide:3	**-.45**	.64	.11	.10	-.65	-.25	.000	12%
Planned suicide:4	-.34	.72	.22	.14	-.61	-.06	.016	1%
Planned suicide:5	**-.33**	.72	.27	.08	-.49	-.18	.000	7%
Planned suicide:6	-.36	.70	.25	.13	-.62	-.09	.008	1%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohorts 2017. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported extended sadness and less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

g. 2019

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	UL	*p*	Missing information
(Intercept):1	**-1.60**	--	.20	.04	-1.68	-1.52	.000	6%
(Intercept):2	**-2.00**	--	.14	.03	-2.07	-1.93	.000	1%
(Intercept):3	**-1.82**	--	.16	.04	-1.90	-1.74	.000	3%
(Intercept):4	**-1.16**	--	.31	.04	-1.23	-1.08	.000	1%
(Intercept):5	**-.83**	--	.43	.04	-.91	-.76	.000	2%
(Intercept):6	**-.86**	--	.42	.06	-.97	-.74	.000	1%
Planned suicide:1	-.27	.77	.15	.08	-.43	-.10	.002	5%
Planned suicide:2	-.05	.95	.13	.10	-.26	.15	.605	3%
Planned suicide:3	**-.49**	.61	.10	.11	-.69	-.28	.000	5%
Planned suicide:4	**-.40**	.67	.21	.09	-.58	-.23	.000	1%
Planned suicide:5	**-.36**	.69	.30	.07	-.50	-.23	.000	1%
Planned suicide:6	**-.32**	.72	.30	.09	-.50	-.15	.000	3%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2019. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

Table E15

Regression Results by Sex: Suicide Planning as Predictor of Non-TV Screen Time, Average School Day

a. Girls

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI		*p*	Missing information
					LL	UL		
(Intercept):1	**-1.41**	--	.24	.02	-1.45	-1.37	.000	0%
(Intercept):2	**-1.40**	--	.25	.03	-1.46	-1.33	.000	0%
(Intercept):3	**-1.36**	--	.26	.03	-1.43	-1.30	.000	0%
(Intercept):4	**-.95**	--	.39	.03	-1.00	-.90	.000	1%
(Intercept):5	**-.82**	--	.44	.03	-.88	-.77	.000	1%
(Intercept):6	**-.91**	--	.40	.03	-.97	-.85	.000	3%
Planned suicide:1	**-.23**	.79	.19	.04	-.30	-.16	.000	1%
Planned suicide:2	**-.24**	.79	.20	.04	-.32	-.16	.000	5%
Planned suicide:3	**-.44**	.64	.17	.05	-.53	-.35	.000	9%
Planned suicide:4	**-.35**	.71	.28	.05	-.44	-.26	.000	7%
Planned suicide:5	**-.30**	.74	.33	.05	-.39	-.20	.000	3%
Planned suicide:6	**-.32**	.72	.29	.06	-.44	-.21	.000	3%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohorts 2007-2019, girls only. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

b. Boys

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept):1	**-1.98**	--	.14	.02	-2.02	-1.94	.000	5%
(Intercept):2	**-1.47**	--	.23	.03	-1.52	-1.41	.000	0%
(Intercept):3	**-1.44**	--	.24	.03	-1.49	-1.38	.000	3%
(Intercept):4	**-.92**	--	.40	.02	-.96	-.88	.000	2%
(Intercept):5	**-.74**	--	.48	.02	-.78	-.70	.000	1%
(Intercept):6	**-.81**	--	.44	.03	-.87	-.76	.000	1%
Planned suicide:1	-.13	.88	.12	.06	-.25	-.02	.024	4%
Planned suicide:2	**-.33**	.72	.17	.06	-.43	-.22	.000	1%
Planned suicide:3	**-.38**	.68	.16	.05	-.49	-.28	.000	12%
Planned suicide:4	**-.37**	.69	.28	.05	-.46	-.27	.000	2%
Planned suicide:5	**-.37**	.69	.33	.06	-.48	-.27	.000	3%
Planned suicide:6	**-.42**	.66	.29	.06	-.54	-.30	.000	0%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohorts 2007-2019, boys only. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

Table E16

Summaries, Cohort and Sex: Number of Suicide Attempts as Predictor of Non-TV Screen Time, Average School Day

a. Regression Coefficients

	2007	2009	2011	2013	2015	2017	2019	Girls	Boys
(Intercept):1	**-1.60**	**-1.69**	**-2.00**	**-1.84**	**-1.62**	**-1.52**	**-1.64**	**-1.43**	**-2.00**
(Intercept):2	**-1.10**	**-1.06**	**-1.31**	**-1.59**	**-1.68**	**-1.81**	**-2.01**	**-1.41**	**-1.48**
(Intercept):3	**-1.08**	**-1.02**	**-1.18**	**-1.56**	**-1.73**	**-1.78**	**-1.86**	**-1.40**	**-1.45**
(Intercept):4	**-.64**	**-.64**	**-.74**	**-1.10**	**-1.12**	**-1.17**	**-1.20**	**-.97**	**-.94**
(Intercept):5	**-.51**	**-.53**	**-.61**	**-.95**	**-.91**	**-.99**	**-.86**	**-.84**	**-.76**
(Intercept):6	**-.68**	**-.62**	**-.77**	**-1.01**	**-.92**	**-1.05**	**-.89**	**-.95**	**-.83**
1 suicide attempt:1	.21	.22	.13	.15	.10	.08	-.12	-.08	.24
1 suicide attempt:2	-.12	-.26	-.30	-.21	-.11	-.16	-.01	**-.25**	-.17
1 suicide attempt:3	-.12	-.28	-.21	-.37	-.48	-.33	-.25	**-.30**	-.30
1 suicide attempt:4	-.05	-.30	-.19	-.30	-.09	-.30	-.06	**-.24**	-.17
1 suicide attempt:5	-.14	-.28	-.04	-.20	-.32	-.33	-.35	**-.28**	-.13
1 suicide attempt:6	.03	-.32	-.07	-.07	-.40	-.47	-.16	-.11	-.30
2-3 suicide attempts:1	.19	.17	-.08	-.17	-.18	-.08	.05	-.12	-.12
2-3 suicide attempts:2	-.14	-.16	-.09	-.21	.01	-.42	.04	-.14	-.29
2-3 suicide attempts:3	-.01	-.20	**-.76**	-.37	-.30	-.48	-.52	**-.41**	-.37
2-3 suicide attempts:4	.19	**-.62**	-.29	-.39	-.36	-.70	-.53	**-.42**	-.32
2-3 suicide attempts:5	-.59	.04	-.49	-.17	-.63	-.63	-.43	**-.39**	**-.44**
2-3 suicide attempts:6	.06	-.95	-.24	-.26	-.74	.00	-.22	-.20	-.50
4-5 suicide attempts:1	.20	.52	-.97	-.11	.33	-.40	.45	-.12	.21
4-5 suicide attempts:2	.25	-.57	.08	-.69	-.67	-.49	.71	-.16	-.17
4-5 suicide attempts:3	-.08	-.67	-.90	.18	-.16	-.33	-.50	-.46	-.42
4-5 suicide attempts:4	-1.46	-.29	-.29	-.65	.06	-.59	-.43	-.43	-.43
4-5 suicide attempts:5	-.36	-.03	-.70	-.46	-.21	-.60	-.58	**-.60**	-.34
4-5 suicide attempts:6	.46	-.16	-.76	-.90	-.08	-.54	-.91	-.37	-.59
6+ suicide attempts:1	-.39	.24	-.13	-.07	-.29	.05	.08	-.21	.02
6+ suicide attempts:2	-.68	-1.21	-.13	-1.10	-.38	-.76	.24	-.22	-.78
6+ suicide attempts:3	-.85	-.94	-1.02	-.88	-.51	-1.54	-.28	**-.80**	-.91
6+ suicide attempts:4	**-1.44**	-.74	-.93	**-1.53**	-.38	-.69	-.68	**-.63**	**-.96**
6+ suicide attempts:5	**-1.67**	**-1.56**	-1.20	-.85	-.87	-.98	-.08	**-.89**	**-1.03**
6+ suicide attempts:6	-2.33	**-1.72**	-1.41	-.78	**-1.22**	**-3.27**	-1.92	**-1.26**	**-1.66**

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohorts 2007-2019. 1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

b. Hazard Ratios

	2007	2009	2011	2013	2015	2017	2019	Girls	Boys
1 suicide attempt:1	1.23	1.24	1.14	1.16	1.10	1.09	.89	.92	1.27
1 suicide attempt:2	.89	.77	.74	.81	.90	.85	.99	.78	.85
1 suicide attempt:3	.89	.76	.81	.69	.62	.72	.78	.74	.74
1 suicide attempt:4	.95	.74	.83	.74	.91	.74	.94	.79	.84
1 suicide attempt:5	.87	.76	.96	.82	.73	.72	.71	.75	.88
1 suicide attempt:6	1.03	.73	.93	.93	.67	.63	.85	.90	.74
2-3 suicide attempts:1	1.21	1.19	.92	.84	.83	.92	1.06	.89	.89
2-3 suicide attempts:2	.87	.85	.92	.81	1.01	.66	1.04	.87	.75
2-3 suicide attempts:3	.99	.81	.47	.69	.74	.62	.59	.67	.69
2-3 suicide attempts:4	1.21	.54	.75	.68	.70	.49	.59	.66	.73
2-3 suicide attempts:5	.55	1.04	.61	.84	.53	.53	.65	.68	.64
2-3 suicide attempts:6	1.06	.39	.79	.77	.48	1.00	.80	.82	.61
4-5 suicide attempts:1	1.23	1.68	.38	.89	1.39	.67	1.57	.89	1.23
4-5 suicide attempts:2	1.28	.57	1.08	.50	.51	.62	2.04	.85	.84
4-5 suicide attempts:3	.93	.51	.41	1.20	.85	.72	.61	.63	.66
4-5 suicide attempts:4	.23	.75	.75	.52	1.06	.56	.65	.65	.65
4-5 suicide attempts:5	.70	.97	.50	.63	.81	.55	.56	.55	.71
4-5 suicide attempts:6	1.59	.85	.47	.41	.92	.58	.40	.69	.55
6+ suicide attempts:1	.68	1.27	.88	.93	.75	1.05	1.08	.81	1.02
6+ suicide attempts:2	.51	.30	.88	.33	.69	.47	1.27	.81	.46
6+ suicide attempts:3	.43	.39	.36	.41	.60	.21	.75	.45	.40
6+ suicide attempts:4	.24	.48	.39	.22	.68	.50	.50	.53	.38
6+ suicide attempts:5	.19	.21	.30	.43	.42	.37	.92	.41	.36
6+ suicide attempts:6	.10	.18	.24	.46	.30	.04	.15	.28	.19

c. Hazard Rates

	2007	2009	2011	2013	2015	2017	2019	Girls	Boys
(Intercept):1	.20	.18	.14	.16	.20	.22	.19	.24	.14
(Intercept):2	.33	.35	.27	.20	.19	.16	.13	.24	.23
(Intercept):3	.34	.36	.31	.21	.18	.17	.16	.25	.23
(Intercept):4	.53	.53	.48	.33	.33	.31	.30	.38	.39
(Intercept):5	.60	.59	.54	.39	.40	.37	.42	.43	.47
(Intercept):6	.51	.54	.46	.36	.40	.35	.41	.39	.44
1 suicide attempt:1	.25	.22	.16	.19	.22	.24	.17	.22	.18
1 suicide attempt:2	.29	.27	.20	.16	.17	.14	.13	.19	.20
1 suicide attempt:3	.30	.27	.25	.14	.11	.12	.12	.19	.17
1 suicide attempt:4	.50	.39	.40	.24	.30	.23	.28	.30	.33
1 suicide attempt:5	.52	.45	.52	.32	.29	.27	.30	.32	.41
1 suicide attempt:6	.53	.39	.43	.33	.27	.22	.35	.35	.33
2-3 suicide attempts:1	.24	.21	.13	.13	.17	.20	.20	.21	.12
2-3 suicide attempts:2	.29	.30	.25	.16	.19	.11	.14	.21	.17
2-3 suicide attempts:3	.34	.29	.15	.14	.13	.11	.09	.17	.16
2-3 suicide attempts:4	.64	.29	.36	.22	.23	.15	.18	.25	.28
2-3 suicide attempts:5	.33	.61	.33	.33	.21	.20	.27	.29	.30
2-3 suicide attempts:6	.54	.21	.36	.28	.19	.35	.33	.32	.27
4-5 suicide attempts:1	.25	.30	.05	.14	.28	.15	.30	.21	.17
4-5 suicide attempts:2	.42	.20	.29	.10	.10	.10	.27	.20	.19
4-5 suicide attempts:3	.32	.18	.13	.25	.15	.12	.10	.16	.15
4-5 suicide attempts:4	.12	.40	.36	.17	.35	.17	.20	.25	.25
4-5 suicide attempts:5	.42	.57	.27	.25	.32	.20	.24	.24	.33
4-5 suicide attempts:6	.81	.46	.22	.15	.37	.20	.16	.27	.24
6+ suicide attempts:1	.14	.23	.12	.15	.15	.23	.21	.19	.14
6+ suicide attempts:2	.17	.11	.24	.07	.13	.08	.17	.19	.11
6+ suicide attempts:3	.15	.14	.11	.09	.11	.04	.12	.11	.09
6+ suicide attempts:4	.13	.25	.19	.07	.22	.16	.15	.20	.15
6+ suicide attempts:5	.11	.12	.16	.17	.17	.14	.39	.18	.17
6+ suicide attempts:6	.05	.10	.11	.17	.12	.01	.06	.11	.08

Table E17

Regression Results by Cohort: Number of Suicide Attempts as Predictor of Non-TV Screen Time, Average School Day

a. 2007

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept):1	**-1.60**	--	.20	.06	-1.71	-1.49	.000	1%
(Intercept):2	**-1.10**	--	.33	.06	-1.21	-.99	.000	1%
(Intercept):3	**-1.08**	--	.34	.04	-1.17	-1.00	.000	4%
(Intercept):4	**-.64**	--	.53	.03	-.70	-.58	.000	1%
(Intercept):5	**-.51**	--	.60	.04	-.58	-.44	.000	3%
(Intercept):6	**-.68**	--	.51	.05	-.78	-.58	.000	5%
1 suicide attempt:1	.21	1.23	.25	.14	-.07	.48	.139	14%
1 suicide attempt:2	-.12	.89	.29	.14	-.39	.15	.385	6%
1 suicide attempt:3	-.12	.89	.30	.15	-.41	.17	.409	16%
1 suicide attempt:4	-.05	.95	.50	.11	-.26	.17	.658	12%
1 suicide attempt:5	-.14	.87	.52	.19	-.52	.25	.480	34%
1 suicide attempt:6	.03	1.03	.53	.24	-.45	.52	.888	26%
2-3 suicide attempts:1	.19	1.21	.24	.19	-.18	.56	.304	17%
2-3 suicide attempts:2	-.14	.87	.29	.20	-.54	.25	.476	8%
2-3 suicide attempts:3	-.01	.99	.34	.19	-.39	.38	.977	18%
2-3 suicide attempts:4	.19	1.21	.64	.13	-.08	.46	.159	11%
2-3 suicide attempts:5	-.59	.55	.33	.29	-1.18	-.01	.044	27%
2-3 suicide attempts:6	.06	1.06	.54	.31	-.54	.66	.842	10%
4-5 suicide attempts:1	.20	1.23	.25	.34	-.46	.87	.546	1%
4-5 suicide attempts:2	.25	1.28	.42	.34	-.41	.91	.455	6%
4-5 suicide attempts:3	-.08	.93	.32	.47	-.99	.84	.872	3%
4-5 suicide attempts:4	-1.46	.23	.12	.62	-2.67	-.25	.018	3%
4-5 suicide attempts:5	-.36	.70	.42	.43	-1.20	.49	.409	4%
4-5 suicide attempts:6	.46	1.59	.81	.56	-.63	1.56	.407	4%
6+ suicide attempts:1	-.39	.68	.14	.36	-1.09	.31	.274	3%
6+ suicide attempts:2	-.68	.51	.17	.38	-1.45	.08	.072	34%
6+ suicide attempts:3	-.85	.43	.15	.40	-1.64	-.06	.036	5%
6+ suicide attempts:4	**-1.44**	.24	.13	.35	-2.16	-.72	.000	49%
6+ suicide attempts:5	**-1.67**	.19	.11	.44	-2.53	-.80	.000	1%
6+ suicide attempts:6	-2.33	.10	.05	.83	-3.99	-.66	.005	32%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2007. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

b. 2009

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	UL	*p*	Missing information
(Intercept):1	**-1.69**	--	.18	.03	-1.75	-1.64	.000	3%
(Intercept):2	**-1.06**	--	.35	.04	-1.14	-.99	.000	0%
(Intercept):3	**-1.02**	--	.36	.05	-1.12	-.92	.000	1%
(Intercept):4	**-.64**	--	.53	.03	-.71	-.57	.000	0%
(Intercept):5	**-.53**	--	.59	.04	-.61	-.45	.000	1%
(Intercept):6	**-.62**	--	.54	.06	-.73	-.51	.000	3%
1 suicide attempt:1	.22	1.24	.22	.14	-.06	.49	.120	9%
1 suicide attempt:2	-.26	.77	.27	.14	-.53	.01	.063	7%
1 suicide attempt:3	-.28	.76	.27	.17	-.62	.07	.103	38%
1 suicide attempt:4	-.30	.74	.39	.17	-.63	.04	.082	11%
1 suicide attempt:5	-.28	.76	.45	.22	-.70	.15	.199	6%
1 suicide attempt:6	-.32	.73	.39	.20	-.72	.09	.123	22%
2-3 suicide attempts:1	.17	1.19	.21	.14	-.09	.44	.204	4%
2-3 suicide attempts:2	-.16	.85	.30	.15	-.44	.13	.276	3%
2-3 suicide attempts:3	-.20	.81	.29	.18	-.56	.15	.258	0%
2-3 suicide attempts:4	**-.62**	.54	.29	.18	-.99	-.26	.001	10%
2-3 suicide attempts:5	.04	1.04	.61	.23	-.40	.49	.846	6%
2-3 suicide attempts:6	-.95	.39	.21	.32	-1.58	-.32	.003	13%
4-5 suicide attempts:1	.52	1.68	.30	.27	-.01	1.05	.054	8%
4-5 suicide attempts:2	-.57	.57	.20	.44	-1.43	.30	.200	5%
4-5 suicide attempts:3	-.67	.51	.18	.48	-1.62	.27	.158	13%
4-5 suicide attempts:4	-.29	.75	.40	.43	-1.12	.54	.495	1%
4-5 suicide attempts:5	-.03	.97	.57	.38	-.78	.71	.928	21%
4-5 suicide attempts:6	-.16	.85	.46	.59	-1.33	1.00	.784	5%
6+ suicide attempts:1	.24	1.27	.23	.26	-.28	.76	.359	8%
6+ suicide attempts:2	-1.21	.30	.11	.43	-2.07	-.35	.005	27%
6+ suicide attempts:3	-.94	.39	.14	.33	-1.60	-.29	.005	9%
6+ suicide attempts:4	-.74	.48	.25	.29	-1.32	-.16	.012	13%

6+ suicide attempts:5	**-1.56**	.21	.12	.44	-2.42	-.70	.000	11%
6+ suicide attempts:6	**-1.72**	.18	.10	.49	-2.69	-.75	.001	10%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2009. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

c. 2011

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept):1	**-2.00**	--	.14	.04	-2.08	-1.92	.000	0%
(Intercept):2	**-1.31**	--	.27	.03	-1.37	-1.25	.000	1%
(Intercept):3	**-1.18**	--	.31	.04	-1.26	-1.09	.000	0%
(Intercept):4	**-.74**	--	.48	.04	-.81	-.67	.000	5%
(Intercept):5	**-.61**	--	.54	.04	-.68	-.54	.000	1%
(Intercept):6	**-.77**	--	.46	.05	-.87	-.68	.000	3%
1 suicide attempt:1	.13	1.14	.16	.12	-.11	.38	.289	6%
1 suicide attempt:2	-.30	.74	.20	.15	-.60	.00	.046	12%
1 suicide attempt:3	-.21	.81	.25	.12	-.45	.02	.068	22%
1 suicide attempt:4	-.19	.83	.40	.17	-.52	.15	.272	31%
1 suicide attempt:5	-.04	.96	.52	.13	-.30	.23	.781	13%
1 suicide attempt:6	-.07	.93	.43	.19	-.45	.31	.721	10%
2-3 suicide attempts:1	-.08	.92	.13	.21	-.48	.33	.703	19%
2-3 suicide attempts:2	-.09	.92	.25	.17	-.42	.25	.612	6%
2-3 suicide attempts:3	-.76	.47	.15	.24	-1.24	-.28	.002	9%
2-3 suicide attempts:4	-.29	.75	.36	.17	-.62	.03	.077	7%
2-3 suicide attempts:5	-.49	.61	.33	.20	-.91	-.06	.016	53%
2-3 suicide attempts:6	-.24	.79	.36	.27	-.76	.28	.365	9%
4-5 suicide attempts:1	-.97	.38	.05	.44	-1.84	-.09	.027	27%
4-5 suicide attempts:2	.08	1.08	.29	.30	-.50	.67	.786	7%
4-5 suicide attempts:3	-.90	.41	.13	.49	-1.85	.06	.065	11%
4-5 suicide attempts:4	-.29	.75	.36	.36	-1.00	.42	.418	7%
4-5 suicide attempts:5	-.70	.50	.27	.39	-1.46	.07	.073	14%
4-5 suicide attempts:6	-.76	.47	.22	.40	-1.54	.03	.058	15%
6+ suicide attempts:1	-.13	.88	.12	.30	-.72	.46	.665	13%

6+ suicide attempts:2	-.13	.88	.24	.27	-.66	.40	.623	17%
6+ suicide attempts:3	-1.02	.36	.11	.40	-1.80	-.23	.011	9%
6+ suicide attempts:4	-.93	.39	.19	.34	-1.60	-.27	.006	20%
6+ suicide attempts:5	-1.20	.30	.16	.39	-1.98	-.43	.002	3%
6+ suicide attempts:6	-1.41	.24	.11	.61	-2.61	-.21	.021	9%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2011. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

d. 2013

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	UL	*p*	Missing information
(Intercept):1	**-1.84**	--	.16	.04	-1.93	-1.76	.000	1%
(Intercept):2	**-1.59**	--	.20	.05	-1.68	-1.50	.000	0%
(Intercept):3	**-1.56**	--	.21	.05	-1.66	-1.45	.000	0%
(Intercept):4	**-1.10**	--	.33	.03	-1.16	-1.04	.000	4%
(Intercept):5	**-.95**	--	.39	.05	-1.04	-.86	.000	0%
(Intercept):6	**-1.01**	--	.36	.05	-1.11	-.91	.000	1%
1 suicide attempt:1	.15	1.16	.19	.16	-.17	.47	.362	8%
1 suicide attempt:2	-.21	.81	.16	.15	-.51	.09	.168	28%
1 suicide attempt:3	-.37	.69	.14	.21	-.77	.04	.073	11%
1 suicide attempt:4	-.30	.74	.24	.18	-.66	.06	.106	10%
1 suicide attempt:5	-.20	.82	.32	.14	-.47	.07	.154	7%
1 suicide attempt:6	-.07	.93	.33	.17	-.41	.26	.671	2%
2-3 suicide attempts:1	-.17	.84	.13	.23	-.63	.28	.452	25%
2-3 suicide attempts:2	-.21	.81	.16	.18	-.56	.14	.244	10%
2-3 suicide attempts:3	-.37	.69	.14	.28	-.92	.17	.178	8%
2-3 suicide attempts:4	-.39	.68	.22	.19	-.76	-.02	.039	19%
2-3 suicide attempts:5	-.17	.84	.33	.23	-.63	.28	.444	16%
2-3 suicide attempts:6	-.26	.77	.28	.24	-.74	.21	.276	6%
4-5 suicide attempts:1	-.11	.89	.14	.36	-.81	.59	.751	18%
4-5 suicide attempts:2	-.69	.50	.10	.53	-1.77	.39	.193	40%
4-5 suicide attempts:3	.18	1.20	.25	.39	-.59	.96	.639	23%
4-5 suicide attempts:4	-.65	.52	.17	.53	-1.70	.40	.215	26%

4-5 suicide attempts:5	-.46	.63	.25	.42	-1.31	.38	.270	27%
4-5 suicide attempts:6	-.90	.41	.15	.65	-2.19	.38	.168	2%
6+ suicide attempts:1	-.07	.93	.15	.41	-.88	.74	.857	26%
6+ suicide attempts:2	-1.10	.33	.07	.61	-2.43	.23	.074	62%
6+ suicide attempts:3	-.88	.41	.09	.49	-1.84	.08	.071	10%
6+ suicide attempts:4	**-1.53**	.22	.07	.46	-2.44	-.61	.001	14%
6+ suicide attempts:5	-.85	.43	.17	.45	-1.79	.09	.061	47%
6+ suicide attempts:6	-.78	.46	.17	.43	-1.63	.06	.068	8%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2013. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

e. 2015

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI		*p*	Missing information
					LL	UL		
(Intercept):1	**-1.62**	--	.20	.03	-1.69	-1.55	.000	5%
(Intercept):2	**-1.68**	--	.19	.05	-1.78	-1.59	.000	2%
(Intercept):3	**-1.73**	--	.18	.06	-1.84	-1.62	.000	0%
(Intercept):4	**-1.12**	--	.33	.05	-1.23	-1.01	.000	2%
(Intercept):5	**-.91**	--	.40	.05	-1.01	-.81	.000	1%
(Intercept):6	**-.92**	--	.40	.04	-1.00	-.84	.000	4%
1 suicide attempt:1	.10	1.10	.22	.12	-.14	.34	.411	16%
1 suicide attempt:2	-.11	.90	.17	.14	-.38	.17	.454	10%
1 suicide attempt:3	-.48	.62	.11	.20	-.87	-.09	.016	8%
1 suicide attempt:4	-.09	.91	.30	.12	-.34	.15	.446	11%
1 suicide attempt:5	-.32	.73	.29	.16	-.64	.00	.050	4%
1 suicide attempt:6	-.40	.67	.27	.17	-.73	-.06	.020	2%
2-3 suicide attempts:1	-.18	.83	.17	.21	-.59	.22	.368	16%
2-3 suicide attempts:2	.01	1.01	.19	.21	-.40	.43	.944	18%
2-3 suicide attempts:3	-.30	.74	.13	.22	-.74	.13	.170	8%
2-3 suicide attempts:4	-.36	.70	.23	.22	-.80	.08	.108	16%
2-3 suicide attempts:5	-.63	.53	.21	.22	-1.07	-.19	.005	14%
2-3 suicide attempts:6	-.74	.48	.19	.29	-1.31	-.16	.011	17%
4-5 suicide attempts:1	.33	1.39	.28	.38	-.43	1.09	.384	30%

4-5 suicide attempts:2	-.67	.51	.10	.67	-2.03	.70	.320	38%
4-5 suicide attempts:3	-.16	.85	.15	.49	-1.13	.81	.745	0%
4-5 suicide attempts:4	.06	1.06	.35	.42	-.76	.88	.883	4%
4-5 suicide attempts:5	-.21	.81	.32	.75	-1.68	1.26	.780	4%
4-5 suicide attempts:6	-.08	.92	.37	.42	-.91	.74	.841	5%
6+ suicide attempts:1	-.29	.75	.15	.28	-.85	.27	.307	17%
6+ suicide attempts:2	-.38	.69	.13	.47	-1.30	.54	.420	1%
6+ suicide attempts:3	-.51	.60	.11	.55	-1.61	.59	.356	29%
6+ suicide attempts:4	-.38	.68	.22	.29	-.95	.19	.184	15%
6+ suicide attempts:5	-.87	.42	.17	.41	-1.68	-.05	.035	20%
6+ suicide attempts:6	-1.22	.30	.12	.39	-1.99	-.45	.002	6%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2015. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

f. 2017

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	UL	*p*	Missing information
(Intercept):1	**-1.52**	--	.22	.04	-1.60	-1.45	.000	2%
(Intercept):2	**-1.81**	--	.16	.05	-1.90	-1.71	.000	1%
(Intercept):3	**-1.78**	--	.17	.05	-1.88	-1.68	.000	3%
(Intercept):4	**-1.17**	--	.31	.04	-1.24	-1.10	.000	2%
(Intercept):5	**-.99**	--	.37	.04	-1.06	-.91	.000	4%
(Intercept):6	**-1.05**	--	.35	.05	-1.13	-.96	.000	2%
1 suicide attempt:1	.08	1.09	.24	.20	-.34	.50	.671	52%
1 suicide attempt:2	-.16	.85	.14	.20	-.55	.23	.415	24%
1 suicide attempt:3	-.33	.72	.12	.24	-.81	.16	.178	35%
1 suicide attempt:4	-.30	.74	.23	.18	-.66	.06	.102	21%
1 suicide attempt:5	-.33	.72	.27	.16	-.65	-.01	.044	17%
1 suicide attempt:6	-.47	.63	.22	.23	-.92	-.01	.045	12%
2-3 suicide attempts:1	-.08	.92	.20	.16	-.40	.24	.612	9%
2-3 suicide attempts:2	-.42	.66	.11	.28	-.97	.13	.133	3%
2-3 suicide attempts:3	-.48	.62	.11	.23	-.94	-.03	.035	19%
2-3 suicide attempts:4	-.70	.49	.15	.24	-1.18	-.23	.004	7%

2-3 suicide attempts:5	-.63	.53	.20	.32	-1.26	-.01	.046	16%
2-3 suicide attempts:6	.00	1.00	.35	.23	-.45	.44	.992	2%
4-5 suicide attempts:1	-.40	.67	.15	.50	-1.38	.59	.430	4%
4-5 suicide attempts:2	-.49	.62	.10	.43	-1.35	.38	.264	21%
4-5 suicide attempts:3	-.33	.72	.12	.46	-1.29	.63	.471	50%
4-5 suicide attempts:4	-.59	.56	.17	.40	-1.38	.20	.145	9%
4-5 suicide attempts:5	-.60	.55	.20	.42	-1.42	.21	.147	4%
4-5 suicide attempts:6	-.54	.58	.20	.46	-1.46	.37	.235	23%
6+ suicide attempts:1	.05	1.05	.23	.35	-.65	.74	.891	20%
6+ suicide attempts:2	-.76	.47	.08	.43	-1.62	.10	.078	23%
6+ suicide attempts:3	-1.54	.21	.04	.87	-3.37	.29	.077	52%
6+ suicide attempts:4	-.69	.50	.16	.38	-1.45	.07	.073	20%
6+ suicide attempts:5	-.98	.37	.14	.52	-2.04	.07	.058	37%
6+ suicide attempts:6	**-3.27**	.04	.01	1.02	-5.28	-1.27	.001	1%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2017. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on p-values ≤ .001.

g. 2019

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	95% CI UL	p	Missing information
(Intercept):1	**-1.64**	--	.19	.04	-1.72	-1.56	.000	2%
(Intercept):2	**-2.01**	--	.13	.03	-2.07	-1.95	.000	4%
(Intercept):3	**-1.86**	--	.16	.04	-1.94	-1.78	.000	2%
(Intercept):4	**-1.20**	--	.30	.04	-1.28	-1.13	.000	4%
(Intercept):5	**-.86**	--	.42	.04	-.94	-.79	.000	1%
(Intercept):6	**-.89**	--	.41	.06	-1.00	-.78	.000	2%
1 suicide attempt:1	-.12	.89	.17	.12	-.35	.11	.295	3%
1 suicide attempt:2	-.01	.99	.13	.16	-.33	.31	.970	22%
1 suicide attempt:3	-.25	.78	.12	.19	-.62	.11	.175	8%
1 suicide attempt:4	-.06	.94	.28	.15	-.37	.25	.701	34%
1 suicide attempt:5	-.35	.71	.30	.16	-.67	-.03	.025	46%
1 suicide attempt:6	-.16	.85	.35	.15	-.46	.14	.300	22%
2-3 suicide attempts:1	.05	1.06	.20	.19	-.32	.43	.775	20%

2-3 suicide attempts:2	.04	1.04	.14	.29	-.54	.62	.888	5%
2-3 suicide attempts:3	-.52	.59	.09	.27	-1.05	.00	.052	2%
2-3 suicide attempts:4	-.53	.59	.18	.19	-.91	-.16	.005	14%
2-3 suicide attempts:5	-.43	.65	.27	.21	-.84	-.02	.041	17%
2-3 suicide attempts:6	-.22	.80	.33	.21	-.63	.18	.280	3%
4-5 suicide attempts:1	.45	1.57	.30	.40	-.33	1.23	.260	11%
4-5 suicide attempts:2	.71	2.04	.27	.43	-.14	1.56	.099	15%
4-5 suicide attempts:3	-.50	.61	.10	.75	-2.01	1.01	.507	35%
4-5 suicide attempts:4	-.43	.65	.20	.57	-1.56	.70	.446	29%
4-5 suicide attempts:5	-.58	.56	.24	.62	-1.79	.63	.350	3%
4-5 suicide attempts:6	-.91	.40	.16	.66	-2.23	.41	.168	29%
6+ suicide attempts:1	.08	1.08	.21	.28	-.48	.63	.782	26%
6+ suicide attempts:2	.24	1.27	.17	.44	-.65	1.13	.581	40%
6+ suicide attempts:3	-.28	.75	.12	.43	-1.14	.57	.514	9%
6+ suicide attempts:4	-.68	.50	.15	.47	-1.61	.24	.147	2%
6+ suicide attempts:5	-.08	.92	.39	.43	-.93	.77	.849	18%
6+ suicide attempts:6	-1.92	.15	.06	.94	-3.88	.05	.041	51%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2019. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

Table E18

Regression Results by Sex: Number of Suicide Attempts as Predictor of Non-TV Screen Time, Average School Day

a. Girls

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept):1	**-1.43**	--	.24	.02	-1.48	-1.39	.000	0%
(Intercept):2	**-1.41**	--	.24	.03	-1.48	-1.35	.000	0%
(Intercept):3	**-1.40**	--	.25	.03	-1.46	-1.33	.000	0%
(Intercept):4	**-.97**	--	.38	.02	-1.02	-.93	.000	1%
(Intercept):5	**-.84**	--	.43	.03	-.89	-.78	.000	2%
(Intercept):6	**-.95**	--	.39	.03	-1.00	-.89	.000	2%

1 suicide attempt:1	-.08	.92	.22	.05	-.19	.02	.131	1%
1 suicide attempt:2	**-.25**	.78	.19	.07	-.40	-.11	.001	6%
1 suicide attempt:3	**-.30**	.74	.19	.08	-.45	-.15	.000	19%
1 suicide attempt:4	**-.24**	.79	.30	.07	-.38	-.10	.001	6%
1 suicide attempt:5	**-.28**	.75	.32	.07	-.43	-.14	.000	13%
1 suicide attempt:6	-.11	.90	.35	.09	-.28	.06	.208	6%
2-3 suicide attempts:1	-.12	.89	.21	.07	-.26	.02	.104	3%
2-3 suicide attempts:2	-.14	.87	.21	.09	-.31	.03	.106	3%
2-3 suicide attempts:3	**-.41**	.67	.17	.11	-.62	-.20	.000	6%
2-3 suicide attempts:4	**-.42**	.66	.25	.09	-.60	-.23	.000	11%
2-3 suicide attempts:5	**-.39**	.68	.29	.11	-.59	-.18	.000	11%
2-3 suicide attempts:6	-.20	.82	.32	.13	-.46	.06	.132	27%
4-5 suicide attempts:1	-.12	.89	.21	.18	-.48	.24	.528	2%
4-5 suicide attempts:2	-.16	.85	.20	.19	-.53	.21	.389	7%
4-5 suicide attempts:3	-.46	.63	.16	.21	-.88	-.04	.031	10%
4-5 suicide attempts:4	-.43	.65	.25	.23	-.88	.02	.063	5%
4-5 suicide attempts:5	-.60	.55	.24	.23	-1.06	-.14	.010	16%
4-5 suicide attempts:6	-.37	.69	.27	.25	-.86	.12	.137	8%
6+ suicide attempts:1	-.21	.81	.19	.16	-.53	.10	.184	4%
6+ suicide attempts:2	-.22	.81	.19	.20	-.62	.19	.287	25%
6+ suicide attempts:3	**-.80**	.45	.11	.24	-1.27	-.33	.001	8%
6+ suicide attempts:4	-.63	.53	.20	.21	-1.04	-.22	.002	4%
6+ suicide attempts:5	**-.89**	.41	.18	.22	-1.32	-.45	.000	10%
6+ suicide attempts:6	**-1.26**	.28	.11	.31	-1.88	-.64	.000	5%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohorts 2007-2019, girls only. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values $\leq .001$.

b. Boys

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	UL	*p*	Missing information
(Intercept):1	**-2.00**	--	.14	.02	-2.04	-1.96	.000	4%
(Intercept):2	**-1.48**	--	.23	.03	-1.54	-1.43	.000	1%
(Intercept):3	**-1.45**	--	.23	.03	-1.51	-1.40	.000	1%
(Intercept):4	**-.94**	--	.39	.02	-.97	-.90	.000	5%
(Intercept):5	**-.76**	--	.47	.02	-.80	-.72	.000	2%
(Intercept):6	**-.83**	--	.44	.02	-.88	-.78	.000	2%
1 suicide attempt:1	.24	1.27	.18	.11	.02	.46	.025	36%
1 suicide attempt:2	-.17	.85	.20	.11	-.38	.05	.116	39%
1 suicide attempt:3	-.30	.74	.17	.12	-.54	-.07	.010	30%
1 suicide attempt:4	-.17	.84	.33	.10	-.37	.03	.082	30%
1 suicide attempt:5	-.13	.88	.41	.11	-.35	.08	.223	21%
1 suicide attempt:6	-.30	.74	.33	.12	-.54	-.06	.013	12%
2-3 suicide attempts:1	-.12	.89	.12	.15	-.41	.18	.426	25%
2-3 suicide attempts:2	-.29	.75	.17	.15	-.58	.00	.048	23%
2-3 suicide attempts:3	-.37	.69	.16	.15	-.66	-.08	.013	13%
2-3 suicide attempts:4	-.32	.73	.28	.13	-.57	-.06	.013	28%
2-3 suicide attempts:5	**-.44**	.64	.30	.14	-.70	-.18	.001	2%
2-3 suicide attempts:6	-.50	.61	.27	.16	-.82	-.18	.002	10%
4-5 suicide attempts:1	.21	1.23	.17	.27	-.32	.74	.434	5%
4-5 suicide attempts:2	-.17	.84	.19	.31	-.80	.45	.578	26%
4-5 suicide attempts:3	-.42	.66	.15	.33	-1.06	.23	.204	13%
4-5 suicide attempts:4	-.43	.65	.25	.28	-.98	.13	.131	21%
4-5 suicide attempts:5	-.34	.71	.33	.37	-1.07	.39	.363	8%
4-5 suicide attempts:6	-.59	.55	.24	.39	-1.38	.20	.127	39%
6+ suicide attempts:1	.02	1.02	.14	.17	-.32	.36	.914	9%
6+ suicide attempts:2	-.78	.46	.11	.26	-1.30	-.25	.003	29%
6+ suicide attempts:3	-.91	.40	.09	.29	-1.50	-.32	.002	37%
6+ suicide attempts:4	**-.96**	.38	.15	.23	-1.44	-.48	.000	48%
6+ suicide attempts:5	**-1.03**	.36	.17	.23	-1.48	-.58	.000	5%
6+ suicide attempts:6	**-1.66**	.19	.08	.34	-2.34	-.98	.000	24%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2007-2019, boys only. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

Table E19

Summaries by Cohort and by Sex: Attempted Suicide (Dichotomous) as Predictor of Non-TV Screen Time, Average School Day

a. Regression Coefficients

	2007	2009	2011	2013	2015	2017	2019	Girls	Boys
(Intercept):1	**-1.60**	**-1.69**	**-2.00**	**-1.84**	**-1.62**	**-1.52**	**-1.64**	**-1.43**	**-2.00**
(Intercept):2	**-1.10**	**-1.06**	**-1.31**	**-1.59**	**-1.68**	**-1.81**	**-2.01**	**-1.41**	**-1.48**
(Intercept):3	**-1.08**	**-1.02**	**-1.18**	**-1.56**	**-1.73**	**-1.78**	**-1.86**	**-1.40**	**-1.45**
(Intercept):4	**-.64**	**-.64**	**-.74**	**-1.10**	**-1.12**	**-1.17**	**-1.20**	**-.97**	**-.94**
(Intercept):5	**-.51**	**-.53**	**-.61**	**-.95**	**-.91**	**-.99**	**-.86**	**-.84**	**-.76**
(Intercept):6	**-.68**	**-.62**	**-.77**	**-1.01**	**-.92**	**-1.05**	**-.89**	**-.95**	**-.83**
Attempted suicide:1	.16	.23	.01	.02	.02	.01	-.01	-.10	.13
Attempted suicide:2	-.15	**-.32**	-.19	-.30	-.12	-.31	.09	**-.21**	**-.27**
Attempted suicide:3	-.14	-.35	**-.45**	-.36	-.40	-.45	-.33	**-.37**	**-.41**
Attempted suicide:4	-.13	-.44	-.30	-.44	-.18	-.48	-.24	**-.33**	**-.34**
Attempted suicide:5	-.43	-.31	**-.33**	-.28	-.44	**-.51**	-.35	**-.37**	**-.37**
Attempted suicide:6	-.21	**-.66**	-.34	-.27	**-.54**	-.42	-.29	**-.22**	**-.59**

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohorts 2007-2019. 1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

b. Hazard Ratios

	2007	2009	2011	2013	2015	2017	2019	Girls	Boys
Attempted suicide:1	1.17	1.26	1.01	1.02	1.02	1.01	.99	.90	1.14
Attempted suicide:2	.86	.72	.82	.74	.89	.73	1.09	.81	.76
Attempted suicide:3	.87	.70	.64	.70	.67	.64	.72	.69	.66
Attempted suicide:4	.88	.65	.74	.64	.84	.62	.79	.72	.71
Attempted suicide:5	.65	.74	.72	.76	.64	.60	.70	.69	.69
Attempted suicide:6	.81	.51	.71	.76	.58	.66	.75	.80	.55

c. Hazard Rates

	2007	2009	2011	2013	2015	2017	2019	Girls	Boys
(Intercept):1	.20	.18	.14	.16	.20	.22	.19	.24	.14
(Intercept):2	.33	.35	.27	.20	.19	.16	.13	.24	.23
(Intercept):3	.34	.36	.31	.21	.18	.17	.16	.25	.23
(Intercept):4	.53	.53	.48	.33	.33	.31	.30	.38	.39
(Intercept):5	.60	.59	.54	.39	.40	.37	.42	.43	.47
(Intercept):6	.51	.54	.46	.36	.40	.35	.41	.39	.44
Attempted suicide:1	.23	.23	.02	.16	.20	.22	.19	.22	.16
Attempted suicide:2	.28	.25	.07	.15	.17	.12	.14	.19	.17
Attempted suicide:3	.30	.25	.10	.15	.12	.11	.12	.17	.15
Attempted suicide:4	.47	.34	.23	.21	.28	.19	.24	.27	.28
Attempted suicide:5	.39	.44	.29	.30	.26	.22	.29	.30	.32
Attempted suicide:6	.41	.28	.21	.27	.23	.23	.31	.31	.24

Table E20

Regression Results by Cohort: Attempted Suicide (Dichotomous) as Predictor of Non-TV Screen Time, Average School Day

a. 2007

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	95% CI UL	p	Missing information
(Intercept):1	**-1.60**	--	.20	.06	-1.71	-1.49	.000	1%
(Intercept):2	**-1.10**	--	.33	.06	-1.21	-.99	.000	1%
(Intercept):3	**-1.08**	--	.34	.04	-1.17	-1.00	.000	4%
(Intercept):4	**-.64**	--	.53	.03	-.70	-.58	.000	1%
(Intercept):5	**-.51**	--	.60	.04	-.58	-.44	.000	3%
(Intercept):6	**-.68**	--	.51	.05	-.78	-.58	.000	3%
Attempted suicide:1	.16	1.17	.23	.10	-.04	.36	.121	15%
Attempted suicide:2	-.15	.86	.28	.11	-.36	.06	.168	9%
Attempted suicide:3	-.14	.87	.30	.11	-.36	.07	.186	7%

Attempted suicide:4	-.13	.88	.47	.08	-.30	.03	.116	17%
Attempted suicide:5	-.43	.65	.39	.15	-.74	-.13	.004	33%
Attempted suicide:6	-.21	.81	.41	.15	-.51	.09	.168	17%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2007. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

b. 2009

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	95% CI UL	p	Missing information
(Intercept):1	**-1.69**	--	.18	.03	-1.75	-1.64	.000	3%
(Intercept):2	**-1.06**	--	.35	.04	-1.14	-.99	.000	0%
(Intercept):3	**-1.02**	--	.36	.05	-1.12	-.92	.000	1%
(Intercept):4	**-.64**	--	.53	.03	-.71	-.57	.000	0%
(Intercept):5	**-.53**	--	.59	.04	-.61	-.45	.000	1%
(Intercept):6	**-.62**	--	.54	.06	-.73	-.51	.000	3%
Attempted suicide:1	.23	1.26	.23	.10	.04	.42	.019	14%
Attempted suicide:2	**-.32**	.72	.25	.10	-.52	-.13	.001	6%
Attempted suicide:3	-.35	.70	.25	.12	-.58	-.12	.003	25%
Attempted suicide:4	-.44	.65	.34	.12	-.67	-.20	.000	4%
Attempted suicide:5	-.31	.74	.44	.17	-.64	.03	.073	3%
Attempted suicide:6	**-.66**	.51	.28	.17	-.99	-.34	.000	15%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2009. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

c. 2011

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	UL	p	Missing information
(Intercept):1	**-2.00**	--	.14	.04	-2.08	-1.92	.000	0%
(Intercept):2	**-1.31**	--	.27	.03	-1.37	-1.25	.000	1%
(Intercept):3	**-1.18**	--	.31	.04	-1.26	-1.09	.000	0%
(Intercept):4	**-.74**	--	.48	.04	-.81	-.67	.000	5%
(Intercept):5	**-.61**	--	.54	.04	-.68	-.54	.000	1%
(Intercept):6	**-.77**	--	.46	.05	-.87	-.68	.000	3%
Attempted suicide:1	.01	.14	.02	.11	-.22	.23	.952	21%
Attempted suicide:2	-.19	.27	.07	.10	-.38	-.01	.044	4%
Attempted suicide:3	**-.45**	.31	.10	.11	-.67	-.23	.000	21%
Attempted suicide:4	-.30	.48	.23	.11	-.52	-.08	.007	27%
Attempted suicide:5	-.33	.54	.29	.11	-.54	-.11	.003	16%
Attempted suicide:6	-.34	.46	.21	.15	-.65	-.04	.026	23%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2011. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

d. 2013

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	UL	p	Missing information
(Intercept):1	**-1.84**	--	.16	.04	-1.93	-1.76	.000	1%
(Intercept):2	**-1.59**	--	.20	.05	-1.68	-1.50	.000	0%
(Intercept):3	**-1.56**	--	.21	.05	-1.66	-1.45	.000	0%
(Intercept):4	**-1.10**	--	.33	.03	-1.16	-1.04	.000	4%
(Intercept):5	**-.95**	--	.39	.05	-1.04	-.86	.000	0%
(Intercept):6	**-1.01**	--	.36	.05	-1.11	-.91	.000	1%
Attempted suicide:1	.02	1.02	.16	.14	-.25	.29	.895	9%
Attempted suicide:2	-.30	.74	.15	.11	-.52	-.08	.008	21%
Attempted suicide:3	-.36	.70	.15	.16	-.68	-.04	.028	8%
Attempted suicide:4	-.44	.64	.21	.14	-.72	-.16	.002	20%
Attempted suicide:5	-.28	.76	.30	.11	-.49	-.06	.011	9%
Attempted suicide:6	-.27	.76	.27	.15	-.57	.03	.076	2%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2013. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

e. 2015

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	95% CI UL	p	Missing information
(Intercept):1	**-1.62**	--	.20	.03	-1.69	-1.55	.000	5%
(Intercept):2	**-1.68**	--	.19	.05	-1.78	-1.59	.000	2%
(Intercept):3	**-1.73**	--	.18	.06	-1.84	-1.62	.000	0%
(Intercept):4	**-1.12**	--	.33	.05	-1.23	-1.01	.000	2%
(Intercept):5	**-.91**	--	.40	.05	-1.01	-.81	.000	1%
(Intercept):6	**-.92**	--	.40	.04	-1.00	-.84	.000	4%
Attempted suicide:1	.02	1.02	.20	.09	-.16	.19	.838	6%
Attempted suicide:2	-.12	.89	.17	.12	-.35	.12	.316	11%
Attempted suicide:3	-.40	.67	.12	.14	-.68	-.13	.004	6%
Attempted suicide:4	-.18	.84	.28	.10	-.36	.01	.065	20%
Attempted suicide:5	-.44	.64	.26	.14	-.72	-.16	.002	17%
Attempted suicide:6	**-.54**	.58	.23	.13	-.80	-.28	.000	3%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2015. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

f. 2017

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	UL	p	Missing information
(Intercept):1	**-1.52**	--	.22	.04	-1.60	-1.45	.000	2%
(Intercept):2	**-1.81**	--	.16	.05	-1.90	-1.71	.000	1%
(Intercept):3	**-1.78**	--	.17	.05	-1.88	-1.68	.000	3%
(Intercept):4	**-1.17**	--	.31	.04	-1.24	-1.10	.000	2%
(Intercept):5	**-.99**	--	.37	.04	-1.06	-.91	.000	4%
(Intercept):6	**-1.05**	--	.35	.05	-1.13	-.96	.000	2%
Attempted suicide:1	.01	1.01	.22	.11	-.21	.23	.957	39%
Attempted suicide:2	-.31	.73	.12	.11	-.53	-.09	.005	29%
Attempted suicide:3	-.45	.64	.11	.19	-.85	-.06	.018	47%
Attempted suicide:4	-.48	.62	.19	.15	-.78	-.17	.002	4%
Attempted suicide:5	**-.51**	.60	.22	.14	-.80	-.22	.000	33%
Attempted suicide:6	-.42	.66	.23	.16	-.74	-.09	.011	11%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2017. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

g. 2019

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	UL	p	Missing information
(Intercept):1	**-1.64**	--	.19	.04	-1.72	-1.56	.000	2%
(Intercept):2	**-2.01**	--	.13	.03	-2.07	-1.95	.000	4%
(Intercept):3	**-1.86**	--	.16	.04	-1.94	-1.78	.000	2%
(Intercept):4	**-1.20**	--	.30	.04	-1.28	-1.13	.000	4%
(Intercept):5	**-.86**	--	.42	.04	-.94	-.79	.000	1%
(Intercept):6	**-.89**	--	.41	.06	-1.00	-.78	.000	2%
Attempted suicide:1	-.01	.99	.19	.09	-.19	.17	.918	14%
Attempted suicide:2	.09	1.09	.14	.14	-.20	.37	.556	12%
Attempted suicide:3	-.33	.72	.12	.12	-.57	-.09	.007	9%
Attempted suicide:4	-.24	.79	.24	.14	-.51	.04	.085	30%
Attempted suicide:5	-.35	.70	.29	.13	-.61	-.10	.005	26%
Attempted suicide:6	-.29	.75	.31	.12	-.53	-.04	.021	14%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2019. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

Table E21

Regression Results by Sex: Attempted Suicide (Dichotomous) as Predictor of Non-TV Screen Time, Average School Day

a. Girls

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	95% CI UL	p	Missing information
(Intercept):1	**-1.43**	--	.24	.02	-1.48	-1.39	.000	0%
(Intercept):2	**-1.41**	--	.24	.03	-1.48	-1.35	.000	0%
(Intercept):3	**-1.40**	--	.25	.03	-1.46	-1.33	.000	0%
(Intercept):4	**-.97**	--	.38	.02	-1.02	-.93	.000	1%
(Intercept):5	**-.84**	--	.43	.03	-.89	-.78	.000	2%
(Intercept):6	**-.95**	--	.39	.03	-1.00	-.89	.000	2%
Attempted suicide:1	-.10	.90	.22	.04	-.18	-.02	.015	2%
Attempted suicide:2	**-.21**	.81	.19	.05	-.31	-.11	.000	5%
Attempted suicide:3	**-.37**	.69	.17	.06	-.49	-.25	.000	13%
Attempted suicide:4	**-.33**	.72	.27	.06	-.44	-.21	.000	7%
Attempted suicide:5	**-.37**	.69	.30	.06	-.49	-.25	.000	19%
Attempted suicide:6	**-.22**	.80	.31	.07	-.36	-.08	.000	11%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohorts 2007-2019, girls only. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

b. Boys

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	UL	p	Missing information
(Intercept):1	**-2.00**	--	.14	.02	-2.04	-1.96	.000	4%
(Intercept):2	**-1.48**	--	.23	.03	-1.54	-1.43	.000	1%
(Intercept):3	**-1.45**	--	.23	.03	-1.51	-1.40	.000	1%
(Intercept):4	**-.94**	--	.39	.02	-.97	-.90	.000	5%
(Intercept):5	**-.76**	--	.47	.02	-.80	-.72	.000	2%
(Intercept):6	**-.83**	--	.44	.02	-.88	-.78	.000	2%
Attempted suicide:1	.13	1.14	.16	.08	-.02	.28	.096	19%
Attempted suicide:2	**-.27**	.76	.17	.07	-.42	-.13	.000	16%
Attempted suicide:3	**-.41**	.66	.15	.09	-.59	-.23	.000	32%
Attempted suicide:4	**-.34**	.71	.28	.08	-.49	-.18	.000	39%
Attempted suicide:5	**-.37**	.69	.32	.08	-.53	-.21	.000	14%
Attempted suicide:6	**-.59**	.55	.24	.08	-.76	-.43	.000	2%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohorts 2007-2019, boys only. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on p-values $\leq .001$.

Table E22

Summaries, Cohort and Sex: All Dichotomous Distress Indicators as Predictors of Non-TV Screen Time, Average School Day

a. Regression Coefficients

	2007	2009	2011	2013	2015	2017	2019	Girls	Boys
(Intercept):1	**-1.62**	**-1.69**	**-1.98**	**-1.80**	**-1.57**	**-1.50**	**-1.58**	**-1.36**	**-1.97**
(Intercept):2	**-1.06**	**-1.01**	**-1.28**	**-1.51**	**-1.58**	**-1.73**	**-1.94**	**-1.31**	**-1.43**
(Intercept):3	**-1.01**	**-.96**	**-1.13**	**-1.47**	**-1.63**	**-1.66**	**-1.71**	**-1.25**	**-1.38**
(Intercept):4	**-.56**	**-.60**	**-.69**	**-1.00**	**-1.01**	**-1.09**	**-1.06**	**-.84**	**-.88**
(Intercept):5	**-.42**	**-.47**	**-.56**	**-.88**	**-.77**	**-.92**	**-.73**	**-.72**	**-.69**
(Intercept):6	**-.66**	**-.54**	**-.70**	**-.89**	**-.81**	**-.99**	**-.84**	**-.86**	**-.77**
Extended sadness:1	.15	.03	-.01	-.02	-.12	.01	-.07	**-.12**	-.04
Extended sadness:2	-.17	-.16	-.10	**-.33**	**-.41**	-.15	-.27	**-.28**	**-.23**

Extended sadness:3	**-.27**	-.16	-.15	-.22	-.24	**-.37**	**-.36**	**-.31**	**-.27**
Extended sadness:4	**-.24**	-.16	-.10	**-.32**	**-.34**	-.18	**-.30**	**-.31**	**-.18**
Extended sadness:5	-.21	-.17	-.07	-.28	-.36	-.16	**-.29**	**-.24**	**-.21**
Extended sadness:6	-.06	-.17	-.24	-.17	-.18	-.11	-.05	-.10	-.15
Considered suicide:1	-.04	-.22	-.15	-.23	-.05	-.17	-.16	**-.18**	-.16
Considered suicide:2	-.02	-.13	-.05	-.17	-.09	-.30	.10	-.09	-.15
Considered suicide:3	.04	-.26	.03	-.27	-.12	-.25	-.27	-.17	-.12
Considered suicide:4	.00	.18	-.03	-.05	-.08	-.26	-.23	-.05	-.09
Considered suicide:5	-.22	-.19	-.07	.10	-.08	-.06	-.19	-.08	-.12
Considered suicide:6	.30	.01	-.06	-.33	-.33	.05	.06	-.09	-.07
Planned suicide:1	-.16	.14	-.07	-.25	-.15	-.05	-.21	-.10	-.12
Planned suicide:2	-.07	-.12	-.03	.13	-.07	-.03	-.04	-.04	-.12
Planned suicide:3	-.15	-.04	-.22	-.01	-.28	-.05	-.14	-.17	-.14
Planned suicide:4	-.17	-.25	-.25	-.09	-.13	.02	-.14	-.14	**-.20**
Planned suicide:5	-.06	.05	-.27	.01	-.25	-.09	-.07	-.06	-.17
Planned suicide:6	-.42	-.32	.04	-.27	-.07	-.24	-.29	**-.23**	-.19
Attempted suicide:1	.21	.29	.16	.34	.20	.14	.24	**.15**	**.31**
Attempted suicide:2	-.01	-.08	-.10	-.10	.18	-.03	.17	.02	-.01
Attempted suicide:3	.05	-.06	-.26	-.05	-.04	-.09	.08	.01	-.13
Attempted suicide:4	.08	-.34	-.07	-.20	.12	-.23	.13	-.07	-.09
Attempted suicide:5	-.16	-.11	-.08	-.22	-.07	-.33	-.06	-.17	-.10
Attempted suicide:6	-.14	-.39	-.22	.20	**-.17**	-.25	-.13	.03	**-.37**

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohorts 2007-2019. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

b. Hazard Ratios

	2007	2009	2011	2013	2015	2017	2019	Girls	Boys
Extended sadness:1	1.16	1.03	.99	.98	.89	1.01	.93	.89	.96
Extended sadness:2	.85	.85	.91	.72	.66	.86	.76	.76	.80
Extended sadness:3	.76	.86	.86	.80	.79	.69	.69	.73	.77
Extended sadness:4	.78	.85	.91	.73	.71	.84	.74	.74	.84
Extended sadness:5	.81	.84	.93	.76	.69	.85	.75	.78	.81
Extended sadness:6	.94	.84	.78	.84	.83	.90	.95	.90	.86
Considered suicide:1	.96	.80	.86	.79	.95	.84	.86	.83	.85

Considered suicide:2	.98	.88	.95	.85	.91	.74	1.11	.91	.86
Considered suicide:3	1.04	.77	1.03	.76	.88	.78	.77	.84	.89
Considered suicide:4	1.00	1.20	.97	.95	.92	.77	.79	.95	.92
Considered suicide:5	.80	.83	.93	1.11	.93	.94	.83	.92	.89
Considered suicide:6	1.35	1.01	.94	.72	.72	1.06	1.06	.91	.94
Planned suicide:1	.85	1.15	.93	.78	.86	.95	.81	.90	.89
Planned suicide:2	.94	.88	.97	1.14	.94	.97	.96	.96	.89
Planned suicide:3	.86	.96	.80	.99	.75	.95	.87	.84	.87
Planned suicide:4	.84	.78	.78	.91	.88	1.02	.87	.87	.82
Planned suicide:5	.94	1.05	.77	1.01	.78	.92	.93	.94	.85
Planned suicide:6	.66	.72	1.04	.77	.93	.79	.75	.80	.83
Attempted suicide:1	1.23	1.34	1.17	1.41	1.22	1.15	1.27	1.16	1.36
Attempted suicide:2	.99	.93	.91	.90	1.20	.97	1.18	1.02	.99
Attempted suicide:3	1.05	.94	.77	.95	.96	.92	1.08	1.01	.87
Attempted suicide:4	1.09	.71	.93	.82	1.13	.80	1.14	.94	.92
Attempted suicide:5	.85	.89	.92	.80	.93	.72	.94	.84	.91
Attempted suicide:6	.87	.67	.80	1.22	.84	.78	.88	1.03	.69

c. Hazard Rates

	2007	2009	2011	2013	2015	2017	2019	Girls	Boys
(Intercept):1	.20	.18	.14	.17	.21	.22	.21	.26	.14
(Intercept):2	.35	.36	.28	.22	.21	.18	.14	.27	.24
(Intercept):3	.36	.38	.32	.23	.20	.19	.18	.29	.25
(Intercept):4	.57	.55	.50	.37	.37	.34	.35	.43	.42
(Intercept):5	.66	.63	.57	.41	.46	.40	.48	.49	.50
(Intercept):6	.52	.58	.50	.41	.45	.37	.43	.42	.46
Extended sadness:1	.23	.19	.14	.17	.19	.22	.20	.23	.13
Extended sadness:2	.30	.31	.25	.16	.14	.15	.11	.21	.19
Extended sadness:3	.27	.33	.28	.18	.16	.13	.12	.21	.19
Extended sadness:4	.44	.47	.46	.27	.26	.29	.26	.32	.35
Extended sadness:5	.53	.53	.53	.31	.32	.34	.36	.38	.41
Extended sadness:6	.49	.49	.39	.34	.37	.33	.41	.38	.40
Considered suicide:1	.19	.14	.12	.13	.20	.18	.18	.22	.12
Considered suicide:2	.34	.32	.27	.19	.19	.13	.16	.25	.21
Considered suicide:3	.37	.29	.33	.17	.18	.15	.14	.24	.22
Considered suicide:4	.57	.66	.49	.35	.34	.26	.28	.41	.39
Considered suicide:5	.53	.52	.53	.46	.43	.38	.40	.45	.45
Considered suicide:6	.70	.59	.47	.30	.32	.39	.46	.38	.43
Planned suicide:1	.17	.21	.13	.13	.18	.21	.17	.23	.12
Planned suicide:2	.33	.32	.27	.25	.20	.17	.13	.26	.21
Planned suicide:3	.31	.36	.26	.23	.15	.18	.16	.24	.22
Planned suicide:4	.48	.43	.39	.34	.33	.35	.30	.37	.34
Planned suicide:5	.62	.66	.44	.41	.36	.37	.45	.46	.43

Planned suicide:6	.34	.42	.52	.32	.42	.29	.32	.34	.38
Attempted suicide:1	.25	.24	.16	.24	.26	.25	.27	.30	.19
Attempted suicide:2	.35	.33	.25	.20	.25	.17	.17	.28	.24
Attempted suicide:3	.38	.36	.25	.22	.19	.17	.19	.29	.22
Attempted suicide:4	.62	.39	.47	.30	.42	.27	.40	.40	.39
Attempted suicide:5	.56	.56	.52	.33	.43	.29	.45	.41	.46
Attempted suicide:6	.45	.39	.40	.50	.38	.29	.38	.43	.32

Table E23

Regression Results by Cohort: All Dichotomous Psychological Distress Indicators as Predictors of Non-TV Screen Time, Average School Day

a.2007

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept):1	**-1.62**	--	.20	.06	-1.74	-1.50	.000	0%
(Intercept):2	**-1.06**	--	.35	.06	-1.18	-.93	.000	1%
(Intercept):3	**-1.01**	--	.36	.04	-1.10	-.92	.000	3%
(Intercept):4	**-.56**	--	.57	.04	-.64	-.49	.000	1%
(Intercept):5	**-.42**	--	.66	.04	-.50	-.35	.000	4%
(Intercept):6	**-.66**	--	.52	.06	-.79	-.53	.000	3%
Extended sadness:1	.15	1.16	.23	.06	.04	.27	.009	2%
Extended sadness:2	-.17	.85	.30	.06	-.28	-.05	.003	19%
Extended sadness:3	**-.27**	**.76**	.27	.05	-.36	-.18	.000	7%
Extended sadness:4	**-.24**	**.78**	.44	.06	-.36	-.12	.000	0%
Extended sadness:5	-.21	.81	.53	.07	-.36	-.07	.004	4%
Extended sadness:6	-.06	.94	.49	.13	-.31	.18	.614	1%
Considered suicide:1	-.04	.96	.19	.10	-.24	.16	.708	2%
Considered suicide:2	-.02	.98	.34	.10	-.23	.18	.810	14%
Considered suicide:3	.04	1.04	.37	.11	-.18	.25	.745	2%
Considered suicide:4	.00	1.00	.57	.12	-.24	.24	.990	2%
Considered suicide:5	-.22	.80	.53	.12	-.46	.02	.071	6%
Considered suicide:6	.30	1.35	.70	.16	-.01	.61	.060	4%
Planned suicide:1	-.16	.85	.17	.14	-.43	.12	.258	2%
Planned suicide:2	-.07	.94	.33	.11	-.27	.14	.532	1%
Planned suicide:3	-.15	.86	.31	.11	-.38	.07	.181	2%
Planned suicide:4	-.17	.84	.48	.12	-.42	.07	.166	4%
Planned suicide:5	-.06	.94	.62	.10	-.26	.14	.546	7%
Planned suicide:6	-.42	.66	.34	.19	-.78	-.05	.025	0%

Attempted suicide:1	.21	1.23	.25	.12	-.04	.45	.093	18%
Attempted suicide:2	-.01	.99	.35	.12	-.24	.22	.921	15%
Attempted suicide:3	.05	1.05	.38	.13	-.20	.30	.704	5%
Attempted suicide:4	.08	1.09	.62	.11	-.14	.31	.475	8%
Attempted suicide:5	-.16	.85	.56	.21	-.58	.27	.456	30%
Attempted suicide:6	-.14	.87	.45	.22	-.57	.28	.509	14%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2007. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on p-values ≤ .001.

b. 2009

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	UL	*p*	Missing information
(Intercept):1	**-1.69**	--	.18	.03	-1.76	-1.63	.000	2%
(Intercept):2	**-1.01**	--	.36	.05	-1.10	-.92	.000	0%
(Intercept):3	**-.96**	--	.38	.05	-1.06	-.86	.000	1%
(Intercept):4	**-.60**	--	.55	.04	-.69	-.52	.000	0%
(Intercept):5	**-.47**	--	.63	.05	-.56	-.38	.000	1%
(Intercept):6	**-.54**	--	.58	.07	-.68	-.41	.000	2%
Extended sadness:1	.03	1.03	.19	.07	-.11	.16	.705	0%
Extended sadness:2	-.16	.85	.31	.06	-.29	-.04	.011	3%
Extended sadness:3	-.16	.86	.33	.05	-.26	-.05	.003	6%
Extended sadness:4	-.16	.85	.47	.06	-.29	-.03	.013	2%
Extended sadness:5	-.17	.84	.53	.08	-.33	-.02	.029	4%
Extended sadness:6	-.17	.84	.49	.11	-.38	.04	.109	1%
Considered suicide:1	-.22	.80	.14	.10	-.43	-.02	.032	3%
Considered suicide:2	-.13	.88	.32	.08	-.29	.02	.100	3%
Considered suicide:3	-.26	.77	.29	.12	-.49	-.02	.030	5%
Considered suicide:4	.18	1.20	.66	.12	-.05	.41	.119	1%
Considered suicide:5	-.19	.83	.52	.14	-.46	.08	.169	2%
Considered suicide:6	.01	1.01	.59	.21	-.40	.41	.974	1%
Planned suicide:1	.14	1.15	.21	.10	-.05	.33	.157	6%
Planned suicide:2	-.12	.88	.32	.09	-.30	.05	.166	1%
Planned suicide:3	-.04	.96	.36	.10	-.24	.16	.669	7%

Planned suicide:4	-.25	.78	.43	.11	-.47	-.03	.028	1%
Planned suicide:5	.05	1.05	.66	.15	-.25	.34	.761	3%
Planned suicide:6	-.32	.72	.42	.15	-.62	-.02	.034	8%
Attempted suicide:1	.29	1.34	.24	.12	.06	.53	.014	17%
Attempted suicide:2	-.08	.93	.33	.13	-.33	.18	.550	5%
Attempted suicide:3	-.06	.94	.36	.15	-.36	.23	.669	30%
Attempted suicide:4	-.34	.71	.39	.15	-.64	-.05	.023	4%
Attempted suicide:5	-.11	.89	.56	.17	-.44	.22	.502	6%
Attempted suicide:6	-.39	.67	.39	.20	-.80	.01	.053	18%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2009. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

c. 2011

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	UL	*p*	Missing information
(Intercept):1	**-1.98**	--	.14	.05	-2.07	-1.89	.000	0%
(Intercept):2	**-1.28**	--	.28	.03	-1.34	-1.21	.000	3%
(Intercept):3	**-1.13**	--	.32	.05	-1.22	-1.03	.000	0%
(Intercept):4	**-.69**	--	.50	.04	-.77	-.61	.000	2%
(Intercept):5	**-.56**	--	.57	.04	-.63	-.49	.000	2%
(Intercept):6	**-.70**	--	.50	.06	-.82	-.58	.000	3%
Extended sadness:1	-.01	.99	.14	.05	-.11	.10	.891	3%
Extended sadness:2	-.10	.91	.25	.06	-.22	.03	.134	1%
Extended sadness:3	-.15	.86	.28	.06	-.27	-.03	.013	1%
Extended sadness:4	-.10	.91	.46	.07	-.23	.04	.173	3%
Extended sadness:5	-.07	.93	.53	.07	-.21	.06	.275	10%
Extended sadness:6	-.24	.78	.39	.10	-.45	-.04	.021	2%
Considered suicide:1	-.15	.86	.12	.11	-.37	.06	.167	5%
Considered suicide:2	-.05	.95	.27	.08	-.21	.12	.572	7%
Considered suicide:3	.03	1.03	.33	.09	-.14	.20	.726	1%
Considered suicide:4	-.03	.97	.49	.12	-.26	.19	.770	5%
Considered suicide:5	-.07	.93	.53	.09	-.24	.11	.444	7%
Considered suicide:6	-.06	.94	.47	.17	-.39	.28	.729	2%

Planned suicide:1	-.07	.93	.13	.11	-.29	.14	.500	4%
Planned suicide:2	-.03	.97	.27	.12	-.26	.21	.816	2%
Planned suicide:3	-.22	.80	.26	.11	-.43	-.01	.040	1%
Planned suicide:4	-.25	.78	.39	.11	-.47	-.04	.021	5%
Planned suicide:5	-.27	.77	.44	.12	-.51	-.02	.033	3%
Planned suicide:6	.04	1.04	.52	.13	-.22	.29	.773	6%
Attempted suicide:1	.16	1.17	.16	.13	-.10	.42	.234	16%
Attempted suicide:2	-.10	.91	.25	.13	-.34	.15	.435	5%
Attempted suicide:3	-.26	.77	.25	.13	-.52	-.01	.036	22%
Attempted suicide:4	-.07	.93	.47	.13	-.34	.19	.575	42%
Attempted suicide:5	-.08	.92	.52	.11	-.29	.13	.446	25%
Attempted suicide:6	-.22	.80	.40	.19	-.60	.16	.253	20%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2011. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on p-values ≤ .001.

d. 2013

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept):1	**-1.80**	--	.17	.05	-1.89	-1.71	.000	2%
(Intercept):2	**-1.51**	--	.22	.05	-1.61	-1.41	.000	0%
(Intercept):3	**-1.47**	--	.23	.06	-1.59	-1.35	.000	1%
(Intercept):4	**-1.00**	--	.37	.04	-1.07	-.93	.000	2%
(Intercept):5	**-.88**	--	.41	.05	-.98	-.78	.000	1%
(Intercept):6	**-.89**	--	.41	.06	-1.01	-.77	.000	3%
Extended sadness:1	-.02	.98	.17	.07	-.16	.12	.766	4%
Extended sadness:2	**-.33**	.72	.16	.09	-.50	-.15	.000	2%
Extended sadness:3	-.22	.80	.18	.09	-.40	-.05	.012	2%
Extended sadness:4	**-.32**	.73	.27	.07	-.45	-.18	.000	3%
Extended sadness:5	-.28	.76	.31	.09	-.45	-.10	.002	0%
Extended sadness:6	-.17	.84	.34	.09	-.35	.01	.070	6%
Considered suicide:1	-.23	.79	.13	.10	-.42	-.05	.014	5%
Considered suicide:2	-.17	.85	.19	.10	-.36	.02	.082	4%

Considered suicide:3	-.27	.76	.17	.12	-.51	-.04	.022	3%
Considered suicide:4	-.05	.95	.35	.12	-.27	.18	.675	3%
Considered suicide:5	.10	1.11	.46	.15	-.19	.39	.489	2%
Considered suicide:6	-.33	.72	.30	.15	-.63	-.03	.029	5%
Planned suicide:1	-.25	.78	.13	.13	-.49	.00	.051	7%
Planned suicide:2	.13	1.14	.25	.11	-.08	.35	.218	4%
Planned suicide:3	-.01	.99	.23	.14	-.29	.28	.966	3%
Planned suicide:4	-.09	.91	.34	.10	-.29	.11	.363	4%
Planned suicide:5	.01	1.01	.41	.13	-.26	.27	.963	4%
Planned suicide:6	-.27	.77	.32	.16	-.59	.05	.101	5%
Attempted suicide:1	.34	1.41	.24	.15	.05	.63	.021	15%
Attempted suicide:2	-.10	.90	.20	.14	-.39	.19	.486	25%
Attempted suicide:3	-.05	.95	.22	.19	-.42	.32	.782	7%
Attempted suicide:4	-.20	.82	.30	.19	-.57	.18	.303	14%
Attempted suicide:5	-.22	.80	.33	.12	-.45	.01	.062	22%
Attempted suicide:6	.20	1.22	.50	.13	-.06	.45	.130	2%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2013. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

e. 2015

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept):1	**-1.57**	--	.21	.04	-1.65	-1.50	.000	7%
(Intercept):2	**-1.58**	--	.21	.05	-1.68	-1.47	.000	6%
(Intercept):3	**-1.63**	--	.20	.06	-1.76	-1.51	.000	1%
(Intercept):4	**-1.01**	--	.37	.06	-1.12	-.90	.000	3%
(Intercept):5	**-.77**	--	.46	.06	-.89	-.65	.000	0%
(Intercept):6	**-.81**	--	.45	.05	-.90	-.71	.000	3%
Extended sadness:1	-.12	.89	.19	.07	-.26	.03	.122	7%
Extended sadness:2	**-.41**	.66	.14	.11	-.62	-.20	.000	10%
Extended sadness:3	-.24	.79	.16	.08	-.40	-.08	.003	8%
Extended sadness:4	**-.34**	.71	.26	.07	-.48	-.20	.000	7%
Extended sadness:5	-.36	.69	.32	.12	-.60	-.13	.002	5%

Extended sadness:6	-.18	.83	.37	.08	-.35	-.02	.031	4%
Considered suicide:1	-.05	.95	.20	.13	-.31	.21	.695	3%
Considered suicide:2	-.09	.91	.19	.13	-.35	.17	.488	10%
Considered suicide:3	-.12	.88	.18	.12	-.36	.11	.303	12%
Considered suicide:4	-.08	.92	.34	.10	-.28	.11	.408	9%
Considered suicide:5	-.08	.93	.43	.13	-.32	.17	.551	6%
Considered suicide:6	-.33	.72	.32	.14	-.60	-.06	.015	14%
Planned suicide:1	-.15	.86	.18	.12	-.39	.09	.216	4%
Planned suicide:2	-.07	.94	.20	.15	-.37	.23	.666	8%
Planned suicide:3	-.28	.75	.15	.11	-.49	-.07	.008	7%
Planned suicide:4	-.13	.88	.33	.11	-.36	.09	.249	9%
Planned suicide:5	-.25	.78	.36	.13	-.51	.01	.063	1%
Planned suicide:6	-.07	.93	.42	.13	-.33	.18	.580	3%
Attempted suicide:1	.20	1.22	.26	.11	-.02	.41	.081	5%
Attempted suicide:2	.18	1.20	.25	.14	-.09	.45	.197	17%
Attempted suicide:3	-.04	.96	.19	.16	-.35	.27	.794	10%
Attempted suicide:4	.12	1.13	.42	.10	-.09	.33	.247	17%
Attempted suicide:5	-.07	.93	.43	.15	-.37	.24	.651	22%
Attempted suicide:6	-.17	.84	.38	.16	-.48	.14	.269	10%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2015. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on p-values ≤ .001.

f. 2017

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	95% CI UL	p	Missing information
(Intercept):1	**-1.50**	--	.22	.04	-1.59	-1.42	.000	1%
(Intercept):2	**-1.73**	--	.18	.06	-1.85	-1.62	.000	2%
(Intercept):3	**-1.66**	--	.19	.06	-1.77	-1.55	.000	3%
(Intercept):4	**-1.09**	--	.34	.04	-1.18	-1.00	.000	1%
(Intercept):5	**-.92**	--	.40	.04	-1.01	-.83	.000	2%
(Intercept):6	**-.99**	--	.37	.07	-1.13	-.86	.000	1%
Extended sadness:1	.01	1.01	.22	.07	-.13	.15	.892	3%
Extended sadness:2	-.15	.86	.15	.07	-.28	-.01	.031	8%

Extended sadness:3	**-.37**	.69	.13	.09	-.54	-.19	.000	23%
Extended sadness:4	-.18	.84	.29	.07	-.31	-.04	.009	2%
Extended sadness:5	-.16	.85	.34	.09	-.34	.01	.070	1%
Extended sadness:6	-.11	.90	.33	.08	-.27	.05	.175	8%
Considered suicide:1	-.17	.84	.18	.09	-.35	.01	.061	21%
Considered suicide:2	-.30	.74	.13	.11	-.51	-.08	.007	5%
Considered suicide:3	-.25	.78	.15	.16	-.56	.06	.113	10%
Considered suicide:4	-.26	.77	.26	.11	-.48	-.04	.018	6%
Considered suicide:5	-.06	.94	.38	.13	-.31	.19	.634	2%
Considered suicide:6	.05	1.06	.39	.16	-.27	.38	.743	4%
Planned suicide:1	-.05	.95	.21	.12	-.29	.19	.700	20%
Planned suicide:2	-.03	.97	.17	.12	-.26	.20	.813	18%
Planned suicide:3	-.05	.95	.18	.17	-.39	.28	.749	26%
Planned suicide:4	.02	1.02	.35	.18	-.32	.36	.911	1%
Planned suicide:5	-.09	.92	.37	.13	-.34	.16	.482	18%
Planned suicide:6	-.24	.79	.29	.13	-.50	.02	.070	1%
Attempted suicide:1	.14	1.15	.25	.15	-.18	.46	.357	49%
Attempted suicide:2	-.03	.97	.17	.13	-.30	.24	.822	41%
Attempted suicide:3	-.09	.92	.17	.23	-.57	.39	.711	48%
Attempted suicide:4	-.23	.80	.27	.14	-.51	.05	.108	11%
Attempted suicide:5	-.33	.72	.29	.19	-.73	.06	.080	43%
Attempted suicide:6	-.25	.78	.29	.16	-.58	.07	.128	20%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2017. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

g. 2019

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept):1	**-1.58**	--	.21	.05	-1.67	-1.49	.000	8%
(Intercept):2	**-1.94**	--	.14	.04	-2.03	-1.85	.000	3%
(Intercept):3	**-1.71**	--	.18	.05	-1.80	-1.62	.000	3%
(Intercept):4	**-1.06**	--	.35	.05	-1.15	-.97	.000	2%
(Intercept):5	**-.73**	--	.48	.04	-.80	-.65	.000	2%

(Intercept):6	**-.84**	--	.43	.06	-.95	-.73	.000	2%
Extended sadness:1	-.07	.93	.20	.07	-.21	.07	.301	6%
Extended sadness:2	-.27	.76	.11	.09	-.46	-.08	.004	2%
Extended sadness:3	**-.36**	.69	.12	.08	-.52	-.21	.000	7%
Extended sadness:4	**-.30**	.74	.26	.08	-.45	-.15	.000	1%
Extended sadness:5	**-.29**	.75	.36	.08	-.44	-.14	.000	2%
Extended sadness:6	-.05	.95	.41	.07	-.19	.09	.465	6%
Considered suicide:1	-.16	.86	.18	.10	-.35	.04	.114	14%
Considered suicide:2	.10	1.11	.16	.15	-.19	.39	.493	3%
Considered suicide:3	-.27	.77	.14	.15	-.56	.02	.073	4%
Considered suicide:4	-.23	.79	.28	.12	-.47	.01	.050	37%
Considered suicide:5	-.19	.83	.40	.11	-.40	.03	.089	1%
Considered suicide:6	.06	1.06	.46	.12	-.18	.30	.618	11%
Planned suicide:1	-.21	.81	.17	.10	-.41	.00	.050	15%
Planned suicide:2	-.04	.96	.13	.13	-.30	.22	.757	6%
Planned suicide:3	-.14	.87	.16	.18	-.48	.21	.432	5%
Planned suicide:4	-.14	.87	.30	.11	-.34	.07	.199	17%
Planned suicide:5	-.07	.93	.45	.12	-.30	.16	.553	5%
Planned suicide:6	-.29	.75	.32	.15	-.59	.00	.051	10%
Attempted suicide:1	.24	1.27	.27	.11	.02	.46	.027	37%
Attempted suicide:2	.17	1.18	.17	.16	-.15	.48	.302	14%
Attempted suicide:3	.08	1.08	.19	.14	-.19	.35	.564	16%
Attempted suicide:4	.13	1.14	.40	.16	-.20	.46	.406	44%
Attempted suicide:5	-.06	.94	.45	.15	-.37	.25	.702	42%
Attempted suicide:6	-.13	.88	.38	.15	-.42	.16	.371	23%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohort 2019. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on p-values $\leq$ .001.

Table E24

Regression Coefficients by Sex: All Dichotomous Psychological Distress Indicators as Predictors of Non-TV Screen Time, Average School Day

a. Girls

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept):1	**-1.36**	--	.26	.02	-1.41	-1.31	.000	0%
(Intercept):2	**-1.31**	--	.27	.03	-1.37	-1.24	.000	0%
(Intercept):3	**-1.25**	--	.29	.03	-1.32	-1.19	.000	0%
(Intercept):4	**-.84**	--	.43	.03	-.89	-.79	.000	1%
(Intercept):5	**-.72**	--	.49	.03	-.78	-.65	.000	1%
(Intercept):6	**-.86**	--	.42	.04	-.93	-.79	.000	2%
Extended sadness:1	**-.12**	.89	.23	.03	-.18	-.06	.000	2%
Extended sadness:2	**-.28**	.76	.21	.03	-.34	-.21	.000	2%
Extended sadness:3	**-.31**	.73	.21	.04	-.38	-.23	.000	1%
Extended sadness:4	**-.31**	.74	.32	.04	-.38	-.23	.000	2%
Extended sadness:5	**-.24**	.78	.38	.05	-.33	-.15	.000	0%
Extended sadness:6	-.10	.90	.38	.05	-.20	.00	.042	6%
Considered suicide:1	**-.18**	.83	.22	.04	-.27	-.10	.000	4%
Considered suicide:2	-.09	.91	.25	.05	-.19	.01	.076	4%
Considered suicide:3	-.17	.84	.24	.06	-.29	-.05	.005	3%
Considered suicide:4	-.05	.95	.41	.05	-.15	.06	.374	2%
Considered suicide:5	-.08	.92	.45	.07	-.21	.04	.199	3%
Considered suicide:6	-.09	.91	.38	.07	-.24	.06	.225	2%
Planned suicide:1	-.10	.90	.23	.05	-.19	-.01	.030	1%
Planned suicide:2	-.04	.96	.26	.05	-.14	.06	.413	3%
Planned suicide:3	-.17	.84	.24	.07	-.30	-.04	.011	11%
Planned suicide:4	-.14	.87	.37	.06	-.26	-.02	.018	2%
Planned suicide:5	-.06	.94	.46	.06	-.18	.07	.381	1%
Planned suicide:6	-.23	.80	.34	.07	-.37	-.08	.002	4%
Attempted suicide:1	.15	1.16	.30	.05	.05	.25	.004	4%
Attempted suicide:2	.02	1.02	.28	.06	-.11	.14	.812	5%
Attempted suicide:3	.01	1.01	.29	.08	-.14	.16	.933	15%
Attempted suicide:4	-.07	.94	.40	.07	-.20	.06	.316	5%
Attempted suicide:5	-.17	.84	.41	.07	-.31	-.03	.016	24%
Attempted suicide:6	.03	1.03	.43	.09	-.15	.20	.762	23%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohorts 2007-2019, girls only. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on *p*-values ≤ .001.

b. Boys

	Coefficient	Hazard ratio	Hazard rate	SE	95% CI LL	95% CI UL	*p*	Missing information
(Intercept):1	**-1.97**	--	.14	.02	-2.02	-1.93	.000	6%
(Intercept):2	**-1.43**	--	.24	.03	-1.48	-1.37	.000	1%
(Intercept):3	**-1.38**	--	.25	.03	-1.44	-1.33	.000	4%
(Intercept):4	**-.88**	--	.42	.02	-.92	-.84	.000	2%
(Intercept):5	**-.69**	--	.50	.02	-.73	-.65	.000	1%
(Intercept):6	**-.77**	--	.46	.03	-.83	-.71	.000	1%
Extended sadness:1	-.04	.96	.13	.05	-.14	.06	.412	2%
Extended sadness:2	**-.23**	.80	.19	.04	-.31	-.14	.000	3%
Extended sadness:3	**-.27**	.77	.19	.04	-.35	-.18	.000	6%
Extended sadness:4	**-.18**	.84	.35	.04	-.25	-.10	.000	3%
Extended sadness:5	**-.21**	.81	.41	.04	-.29	-.13	.000	3%
Extended sadness:6	-.15	.86	.40	.05	-.25	-.04	.008	5%
Considered suicide:1	-.16	.85	.12	.09	-.33	.01	.066	9%
Considered suicide:2	-.15	.86	.21	.06	-.27	-.03	.012	9%
Considered suicide:3	-.12	.89	.22	.07	-.25	.02	.086	4%
Considered suicide:4	-.09	.92	.39	.07	-.23	.06	.242	1%
Considered suicide:5	-.12	.89	.45	.07	-.25	.01	.074	2%
Considered suicide:6	-.07	.94	.43	.09	-.24	.11	.454	2%
Planned suicide:1	-.12	.89	.12	.08	-.28	.04	.141	7%
Planned suicide:2	-.12	.89	.21	.07	-.26	.02	.101	3%
Planned suicide:3	-.14	.87	.22	.07	-.28	-.01	.035	9%
Planned suicide:4	-.20	.82	.34	.07	-.34	-.07	.004	5%
Planned suicide:5	-.17	.85	.43	.07	-.31	-.02	.025	7%
Planned suicide:6	-.19	.83	.38	.08	-.35	-.02	.024	2%
Attempted suicide:1	**.31**	1.36	.19	.09	.12	.50	.001	26%
Attempted suicide:2	-.01	.99	.24	.08	-.18	.16	.930	19%

Attempted suicide:3	-.13	.87	.22	.11	-.35	.09	.213	39%
Attempted suicide:4	-.09	.92	.39	.09	-.28	.10	.337	46%
Attempted suicide:5	-.10	.91	.46	.09	-.28	.08	.286	25%
Attempted suicide:6	**-.37**	.69	.32	.10	-.56	-.18	.000	3%

Note. Ordinal regression on five reweighted imputations of raw data from YRBS cohorts 2007-2019, boys only. SE=standard error, CI=confidence interval, LL=lower limit, UL= upper limit. 1=Respondents reported less than 1 hour of non-TV screen-time; 2, 1 hour; 3, 2 hours; 4, 3 hours; 5, 4 hours; 6, 5 hours or more. Bold font indicates statistical significance, based on p-values $\leq .001$.

Appendix F

Comparison of Effect Sizes for Associations of Non-TV Screen Time with Psychological Distress

Table F1

Cohen's d *Effect Sizes for "Differences in Well-Being" Aßociated with Pairs of YRBS Non-TV Screen Time Categories (Twenge & Campbell, 2019)*

	h<1 vs. h ≥ 5	h<1 vs. h = 3	h=3 vs. h ≥ 5
Extended sadness, 2009-15	**-.36**	-.12	**-.26**
Consideration of suicide, 2009-15	**-.32**	-.10	-.21
Suicide planning, 2009-15	**-.30**	-.08	-.20
Attempted suicide, 2009-15	**-.29**	-.14	-.19
1 or more distress indicators, 2009-15	**-.42**	-.15	**-.27**
1 or more distress indicators, 2013-15	**-.45**	-.14	**-.30**

Note: h= hours of non-TV screen use, average school day. Bold font indicates effect size meets Twenge and Campbell (2019)'s minimum threshold (.24), as discussed in the body of the paper. Blue font indicates effect size meets their intermediate threshold (.34). Green font indicates effect size meets their upper threshold (.41).

Table F2

Cohen's d *Equivalents of Odds Ratios for Non-TV Screen Time as Predictor of Extended Sadness*

	All	2007	2009	2011	2013	2015	2017	2019	Girls	Boys
Less than 1 hour	-0.12	-0.17				-0.13				
1 hour		-0.19					-0.20			
2 hours										
3 hours									0.14	
4 hours	0.13							0.23	**0.27**	
5 hours or more	**0.29**	0.19	**0.28**	**0.25**	**0.33**	**0.40**	0.23	**0.33**	**0.40**	**0.30**
Differences:										
h<1 vs. h ≥ 5	**0.41**	**0.36**				**0.53**				
h<1 vs. h = 3										
h=3 vs. h ≥ 5									**0.26**	

Note: Bold font indicates effect size meets Twenge and Campbell (2019)'s minimum threshold (.24), as discussed in the body of the paper. Blue font indicates effect size meets their intermediate threshold (.34). Green font indicates effect size meets their upper threshold (.41). Only effect sizes associated with statistically significant ($p \leq .001$) are compared in the difference table.

Table F3

Cohen's d *Equivalents of Odds Ratios for Non-TV Screen Time as Predictor of Consideration of Suicide*

	All	2007	2009	2011	2013	2015	2017	2019	Girls	Boys
Less than 1 hour										
1 hour	-0.10									
2 hours										
3 hours					0.22				0.15	
4 hours	0.13							**0.24**	**0.24**	
5 hours or more	**0.35**	0.20	**0.35**	**0.33**	**0.38**	**0.37**	**0.31**	**0.36**	**0.41**	**0.38**
Differences:										
h<1 vs. h ≥ 5										
h<1 vs. h = 3										
h=3 vs. h ≥ 5									**0.26**	

Note: Bold font indicates effect size meets Twenge and Campbell (2019)'s minimum threshold (.24), as discussed in the body of the paper. Blue font indicates effect size meets their intermediate threshold (.34). Green font indicates effect size meets their upper threshold (.41). Only effect sizes associated with statistically significant ($p \leq .001$) are compared in the difference table.

Table F4

Cohen's d *Equivalents of Odds Ratios for Non-TV Screen Time as Predictor of Suicide Planning*

	All	2007	2009	2011	2013	2015	2017	2019	Girls	Boys
Less than 1 hour			-0.22							
1 hour	-0.10									
2 hours										
3 hours									0.15	
4 hours	0.12		-0.08					0.18	0.19	
5 hours or more	**0.36**		**0.30**	**0.36**	**0.38**	**0.40**	**0.30**	**0.39**	**0.41**	**0.39**
Differences:										
h<1 vs. h ≥ 5			**0.52**							
h<1 vs. h = 3										
h=3 vs. h ≥ 5									**0.26**	

Note: Bold font indicates effect size meets Twenge and Campbell (2019)'s minimum threshold (.24), as discussed in the body of the paper. Blue font indicates effect size meets their intermediate threshold (.34). Green font indicates effect size meets their upper threshold (.41). Only effect sizes associated with statistically significant (p≤.001) are compared in the difference table.

Table F5

Cohen's d *Equivalents of Odds Ratios for Non-TV Screen Time as Predictor of Attempted Suicide (Dichotomous)*

	All	2007	2009	2011	2013	2015	2017	2019	Girls	Boys
Less than 1 hour	-0.14		**-0.29**							-0.22
1 hour	-0.18									**-0.25**
2 hours	-0.11									
3 hours										
4 hours									0.16	
5 hours or more	**0.25**		**0.30**	**0.31**		0.23	**0.27**		**0.30**	**0.25**
Differences:										
h<1 vs. h ≥ 5	**0.39**		**0.59**							**0.57**
h<1 vs. h = 3										
h=3 vs. h ≥ 5										

Note: Bold font indicates effect size meets Twenge and Campbell (2019)'s minimum threshold (.24), as discussed in the body of the paper. Blue font indicates effect size meets their intermediate threshold (.34). Green font indicates effect size meets their upper threshold (.41). Only effect sizes associated with statistically significant ($p \leq .001$) are compared in the difference table.

References

Anderson, C.A. & Dill, K.E. (2000). Video games and aggressive thoughts, feelings, and behavior in the laboratory and in life. *Journal of Personality and Social Psychology, 78* (4), 772-790. https://doi.org/10.1037//O022-3514.78.4.772

Anderson, L.A., Steen, E. & Stavropoulos (2017). Internet use and problematic internet use: A systematic review of longitudinal research trends in adolescence and emergent adulthood. *International Journal of Adolescence and Youth*, *22*(4), 430-454. https://doi.org/10.1080/02673843.2016.1227716

Apple (2007). Retrieved August 14, 2021, from https://www.apple.com/newsroom/2007/01/09Apple-Reinvents-the-Phone-with-iPhone/

Apple (2010). Retrieved August 14, 2021, from https://www.apple.com/newsroom/2010/03/05iPad-Available-in-US-on-April-3/

Babic, M.J., Smith, J.J., Morgan, P.J., Eather, N., Plotnikoff, R.C. & Lubans, D.R. (2017). Longitudinal associations between changes in screen-time and mental health outcomes in adolescents. *Mental Health and Physical Activity, 12*, 124-131. https://doi.org/10.1016/j.mhpa.2017.04.001

Barry, C.T., Sidoti, C.L.,Briggs, S.M., Reiter,S.R. & Lindsey, R.A. (2017). Adolescent social media use and mental health from adolescent and parent perspectives. *Journal of Adolescence, 61*, 1-11. https://doi.org/10.1016/j.adolescence.2017.08.005

Barthorpe, A., Winstone, L., Mars, B. and Moran, P. (2020). Is social media time really associated with poor adolescent mental health? A time use diary study. *Journal of Affective Disorders, 274*, 864-870. https://doi.org/10.1016/j.jad.2020.05.106

Bélair, M-A., Kohen, D.E., Kingsbury M. & Colman, I. (2018). Relationship between leisure time physical activity, sedentary behaviour and symptoms of depression and anxiety: evidence from a population- based sample of Canadian adolescents. *BMJ Open,8* (e021119). https://doi.org/10.1136/bmjopen-2017-021119

Berry, K.J., Johnston, J.E. & Mielke, P.W. (2006). A measure of effect size for RxC contingency tables. *Psychological Reports, 99*, 251-256. https://doi.org/10.2466/PR0.99.5.251-256

Best, P., Manktelow, R., & Taylor, B. (2014). Online communication, social media and adolescent wellbeing: A systematic narrative review. *Children and Youth Services Review, 41*, 27–36. https://doi.org/10.1016/j.childyouth.2014.03.001

Beyens, I., Pouwels, J.L., van Driel, I.I., Keijsers, L., & Valkenburg, P.M. (2020). The effect of social media on well-being differs from adolescent to adolescent. *Scientific Reports, 10(*10463*).* https://doi.org/10.1038/s41598-020-67727-7

Boer, M., van den Eijnden, R.J.J., Boniel-Nissim, M., Wong, S-L., Inchley, J.C., Badura, P., Craig, W.M., Gobina, I., Kleszczewska, D., Klanšček & Stevens, G.W.M.J. (2020). Adolescents' intense and problematic social media use and their well-being in 29 countries. *Journal of Adolescent Health*, 66, S89-S99. https://doi.org/10.1016/ j.jadohealth.2020.02.014

Boers, E., Afzali M.H., & Conrod, P. (2020). Temporal associations of screen time and anxiety symptoms among adolescents. *The Canadian Journal of Psychiatry, 65*(3), 206-208. https://doi.org/10.1177/0706743719885486

Boers, E., Afzali M.H., Newton,N. & Conrod, P. (2019). Association of screen time and depression in adolescence. *JAMA Pediatrics, 173*(9), 853-859. https://doi.org/10.1001/jamapediatrics.2019.1759

Boeschoten, L., Ausloos, J., Möller, J.E., Araujo, T., & Oberski, D.L. (2020). A framework for digital trace collection through data donation. ArXiv. https://arxiv.org/abs/2011.09851v1

Boone, J.E., Gordon-Larsen, P., Adair, L.S. & Popkin, B.M. (2007). Screen time and physical activity during adolescence: longitudinal effects on obesity in young adulthood. *International Journal of Behavioral Nutrition and Physical Activity, 4*, 26-36. https://doi.org/10.1186/1479-5868-4-26

Booker, C. L., Skew, A. J., Kelly, Y. J., & Sacker, A. (2015). Media use, sports participation, and well-being in adolescence: Cross-sectional findings from the UK Household longitudinal study. *American Journal of Public Health, 105*(1), 173-179. https://doi.org/ 10.2105/AJPH.2013. 301783

Brener, N.D., Billy, J.O.G., and Grady, W.R. (2003) Assessment of factors affecting the validity of self-reported health-risk behavior among adolescents: Evidence from the scientific literature. *Journal of Adolescent Health, 33*, 436-457. https://doi.org/10.1016/S1054-139X(03)00052-1

Burke, M. & Kraut, R.E. (2016). The relationship between facebook use and well-being depends on communication type and tie strength. *Journal of Computer Mediated Communication, 21*(4),265–281. https://doi.org/10.1111/ jcc4.12162

Burke, M., Marlow, C. & Lento, T. (2010). Social network activity and social well-being. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems,3,* (1909-1912). https://doi.org/10.1145/1753326.1753613

Bürkner, P.-C. & Vuorre, M. (2019). Ordinal regression models in psychology: A tutorial. *Advances in Methods and Practices in Psychological Science, 2*(1),77-101. https://doi.org/10.1177%2F2515245918823199

Busch, V., Manders, L.A., & de Leeuw, J. R.J. (2013). Screen time associated with health behaviors and outcomes in adolescents. *American Journal of Health Behavior*, *37*(6), 819-830. https://doi.org/10.5993/AJHB.37.6.11

Cain, N. & Gradisar, M. (2010) Electronic media use and sleep in school-aged children and adolescents: a review. *Sleep Medicine,11*(8):735-42. https://doi.org/10.1016/ j.sleep.2010.02.006

Calandri, E., Graziano, F., & Rollé, L. (2021). Social media, depressive symptons and well-being in early adolescence: The moderating role of emotional self-efficacy and gender. *Frontiers in Psychology, 12*(660740). https://doi.org/10.3389/fpsyg.2021.660740

Cantril, H. (1966). *The Pattern of Human Concerns.* Rutgers University Press.

Carter, B., Rees, P., Hale, L., Bhattacharjee, D. & Paradkar, M. (2016). A meta-analysis of the effect of media devices on sleep outcomes. *JAMA Pediatrics,170*(12),1202–1208. https://doi.org/10.1001/jamapediatrics.2016.2341.

Casiano, H., Kinley, D.J., Katz, L.Y., Chartier, M.J. & Sareen, J. (2012). Media use and health outcomes in adolescents: Findings from a nationally representative survey. *Journal of the Canadian Academy of Child and Adolescent Psychiatry,21*(4), 296-301.

Centers for Disease Control and Prevention (2007). *Youth Risk Behavior Survey Data* [Data set]. Centers for Disease Control and Prevention. https://www.cdc.gov/healthyyouth/data/ yrbs/data.htm.

____________ (2008). 2007 *National YRBS Data Users Manual.* Retrieved February 22, 2020, from ftp.cdc.gov/pub/data/yrbs/2007/YRBS_2007_National_User_Guide.pdf

____________ (2009). *Youth Risk Behavior Survey Data*. [Data set]. Centers for Disease Control and Prevention. https://www.cdc.gov/healthyyouth/data/yrbs/data.htm.

____________ (2010). 2009 *National YRBS Data Users Manual.* Retrieved February 22, 2020, from ftp.cdc.gov/pub/data/yrbs/2009/YRBS_2009_National_User_Guide.pdf

____________ (2011). *Youth Risk Behavior Survey Data*. [Data set]. Centers for Disease Control and Prevention. https://www.cdc.gov/healthyyouth/data/yrbs/data.htm.

____________ (2012). 2011 *National YRBS Data Users Manual.* Retrieved February 22, 2020, from ftp.cdc.gov/pub/data/yrbs/2011/YRBS_2011_National_User_Guide.pdf

____________ (2013a). *Youth Risk Behavior Survey Data*. [Data set]. Centers for Disease Control and Prevention. https://www.cdc.gov/healthyyouth/data/yrbs/data.htm.

____________ (2013b). Methodology of the Youth Risk Behavior Surveillance System -- 2013. *Morbidity and Mortality Weekly Report Recommendations and Reports*, 62(1).

____________ (2014). 2013 *National YRBS Data Users Manual.* Retrieved February 22, 2020, from ftp.cdc.gov/pub/data/yrbs/2013/YRBS_2013_National_User_Guide.pdf

_____________ (2015). *Youth Risk Behavior Survey Data*. [Data set]. Centers for Disease Control and Prevention. https://www.cdc.gov/healthyyouth/data/yrbs/data.htm.

_____________ (2016). 2015 *National YRBS Data Users Manual.* Retrieved February 22, 2020, from www.cdc.gov/healthyyouth/data/yrbs/pdf/2015/2015_yrbs-data-users_guide_smy_combined.pdf

_____________ (2017a). *Youth Risk Behavior Survey Data*. [Data set]. Centers for Disease Control and Prevention. https://www.cdc.gov/healthyyouth/data/yrbs/data.htm.

_____________ (2017b) *Software for Analysis of YRBS Data.* Retrieved February 22, 2020, from www.cdc.gov/healthyyouth/data/yrbs/pdf/2017/2017_YRBS_analysis_software.pdf

_____________ (2018a). 2017 *National YRBS Data Users Manual.* Retrieved February 22, 2020, from www.cdc.gov/healthyyouth/data/yrbs/pdf/2017/2017_YRBS_Data_Users_Guide.pdf

_____________(2018b). *YRBS Questionnaire Content - 1991-2019*. Retrieved February 22, 2020, from www.cdc.gov/healthyyouth/data/yrbs/questionnaires.htm

_____________(2018c). *Combining YRBS Data Across Years and Sites*. Retrieved January 31, 2019, from www.cdc.gov/healthyyouth/data/yrbs/pdf/yrbs_combining_data.pdf

_____________ (2019). *Youth Risk Behavior Survey Data* [Data set]. Centers for Disease Control and Prevention. https://www.cdc.gov/ healthyyouth/data/yrbs/data.htm.

_____________ (2020). 2019 *National YRBS Data Users Manual.* Retrieved September 30, 2020, from www.cdc.gov/healthyyouth/data/yrbs/pdf/2019/2019_National_YRBS_Data_Users_Guide.pdf

Chinn, S. (2000). A simple method for converting an odds ratio to effect size for use in meta-analysis. *Statistics in Medicine, 19*, 3127-3131. https://doi.org/10.1002/ 1097-0258(20001130)19:22<3127::AID-SIM784>3.0.CO;2-M

Coyne, S.M., Rogers, A.A., Zurcher, J.D., Stockdale, L. & Booth, M. (2020). Does time spent using social media impact mental health? An eight year longitudinal study. *Computers in Human Behavior, 104,*106160. https://doi.org/10.1016/j.chb.2019.106160

Crespo, C.J., Smit, E., Troiano, R.P. ,Bartlett, S.J., Macera, C.A. & Andersen, R.E. (2001). Television watching, energy intake, and obesity in U.S. children: Results from the Third National Health and Nutrition Examination Survey, 1988-1994. *Archives of Pediatric and Adolescent Medicine, 155*, 360-365.

Critcher, C. (2008) Making waves: Historical aspects of public debates about children and mass media. In: Drotner, K. and Livingstone, S., (Eds.) *The International Handbook of Children, Media and Culture* (99-103). SAGE.

Cunningham, A.S., Engelstätter, B. & Ward, M.R. (2011). *Understanding the Effects of Violent Video Games on Violent Crime*. Zentrum für Europäische Wirtschaftsforschung GmbH/ Centre for European Economic Research. http://ftp.zew.de/pub/ zew-docs/dp/dp11042.pdf

Curtin, S.C., Hedegaard, H., Minino, A., Warner, M. & Simon, T. (2017). Suicide rates for teens aged 15–19 years, by sex — United States, 1975–2015. *Mortality and Morbitity Weekly Report, 66*(30), 816.

Daly, M. (2018). Social-media use may explain little of the recent rise in depressive symptoms among adolescent girls. *Clinical Psychological Science,6* (3), 295. https://doi.org/10.1177/2167702617750869

De Jong, E., Visscher, T.L.S., HiraSing, R.A., Heymans, M.H., Seidell, J.C. & Renders, C.M. (2013). Association between TV viewing, computer use and overweight, determinants and competing activities of screen time in 4- to 13-year-old children. *International Journal of Obesity, 37,* 47-53. https://doi.org/10.1038/ijo.2011.244

Dickson, K., Richardson, M., Kwan, I., MacDowall, W., Burchett, H., Stansfield, C., Brunton, G., & Sutcliffe, K.T.J. (2018) *Screen-based activities and children and young people's mental health: A systematic map of reviews.* EPPI-Centre, Social Science Research Unit, UCL Institute of Education, University College London. https://eppi.ioe.ac.uk/cms/Portals/0/PDF%20reviews%20and%20summaries/Systematic%20Map%20of%20Reviews%20on%20Screen-based%20activties_08.01.19.pdf?ver=2019-01-29-155200-517

Diener, E., Wirtz, D., Tov, W., Kim-Prieto, C., Choi, D., Oishi, S., & Biswas-Diener, R. (2010). New well-being measures: Short scales to assess flourishing and positive and negative feelings. *Social Indicators Research, 97*, 143-156. https://doi.org/10.1007/s11205-009-9493-y

Dolev-Cohen, M., & Barak, A. (2013). Adolescents' use of Instant Messaging as a means of emotional relief. *Computers in Human Behavior*, *29*, 58–63. https://doi.org/10.1016/j. chb.2012.07.016

Ellis, D. A. (2019). Are smartphones really that bad? Improving the psychological measurement of technology related behaviors. *Computers in Human Behavior, 97*, 60-66. https://doi.org/10.1016/j.chb.2019.03.006

Ellison, N. B., Steinfeld, C., & Lampe, C. (2007). The benefits of Facebook "friends": Social capital and college students' use of online social network sites. *Journal of Computer-Mediated Communication, 12*(4), 1143–1168. https://doi.org/10.1111/j.1083-6101.2007.00367.

Ferguson, C.J. (2009). An effect size primer: A guide for clinicians and researchers. *Professional Psychology: Research and Practice, 40*(5), 532-538. https://doi.org/ 10.1037/a0015808

Ferguson, C.J. & Kilburn, J. (2009). The public health risks of media violence: A meta-analytic review. *The Journal of Pediatrics*, *154*(5), 759-763. https://doi.org/10.1016/j.jpeds.2008.11.033

Foster, J.D. & Jackson, M.H. (2019). Measurement confounds in study on social media usage and adolescent life satisfaction. *Proceedings of the National Academy of Sciences of the United States of America, 116* (31), 15333. https://doi.org/10.1073/pnas.1908385116

Frison, E. & Eggermont, S. (2017). Browsing, posting, and liking on Instagram: The reciprocal relationships between different types of Instagram use and adolescents' depressed mood. *Cyberpsychology, Behavior, and Social Networking, 20* (10), 603-609. https://doi.org/10.1089/ cyber.2017.0156

Gebremariam, M.K., Bergh, I.H., Andersen, L.F., Ommundsen, Y., Totland, T.H., Bjelland, M., Grydeland, M. & Lien, N. (2013) Are screen-based sedentary behaviors longitudinally associated with dietary behaviors and leisure-time physical activity in the transition into adolescence? *International Journal of Behavioral Nutrition and Physical Activity, 10*(9). http://www.ijbnpa.org/content/10/1/9

George, M.J. & Odgers, C.L. (2015). Seven fears and the science of how mobile technologies may be influencing adolescents in the digital age. *Perspectives on Psychological Science, 10*(6), 832-851. https://doi.org/10.1177/1745691615596788

George, M.J. Russell, M.A., Piontack,J.R. & Odgers, C.L. (2018). Concurrent and subsequent associations between daily digital technology use and high-risk adolescents' mental health symptoms. *Child Development, 89*(1),78–88. https://doi.org/10.1111/cdev.12819

Goldfield, G.S., Cameron, J.D., Murray, M., Maras, D., Wilson, A.L., Phillips, P., Kenny, G.P., Hadjiyannakis, S., Alberga, A.S., Tullock, H., Doucette, S. & Sigal, R.J. (2015). Screen time is independently associated with health-related quality of life in overweight and obese adolescents. *Acta Pediatrica,104*, e448-e454. https://doi.org/10.1111/apa.13073

Goodman, R. (1997). The Strengths and Difficulties Questionnaire: A research note. T*he Journal of Child Psychology and Psychiatry, 38*(5), 581-586. https://doi.org/10.1111/ j.1469-7610.1997.tb01545.x |

Gunnell, K.E., Flament, M.F., Buchholz, A., Henderson, K.A., Obeid, N., Schubert, N. & Goldfield, G.S. (2016). Examining the bidirectional relationship between physical activity, screen time, and symptoms of anxiety and depression over time during adolescence. *Preventive Medicine, 88*, 147-152. https://doi.org/10.1016/ j.ypmed.2016.04.002

Halbrook, Y.J., O'Donnell, A.T. & Msefti, R.M. (2019) When and how video games can be good: A review of the positive effects of video games on well-being. *Perspectives on Psychological Science, 14*(6), 1096-1104. https://doi.org//10.1177/1745691619863807

Heffer, T., Good, M., Daly, O., MacDonell. E. & Willoughby,T. (2019). The longitudinal association between social-media use and depressive symptoms among adolescents and young adults: An empirical reply to Twenge et al. (2018). *Clinical Psychological Science, 7*(3), 462-470. https://doi.org/10.1177/216770261812727

Hellström, C., Nilsson, K.W., Leppert, J. & Åslund, C. (2015). Effects of adolescent online gaming time and motives on depressive, musculoskeletal, and psychosomatic symptoms. *Upsala Journal of Medical Sciences, 120*, 263-275. https://doi.org/10.3109/ 03009734.2015.1049724

Hoare, E., Milton, K., Foster, C. and Allender, S. (2016). The associations between sedentary behaviour and mental health among adolescents: a systematic review. *International Journal of Behavioral Nutrition and Physical Activity,13*:108. https://doi.org/10.1186/s12966-016-0432-4

Hoge, E., Bickham, D., and Cantor, J. (2017). Digital media, anxiety, and depression in children. *Pediatrics, 140* (s2), S77-S80. https://doi.org/10.1542/peds.2016-1758G

Houghton, S., Lawrence, D., Hunter, S.C., Rosenberg, M., Zadow, C., Wood, L. & Shilton, T. (2018). Reciprocal relationships between trajectories of depressive symptoms and screen media use during adolescence. *Journal of Youth and Adolescence, 47,* 2453–2467. https://doi.org/10.1007/s10964-018-0901-y

Huesmann, L.R. (2008). The impact of electronic media violence: Scientific theory and research. *Journal of Adolescent Health, 41*, S6-S13. https://doi.org/:10.1016/j.jadohealth.2007.09.005

Horowitz, J. (2021, December 9). Senators want social-media apps to share research. *The Wall Street Journal.* https://www.wsj.com/articles/senators-want-social-media-apps-to-share-research-11639044001?reflink=desktopwebshare_permalink

Hughes. M.R., Gaines, J.S. & Pryor, D.W. (2015) Staying awayfrom school: Adolescents who miss school due to feeling unsafe. *Youth Violence and Juvenile Justice, 13*(3), 270-290. https://doi.org/10.1177/1541204014538067

Ipsos MORI (2015). *2015 Health and Wellbeing of 15 year olds in England – What About YOUth? Survey 2014 Technical Report,* Health and Social Care Information Centre. https://www.ipsos.com/ipsos-mori/en-uk/health-and-wellbeing-15-year-olds-england

Jensen, M., George, M.J., Russell, M.R., & Odgers, C.L. (2019). Young adolescents' digital technology use and mental health symptoms: Little evidence of longitudinal or daily linkages. *Clinical Psychological Science, 7*(6), 1416-1433. https://doi.org/10.1177/ 2167702619859336

Johannes, N., Vuorre, M., & Przybylski, A.K. (2021) Video game play is positively correlated with well-being. *Royal Society Open Science*, (8) 202049. https://doi.org/10.1098/rsos.202049

Johnson, M.K., Staff, J.,Patrick, M.E. & Schulenberg, J.E. (2017). Adolescent adaptation before, during and in the aftermath of the Great Recession in the USA. *International Journal of Psychology, 52* (1), 9–18. https://doi.org/110.1002/ijop.12389

Kann, L., McManus, T., Harris, W.A.,Shanklin, S.L., Flint, K.H.,Hawkins, J.,Queen, B., Lowry,R. , Olsen, E.O., Chyen, D.,Whittle, L.,Thornton, J.,Lim, C.,Yamakawa, Y., Nancy Brener, N., & Zaza, S. (2016). Youth risk behavior surveillance — United States, 2015. *Morbidity and Mortality Weekly Report Surveillance Summaries,65*(6).

Kardefelt-Winther, D., Rees, G. & Livingstone, S. (2020). Contextualizing the link between adolescents' use of digital technology and their mental health: A multi-country study of the time spent online and life satisfaction. *The Journal of Child Psychology and Psychiatry, 61* (8), 875-889. https://doi.org/10.1111/jcpp.13280

Kelly, Y., Zilanawala, A., Booker, C., & Sacker, A. (2018) Social media use and adolescent mental health: Findings from the UK Millennium Cohort Study. *EClinical Medicine, 6*, 59-68. https://doi.org/10.1016/j.eclinm.2018.12.005

Kenney, E.L. & Gortmaker, S.L. (2017). United States adolescents' television, smartphone, videogame and tablet use: Associations with sugary drinks, sleep, physical activity, and obesity. *The Journal of Pediatrics (182)*, 144-149. https://doi.org/10.1016/j.jpeds.2016.11.015

Keyes, K.M., Gary, D., O'Malley, P.M. & Schulenberg, J. (2019). Recent increases in depressive symptoms among US adolescents: trends from 1991 to 2018. *Social Psychiatry and Psychiatric Epidemiology ,54*, 987–996. https://doi.org/10.1007/s00127-019-01697-8

Khan, A. & Burton, N.W. (2017). Is physical inactivity associated with depressive symptoms among adolescents with high screen time? Evidence from a developing country. *Mental Health and Physical Activity 12*, 94-99. https://doi.org/10.1016/j.mhpa.2017.03.001

Khouja, J.N., Munafò, M.R., Tilling, K., Wiles, N.J., Joinson, C., Etchells, P.J., John, A., Hayes, F.M., Gage, S.H. & Cornish, R.P. (2019) Is screen time associated with anxiety or depression in young people? Results from a UK birth cohort. *BMC Public Health,19*:82. https://doi.org/10.1186/s12889-018-6321-9

Kovacs, M.(2015) Children's Depression Inventory (CDI and CDI 2). In: *The Encyclopedia of Clinical Psychology*, Wiley. https://doi.org/10.1002/9781118625392.wbecp419

Kremer, P., Elshaug, C., Leslie, E., Toumbourou, J.W., Patton, G.C. & Williams, J. (2014) .Physical activity, leisure-time screen time and depression among children and young adolescents *Journal of Science and Medicine in Sport, 17,*183–187. https://doi.org/10.1016/j.jsams.2013.03.012

Kreski, N., Platt, J., Rutherford, C., Olfson, M., Odgers, C., Schulenberg, J. & Keyes, K.M. (2021). Social media use and depressive symptoms among United States adolescents. *Journal of Adolescent Health, 68*, 572-579. https://doi.org/10.1016/ j.jadohealth.2020.07.006

Kühn, S., Kugler, D. T., Schmalen, K., Weichenberger, M., Witt, C., & Gallinat, J. (2019). Does playing violent video games cause aggression? A longitudinal intervention study. *Molecular Psychiatry, 24*(8), 1220–1234. https://doi.org/10.1038/s41380-018-0031-7

Lemola, S., Perkinson-Gloor, N., Brand,S., Dewald-Kaufmann, J.F. & Grob, A. (2015) Adolescents' electronic media use at night, sleep disturbance, and depressive symptoms in the smartphone age. *Journal of Youth and Adolescence,44*, 405–418. https://doi.org/10.1007/s10964-014-0176-x

Lenhart, A. (2015). *Teens, Social Media & Technology Overview 2015.* Pew Research Foundation. https://www.pewresearch.org/internet/2015/04/09/teens-social-media-technology-2015/

Li, X., Buxton, O.M., Lee, S., Chang, A-M., Berger, L.M. & Hale, L.. (2019) . Sleep mediates the association between adolescent screen time and depressive symptoms. *Sleep Medicine, 57,* 51-60. https://doi.org/10.1016/j.sleep.2019.01.029

Liddell, T.M. & Kruschke, J.K. (2018) Analyzing ordinal data with metric models: What could possibly go wrong? *Journal of Experimental Social Psychology, 79*, 328-348. https://doi.org/10.1016/j.jesp.2018.08.009

Lin, M., Lucas, H.C. Jr. & Shmueli, G. (2013) Research commentary: Too big to fail: Large samples and the *p*-value. *Information Systems Research, 24*(4), 906-917. https://doi.org/ 10.1287/ isre.2013.0480

Liu, M., Wu, L. & Yao, S. (2016). Dose–response association of screen time-based sedentary behaviour in children and adolescents and depression: a meta-analysis of observational studies. *British Journal of Sports Medicine, 6* (50),1252–1258. https://doi.org/10.1136/bjsports-2015-095084

Lumley, T. (2019). mitools: Tools for Multiple Imputation of Missing Data (R Package Version 2.4) [Computer software]. CRAN. https://cran.r-project.org/package=mitools

Lumley, T. (2020). survey: Analysis of Complex Survey Samples (R Package Version 4.0) [Computer software]. R-Forge. http://r-survey.r-forge.r-project.org/survey/

Lumley, T. (2021). svyVGAM: Design-Based Inference in Vector Generalised Linear Models (R Package Version 1.0) [Computer software]. CRAN. https://cran.r-project.org/ package=svyVGAM

Maras, D., Flament, M.F., Murray, M., Buchholz, A., Henderson, K.A., Obeid, N. & Goldfield, G.S. (2015). Screen time is associated with depression and anxiety in Canadian youth. *Preventive Medicine, 73,*133–138. https://doi.org/10.1016/j.ypmed.2015.01.029

Marino, C. (2018). Quality of social-media use may matter more than frequency of use for adolescents' depression. *Clinical Psychological Science, 6*(4), 455. https://doi.org/10.1177/ 2167702618771979

Mathers, M., Canterford, L., Olds, T., Hesketh, K., Ridley, K. & Wake, M. (2009) Electronic media use and adolescent health and well-being: Cross-sectional community study. *Academic Pediatrics,9(*5), 307-l4.

Messias, E., Castro, J., Saini, A., Usman, M. & Peeples, D. (2011) Sadness, suicide, and their association with video game and internet overuse among teens: Results from the Youth Risk Behavior Survey, 2007 and 2009. *Suicide and Life-Threatening Behavior 41*(3), 307-315.

Miech, R.A., Johnston, L.D., Bachman. J.G., O'Malley, P.M. & Schulenberg, J.E. (2018). *Monitoring the Future: A Continuing Study of American Youth (8th- and 10th-Grade Surveys), 2018: ICPSR Codebook*. Inter-university Consortium for Political and Social Research.

Miron, O., Yu, K-H.,Wilf-Miron, R. & Kohane, I.S. (2019). Suicide rates among adolescents and young adults in the United States, 2000-2017. *Journal of the American Medical Association, 321*(23), 2362-2364.

Mojtabai, R., Olfson, M. & and Han, B. (2016). National trends in the prevalence and treatment of depression in adolescents and young adults. *Pediatrics,138*(6), e20161878. https://doi.org/10.1542/peds.2016-1878

Nesi, J., Miller, A. B., & Prinstein, M. J. (2017). Adolescents' depressive symptoms and subsequent technology-based interpersonal behaviors: A multi-wave study. *Journal of Applied Developmental Psychology, 51*, 12–19. https://doi.org/10.1016/j.appdev.2017.02.002

Nesi, J., & Prinstein, M. J. (2015). Using social media for social comparison and feedback-seeking: Gender and popularity moderate associations with depressive symptoms. *Journal of Abnormal Child Psychology, 43*, 1427–1438. https://doi.org/10.1007/s10802-015-0020-0

Odgers, C.L. and Jensen, M.R. (2020). Annual research review: Adolescent mental health in the digital age: Facts, fears, and future directions. *Journal of Child Psychology and Psychiatry, 61*(3), 336-348. https://doi.org/10.1111/jcpp.13190

Ohannessian, C. M. (2009). Media use and adolescent psychological adjustment: An examination of gender differences. *Journal of Child and Family Studies*, *18*, 582–593. https://doi.org/10.1007/ s10826-009-9261-2

Ophir, Y., Lipshits-Braziler, Y. & Rosenberg, H. (2019). New-media screen time is not (necessarily) linked to depression: Comments on Twenge, Joiner, Rogers, and Martin (2018). *Clinical Psychological Science.* Advance online publication. https://doi.org/10.1177/ 2167702619849412

Orben, A. & Przybylski, A.K. (2019a). The association between adolescent well-being and digital technology use. *Nature Human Behaviour,3,*173-182. https://doi.org/10.1038/ s41562-018-0506-1

___________________________ (2019b). Screens, teens, and psychological well-being: Evidence from three time-use diary studies. *Psychological Science, 30*(5), 682-696). https://doi.org/10.1177/ 0956797619830329

____________________________(2020). Teenage sleep and technology engagement across the week. *PeerJ,8,* e8427. https://doi.org/10.7717/peerj.8427

Orben, A. (2020). Teenagers, screens and social media: a narrative review of reviews and key studies. *Social Psychiatry and Psychiatric Epidemiology.* Advance online publication. https://doi.org/10.1007/s00127-019-01825-4

Orben, A., Dienlin, T. & Przybylski, A.K. (2019). Social media's enduring effect on adolescent life satisfaction. *Proceedings of the National Academy of Sciences of the United States of America, 116* (21), 10226-10228. https://doi.org/10.1073/pnas.1902058116

Oshima, N., Nishida,A., Shimodera, S., Tochigi, M., Ando, S., Yamasaki,S., Okazaki, Y. & Sasaki, T.(2012). The suicidal feelings, self-injury, and mobile phone use after lights out in adolescents. *Journal of Pediatric Psychology, 37*(9) 1023–1030. https://doi.org/10.1093/jpepsy/jss072

Parent, J., Sanders, W. & Forehand, R. (2016). Youth screen time and behavioral health problems: The role of sleep duration and disturbances. *Journal of Developmental Behavioral Pediatrics, 37*(4), 277–284. https://doi.org/10.1097/DBP.0000000000000272

Parry, D. A., Davidson, B. I., Sewall, C., Fisher, J. T., Mieczkowski, H., & Quintana, D. (2020). *Measurement discrepancies between logged and self-reported digital media use: A systematic review and meta-analysis*. PsyArXiV. https://doi.org/10.31234/osf.io/f6xvz

Pearson, R. (2020). GoodmanKruskal (R Package Version 0.03) [Computer software]. CRAN. https://cran.r-project.org/package=GoodmanKruskal

_________ (2020, March 18). The GoodmanKruskal package: Measuring association between categorical variables. https://cran.r-project.org/web/packages/GoodmanKruskal/vignettes/GoodmanKruskal.html

Pine, R., Fleming, T., McCallum, S. & Sutcliffe, K. (2020). The effects of casual videogames on anxiety, depression, stress, and low mood: a systematic review. *Games for Health Journal, 9*(4), 255–264. https://doi.org/10. 1089/g4h.2019.0132

Primack, B.A., Swanier, B., Georgiopoulos, A.M., Land, S.R. & Fine, M.J.(2009). Association Between Media Use in Adolescence and Depression in Young Adulthood: A longitudinal study. *Archives of General Psychiatry, 66*(2), 181-188.

Przybylski, A.K. & Weinstein, N. (2017). A large-scale test of the Goldilocks hypothesis: Quantifying the relations between digital-screen time and the mental well-being of adolescents. *Psychological Science, 28*(2) 204–215. https://doi.org/10.1177/0956797616678438

Przybylski, A.K, Orben, A.. & Weinstein, N. (2019). How much is too much? Examining the relationship between digital screen engagement and psychosocial functioning in a confirmatory cohort study. *Journal of the American Academy of Child and Adolescent Psychiatry*. Advance online publication. https://doi.org/10.1016/j.jaac.2019.06.017

Puukko, K., Hietajärvi, L., Maksniemi, E., Alho, K., & Salmela-Aro, K. (2020). Social media use and depressive symptons: A longitudinal study from early to late adolescence. *International Journal of Environmental Research and Public Health, 17*(5921). https://doi.org/10.3390/ijerph17165921

R Core Team (2021). R: A language and environment for statistical computing [Computer software]. R Foundation for Statistical Computing. https://www.R-project.org/

Raghunathan, T., Solenberger, P., Berglund, P. & van Hoewyk, J. (2016). IVEware: Imputation and Variance Estimation Software (Version 0.3) [Computer software]. University of Michigan. https://www.src.isr.umich.edu/software/iveware/

Reid Chassiakos, Y., Radesky, J., Christakis, D., Moreno, M.A. & Cross, C. (2016). Children and adolescents and digital media. *Pediatrics,138*(5), e20162593. https://doi.org/10.1542/peds.2016-2593

Rideout, V. (2015). *The Common Sense Census: Media Use by Tweens and Teens, 2015*. Common Sense Media. https://www.commonsensemedia.org/sites/default/files/ uploads/ research/census_research report.pdf

Rideout, V.J., Foehr, U.G. & Roberts, D.F. (2010). *Generation M^2: Media in the Lives of 8-to 18-Year-Olds.* Kaiser Family Foundation. https://www.kff.org/w*p*-content/ uploads/2013/04/8010.pdf

Rideout, V. & Robb, M. B. (2019). *The Common Sense Census: Media Use by Tweens and Teens, 2019*. Common Sense Media. https://www.commonsensemedia.org/sites/ default/ files/ uploads/research/2019-census-8-to-18-full-report-updated.pdf

Riehm, K.E., Feder, K.A., Tomohlen, K.N., Crum, R.M., Young, A.S., Green, K.M., Pacek, L.R., LaFlair, L.N., & Mojtabai, R. (2019). Associations between time spent using social media and internalizing and externalizing problems among U.S. youth. *JAMA Psychiatry, 76*(12), 1266-1273. https://doi.org/10.1001/jamapsychiatry.2019.2325

Romer, D., Bagdasarov, Z. & More, E. (2013) Older versus newer media and the well-being of United States youth: Results from a national longitudinal panel. *Journal of Adolescent Health, 52*, 613-619. https://doi.org/10.1016/j.jadohealth.2012.11.012

Rosenbaum, J.E. (2009). Truth or consequences: The intertemporal consistency of adolescent self-report on the Youth Risk Behavior Survey. *American Journal of Epidemiology,169* (11), 1388–1397. https://doi.org/10.1093/aje/kwp049

Rozgonjuk, D., Levine, J. C., Hall, B. J., & Elhai, J. D. (2018). The association between problematic smartphone use, depression and anxiety symptom severity, and objectively measured smartphone use over one week. *Computers in Human Behavior*, *87*, 10–17. https://doi.org/10.1016/j.chb.2018.05.019

Sampasa-Kanyinga, H., Chaput, J-P. and Hamilton, H.A. (2019). Social media use, school connectedness, and academic performance among adolescents. *The Journal of Primary Prevention, 40*, 189–211. https://doi.org/10.1007/s10935-019-00543-6

Sampasa-Kanyinga, H., Hamilton, H.A. & Chaput, J-P. (2018). Use of social media is associated with short sleep duration in a dose–response manner in students aged 11 to 20 years. *Acta Pediatrica,107*, 694–700. https://doi.org/10.1111/apa.14210

Sarmiento, I.G., Olson, C., Yeo, G., Chen, Y.A., Toma, C.L., Brown, B.B., Bellmore, A., & Mares, M-L. (2018). Does social media use improve or worsen adolescents' internalizing behaviors? Conclusions from a systematic narrative review. *Proceedings of Technology, Mind, and Society (TechMindSociety '18).* https://doi.org/10.1145/3183654.3183699

Scharkow, M. (2016). The accuracy of self-reported internet use: A validation study using client log data. *Communication Methods and Measures*, 10(1), 13-27. https://doi.org/10.1080/ 19312458.2015.1118446

Scott, H., Biello, S.M. & Woods, H.C. (2019). Social media use and adolescent sleep patterns: cross-sectional findings from the UK Millennium Cohort study.*BMJ Open,9 (*e031161). https://doi.org/10.1136/ bmjopen-2019-031161

Selfhout, M. H. W., Branje, S. J. T., Delsing, M., ter Bogt, T. F. M., & Meeus, W. H. J. (2009). Different types of Internet use, depression, and social anxiety: The role of perceived friendship quality. *Journal of Adolescence*, *32*, 819–833. https://doi.org/10.1016/ j.adolescence.2008.10.011https://doi.org/10.1136/ bmj

Shaw, H., Ellis, D. A., Geyer, K., Davidson, B. I., Ziegler, F. V., & Smith, A. (2020). Quantifying smartphone 'use': Choice of measurement impacts relationships between 'usage' and health. PsyArXiv. https://doi.org/10.31234/osf.io/mpxra

Siegrist, K. (2020, August 10). *The Extreme Value Distribution.* Retrieved July 24, 2021, from https://stats.libretexts.org/@go/page/10370

Silberzahn, R., Uhlmann, E.L., Martin D.P., Anselmi, P., Aust, F., Awtrey, E., Bahník, Š. et al. (2018). Many analysts, one data set: Making transparent how variations in analytic choices affect results. *Advances in Methods and Practices in Psychological Science 1*(3), 337–56. https://doi.org/10.1177/2515245917747646

Smith, A. (2017) . Record shares of Americans now own smartphones, have home broadband. *Fact-Tank: News in the Numbers*. https://www.pewresearch.org/fact-tank/ 2017/01/12/ evolution-of-technology/

Snelling, A., Belson, S.I., Beard, J., & Young, K. (2014). Associations between grades and physical activity and food choices: Results from YRBS from a large urban school district. *Health Education, 115* (2),141-151. https://doi.org/10.1108/HE-03-2014-0028

Spence, S. H. (1998). A measure of anxiety symptoms among children. *Behaviour Research and Therapy*, *36*, 545–566. https://doi.org/10.1016/S0005-7967(98)00034-5

Steegen, S., Tuerlinckx, F., Gelman, A. & Vanpaemel, W. (2016). Increasing transparency through a multiverse analysis. *Perspectives on Psychological Science, 11*(5), 702-712. https://doi.org/10.1177/1745691616658637

Tutz, G. (1990). Sequential item response models with an ordered response. *British Journal of Mathematical and Statistical Psychology, 43*, 39-55. https://doi.org/10.1111/ j.2044-8317.1990.tb00925.x

Twenge, J.M. (2013). Does online social media lead to social connection or social disconnection? *Journal of College & Character, 14* (1), 11-20. https://doi.org/10.1515/jcc-2013-0003

___________ (2017). Have smartphones destroyed a generation? *The Atlantic,* at https://www.theatlantic.com/magazine/archive/2017/09/has-the-smartphone-destroyed-a-generation/534198/

___________ (2019). More time on technology, less happiness? Associations between digital-media use and psychological well-being. *Current Directions in Psychological Science, 28* (4), 372-379. https://doi.org/10.1177/0963721419838244

___________ (2020a). Why increases in adolescent depression may be linked to the technological environment. *Current Opinion in Psychology, 32*, 89-94. https://doi.org/10.1016/ j.copsyc.2019.06.036

___________ (2020b). Increases in depression, self-harm and suicide among U.S. adolescents after 2012 and links to technology use: Possible mechanisms. *Psychiatric Research and Clinical Practice, 2*(1). https://doi.org/10.1176/appi.prcp.20190015

Twenge, J.M., Blake, A.B., Haidt, J. & Campbell, W.K. (2020). Commentary: Screens, teens, and psychological well-being: Evidence from three time-use-diary studies. *Frontiers in Psychology, 11*(181), 1-3. https://doi.org/10.3389/fpsyg.2020.00181

Twenge, J.M. & Campbell, W.K. (2018). Associations between screen time and lower psychological well-being among children and adolescents: Evidence from a population-based study. *Preventive Medicine Reports, 12*, 271-183. https://doi.org/10.1016/j.pmedr.2018.10.003

Twenge, J.M. & Campbell, W.K. (2019), Media use is linked to lower psychological well-being: Evidence from three datasets. *Psychiatric Quarterly, 90*, 311–331. https://doi.org/10.1007/s11126-019-09630-7

Twenge, J.M. & Farley, E. (2020). Not all screen time is created equal: Associations with mental health vary by activity and gender. *Social Psychiatry and Psychiatric Epidemiology*. Advance online publication. https://doi.org/10.1007/s00127-020-01906-9

Twenge, J.M., Hisler, G. & Krizan, Z. (2019). Associations between screen time and sleep duration are primarily driven by portable electronic devices: evidence from a population-based study of U.S. children ages 0-17. *Sleep Medicine, 56*, 211-218. https://doi.org/10.1016/j.sleep.2018.11.009

Twenge, J.M., Joiner, T.E., Rogers, M.L. & Martin, G.N. (2018). Increases in depressive symptoms, suicide-related outcomes, and suicide rates among U.S. adolescents after 2010 and links to increased new media screen time. *Clinical Psychological Science, 6*(1), 3-17. https://doi.org/10.1177/ 2167702617723376

___________ (2020). Considering all of the data on digital-media use and depressive symptoms: Response to Ophir, Lipshits-Braziler, and Rosenberg (2020). *Clinical Psychological Science, 8*(2), 379-383. https://doi.org/10.1177/ 2167702619898179

Twenge, J.M., Krizan, Z. & Hisler, G. (2017). Decreases in self-reported sleep duration among U.S. adolescents 2009-2015 and association with new media screen time. *Sleep Medicine, 39,* 47-53. https://doi.org/10.1016/j.sleep.2017.08.013

Twenge, J.M. & Martin, G.N. (2020). Gender differences in associations between digital media use and psychological well-being: Evidence from three large datasets. *Journal of Adolescence, 79*, 91-102. https://doi.org/10.1016/ j.adolescence.2019.12.018

Twenge, J.M., Martin, G.N., & Campbell, W.K. (2018). Decreases in psychological well-being among american adolescents after 2012 and links to screen time during the rise of smartphone technology. *Emotion, 18*(6), 765-780. https://doi.org/10.1037/emo0000403

Twenge, J.M., Martin, G.N., & Spitzberg, B.H. (2019). Trends in U.S. adolescents' media use, 1976-2016: The rise of digital media, the decline of TV, and the (near) demise of print. *Psychology of Popular Media Culture, 8*(4), 329-345. https://doi.org/10.1037/ppm0000203

Twenge, J.M., Spitzberg, B.H., & Campbell, W.K. (2019) Less in-person social interaction with peers among U.S. adolescents in the 21st century and links to loneliness. *Journal of Social and Personal Relationships, 36*(6), 1892-1913. https://doi.org/ 10.1177/0265407519836170

Valkenburg, P.M., Meier, A., & Beyens, I. (2022). Social media use and its impact on adolescent mental health: An umbrella review of the evidence. *Current Opinion in Psychology*, 44 (58-68). http://doi.org/10.1016/j.copsyc.2021.08.017

Verduyn, P., Lee, D.S., Park, J., Shablack, H., Orvell, A., Bayer, J., Ybarra, O., Jonides, J., & Kross, E. (2015). Passive Facebook usage undermines affective well-being: Experimental and longitudinal evidence. *Journal of Experimental Psychology: General, 144*(2), 480-488. https://doi.org/ 10.1037/xge0000057

Verduyn, P., Ybarra, O., Résibois, M., Jonides, J. & Kross, E. (2017). Do social network sites enhance or undermine subjective well-being? A critical review. *Social Issues and Policy Review, 11*(1), 274-302. https://doi.org/10.1111/sipr.12033

van Buuren, S. (2021). mice: Multiple Imputation by Chained Equations (R Package Version 3.13.0) [Computer software]. amices. http://amices.org/mice

Verduyn, P., Ybarra, O., Résibois, M., Jonides, J., & Kross, E. (2017) Do social network sites enhance or undermine subjective well−being? A critical review. *Social Issues and Policy Review, 11*(1) 274-302. https://doi.org/ 10.1111/sipr.12033

Vuorre, M., Orben, A., & Przybylski, A.K. (2021, May 3). There is no evidence that associations between adolescents' digital technology engagement and mental health problems have increased. *Clinical Psychological Science*, 1-13. https://doi.org/10.1177/ 2167702621994549

Wang, C., Li, K., Kim, M., Lee, S., & Seo, D-C. (2018) Association between psychological distress and elevated use of electronic devices among U.S. adolescents: Results from the youth risk behavior surveillance 2009-2017. *Addictive Behaviors, 90*, 112-118. https://doi.org/ 10.1016/j.addbeh.2018.10.037

Weissman, M.M., Orvaschel, H., & Padian, N. (1980). Children's symptom and social functioning self-report scales: Comparison of mothers' and children's reports. *The Journal of Nervous and Mental Disease, 168*(12), 736-740.

West, B.T. Sakshaug, J.W., & Aurelian, G.A.S. (2018). Accounting for complex sampling in survey estimation: A review of current software tools. *Journal of Official Statistics, 34*(3), 721-752. soi:10.2478/JOS-2018-0034

Weston, S.J., Ritchie, S.J., Rohrer, J.M. and Przybylski, A.K. (2019). Recommendations for increasing the transparency of analysis of preexisting data sets. *Advances in Methods and Practices in Psychological Science, 2*(3), 214-227. https://doi.org/10.1177/ 2515245919848684

Wilcockson, T.D.W., Ellis, D.A., & Shaw, H. (2018). Determining typical smartphone usage: What data do we need? *Cyberpsychology, Behavior, and Social Networking, 21*(6), 395-398. https://doi.org/10.1089/cyber.2017.0652

Wilson, B.J., Smith, S.L., Potter, W.J., Kunkel, D., Linz, D., Colvin, C.M. & Donnerstein, E. and colleagues (2002). Violence in children's television programming: Assessing the risks. *Journal of Communication, 52*(1), 5-35. https://doi.org/10.1111/j.1460-2466.2002.tb02531.x

Woods, H.C. & Scott, H. (2016). #Sleepyteens: Social media use in adolescence is associated with poor sleep quality, anxiety, depression and low self-esteem. *Journal of Adolescence, 51*, 41-49. https://doi.org/ 10.1016/j.adolescence.2016.05.008

Worden, N. (2010, November 23). Netflix unveils streaming-only plan, lifts prices. *The Wall Street Journal*. https://www.wsj.com/articles/ SB10001424052748704243904575630441038304032

Yee, T. & Moler, C. (2021). VGAM:Vector Generalized Linear and Additive Models (R Package Version 1.1-5) [Computer software]. University of Auckland. https://www.stat.auckland.ac.nz/~yee/VGAM/

Yee, T.W. (2010). The VGAM package for categorical data analysis. *Journal of Statistical Software,* 32(10), 1-34. https:doi.org/10.18637/jss.v032.i10

Zastrow, M. (2017). Is video game addiction really an addiction? *Proceedings of the National Academy of Sciences of the United States of America, 114(*17), 4268-4272. https://doi.org/10.1073/pnas.1705077114