

Young people's online communication and its association with mental well-being: results from the 2019 student health and well-being survey

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Background: Online communication has become an integral aspect of daily life for young people internationally. Very little research has examined whether the association between social media use and well-being depends on *who* young people engage with (i.e. real, or virtual friendships). **Methods:** Data were drawn from a subsample of students ($N = 38,736$) who took part in the School Health Research Network (SHRN) 2019 Student Health and Well-being (SHW) survey. A series of multivariable regression models were used to assess the association between who adolescents were communicating with online and well-being, controlling for confounders: passive social media use; friendship quality; and cyberbullying. We also tested whether these associations were modified based on gender. **Results:** Students are highly engaged on social networking sites, and these sites are used to communicate with existing friendship groups and develop virtual friendships. Frequent online communication with best friends ($b = .340, p < .001$) and bigger friendship groups ($b = .397; p < .001$) was associated with higher levels of well-being. However, the frequency of online contact with virtual friends made online was negatively and significantly associated with well-being ($b = -.760; p < .001$), with a larger negative association for girls than boys. **Conclusions:** Online communication with virtual friendship networks were associated with lower mental well-being, with stronger associations for girls than boys; however, frequent online communication with 'real' friends was associated with better well-being. Our results indicate the importance of considering the nature of adolescent online communication, rather than just its quantity, in developing interventions to improve adolescent well-being.

Key Practitioner Message

- **What is known?** A growing body of research has found an association between time spent on social media and lower levels of well-being; however, little is known about the context of time spent on social media and well-being.
- **What is new?** Online communication with existing friendship groups was associated with increased well-being for both boys and girls. Frequent online communication with virtual friends made online was negatively and significantly associated with well-being, with a larger negative association for girls than boys.
- **What is significant for clinical practice?** Interventions to improve young people's well-being should consider the *positive* association between online communication and adolescent well-being, while limiting harms.

Keywords: Social media; well-being; mental health; friendships; cyberbullying

Introduction

Mental health problems are associated with distress and impairment (Sellers et al., 2019), have long-term health, education and psychosocial consequences and are a significant cost to health services (Agnafors, Barmark, & Sydsjö, 2021; ESRC, 2013). Studies on trends report a secular increase in levels of self-reported health problems and symptoms since the 1980s (Bor, Dean, Najman, & Hayatbakhsh, 2014; Calling, Midlöv, Johansson, Sundquist, & Sundquist, 2017; Collishaw, 2015), which have

increased dramatically in recent years (Keeley, 2021). The trend has been stronger among girls than boys (Calling et al., 2017; Collishaw, Maughan, Natarajan, & Pickles, 2010), and children and adolescents from less affluent families (Collishaw, Furzer, Thapar, & Sellers, 2019), thus widening the gender and affluence gap in mental well-being among adolescents. Researchers suggest that positive mental health includes mental well-being (Barry, 2009; Deci & Ryan, 2008; Stewart-Brown, 2002), defined as the state in which 'the individual realises his or her own abilities, can cope with the

normal stresses of life, can work productively and fruitfully and is able to make a contribution to his or her community' (World Health Organization, 2005, p. 49). Mental well-being allows individuals to thrive (Clarke et al., 2011).

Online communication has become an integral aspect of daily life for young people in the UK. According to recent statistics, 99% of 12- to 15 year olds are connected to the internet, and 95% report using social media before and after school daily (Home Office, 2020). These high levels of digital media use have led to concerns about whether time spent on digital media is related to poor negative health outcomes among adolescents (Marino, Gini, Vieno, & Spada, 2018). A growing body of research has found an association between time spent on social media and lower levels of well-being (Booker, Kelly, & Sacker, 2018; Kelly, Zilanawala, Booker, & Sacker, 2018; Marino et al., 2018; Odgers & Jensen, 2020; Stiglic & Viner, 2019), higher levels of depression (Lin et al., 2016; Twenge, Cooper, Joiner, Duffy, & Binau, 2019; Twenge, Joiner, Rogers, & Martin, 2018) and suicide attempts (Sedgwick, Epstein, Dutta, & Ougrin, 2019). The negative effects of social media exposure appear to be particularly salient among girls (Booker et al., 2018; Nesi & Prinstein, 2015; Twenge et al., 2018). However, these studies have typically assumed a dose-response relationship where well-being is believed to decrease proportionately with social media exposure (Boers, Afzali, Newton, & Conrad, 2019).

The hypothesis that social media use is associated with lower levels of well-being has been challenged by other researchers, who have questioned the functional form of this relationship (Bell, Bishop, & Przybylski, 2015; Heffer, Good, Daly, MacDonell, & Willoughby, 2019; Huang, 2017; Przybylski & Weinstein, 2017; Sampasa-Kanyinga, Chaput, & Hamilton, 2019). For instance, using a large and representative population sample of 120,000 students from England, researchers suggest that digital activity was unlikely to present a material risk to mental well-being at moderate levels, although high levels of engagement may have a measurable, albeit small, negative influence (Przybylski & Weinstein, 2017). A recent meta-analysis showed a small but significant positive correlation between adolescent social media use and depressive symptoms (Ivie, Pettitt, Moses, & Allen, 2020). However, the review highlighted high heterogeneity, indicating substantial variation among studies.

One limitation in the research literature is the measure of social media use, which typically focuses on the frequency of time spent on social media, while neglecting differences in how people are engaging with social media. Measurement of social media use, which often focuses solely on frequency or duration of use may be overly simplistic and does not account for *who* young people engage with online. For instance, Bagwell and Schmidt (2011) highlight that supportive relationships within friendships during early adolescence are associated with better quality of life and the development of social skills, personality and social behaviour. Online communication has changed the mode of communication, with social networking facilitating virtual communication opportunities between real-life friendship groups, as well as expanding their social networks to include 'virtual friends', that is those made exclusively online. Social

media has been shown to affect peer relationships in both beneficial and detrimental ways, whilst it may broaden opportunities to enhance peer relations, it can also complicate or amplify the social dynamics or experiences with peers online (D'Rozario, 2020).

In addition, most research has not considered the different *types* of engagement. For example, a growing body of research demonstrates that different types of online communication, for example active and passive social media use, have a differential impact on well-being (Escobar-Viera et al., 2018; Frison & Eggermont, 2016; Thorisdottir, Sigurvinsdottir, Asgeirsdottir, Allegrante, & Sigfusdottir, 2019; Verduyn, Ybarra, Résibois, Jonides, & Kross, 2017). Furthermore, any communication carries with it a series of online risks, and research has shown a link between exposure to online bullying and subsequent poor mental health (Nixon, 2014).

The present study

Recent research has highlighted the need to better understand people's reactions to digital technologies (Orben, 2020) and the ways in which social media is being used by young people (Twigg, Duncan, & Weich, 2020). This study adds to the literature by examining the association between online communication with different groups of friends and mental well-being among a representative sample of young people aged 11–16 from Wales. Given that three times as many adolescent girls are diagnosed with depression as boys (Salk, Hyde, & Abramson, 2017), as a secondary objective, this study examines whether the association between online communication with different groups of friends and mental well-being varies by gender. To limit potential concerns with confounding, we controlled for quality of friendships, type of social media use and cyberbullying victimisation in all analyses.

Methods

Sample and procedure

This study uses cross-sectional data obtained from 11- to 16 year olds in Wales, UK via the School Health Research Network (SHRN) 2019 Student Health and Well-being (SHW) survey. Data were collected using an online, self-completion questionnaire available in both English and Welsh and divided into four survey routes. Questions appeared in single or multiple routes and stratified random sampling was used to allocate each school to a particular route to ensure nationally representative data across a wide range of diverse topics. Further information on survey methodology is available (Page, Hewitt, Young, Moore, & Murphy, 2021). Ethical approval for this study was granted by Cardiff University School of Social Sciences Research Ethics Committee. Informed consent was obtained from schools, parents and students. Schools had to register to take part in the survey and parents had the option to withdraw their child(ren) from data collection. Students' participation was optional, with the first question in the survey asking for their consent to take part. Due to survey routing, from the full sample of $N = 119,388$ students, 44.5% ($n = 53,150$) were asked all questions of interest and our final sample included $n = 38,736$ adolescents with complete responses. Descriptive statistics for the sample can be found in Table 1. Table S1 compares descriptive statistics for the analytic sample compared to the full sample. Models were conducted using complete case analysis.

Measures

Outcome variable: Mental well-being. Mental well-being was measured with the shortened version of the Warwick-

Table 1. Descriptive statistics

	%	95% CI/SD
Grade		
7	19.1%	18.7%–19.5%
8	20.3%	19.9%–20.7%
9	21.1%	20.7%–21.5%
10	19.4%	19%–20%
11	20.1%	19.7%–20.5%
Gender		
Boys	47.9%	47.4%–48.4%
Girls	52.1%	51.6%–52.6%
Ethnicity		
White	90.8%	90.5%–91.5%
Ethnic Minority	9.2%	9.0%–9.5%
Family Affluence Scale (continuous, 0–13) ^a	9.4	2.3
<i>Frequency of social media contact with friends</i>		
Freq: social media contact with close friends		
Never/almost never	5.7%	5.5%–5.9%
Weekly	12.7%	12.4%–13.1%
Daily	28.4%	28.0%–28.9%
Several times daily	25.3%	24.9%–25.8%
Almost any time of day	27.8%	27.4%–28.3%
Freq: social media contact with friend group		
Never/almost never	20.7%	20.3%–21.1%
Weekly	26.9%	26.5%–27.4%
Daily	25.4%	25.0%–25.9%
Several times daily	15.4%	15.0%–15.7%
Almost any time of day	11.6%	11.3%–11.9%
<i>Social media contact with virtual friends</i>		
Freq social media contact with friends made online		
Never/almost never	65.1%	64.6%–65.5%
Weekly	15.2%	14.8%–15.6%
Daily	9.1%	8.8%–9.4%
Several times daily	5.3%	5.1%–5.6%
Almost any time of day	5.3%	5.1%–5.5%
Cyberbully Victimisation		
Never	83.3%	82.9%–83.6%
Some	12.5%	12.1%–12.8%
Extensive	4.3%	4.1%–4.5%
Passive social media use		
No	60.2%	59.7%–60.7%
Yes	39.8%	39.3%–40.3%
Friendship quality (continuous, 0–7) ^a	5.01	1.9

^aStandard Deviations presented for continuous items.

Edinburgh Mental Health Well-being scale (SWEMWBS), an instrument that has been empirically validated among adolescent populations (Hunter, Houghton, & Wood, 2015; Koushede et al., 2019; Melendez-Torres et al., 2019; Smith, Alves, Knapstad, Haug, & Aarø, 2017; Stewart-Brown et al., 2009). Students were asked to select the option best describing their experiences over the past two weeks to the following seven questions: (a) I've been feeling optimistic about the future, (b) I've been feeling useful, (c) I've been feeling relaxed, (d) I've been dealing with problems well, (e) I've been thinking clearly, (f) I've been feeling close to other people, (g) I've been able to make up my own mind about things. Each question was ranked on Likert scale ('none of the time,' 'rarely,' 'some of the time,' 'often,' 'all the time'), which was then summed into the SWEMWBS scale. All items loaded onto one factor, with an acceptable level of internal consistency (Cronbach's $\alpha = .82$).

Exposure variable: Frequency of online communication. Students were asked about their frequency of online communication with the following groups of friends: (a) close friends; (b) friends from a larger friend group; (c) friends that

you know through the internet but did not know before. Online communication was operationalised as 'sending and receiving text messages, emoticons and photo, video or audio messages through instant messaging (e.g. WhatsApp, Snapchat), social network sites (e.g. Facebook) or email (on a computer, laptop, tablet or smartphone). Students were given the following response options: Do not know/does not apply; never/almost never; at least once every week; daily or almost daily; several times each day; almost all the time throughout the day.

Confounding and control variables. Previous research has linked adolescent well-being to several demographic variables including age (Hewitt, Anthony, Moore, Melendez-Torres, & Murphy, 2019), sex (Calling et al., 2017; Collishaw et al., 2010; Hewitt et al., 2019) and family affluence (Collishaw et al., 2019; Hewitt et al., 2019). Therefore, these variables were included as control variables in the multivariate statistical analysis. School year was coded as a continuous variable (Years 7 to 11), while gender (0 = boy, 1 = girl) and ethnicity (0 = white, 1 = ethnic minority) were coded as dichotomous predictors. The 'Family Affluence Scale' (FAS III) (Hartley, Levin, & Currie, 2016)

comprises six items: households' number of cars (0 = none, 1 = one, 2 = two or more), computers (0 = none, 1 = one, 2 = two, 3 = more than two) and bathrooms (0 = none, 1 = one, 2 = two, 3 = more than two), whether they had their own bedroom (0 = no, 1 = yes), whether they had a dishwasher (0 = no, 1 = yes), and the number of holidays spent abroad in the past year (0 = not at all, 1 = once, 2 = twice, 3 = more than twice). The scores for each item were summed to give a total affluence score ranging from 0 to 13 and included as a continuous control measure in the current study. FAS is a validated proxy for measuring socioeconomic status in adolescent populations (Torsheim et al., 2016).

To control for potential confounders in the association between the frequency of different types of online communication and well-being, we included three additional variables. Given that passive social media use (Escobar-Viera et al., 2018; Frison & Eggermont, 2016; Thorisdottir et al., 2019; Verduyn et al., 2017), friendship quality (D'Rozario, 2020) and online bullying (Dorol-Beauroy-Eustache & Mishara, 2021; Nixon, 2014), that is an intentional act of aggression, carried out to harm another individual using electronic forms of contacts or devices (Patchin & Hinduja, 2006), have been associated with poorer mental health and well-being these were included.

Passive social media use. Students were asked if during the past year they had often used social media to escape from negative feelings, with yes or no response options. If they had used social media to escape from negative feelings, this was used as a proxy measure for passive social media use.

Friendship quality. Young people were asked to indicate their agreement or disagreement with four items on a 7-point Likert scale, relating to the extent to which they felt that friends tried to help them, could be counted on when things go wrong, could share in joys and sorrows and that they could talk easily to friends. All items loaded onto a single factor, with good internal consistency ($\alpha = 0.96$).

Cyberbullying victimisation. Participants were asked if in the last two months had they ever been cyberbullied 'e.g., someone sent mean instant messages, email or text messages about you, wall postings, created a website making fun of you, posted unflattering or inappropriate pictures of you online without permission or shared them with others'. Response options included 'I have not been bullied', 'it has happened once or twice', '2 or 3 times a month', 'about once a week' and 'several times a week'. Response options were combined into 'never (it has not happened)', 'some' (1 to 2 times) and 'extensive' bullying (once a week or more).

Statistical analysis

Descriptive statistics were first calculated for sociodemographic and social media-related characteristics. We then estimated a series of hierarchically arranged multivariable regression models predicting mental well-being using the same analytic sample. Model 1 included sociodemographic predictors and our exposure variable, the frequency of online communication with best friends, casual friends and virtual friends. Model 2 added controls for the potential confounding associations of friendship quality, cyberbullying and passive social media use. Model 3 tested the interactions between social media use and gender. The marginal interactive associations were used to assess the interactions and we graphed the predicted probabilities for the statistically significant interactions ($p < .05$). All regression models included robust standard errors to limit potential concerns associated with heteroscedasticity and adjust for school level clustering, and the frequency of online communication with close friends, casual friends and virtual friends were mean-centred. All analyses were conducted using Stata, Version 16.1 (Stata-Corp, 2019).

Results

Social media use and patterns of online communication

Table 1 presents the descriptive characteristics of the students and their patterns of social media use. Of the 38,736 children and young people, 52.1% were girls. The majority of respondents reported their ethnicity as White (90.8%), and age (grade) was distributed fairly evenly. Results showed high levels of online communication with friends, as 81.5% of students reported connecting with their closest friends at least once a day and 27.8% reported being available 'almost all the time throughout the day'. Students also reported frequently communicating with their larger group of friends online, with 52.4% reported doing so daily, while 34.9% of students reported online communication with virtual friends made online. Of those who reported making virtual friends online, 66.0% reported daily online communication with these friends. In this study, 12.5% of students reported at least one instance of cyberbullying victimisation online, and 4.3% reported being the victim of at least three instances of cyberbullying. Students were also asked whether they used social media to escape from negative feelings, with 39.8% reporting that they had used social media as a form of escapism.

Multivariable models predicting wellbeing

Table 2 presents the findings from the hierarchically arranged linear regression models predicting well-being. Frequent online communication with best friends ($b = .340$, $p < .001$) and bigger friendship groups ($b = .397$; $p < .001$) were both associated with higher levels of well-being. These findings remained significant across all models. In contrast, the frequency of online contact with virtual friends was negatively and significantly associated with well-being ($b = -.760$; $p < .001$); an association that remained significant after controlling for all covariates. Overall, girls reported significantly lower levels of well-being ($b = -2.153$, $p < .001$) and this remained significant across all the models, including model three which included gender interactions. All interactions indicated a gender difference in the same direction, even though only the frequency of online contact with virtual friends was significant ($b = -2.20$, $p < .001$), demonstrating that the strength of the association was different for boys and girls (Figure 1). The steeper slope for girls demonstrates that the frequency of online contact with virtual friends had a larger negative association for girls than for boys.

Several control variables were significantly associated with mental well-being. Older students ($b = -.483$, $p < .001$) reported lower levels of well-being, ethnic minority students reported higher levels of well-being ($b = .231$, $p < .05$), and family affluence was positively associated with well-being ($b = .305$, $p < .001$). All confounder variables were significantly associated with mental well-being (see Table 2 for more details).

Discussion

The primary objective of the current research was to examine the association between online communication with different groups of friends and mental well-being

Table 2. OLS regression predicting mental well-being ($n = 38,786$)

	Model 1: Focal IV Model				Model 2: Main Effects Model				Model 3: Gendered Interactions			
	<i>b</i>	<i>SE</i>	beta	Sig	<i>b</i>	<i>SE</i>	beta	Sig	<i>b</i>	<i>SE</i>	beta	Sig
Grade	-.483	.018	-.127	***	-.415	.018	-.109	***	-.412	.018	-.108	***
Female	-2.153	.052	-.201	***	-1.83	.050	-.171	***	-1.83	.049	-.171	***
Ethnic Minority	.231	.092	.013	*	.230	.087	.012	**	.232	.087	.013	**
Family affluence	.305	.011	.132	***	.253	.011	.109	***	.254	.011	.110	***
<i>Frequency of online communication</i>												
Freq: Best friends (mean-centred)	.340	.029	.095	***	.280	.027	.073	***	.326	.039	.072	***
Freq: Casual friends (mean-centred)	.397	.027	.075	***	.306	.025	.062	***	.345	.037	.082	***
Freq: Virtual friends (mean-centred)	-.760	.025	-.165	***	-.450	.024	-.098	***	-.334	.036	-.072	***
<i>Cyberbullying</i>												
Never					REF				REF			
Some					-1.59	.070	-.105	***	-1.57	.070	-.104	***
Extensive					-3.19	.205	-.085	***	-3.18	.205	-.085	***
Passive Social Media Use					-2.32	.052	-.212	***	-2.31	.052	-.211	***
Friendship quality					.478	.014	.172	***	.479	.014	.173	***
<i>Gendered interactions</i>												
Gender*best friends									-.101	.054	-.015	NS
Gender*casual friends									-.072	.050	-.012	NS
Gender*virtual friends									-.220	.047	-.034	***
Likelihood ratio (<i>df</i>)		4624.32 (7)				9538.13 (11)				9594.562 (14)		
Adjusted R^2		.112				.218				.219		

* < .05, ** < .01, *** < .001.

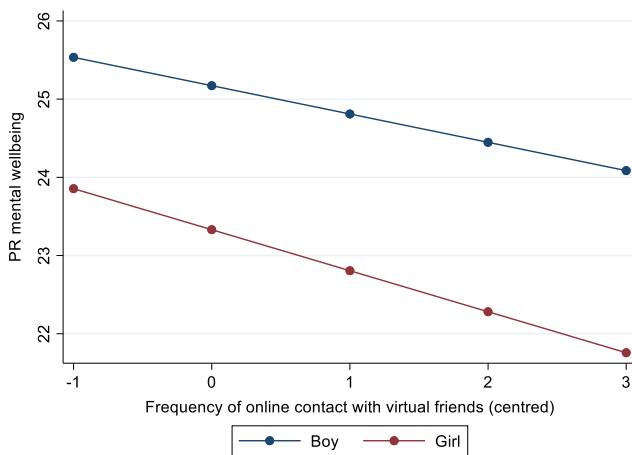


Figure 1. Fitted values of online communication with virtual friends by gender predicting mental well-being, 2019 Student Health And Well-being Survey

among a representative population of students aged 11–16 from Wales, UK. Our findings revealed that the frequency of communication online is associated with higher levels of well-being when communicating with ‘real-life’ friendship networks. This finding supports research demonstrating that when online communication is with ‘real’ friends it can have a positive association with mental well-being, similar to previous findings (Przybylski & Weinstein, 2017). However, in contrast, we found that frequency of communication with virtual friends was associated with lower levels of mental well-being, suggesting that social media engagement may complicate or amplify the social dynamics or experiences with peers online (D’Rozario, 2020). These findings remained even after controlling for type of engagement, that is passive social media use, as well as friendship quality and cyberbullying.

Consistent with previous research (Twenge & Martin, 2020), across the different analyses the negative associations of online communication and young people’s mental well-being appear to be highly gendered, with stronger negative associations for girls than boys. We found that the association between frequency of communication with virtual friendships and mental well-being was moderated by gender, with a stronger negative association for girls than boys. Girls’ friendships tend to be more intimate (Rose, 2002), thus its possible ‘virtual’ friendships may lack that intimacy associated with well-being. Girls’ friendships are also known to be more fragile (Benenson & Christakos, 2003), which may again be heightened for ‘virtual’ friendships where it may be easier for friendships to break down. Our findings add to previous research, which found that associations between frequency of digital media and low psychological well-being/mental health issues were generally larger for girls than for boys (Twenge & Martin, 2020).

The relationship between online communication and well-being in adolescents appears to be a nuanced one and may be beneficial for many in terms of mental well-being but also detrimental for some. We found that those communicating with virtual friends online, particularly girls, had the poorest well-being, identifying this group as warranting further investigation and potential intervention. While further work is needed to understand the causal nature of these associations given our cross-sectional design, our data suggests that interventions might be tailored to emphasise positive associations between online communication and adolescent well-being with close friends (Kross et al., 2021), while limiting harms for those communicating with virtual friends. Given the ease in which people are able to build an online network of virtual friends, schools (Dubicka, Martin, & Firth, 2019), family and clinical settings (Kaess, 2020)

are potential contexts for identifying more potentially harmful forms of online interaction. However, adults in these contexts will likely need further advice to distinguish between adaptive and maladaptive uses of online communication in practice (Healy, 2021). Given the prevalence of online communication, many young people will know more about social media than their teachers and parents, thus there is a need to address safety issues both with children and those that care for them, and to involve young people in the development of interventions to support healthy online communication.

Strengths and limitations

One of the main strengths of this study is the use of a large, nationally representative sample to explore the association between online communication and mental well-being. This study adds important findings to the field by examining who adolescents are engaging with, as well as controlling for confounders such as friendship quality, passive use of social media and cyberbullying. However, our study has some important limitations. First, the data were cross-sectional; thus, causal inferences cannot be drawn. Further longitudinal research is needed to investigate the mechanisms between communication with virtual friends and poorer well-being for girls. For example, it is possible that those young people who report using social media to escape from negative feelings may be more likely to report lower well-being more generally, and the direction of the relationship between these two variables cannot be established within a cross-sectional design. While we controlled for the confounding factor cyberbullying and friendship quality, there may be additional unmeasured confounders that bias our results. In addition, self-reported data may have been biased by standard limitations (e.g. memory recall biases, social desirability, etc.), particularly considering the sensitive nature of certain survey questions. A meta-analysis of the relationship between self-reported media usage and actual use showed that adolescents, in particular, are poor reporters (Scharnow, 2019). Furthermore, single-use measures may not accurately predict behaviour (Ellis, Davidson, Shaw, & Geyer, 2019). Finally, given the large sample size, small effects may be more likely to be statistically significant. This is evident in that model 3 explains only 21.8% of variance.

Conclusions

Research examining the effects of online communication have mostly focused on screen time, which may be over simplistic and fails to consider specific nuances such as how adolescents are communicating and with whom. In this nationally representative sample of young people from Wales, we demonstrate the complex relationship between online communication and mental well-being. We found that the association between online communication and well-being varied depending on who adolescents were engaging with. Rather than overemphasising the significance of time spent online and uniformly castigating online communication as something that needs to be heavily monitored and controlled, digital literacy education for young people should acknowledge the possible benefits of online communication with existing friendship groups.

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Author contributions

S.C., G.H., G.M. and S.M. conceived the work. R.A. and S.C. had full access to all the data in the study. R.A. analysed and interpreted the data, with S.C. assuring the integrity of the data and the accuracy of the data analysis. R.A., H.Y. and S.C. drafted the manuscript and all authors contributed to the revisions of the manuscript and approved the final draft for submission.

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Supporting information

Additional Supporting Information may be found in the online version of this article:

Table S1. Descriptive statistics for the analytical and full sample.

References

- Agnafors, S., Barmark, M., & Sydsjö, G. (2021). Mental health and academic performance: A study on selection and causation effects from childhood to early adulthood. *Social Psychiatry and Psychiatric Epidemiology*, 56, 857–866.
- Bagwell, C.L., & Schmidt, M.E. (2011). The friendship quality of overtly and relationally victimized children. *Merrill-Palmer Quarterly*, 57(2), 158–185.
- Barry, M.M. (2009). Addressing the determinants of positive mental health: Concepts, evidence and practice. *International Journal of Mental Health Promotion*, 11, 4–17.
- Bell, V., Bishop, D.V., & Przybylski, A.K. (2015). The debate over digital technology and young people. *BMJ*, 351, h3064.
- Benenson, J.F., & Christakos, A. (2003). The greater fragility of females' versus males' closest same-sex friendships. *Child Development*, 74, 1123–1129.
- Boers, E., Afzali, M., Newton, N., & Conrad, P. (2019). Association of screen time and depression in adolescence. *JAMA Pediatrics*, 173, 853–859.
- Booker, C.L., Kelly, Y.J., & Sacker, A. (2018). Gender differences in the associations between age trends of social media interaction and well-being among 10–15 year olds in the UK. *BMC Public Health*, 18, 321.
- Bor, W., Dean, A.J., Najman, J., & Hayatbakhsh, R. (2014). Are child and adolescent mental health problems increasing in

- the 21st century? A systematic review. *Australian and New Zealand Journal of Psychiatry*, 48, 606–616.
- Calling, S., Midlöv, P., Johansson, S.-E., Sundquist, K., & Sundquist, J. (2017). Longitudinal trends in self-reported anxiety. Effects of age and birth cohort during 25 years. *BMC Psychiatry*, 17, 1–11.
- Clarke, A., Friede, T., Putz, R., Ashdown, J., Martin, S., Blake, A., ... & Stewart-Brown, S. (2011). Warwick-Edinburgh mental well-being scale (WEMWBS): Validated for teenage school students in England and Scotland. A mixed methods assessment. *BMC Public Health*, 11, 487.
- Collishaw, S. (2015). Annual research review: Secular trends in child and adolescent mental health. *Journal of Child Psychology and Psychiatry*, 56, 370–393.
- Collishaw, S., Furzer, E., Thapar, A.K., & Sellers, R. (2019). Brief report: A comparison of child mental health inequalities in three UK population cohorts. *European Child & Adolescent Psychiatry*, 28, 1547–1549.
- Collishaw, S., Maughan, B., Natarajan, L., & Pickles, A. (2010). Trends in adolescent emotional problems in England: A comparison of two national cohorts twenty years apart. *Journal of Child Psychology and Psychiatry*, 51, 885–894.
- Deci, E.L., & Ryan, R.M. (2008). Hedonia, eudaimonia, and well-being: An introduction. *Journal of Happiness Studies*, 9, 1–11.
- Dorol-Beauroy-Eustache, O., & Mishara, B.L. (2021). Systematic review of risk and protective factors for suicidal and self-harm behaviors among children and adolescents involved with cyberbullying. *Preventive Medicine*, 152, 106684.
- D'Rozario, V.A. (2020). *Early adolescent views on the mediating role of social network sites use on peer relations*. London: UCL (University College London).
- Dubicka, B., Martin, J., & Firth, J. (2019). Screen time, social media and developing brains: A cause for good or corrupting young minds? *Child and Adolescent Mental Health*, 24, 203–204.
- Ellis, D.A., Davidson, B.I., Shaw, H., & Geyer, K. (2019). Do smartphone usage scales predict behavior? *International Journal of Human-Computer Studies*, 130, 86–92.
- Escobar-Viera, C.G., Shensa, A., Bowman, N.D., Sidani, J.E., Knight, J., James, A.E., & Primack, B.A. (2018). Passive and active social media use and depressive symptoms among United States adults. *Cyberpsychology, Behavior and Social Networking*, 21, 437–443.
- ESRC. (2013). Mental health and social relationships. Available from: <https://esrc.ukri.org/news-events-and-publications/evidence-briefings/mental-health-and-social-relationships/> [last accessed 01 December 2021].
- Frison, E., & Eggermont, S. (2016). Exploring the relationships between different types of Facebook use, perceived online social support, and adolescents' depressed mood. *Social Science Computer Review*, 34, 153–171.
- Hartley, J.E., Levin, K., & Currie, C. (2016). A new version of the HBSC family affluence scale - FAS III: Scottish qualitative findings from the international FAS development study. *Child Indicators Research*, 9, 233–245.
- Healy, M. (2021). Keeping company: Educating for online friendship. *British Educational Research Journal*, 47, 484–499.
- 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, 462–470.
- Hewitt, G., Anthony, R., Moore, G., Melendez-Torres, G., & Murphy, S. (2019). Student health and wellbeing in Wales: Report of the 2017/18 health behaviour in school-aged children survey and school health research network student health and wellbeing survey. Available from: https://shrn.org.uk/wp-content/uploads/2019/05/SHRN-HBSC-NR_31.05.2019.pdf [last accessed 02 December 2021].
- Home Office. (2020). Online harms white paper. Available from: <https://www.gov.uk/government/consultations/online-harms-white-paper/online-harms-white-paper> [last accessed 15 November 2021].
- Huang, C. (2017). Time spent on social network sites and psychological well-being: A meta-analysis. *Cyberpsychology, Behavior and Social Networking*, 20, 346–354.
- Hunter, S.C., Houghton, S., & Wood, L. (2015). Positive mental well-being in Australian adolescents: Evaluating the Warwick-Edinburgh mental well-being scale. *The Educational and Developmental Psychologist*, 32, 93–104.
- Ivie, E.J., Pettitt, A., Moses, L.J., & Allen, N.B. (2020). A meta-analysis of the association between adolescent social media use and depressive symptoms. *Journal of Affective Disorders*, 275, 165–174.
- Kaess, M. (2020). Social media use in children and adolescents—on the good or the bad side of the force? *Child and Adolescent Mental Health*, 25, 199–200.
- Keeley, B. (2021). *The state of the World's children 2021: On my mind—promoting, protecting and caring for Children's mental health*. New York: UNICEF.
- Kelly, Y., Zilanawala, A., Booker, C., & Sacker, A. (2018). Social media use and adolescent mental health: Findings from the UK millennium cohort study. *EClinicalMedicine*, 6, 59–68.
- Koushede, V., Lasgaard, M., Hinrichsen, C., Meilstrup, C., Nielsen, L., Rayce, S.B., ... & Santini, Z.I. (2019). Measuring mental well-being in Denmark: Validation of the original and short version of the Warwick-Edinburgh mental well-being scale (WEMWBS and SWEMWBS) and cross-cultural comparison across four European settings. *Psychiatry Research*, 271, 502–509.
- Kross, E., Verduyn, P., Sheppes, G., Costello, C.K., Jonides, J., & Ybarra, O. (2021). Social media and well-being: Pitfalls, progress, and next steps. *Trends in Cognitive Sciences*, 25, 55–66.
- Lin, L.Y., Sidani, J.E., Shensa, A., Radovic, A., Miller, E., Colditz, J.B., ... & Primack, B.A. (2016). Association between social media use and depression among US young adults. *Depression and Anxiety*, 33, 323–331.
- Marino, C., Gini, G., Vieno, A., & Spada, M.M. (2018). The associations between problematic Facebook use, psychological distress and well-being among adolescents and young adults: A systematic review and meta-analysis. *Journal of Affective Disorders*, 226, 274–281.
- Melendez-Torres, G., Hewitt, G., Hallingberg, B., Anthony, R., Collishaw, S., Hall, J., ... & Moore, G. (2019). Measurement invariance properties and external construct validity of the short Warwick-Edinburgh mental wellbeing scale in a large national sample of secondary school students in Wales. *Health and Quality of Life Outcomes*, 17, 139.
- 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.
- Nixon. (2014). Current perspectives: The impact of cyberbullying on adolescent health. *Adolescent Health, Medicine and Therapeutics*, 5, 143–158.
- Ogders, C.L., & 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, 336–348.
- Orben, A. (2020). Teenagers, screens and social media: A narrative review of reviews and key studies. *Social Psychiatry and Psychiatric Epidemiology*, 55, 407–414.
- Page, N., Hewitt, G., Young, H., Moore, G., & Murphy, S. (2021). Student health and wellbeing in Wales: Report of the 2019/20 school health research network student health and wellbeing survey. Cardiff University, Cardiff, UK. Available from: https://www.shrn.org.uk/wp-content/uploads/2021/03/SHRN-NR-FINAL-23_03_21-en.pdf [last accessed 01 November 2021].
- Patchin, J.W., & Hinduja, S. (2006). Bullies move beyond the schoolyard: A preliminary look at cyberbullying. *Youth Violence and Juvenile Justice*, 4, 148–169.
- Przybylski, A.K., & Weinstein, N. (2017). A large-scale test of the goldilocks hypothesis: Quantifying the relations between digital-screen use and the mental well-being of adolescents. *Psychological Science*, 28, 204–215.

- Rose, A.J. (2002). Co-rumination in the friendships of girls and boys. *Child Development*, 73, 1830–1843.
- Salk, R.H., Hyde, J.S., & Abramson, L.Y. (2017). Gender differences in depression in representative national samples: Meta-analyses of diagnoses and symptoms. *Psychological Bulletin*, 143, 783–822.
- Sampasa-Kanyinga, H., Chaput, J.-P., & Hamilton, H.A. (2019). Social media use, school connectedness, and academic performance among adolescents. *The Journal of Primary Prevention*, 40, 189–211.
- Scharkow, M. (2019). The reliability and temporal stability of self-reported media exposure: A meta-analysis. *Communication Methods and Measures*, 13, 198–211.
- Sedgwick, R., Epstein, S., Dutta, R., & Ougrin, D. (2019). Social media, internet use and suicide attempts in adolescents. *Current Opinion in Psychiatry*, 32, 534.
- Sellers, R., Warne, N., Pickles, A., Maughan, B., Thapar, A., & Collishaw, S. (2019). Cross-cohort change in adolescent outcomes for children with mental health problems. *Journal of Child Psychology and Psychiatry*, 60, 813–821.
- Smith, O.R., Alves, D.E., Knapstad, M., Haug, E., & Aarø, L.E. (2017). Measuring mental well-being in Norway: Validation of the Warwick-Edinburgh mental well-being scale (WEMWBS). *BMC Psychiatry*, 17, 182.
- StataCorp. (2019). *Stata statistical software: Release 16*. College Station, TX: StataCorp LLC.
- Stewart-Brown, S. (2002). Measuring the parts most measures do not reach: A necessity for evaluation in mental health promotion. *Journal of Mental Health Promotion*, 1, 4–9.
- Stewart-Brown, S., Tennant, A., Tennant, R., Platt, S., Parkinson, J., & Weich, S. (2009). Internal construct validity of the Warwick-Edinburgh mental well-being scale (WEMWBS): A Rasch analysis using data from the Scottish health education population survey. *Health and Quality of Life Outcomes*, 7, 15.
- Stiglic, N., & Viner, R.M. (2019). Effects of screen time on the health and well-being of children and adolescents: A systematic review of reviews. *BMJ Open*, 9, e023191.
- Thorisdottir, I.E., Sigurvinsdottir, R., Asgeirsdottir, B.B., Allegrante, J.P., & Sigfusdottir, I.D. (2019). Active and passive social media use and symptoms of anxiety and depressed mood among Icelandic adolescents. *Cyberpsychology, Behavior and Social Networking*, 22, 535–542.
- Torsheim, T., Cavallo, F., Levin, K.A., Schnohr, C., Mazur, J., Niclasen, B., & Currie, C. (2016). Psychometric validation of the revised family affluence scale: A latent variable approach. *Child Indicators Research*, 9, 771–784.
- Twenge & Martin. (2020). Gender differences in associations between digital media use and psychological well-being: Evidence from three large datasets. *Journal of Adolescence*, 79, 91–102.
- Twenge, J.M., Cooper, A.B., Joiner, T.E., Duffy, M.E., & Binau, S.G. (2019). Age, period, and cohort trends in mood disorder indicators and suicide-related outcomes in a nationally representative dataset, 2005–2017. *Journal of Abnormal Psychology*, 128, 185–199.
- Twenge, J.M., Joiner, T.E., Rogers, M.L., & Martin, G.N. (2018). Increases in depressive symptoms, suicide-related outcomes, and suicide rates among US adolescents after 2010 and links to increased new media screen time. *Clinical Psychological Science*, 6, 3–17.
- Twigg, L., Duncan, C., & Weich, S. (2020). Is social media use associated with children's well-being? Results from the UK household longitudinal study. *Journal of Adolescence*, 80, 73–83.
- 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, 274–302.
- World Health Organization. (2005). Mental health: Facing the challenges, building solutions. Report from the WHO European ministerial conference: WHO Regional Office Europe. Available from: <https://apps.who.int/iris/handle/10665/326566> [last accessed 01 November 2021].

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