Longitudinal Associations Between Social Media Use and Mental Health Outcomes in Sample of Irish Youth: A Brief Report

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Longitudinal Associations Between Social Media Use and Mental Health Outcomes in Sample of Irish Youth: A Brief Report

Q1   Christopher J. Ferguson

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Questions remain over whether internet and social media use are associated with mental health outcomes in youth. Data has remained inconsistent in previous longitudinal studies. The current study sought to extend this work with a longitudinal study involving Irish youth (*N*=8,500) assessed initially at age 9 (time 1; T1), then again at ages 13 (time 2; T2) and 17/18 (time 3; T3). Analyses were preregistered. Early internet use (T1) and social media use (T2) were assessed along with controls for emotional problems at T1 and T2, language problems, parental conflict, popularity, and happiness at T1. Outcomes included emotional problems, peer problems, and emotional stability at T3. Results indicated that early internet use and social media use were not associated with later mental health problems when controlling for other factors. These results do not support the belief that social media use is a predictor of later mental health problems in youth.

Keywords: social media; mental health; adolescentsmoral panic

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The issue of whether social media use predicts youth mental illness has been a topic of significant debate for the last decade. In the U.S., China, and other countries, politicians have debated what laws or legislation might be enacted to reduce youth access to social media. The topic has raised concern, particularly

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Correspondence to: Christopher J. Ferguson E-mail: CJFerguson1111@aol.com Department of Psychology, Stetson University, 421 N. Woodland Blvd, DeLand, FL 32729, USA

Christopher J. Ferguson is professor of psychology at Stetson University. He has been researching media impacts on youth for over two decades. He lives in Orlando with his wife and son.

regarding issues such as emotional problems, emotional stability, and peer problems. The current study examined these issues with a sample of youth in Ireland.   25

Social Media Use and Mental Health Among Youth

Increases in emotional problems (e.g., mental health symptoms, such as depression and anxiety), emotional stability (e.g., long-term traits, mainly neuroticism), and peer problems (e.g., loneliness, isolation) among teens have been attributed to changes in technology use among youth beginning roughly from the year 2010   30
and on (Twenge et al., 2018). Twenge et al. (2018) argued that the adoption of social media by youth created a media environment that both isolated youth from real-life socialization and exposed teens to greater adverse communication online, including bullying. It is thought that social media use causes teens to socialize less in real life, leading to peer problems and subsequent neuroticism, depression, and   35
anxiety. Because this adoption of social media occurred contemporaneously with a rise in self-reported emotional and peer problems, it has been considered evidentiary of a causal relationship.

However, determining causality from co-occurring societal phenomena can be difficult, raising the risk of ecological fallacies. Other studies, for instance, have failed   40
to find evidence that changes in youth technology use, as indicated by social media, are correlated with changes in youth mental health (e.g., Vuorre et al., 2021). Many other changes have also occurred in U.S. society, such as changes in parenting practices, rising income inequality, changes in the K12 education system emphasizing oppression in society (Kaufman & Goldberg, 2023), and increased fatherlessness,   45
not to mention an increased rate of suicide among parenting age adults for contemporary youth. In fact, adult suicides are far higher and have grown more quickly than have youth suicides (Centers for Disease Control and Prevention, 2023). Failing to consider other potential historical factors that can influence various aspects of youth mental health may cause misattribution related to contemporary technology   50
changes as a cause of youth mental health trends.

Evidence from individual research studies regarding the impact of social media on mental health has been equivocal and, at times, acrimonious. Interestingly, many of the debates focus on different interpretations of results from the exact same datasets, such as *Monitoring the Future* (e.g., Patrick et al., 2023) or the *Millennium Cohort*   55
Study (Castañeda et al., 2021). In essence, these debates tend to focus on the interpretation of very small effect sizes, typically below $r = .10$, which may become "statistically significant" in samples of tens or hundreds of thousands of participants. Some authors argue that these effect sizes are meaningful (e.g., Twenge & Farley, 2021), whereas others argue that they are trivial and differ little from the impact of   60
other meaningless correlations, such as eating potatoes or wearing eyeglasses on suicide (e.g., Orben & Przybylski, 2019).

Reviews of this data have likewise returned mixed results. A recent umbrella review found that most meta-analyses of the effects of social media on mental health concluded that the evidence was weak and inconsistent, though there was not perfect agreement among the reviews (Valkenburg et al., 2022). For instance, one meta-analysis concluded that the effects were small, with significant heterogeneity, which might indicate significant moderators in the relationship between social media and mental health (Ivie et al., 2020). Another review (Odgers & Jensen, 2020) noted that, particularly from preregistered studies, evidence tended to be weak and unlikely to be of clinical significance. As such preregistered studies may be of particular value in understanding the relationship between social media use and youth mental health.

The Current Study

At present, uncertainty remains regarding whether social media impacts youth mental health, and the employment of more rigorous studies could help answer these questions. One way of providing better evidence is through a process of preregistration, by which study hypotheses and data-analysis plans are published publicly in advance (Odgers & Jensen, 2020). As such, the current study sought to add to this evidence base by using a preexisting dataset (i.e., *Growing Up in Ireland*; McNamara et al., 2020) and preregistering analyses. This preregistration is available here: https://aspredicted.org/13S_4F2. This study was designed to test the association between early internet or social media use and mental health, controlling for relevant factors. Control variables were selected based on several criteria. First, as early problems can predict later problems, measures related to the child's early emotional and social functioning as well as general happiness serve as controls for baseline functioning (Gao et al., 2020). Issues such as language delays could impact peer relations (Horwitz et al., 2003) and family conflict may also relate to later emotional problems (David et al., 1996). Furthermore, sex and age are standard demographic control variables. Taken together, this study tested the following hypothesis:

> H: Internet use at age 9 and social media use at age 13 will predict emotional problems, peer problems, and emotional stability at age 17/18, controlling for age, sex, language problems, popularity, happiness, parent conflict, and parent- and teacher-rated emotional problems at age 9 and parent-rated emotional problems at age 13.

Method

Data were taken from the *Growing Up in Ireland* longitudinal study of youth (McNamara et al., 2020). This longitudinal study began examining a large sample of youth in 2008 when the youth were aged 9 and has continued to the present day (at the time of publication).

Participants

Participants were 8,500 youth aged 9 at time 1 (T1), 13 at time 2 (T2), and between   100
17 and 18 at time 3 (T3). At wave 3, 6,309 participants were available. Only
participants with data from all three waves were included. There were slightly
more female (51.4%) than male (48.6%) youth in the sample. 94.8% of youth were
citizens of Ireland and 87% were Roman Catholic (other Christian were 5.8%, and
"other" was 1.2%, with the remainder non-reporting).   105

Materials

All materials were included in the *Growing Up in Ireland* longitudinal surveys.

Main Predictor Measures

Internet use and social media use were considered as predictors. The difference in
the predictors likely reflects both changes in technology and related concerns as   110
internet technology evolved over time. Social media gradually became prevalent in
the 2000s. Data collection for the first wave occurred in 2007/2008, before a focus on
social media had become more prevalent. The second wave of assessments occurred
in 2011/2012, as social media concerns began to emerge. As such, the two predictors
differed slightly in focus, but reflect changes in technology and social media use   115
across time, making each interesting and valuable to consider.

   Internet Use. At age 9 (T1), internet use was calculated from combined items for
whether the child self-reported using chatrooms, emailing, instant messaging, and
surfing the internet for fun ("Do you have a computer at home. What do you use it
for?;" α = .58). Participants were asked (yes/no) about using computers for these   120
activities over the past week.

   Social Media Use. At age 13 (T2), social media was assessed by child self-report of
using social media sites such as Facebook or Twitter. Participants were asked to
report whether they used the internet for these social media sites on a typical day.
This was a single question "What do you use the internet for? Personal webpage   125
(Facebook, Bebo, Twitter, etc.)/instant messaging/emailing."

Main Outcome Measures

   Emotional and Peer Problems. Emotional problems and peer problems at age 17/
18 (T3) were both assessed with items from the Strengths and Difficulties Question-
naire (Goodman, 1997). This questionnaire was rated by parents indicating youth   130
problem areas (e.g., "Restless, overactive, cannot stay still for long;" "Often loses
temper") on a three-point Likert scale (1 = *not true*, 3 = *certainly true*). The Strengths
and Difficulties (SDQ) Questionnaire was designed to help clinicians and educators
understand both different competency realms in which youth may be struggling, but
also where youth may be doing well (e.g., "Has at least one good friend").   135

Emotional Stability. T3 emotional stability was taken from the Ten Item Personality Inventory (TIPI; Gosling et al., 2003), which measures the Big-5 personality traits (i.e., openness, agreeableness, extraversion, neuroticism, conscientiousness) using a 7-point scale (from 1= *strongly disagree* to 7 = *strongly agree*). Emotional stability corresponds to what is often called neuroticism. This concept has been studied for decades as part of the Big-5 theory of personality (Goldberg, 1992; e.g., "Anxious, easily upset"), and neuroticism has been associated with a variety of life problems, stress, and mental disorders such as anxiety and depression (Kendler, 1993). It is worth noting that these measures have a track record of construct and predictive validity and use in clinical assessments. This was included as a full-scale score in the database.

There were small to moderate correlations between the outcome variables. T3 Emotional Problems were correlated with T3 Peer Problems ($r = .248$, $p < .001$) and T3 Emotional Stability ($r = -.462$, $p < .001$). T3 Peer Problems were correlated with T3 Emotional Stability ($r = -.340$, $p < .001$).

Control Variables

Control variables included the youth's sex (coded as 1 = *male*, 2 = *female*), age, T1 parent- and teacher-rated SDQ emotional problems, and T2 parent-rated emotional problems. Other T1 control variables included language delays, family conflict, happiness, and popularity. Of note, most of these variables in the dataset, with the exception of language delays, were included as full-scale scores, not individual items. As such, reliability data could not be calculated.

Parent- and Teacher-Rated Emotional Problems. The SDQ, as described above, was used to assess teacher and parent related emotional problems at T1 (parent and teacher) and T2 (parent).

Language Delays

Language delays were measured using a 9-item scale developed as part of this database. Sample items include, "speech not clear to family," "stutters," and "difficulty finding words," which were measured on a yes/no scale ($\alpha = .66$).

Family Conflict

Family conflict was measured using the 30-item scale (Pianta, 1992). Questions were presented on a 5-point Likert scale (1 = *definitely does not apply*, 5 = *definitely applies*). The conflict subscale of 12 items includes sample items such as "dealing with child drains energy" and "feels I treat him/her unfairly."

Happiness and Popularity
Happiness and popularity were measured using subscales of the Piers-Harris Self-   170
Concept Scale (Piers & Herzberg, 2007). The Piers-Harris is a 60-item inventory
presented in a yes/no response format. Sample items include, "I am a happy person"
and "people pick on me."

Procedures

All data were collected as part of the *Growing Up in Ireland* longitudinal study   175
(McNamara et al., 2020). These data were archived for this project and can be
supplied upon request. Separate Ordinary Least Squares (OLS) regressions were
performed for each of the T3 outcomes. Pairwise deletion was used for missing
data. VIFs indicated an absence of collinearity issues with the highest VIFs below 1.5.
Although it was not preregistered, a threshold of $r = .10$ was used as a smallest effect   180
size of interest (SESOI), as effect sizes below that point are difficult to distinguish
from methodological noise, even if they are statistically significant (Ferguson &
Heene, 2021).

Results

Means and standard deviations for all measures are reported in Table 1. Intercorre-   185
lations between measures are included as Table 2. Standardized regressions for all
results are presented in Table 3.

Table 1 Means and Standard Deviations for Variables

Time	Variable	M	SD
T1	Early language problems	.014	.061
T1	Internet use	1.784	.217
T1	Popularity	8.735	2.366
T1	Happiness	8.776	1.582
T1	SDQ emotional	2.013	1.973
T1	Caregiver conflict	21.760	8.500
T1	Teacher SDQ emotional	1.284	1.829
T2	Parent SDQ emotional	1.782	1.934
T2	Social media use	1.181	.385
T3	Parent SDQ emotional	1.767	1.948
T3	Peer problems	1.359	1.471
T3	Emotional stability	5.322	1.410

T1 = time 1; T2 = time 2; T3 = time 3; SDQ = strengths difficulties questionnaire.

Table 2 Correlations Between Variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1) Early language problems	1.00	.011	-.071	.053	.103*	.085	.062	.098	.052	.035	.110*	-.063
2) Internet		1.00	-.038	-.008	-.028	-.063	.005	-.023	.134*	-.030	-.014	.043
3) Popularity			1.00	.521*	-.138*	-.121*	-.146*	-.121*	-.030	-.085	-.169*	.138*
4) Happiness				1.00	-.087	-.140*	-.078	-.094	.008	-.034	-.109*	-.091
5) SDQ emotional					1.00	.354*	.233*	.494*	.001	.246*	.198*	-.303*
6) Caregiver conflict						1.00	.095	.302*	-.046	.153*	.185*	-.287*
7) Teacher SDQ emotional							1.00	.187*	.032	.144*	.146*	-.156*
8) T2 Parent SDQ emotional								1.00	-.035	.344*	.295*	.421*
9) T2 Social media use									1.00	-.035	.031	.047
10) T3 Parent SDQ emotional										1.00	.248*	-.462*
11) T3 Peer problems											1.00	-.340
(12) Emotional stability												1.00

$* = p < .01$.

Table 3 Standardized Regression Coefficients for All Regression Results

Time	Predictor	β		
		Emotional Problems	Peer Problems	Emotional Stability
	Female sex	.179* (.697, 062)	-.012 (-.037, .039)	-.141* (-.397, .035)
	Age	-.002 (-.037, .239)	-.009 (-.102, .153)	.006 (.067, .135)
T1	Early language problems	.008 (.266, .503)	.066 (1.585, .322)	-.019 (-.433, .285)
T1	Popularity	-.044 (-.036, .015)	-.110* (-.068, .010)	.068 (.040, .009)
T1	Happiness	.023 (.028, .023)	-.009 (-.009014)	.000 (.000, .013)
T1	Parent SDQ emotional	.070 (.069, .019)	.043 (.032, .012)	-.061 (-.044, .010)
T1	Family conflict	.035 (.008, .004)	.093 (.016, .002)	-.153* (-.025, .002)
T1	Teacher SDQ emotional	.064 (.069, .017)	.074 (.060, .011)	-.055 (-.042, .010)
T2	Parent SDQ emotional	.264* (.266, .018)	.179* (.127, .012)	-.309* (-.225, .010)
T1	Internet use	-.021 (-.192, .141)	-.013 (.086, .090)	.026 (.170, .080)
T2	Social media use	-.009 (-.047, 080)	.032 (.122, .051)	.017 (.064, .045)

T1 = time 1; T2 = time 2; SDQ = strengths difficulties questionnaire. * $p < 0.05$. Unstandardized regression weights and standard error in parentheses.

Emotional Problems

The overall model for T3 emotional problems was significant ($R = .407$, $R^2_{adj} = .163$, $F[11, 3445] = 62.01$, $p < .001$). Of the predictor variables, youth female sex ($\beta = .179$,   190
$p < .001$), and T2 parent-rated emotional problems ($\beta = .264$, $p < .001$) were the only predictors of T3 emotional problems. Neither T1 internet use nor T2 social media use predicted T3 emotional problems.

Peer Problems

The overall model for T3 peer problems was significant ($R = .326$, $R^2_{adj} = .104$, $F[11,$ 195
$5139] = 55.62$, $p < .001$). Of the predictor variables, T1 popularity ($\beta = -.110$, $p < .001$) and T2 parent-rated emotional problems ($\beta = .167$, $p < .001$) were the only predictors of T3 peer problems. Neither T1 internet use nor T2 social media use predicted T3 peer problems.

Emotional Stability   200

The overall model for T3 emotional stability was significant ($R = .489$, $R^2_{adj} = .237$, F
$[11, 5137] = 146.40$, $p < .001$). Of the predictor variables, youth female sex ($\beta = -.141$,
$p < .001$), T1 family conflict ($\beta = -.153$, $p < .001$), and T2 parent-rated emotional
problems ($\beta = -.309$, $p < .001$) were the only predictors of T3 emotional stability.
Neither T1 internet use nor T2 social media use predicted T3 emotional stability.   205

Resiliency Testing

The multiple regressions were tested for resiliency by switching to hierarchical regressions and imputing the missing data. Neither adjustment changed the outcomes substantially for internet or social media use, suggesting that these results were robust to the specific regression method used. Missing data was modest for T3 emotional stability and T3 peer problems but higher for T3 emotional problems. Adjusting for missing data using replace with mean procedures did not influence the study results.

Mini Meta-Analysis

The effect sizes for the T1 internet and T2 social media relationships with each outcome was subjected to a mini random effects meta-analysis. Results indicated that the overall effect size was equivalent to $\beta = -.009$ and was non-significant ($p = .336$). These results do not support the hypothesis that internet or social media use is associated with long-term mental health or peer problems among youth.

Discussion

The issue of whether social media impacts mental health remains a topic of considerable contention in the published literature, both among policy makers and for parents. Given the lack of consensus on this issue, the current study sought to add to the evidence base by conducting preregistered analyses regarding the impact of social media on mental health outcomes among Irish youth. Overall, evidence did not support a link between early internet or social media use and later mental health.

The main findings indicated that internet use at age 9 and social media use at age 13 were not associated with emotional problems, peer problems, or emotional stability (i.e., neuroticism) at age 17/18. As such, these results do not support the belief that social media use, at least in regard to general use or time spent on social media, is associated with negative outcomes for youth. As such, current concerns regarding the internet and social media use may reflect moral panics over technology or media use that have been exhibited in the past, such as with comic books, rock music, or video games, more than an actual public health crisis.

This does not necessarily mean that there are no concerns about social media use. For instance, even if time spent on social media were not inherently worrisome, how people choose to use social media could be associated with negative outcomes. Some research indicates that different ways of using social media may be associated with both positive (e.g., Reinecke & Trepte, 2014) and negative (e.g., Davila et al., 2012) outcomes. Thus, understanding interactions between social media and user intentions and motivations may be more fruitful than examining only time spent on social media.

The findings have implications for policy insofar as policies that attempt to globally restrict youth access to social media may have little actual impact on

youth wellbeing. This may be of concern as a focus on technology as harmful often   245
distracts the public from more fruitful avenues toward reducing public health
concerns. Given that suicide appears to follow similar patterns across most age
groups (Centers for Disease Control and Prevention, 2023), a hyperfocus on teens
may have mistakenly created a false impression that teen suicide was linked to
technology used by teens rather than following a broader societal pattern experi-   250
enced across age groups.

Regarding actual predictors of mental health concerns in the current sample, the
two most significant predictors were female sex and prior mental health concerns.
This suggests that mental health concerns may be at least fairly stable in youth and
early intervention may be more fruitful than focusing on technology use. Given that   255
parent ratings were particularly reliable, this finding may indicate that parents are
fairly attuned to their youths' mental health. Instead, resources should be devoted
toward early identification of and intervention with at-risk children. Family conflict
and peer unpopularity were also related to some outcomes, and these may also be
important areas to consider clinically with youth. Mental health problems also   260
appear to be slightly higher among female youth.

The current study aligns with other studies that have failed to find that social
media use is a predictor of mental health outcomes (e.g., Heffer et al., 2019; Orben &
Przybylski, 2019). Most debates in this area appear to focus on the interpretation of
relatively small effect sizes. For policy makers, it is suggested that a moratorium on   265
legislation seeking to regulate youth social media use be considered until research
becomes clearer. Particularly given free speech concerns regarding governments
restricting communication access in the name of preventing "harm," the risks of
such policies at this juncture outweigh the evidence for appreciable benefits.

Limitations and Conclusion   270

As with all studies, this longitudinal analysis has limitations that bear discussion.
First, all data are correlational. Though longitudinal studies can establish time
patterns, causal attributions can still not be made. Second, internet and social
media use data were self-reported, and some analyses suggest that self-report data
are less reliable than other forms of data such, as time diaries or application   275
recordings (Orben & Przybylski, 2019). Third, the current analysis only considers
overall use of social media, not the specific activities that youth engaged in while on
social media. It is possible that more idiosyncratic effects might be noted when
specific activities are taken into account.

The current data were unable to support the belief that internet and social media   280
use are associated with later mental health problems in youth. It is recommended
that future dialogue on this issue be more cautious in noting the equivocal nature of
this body of research. It is hoped that the current study will productively add to
dialogs on this issue.

Disclosure Statement

Q3 No potential conflict of interest was reported by the author(s).

ORCID

Christopher J. Ferguson http://orcid.org/0000-0003-0986-7519

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