Too Connected to being Connected? Adolescents' Social Media Emotional Investment

Moderates the Association between Cybervictimization and Internalizing Symptoms

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Abstract

This study examined whether the association between cybervictimization and internalizing symptoms was moderated by adolescents' emotional connectedness to their social media. Participants were 288 adolescents (54.9% male participants) with ($n = 151$) and without ($n = 137$) attention-deficit/hyperactivity disorder (ADHD) between the ages of 13 and 15 years ($M = 14.09$, $SD = 0.36$). Adolescents reported on social integration and emotional connection (SIEC) to social media and parents reported on their impression of their adolescent's SIEC to social media. Adolescents also reported on cybervictimization experiences and internalizing symptoms. Adolescents with ADHD had higher cybervictimization scores than adolescents without ADHD and were also more likely to report multiple experiences of cybervictimization over the past month. Emotional investment in social media moderated the relations between cybervictimization and internalizing symptoms such that cybervictimization was associated with higher anxiety and depression symptoms at higher levels of emotional investment in social media. Results were consistent across both parent and adolescent report of social integration and emotional connection to social media. These findings indicate that cybervictimization may be associated with negative outcomes specifically among adolescents with a strong emotional connection to their social media use.

Keywords: adolescence; bullying; media use; peer victimization; social media; attention-deficit/hyperactivity disorder

Too Connected to being Connected? Adolescents' Social Media Emotional Investment Moderates

the Association between Cybervictimization and Internalizing Symptoms

Peer victimization is common and increases during early adolescence (Troop-Gordon, 2017). Approximately 10-15% of youth experience ongoing peer victimization, and there is growing concern that these victimization experiences also commonly occur in the online world as the Center for Disease Control and Prevention has stated cybervictimization to be a serious public health threat (Brochado et al., 2016; Troop-Gordon et al., 2017). Though far less studied than in-person victimization, there is growing interest in examining cybervictimization among adolescents, especially given evidence for high rates of technology and social media use in this population (Anderson & Jiang, 2018; David-Ferdon & Hertz, 2007; Nesi, 2020). Cybervictimization is defined as the experience of aggression through an electronic platform or online technology (Mehari, Farrell, & Le, 2014). Research estimates a median of 11.7% (ranging from 5.3-66.2%) of youth experience perpetual cybervictimization (Camerini et al., 2020), which is linked to a number of negative outcomes. A meta-analysis by Fisher and colleagues (2016) found cybervictimization to be associated with higher depression, anxiety, sadness, and suicidal ideation, as well as lower self-esteem in adolescents. However, the effect sizes were moderate (mean Pearson's *r* for overall internalizing = .30), suggesting that there is likely variability in the extent to which cybervictimization and internalizing problems are related. Accordingly, there is a need to move beyond main effects to understand which factors may be important for understanding when the association between cybervictimization and internalizing problems may be more pronounced.

Up to 92% of adolescents report accessing the internet daily, 95% having access to a smartphone, and 45% reporting being online "almost constantly," in which they frequently interact with peers and strangers via social networking sites (Anderson & Jiang, 2018). With internet usage among adolescents nearly ubiquitous, researchers have begun to examine what factors contribute to

or exacerbate the link between cybervictimization and associated negative outcomes. It may be especially important to examine how adolescents engage with their media use, as differences in media use engagement could shed light on the subsample of adolescents for whom the association between cybervictimization and internalizing symptoms is particularly strong. Emotional investment in social media use refers to the extent that an individual becomes upset when they cannot use social media, feels disconnected when not logged into social media, and believes that social media plays an important role in social relationships (Jenkins-Guarnieri et al., 2013). We are aware of only one study to date that has examined emotional investment in social media use in relation to adolescent internalizing symptoms. In a study with 467 Scottish adolescents (ages 11-17 years), Woods and Scott (2016) found that adolescents who were more emotionally invested in their social media use reported lower self-esteem and higher depression and anxiety symptoms. These results suggest that the manner in which adolescents engage with their social media use is an important factor in studies aiming to examine how media use is linked to adjustment.

Not all youth who experience cybervictimization experience internalizing symptoms (Ortega, et al., 2013). Drawing from the work of Woods and Scott (2016), it is likely that adolescents with greater emotional investment in their social media use also experience greater distress following cybervictimization. Adolescents with high social media emotional investment may place greater value on how they are perceived and treated on social media, and they may also have a harder time separating their online lives from the rest of their lives (Nesi & Prinstein, 2019). For example, an adolescent with high emotional investment in social media may have great difficulty putting cybervictimization experiences in the broader context of their lives, perseverate over cybervictimization experiences, and engage in negative social interactions by replying to aggressors or repeatedly re-reading or looking at posts and photos. This explanation would align with the proposed differential susceptibility to media effects model (DSMM), which states that

media effects are conditional and depend on dispositional, developmental, and/or social variables (Valkenburg & Peter, 2013). Although unexamined in any study to date, we propose that emotional investment in social media is likely to exacerbate the relation between cybervictimization and internalizing symptoms among adolescents.

Victimization, Internalizing Difficulties, and Media Use in Adolescents with ADHD

Adolescents with attention-deficit/hyperactivity disorder (ADHD) experience far higher rates of both peer difficulties, including in-person victimization, and co-occurring internalizing symptoms than their peers without ADHD (Becker & Fogleman, 2020; Becker, Mehari, Langberg & Evans, 2017; Wiener & Mak, 2008). A study examining cybervictimization also demonstrated that adolescents with ADHD (ages 12-16 years) are more likely to experience cybervictimization than their peers (18.7% v. 12.6%; Heiman, Olenik-Shemesh, & Eden, 2015). A recent study of 58 adolescents with ADHD (ages 13-16 years) found 60% of the sample to report having experienced cybervictimization in the past year (Dawson, Wymbs, Evans, & DuPaul, 2019). Another recent study with 78 adolescents with ADHD (ages 13-17 years) found 23% to report experiencing cybervictimization in the past month (Fogleman et al., 2021). Additionally, adolescents with ADHD report a preference for online relationships (Mikami, Szwedo, Ahmad, Samuels, & Hinshaw, 2015), which also may place adolescents with ADHD at higher risk for experiencing cybervictimization.

Moreover, adolescents with ADHD not only are at greater risk for experiencing cybervictimization but also may be more emotionally connected to their social media. Some research has demonstrated that multi-communication (i.e., engaging in two or more overlapping synchronous conversations) was positively associated with problematic phone use, which was explained by ADHD symptoms and also a social need to belong (Seo et al., 2015). These findings may suggest that individuals with ADHD symptoms are connected to their online devices more intensely and emotionally. While research is limited in examining how ADHD symptoms relate to

emotional connection to social media, somewhat related literature has demonstrated that a fear of missing out (FOMO) is associated with a decrease in emotional well-being in adolescents (Fabris et al., 2020). Furthermore, some research has shown that FOMO scores are positively associated with ADHD symptoms (Ünübol & Hizli Sayar, 2020). Thus, to maximize variability and applicability of the study findings to a population likely to experience both cybervictimization and internalizing symptoms, the current study included a sample of adolescents with and without ADHD.

The Present Study

The present study examines whether the association between cybervictimization and internalizing symptoms is stronger among adolescents with a greater emotional connection to their social media. Using a sample of adolescents with and without ADHD, the purposes of the current study were to (1) evaluate whether cybervictimization is associated with anxiety and depression; (2) examine if the relations between cybervictimization and internalizing symptoms are moderated by adolescents' emotional connection to their social media; and (3) describe rates of cybervictimization among adolescents with and without ADHD. We hypothesized that cybervictimization would be associated with higher depression and anxiety symptoms for adolescents with a stronger emotional connection to their social media use. We also hypothesized that adolescents with ADHD would report higher rates of cybervictimization than their peers without ADHD.

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Methods

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Participants

Participants were 288 adolescents (158 male participants, 130 female participants) with and without ADHD between the ages of 13 and 15 years (*M*=14.09, *SD*=0.36). Participants were recruited from local schools between two sites in Southeast and Midwest United States. Approximately half of the sample (*n*=151) was diagnosed with DSM-5 ADHD (112 with Predominantly Inattentive Presentation and 39 with Combined Presentation). The remaining 137

participants comprised a comparison sample of adolescents without ADHD. Further description of the sample and comparisons between the ADHD and comparison groups can be found in Table 1.

Procedures

Adolescents in eighth grade and their parents were recruited in the context of a larger, ongoing longitudinal study examining sleep in adolescents with and without ADHD (Becker, Langberg, Eadeh, Isaacson, & Bourchtein, 2019). For this study, only cross-sectional data from the second time point (spring of eighth grade) was examined because this is when the social media measures were collected. The Institutional Review Boards at Cincinnati Children's Hospital Medical Center and Virginia Commonwealth University approved this study. Information about the study was widely distributed by partner schools to parents of eighth grade students, and interested families contacted the study staff for an initial phone screen. After initial phone screens, families who met screening criteria completed an inclusion visit at which consent and assent were obtained. Inclusion criteria for the broader study from which data for the present study were drawn included the following: (a) enrolled in eighth grade (given broader study goal to follow participants across the transition from middle to high school); (b) estimated Full Scale IQ $\geq$ 80 based on the Wechsler Abbreviated Scale of Intelligence, Second Edition (WASI-II; Wechsler, 2011) (to ensure participants could complete study measures); and (c) enrolled in regular education classes for the majority of the school day. Exclusion criteria were as follows: (a) meeting criteria for autism spectrum disorders, bipolar disorder, a dissociative disorder, or a psychotic disorder; or a previous diagnosis of an organic sleep disorder (e.g. obstructive sleep apnea, narcolepsy, restless leg syndrome, periodic limb movement disorder) according to parent report during the initial phone screen (given that youth with these disorders often have very irregular and specific sleep problems examined in the broader study); and (c) not meeting criteria for either the ADHD or comparison groups as described below.

ADHD status was determined at the visit based on full DSM-5 (APA, 2013) criteria using a

structured diagnostic interview, the parent version of the Children's Interview for Psychiatric

Syndromes (Weller, Weller, Fristad, Rooney, & Schecter, 2000). Interviews were completed by

doctoral-level graduate students and postdoctoral fellows who were supervised by each site's

principal investigator. For the ADHD sample, full criteria according to the DSM–5 (APA, 2013)

had to be met. Parents had to endorse that their child met at least six symptoms of inattention and/or

hyperactivity/impulsivity, with impairment across multiple domains (e.g., school and home), and

onset had to occur prior to age 12. ADHD-related impairment had to be present and could not be

better accounted for by any of the other psychiatric disorders assessed in this study (see Table 1).

This aligns with recommendations for emphasizing impairment when diagnosing ADHD in

adolescents, in addition to findings showing parent retrospective report of ADHD symptoms (but

not adolescent self-report of symptoms) to be significantly correlated with ADHD symptoms

assessed in childhood (Sibley et al., 2012). To be eligible for the comparison group, three or fewer

symptoms had to be endorsed in both the inattention and hyperactivity/impulsivity domains. Youth

that did not meet full criteria for an ADHD diagnosis but had more than three symptoms in either

the inattention or hyperactivity/impulsivity domains were excluded from the study.

The broader study from which data in the present study were drawn included 302

participants (Becker, Langberg et al., 2019), 288 of whom completed rating scales at the second

timepoint used in the current study (151 with ADHD, 137 comparison; $X^2(1) = 3.67, p > .05$).

Participants included in this study did not differ from the other participants in the broader study on

adolescent-reported anxiety or depressive symptoms, sex, race, ethnicity, or study site (all ps > .05).

Participants included in this study had significantly higher IQ scores than participants not included

in this study; 107.43±13.39 and 98.93±10.97, respectively, $t(300) = 2.34, p = .02$.

Measures

Problem Behavior Frequency Scale – Adolescent Report (PBFS-AR). The PBFS-AR

(Farrell, Thompson, Mehari, Sullivan, & Goncy, 2020) was used to assess the frequency of

cybervictimization experiences. The PBFS-AR is a 68-item questionnaire that has demonstrated

reliability (e.g., item response theory reliabilities > .70), validity (e.g., criterion validity with office

discipline referrals and outcomes), and invariance across sex and grade for assessing adolescent's

frequency of victimization experiences, aggression, substance use and delinquent behavior (Farrell

et al., 2020). For the current study, the 11-item cybervictimization scale was used. These 11 items

were added to the PBFS-AR after a systematic review of measures on cybervictimization and a

review of qualitative studies examining cybervictimization (e.g., "Called someone you know mean

names online like on Facebook or SnapChat or through texting," "Posted rude comments about

someone you know," "Left someone out of an online group or unfriended them on Facebook";

Mehari et al., 2014; Mishna et al., 2009). Each item is rated on a six-point frequency scale (1 =

never, 2 = *1-2 times*, 3 = *3-5 times,* 4 = *6-9 times*, 5 = *10-19 times,* and 6 = *20 or more times*) in

reference to the past 30 days. As very few participants endorse the higher frequency categories

(Farrell et al., 2020) and consistent with previous research with this measure (Fogleman et al.,

2021), the present study modified each item's original six-point frequency scale to a dichotomy (0 =

never, 1 = *at least once in the past 30 days*). The 11 dichotomous items were summed to create a

total index of cybervictimization. Internal consistencies were calculated for cybervictimization (α =

.84).

Revised Child Anxiety and Depression Scales (RCADS). The RCADS (Chorpita, Moffitt,

& Gray, 2005) was used to assess symptoms of anxiety and depression. The RCADS has

demonstrated sound psychometric properties, including acceptable reliability and structural validity

across community and clinical samples of youth (Chorpita et al., 2005; Chorpita, Yim, Moffitt,

Umemoto, & Francis, 2000; Gormez et al., 2017), including in youth with ADHD (Becker,

Schindler, Luebbe, Tamm, & Epstein, 2019). Specifically, in a sample of 117 youth with ADHD,

the total anxiety and depression scales demonstrated acceptable reliability (αs = .92 and .72,

respectively) and both convergent and discriminant validity with other child self-report measures of

internalizing symptoms (convergent validity) and aggression (discriminant validity) (Becker,

Schindler et al., 2019). The RCADS includes 47 items that are rated on a four-point scale (0 =

never, 1 = *sometimes,* 2 = *often,* 3 = *always*), with higher scores indicating higher anxiety and

depressive symptoms (e.g., "I worry about making mistakes," "I worry about things," "I feel sad or

empty," "I feel worthless"). The present study used the total anxiety (37 items; α = .94) and

depression (10 items; α = .85) mean scale scores.

   Social Media Use Integration Scale (SMUIS) and SMUIS-parent version. The Social

Media Use Integration scale (Jenkins-Guarnieri, Wright, & Johnson, 2013) is a self-report 10-item

assessment of adolescent's integration of social media in their daily routines and emotional

connectedness to their social media. The SMUIS-parent version is a modified version of the original

scale that asks parents their impression of their adolescent's integration of social media in their

daily routines (e.g., "My child gets upset when they can't log in to social media"). The original

scale assessed social media in the context of the social media site Facebook, however, given the

authors' recommendation that the measure be adapted for use with other types of social media

(Jenkins-Guarnieri, Wright, & Johnson, 2013), and consistent with previous literature (Woods &

Scott, 2016), this study replaced Facebook with the more general phrase of "social media." Also

consistent with Woods and Scott (2016) the SMUIS includes two subscales (Social Integration and

Emotional Connection, and Integration into Social Routines), but only the Social Integration and

Emotional Connection (SIEC) subscale (e.g., "I get upset when I can't log in to social media"),

which contained six items, was used in this study. Jenkins-Guarnieri and colleagues (2013) report

good reliability for the six-item subscale (SIEC) with a Cronbach's alpha of .89 and the authors also

reported stable test-retest reliability over three weeks (r = .80 for SIEC) and evidence of both

convergent and discriminant validity with other previously published measures on social media use.

Each item is rated on a five-point scale (1 = *strongly disagree*, 2 = *disagree*, 3 = *neither agree nor*

disagree, 4 = *agree*, 5 = *strongly agree*), with higher scores indicating higher emotional

connectedness to social media. Mean scale scores were used in analyses (adolescent-reported SIEC

α = .94; parent-report of adolescents' SIEC α = .92).

   Daily Online Technology Use. Three items from an adolescent-report technology use

measure (Pea, Nass et al., 2012) were used to create a composite of daily online technology use.

These items assessed how many hours the adolescent spends on an average day e-mailing/posting

on social media, texting or instant messaging, and being on the phone or video chatting. Each item

was rated on a five-point scale (0 = *never*, 1 = *less than 1 hour*, 2 = *about 1-2 hours*, 3 = *about 2-3*

hours, 4 = *about 3-4 hours*, 5 = *more than 4 hours*). A mean score was calculated of the three items

as in index of daily online technology use (α = .63).

Statistical Analyses

   IBM SPSS Statistics Version 26.0 statistical software was used for all analyses (IBM Corp.,

2019). First, bivariate correlations were conducted among study variables. Next, a series of

regression models were conducted using the PROCESS macro (Version 3; Hayes, 2018).

Cybervictimization was the primary independent variable. Separate regression models were tested

for anxiety and depression as the dependent variables. Parent and self-report of adolescents' SIEC

to social media were tested separately as potential moderators of the relation between

cybervictimization and internalizing symptoms (a total of four regression models). The interaction

tests whether the association between cybervictimization and depression or anxiety differ depending

on parent or adolescent self-report of adolescents' emotional connectedness to social media. ADHD

status, sex, and total daily online technology use were included as covariates in the regression

models. Because female students starting around the age of 13 report higher rates of both depression

and anxiety symptoms (Costello et al., 2006; Letcher et al., 2012) and our participants were 13-15

years old, sex was included as a covariate in regression models. Total daily online technology use

was included as a covariate in regression models as a systematic review on social media behavior

and internalizing symptoms demonstrated a clear positive association between time spent online and

depression across many studies (Sarmiento et al., 2018). ADHD status was included as a covariate

because adolescents with ADHD may be expected to more frequently experience cybervictimization

and to have higher internalizing symptoms than adolescents without ADHD. Since all participants

were in the 8th grade and between the ages of 13 and 15 years, age was not selected as a covariate.

Significant interactions were probed using PROCESS with simple slopes calculated at one standard

deviation above and below the mean for SIEC to social media. Simple slopes indicate the

association between cybervictimization and the internalizing outcome for a given value of SIEC to

social media.

Finally, to further characterize and describe the sample, we compared scores and rates of

cybervictimization between adolescents with and without ADHD. We did this in two ways: an

independent samples *t*-test was conducted to examine whether adolescents with and without ADHD

differed in their dimensional cybervictimization scores (Cohen's *d* effect sizes were calculated with

.2, .5 and .8 as benchmarks for small, medium and large effect sizes, respectively) and chi-square

tests comparing differences in rates of cybervictimization experiences between adolescents with and

without ADHD (odds ratio was used as a measure of effect size, with 1.5 considered a small effect,

3.5 a medium effect, and 9.0 a large effect).

Results

Thirteen participants were excluded from analyses in the current study because the

adolescent and parent reported that the adolescent did not use social media. Adolescents with

ADHD were significantly more likely than adolescents without ADHD to not use social media (11

and 2 adolescents, respectively; $X^2(1) = 5.65$, $p = .017$). The remaining analyses included the 275

adolescents with social media use.

Bivariate Correlations

Table 2 provides the descriptive statistics and intercorrelations of the study variables.

Female sex was associated with greater anxiety symptoms ($r = .26$, $p < .001$) and higher parent-

report of adolescents' SIEC to social media ($r = .18$, $p = .003$). Sex was not significantly associated

with daily online technology use, cybervictimization, adolescent-reported SIEC to social media, or

depressive symptoms (all ps > .05). ADHD status was significantly associated with greater

depressive symptoms ($r = .16$, $p = .009$) but was not significantly related to anxiety symptoms ($p >$

.05).

Greater cybervictimization was significantly associated with higher self- and parent-report

of adolescents' SIEC to social media (rs = .28 and .16, respectively; both ps < .01). Greater

cybervictimization was also significantly associated with greater depressive and anxiety symptoms

(rs = .27 and .15, respectively; both ps < .05). Daily online technology use was significantly

correlated with cybervictimization ($r = .25$, $p < .001$) and both self-report and parent-report of

adolescents' SIEC to social media (rs = .35 and .28, respectively; both ps < .001). Finally, self-

report and parent-report of adolescents' SIEC to social media were significantly correlated ($r = .45$,

$p < .001$), indicating moderate parent-adolescent agreement in the extent to which adolescents were

socially integrated and emotionally connected to social media.

Moderation Analyses Examining Self-Report of Adolescents' Social Media Emotional

Investment

Results of the analyses examining the interaction between cybervictimization and

adolescent-reported SIEC to social media in relation to depression and anxiety symptoms are

summarized in the top part of Table 3. Significant interaction effects were found for both depression (R^2 change = .023, b = 0.04, p = .008) and anxiety (R^2 change = .019, b = 0.03, p = .02). As shown in Figure 1, conditional effect analyses indicated that cybervictimization was associated with significantly higher depressive symptoms at mean levels ($t(268)$ = 2.81, p = .005) and high levels of adolescent-reported SIEC to social media ($t(268)$ = 4.97, p < .0001), but not at low levels of adolescent-reported SIEC to social media ($t(268)$ = 0.04, p = .97). Similarly, cybervictimization was associated with significantly higher anxiety symptoms at high levels of adolescent-reported SIEC to social media ($t(268)$ = 3.14, p = .002), but not at mean levels ($t(268)$ = 1.00, p = .32) or low levels of adolescent-reported SIEC to social media ($t(268)$ = -0.89, p = .38; Figure 1).

Moderation Analyses Examining Parent-Report of Adolescents' Social Media Emotional Investment

Results of the analyses examining the interaction between cybervictimization and parent-reported SIEC to social media in relation to depression and anxiety symptoms are summarized in the bottom part of Table 3. Significant interaction effects were found for both depression (R^2 change = .047, b = 0.04, p < .0002) and anxiety (R^2 change = .014, b = 0.02, p = .04). As shown in Figure 2, conditional effect analyses indicated that cybervictimization was associated with significantly higher depressive symptoms at mean levels ($t(268)$ = 2.98, p = .003) and high levels of parent-reported SIEC to social media ($t(268)$ = 5.67, p < .0001), but not at low levels of parent-reported SIEC to social media ($t(268)$ = -0.38, p = .70). Similarly, cybervictimization was associated with significantly higher anxiety symptoms at high levels of parent-reported SIEC to social media ($t(268)$ = 3.22, p = .001), but not at mean levels ($t(268)$ = 1.81, p = .07) or low levels of parent-reported SIEC to social media ($t(268)$ = -0.07, p = .95; Figure 2).[1]

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[1] We also tested the three-way interactions of cybervictimization, SIEC to social media, and ADHD group status were also tested to explore whether any moderating effect of emotional connectedness to social media is further moderated by ADHD group status. None of the four analyses indicated a significant three-way

Comparing Cybervictimization in Adolescents with and without ADHD

An independent samples *t*-test indicated that adolescents with ADHD had higher

cybervictimization scores than adolescents without ADHD (ADHD $M\pm SD$ = 1.14±0.29; comparison

$M\pm SD$ = 1.08±0.25; $t(273)$ = 2.42, p = .04). In considering rates of cybervictimization, 38.6% of

adolescents with ADHD reported experiencing at least one instance of cybervictimization in the

past month, compared to 28.9% of adolescents without ADHD, $X^2(1)$ = 2.88, p = .09 (odds ratio =

1.55 [95% CI: 0.93, 2.56]). Adolescents with ADHD also had a higher rate of experiencing poly-

cybervictimization than adolescents without ADHD. Specifically, almost a quarter (24.3%) of

adolescents with ADHD endorsed at least two separate cybervictimization events occurring in the

past month, compared to a tenth (9.6%) of adolescents without ADHD, $X^2(1)$ = 10.42, p = .001

(odds ratio = 3.01 [95% CI: 1.51, 6.00]).

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Discussion

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The present study contributes to the growing literature of adolescents' experiences with

cybervictimization and helps advance understanding of which adolescents may be more vulnerable

to experience negative associated outcomes. In a sample of adolescents with and without ADHD,

the findings of the present study reveal that adolescent social integration and emotional connection

to their social media, as rated by either parents or adolescents themselves, moderated the relations

between cybervictimization experiences and internalizing symptoms. Specifically, greater

cybervictimization was associated with higher levels of anxiety and depression symptoms for

adolescents with greater emotional connection to their social media but not for adolescents with a

lower emotional connection to their social media. As the digital world becomes integrated within

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interaction (all ps > .05), indicating that the interaction between cybervictimization and SIEC to social media
was not different for adolescents with or without ADHD. Furthermore, all findings were unchanged when
study site was also included as a covariate (all ps > .05).

both school and personal use for adolescents, understanding which factors buffer against the

negative effects of cybervictimization can help inform future interventions for adolescents.

As hypothesized, cybervictimization was associated with higher internalizing symptoms for

adolescents with greater emotional investment in social media but not for adolescents with low

emotional investment in social media. Although the pattern of findings was largely consistent across

self and parent report of adolescents' SIEC to social media, is interesting to note one nuance: for

parent report of adolescents' SIEC to social media, adolescents high in SIEC to social media had

lower anxiety at low levels of victimization (see Figure 2, bottom panel). Perhaps because in the

absence of cybervictimization adolescents are more likely to have enjoyable experiences when

using social media, higher parent-observed connection to social media is associated with lower

anxiety. For the other three interaction effects (adolescent-reported SIEC to social media in relation

to both anxiety and depression, as well as parent-reported SIEC in relation to depression),

adolescents high in SIEC to social media had greater internalizing symptoms at high levels of

cybervictimization. Considered together, these findings suggest that the way adolescents interact

with their social media plays an important role in how they may react to negative online experiences

like cybervictimization. In the context of the meta-analysis conducted by Fisher and colleagues

(2016) that showed moderate effect sizes between cybervictimization and internalizing symptoms,

our findings extend this literature by also demonstrating that this association may be stronger or

weaker depending on the extent to which adolescents are emotionally invested in their social media

use. Furthermore, our findings provide additional support to the only other study to our knowledge

that has directly examined how higher emotional connection to social media is linked with higher

internalizing symptoms (Woods & Scott, 2016). Together, these findings fit within the differential

susceptibility to media effects model (DSMM) as emotional investment in social media would fall

within the branch of dispositional variables that moderate whether an adolescent experiences negative effects from cybervictimization (Valkenberg & Peter, 2013).

These interaction effects suggest that how adolescents invest in social media and connect it to the rest of their lives could be an area to target in future interventions, or to incorporate in existing antibullying programs (e.g., Williford et al., 2013). Adolescents with a low social integration and emotional connection to their social media may be less likely to ruminate about their cybervictimization experiences, buffering against elevated internalizing symptoms. Future research should consider examining the mechanisms behind adolescents' emotional connection to their social media to better understand if this is a potential area that can be influenced and used for future interventions. For example, some research has examined potential interventions designed to reduce negative affective consequences from social media and found that interventions that prime users about the curated nature of social media (e.g., "Please remember most people post only their best moments and most flattering pictures on social media. They have struggles and bad days, too") or provide a more balanced media feed (e.g., showing feeds that depict users also having bad days) moderated the relation between negative social comparison and negative affect (Weinstein, 2017). This moderation demonstrated that the interventions reduced post-browsing negative affect for participants who were highly susceptible to negative social comparison but not for those at low levels of negative social comparison. In the context of our findings, it may be adolescents with a high emotional connection to their social media that are more likely to engage in negative social comparisons and therefore are more vulnerable to the negative effects of cybervictimization experiences. These findings highlight the importance of identifying which adolescents are highly connected to their social media for more targeted interventions or individuals currently in treatment for internalizing problems that could benefit from focusing on reducing emotional connection to their social media.

In addition, some research has suggested that users' motivations for their social media use can be an important moderator for experiencing negative effects from social media consumption (Dubow et al., 2007). One of those important motivators relevant to our findings is using social media for social utility purposes (e.g., social comparison), which has been associated with internalizing problems (Lup et al., 2015; Nesi & Prinstein, 2015). Another important mechanism that explains the association between social media use and internalizing problems is the fear of missing out (FOMO). In a systematic review, cybervictimization, negative social comparison, and FOMO all were mediators in the relation between social media use and internalizing problems (Sarmiento et al., 2018). Research has also shown that more frequent social media use is associated with lower self-esteem and this relation was explained by exposure to social comparison on social media (Vogel et al., 2014). If we can better understand why some adolescents have such a high emotional connection to their social media compared to their peers, this could be a mechanism that interventions are built around. For example, interventions may start creating reward structures that devalue these adolescent's social media connection and value in-person interactions more by creating more opportunities for positive feedback in person and fewer opportunities for negative online feedback. Alternatively, it may be possible that adolescents with high emotional connection to their social media have a greater disconnect from their offline world. For example, adolescents with low emotional connection to their social media may have a social media presence that largely reflects the same circles of people they interact with in their day-to-day lives. On the other hand, adolescents with higher emotional connection to their social media may be more likely to follow more strangers/acquaintances, engage in greater compulsive internet use or engage with their social media at inappropriate times when it becomes at the expense of other important or enjoyable activities. Following more strangers/acquaintances, sacrificing important activities for social media, and engaging in compulsive internet use have been associated with increased internalizing

symptoms and may be important for understanding why adolescents with high emotional connection to social media are experiencing higher internalizing symptoms after cybervictimization experiences (Lup, Trub, & Rosenthal, 2015; Underwood and Ehrenreich, 2017).

Finally, although not the focus of the present study, adolescents with ADHD had higher cybervictimization scores than adolescents without ADHD. Further, adolescents with ADHD were significantly more likely than adolescents without ADHD to report experiencing multiple instances of cybervictimization in the past month (24.3% and 9.6%, respectively). Our findings that adolescents with ADHD experience higher rates of cybervictimization than their peers are consistent with extant literature (Heiman et al., 2015; Przybylski & Bowes, 2017). Thus, adolescents with ADHD appear to experience higher rates of victimization regardless of the medium through which it occurs. It is likely that low peer status transcends offline and online worlds, as peer rejection is highly stable over time (Paul & Cillessen, 2008; Wang et al., 2010). It is also possible that the same types of ADHD behaviors that interfere with in person social interactions (e.g., failing to wait their turn, difficulty regulating their emotions, inappropriate and aggressive behavior) carry over into the online world as well (e.g., inappropriate contributions to conversations and failing to pick up on social cues; Fogleman, Walerius, Rosen, & Leaberry, 2016; McQuade, Breslend, & Groff, 2018; Mikami et al., 2015).

The present study had several limitations that must be considered. First, the data analyzed were in a cross-sectional design and therefore directionality cannot be determined. It is possible that internalizing symptoms contribute to more cybervictimization, or that these behaviors are reciprocally intertwined over time (Rose & Tynes, 2015). It would be beneficial for future research to examine whether emotional connection to social media modifies prospective associations between cybervictimization and internalizing symptoms. Secondly, the present sample was mostly White, and therefore may not generalize to more diverse samples of adolescents. A valuable

extension of the current study would be to more deeply understand adolescents' emotional

connection to their social media, including among historically underrepresented and minoritized

adolescents. Lastly, cybervictimization was rated by adolescents themselves, and it would be

beneficial for future research to include other methods for assessing cybervictimization (e.g., peer

ratings) or actual coding of online cybervictimization experiences.

The present study compared rates of cybervictimization between adolescents with and

without ADHD and examined how social integration and emotional connection to social media

moderated the relationship between cybervictimization and internalizing symptoms. Our findings

extend the literature demonstrating that adolescents with ADHD experience more frequent

cybervictimization than their peers. Our findings also highlight the importance that social

integration and emotional connection to social media may play in the degree to which

cybervictimization and internalizing problems are associated among adolescents.

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Table 1

Sample Characteristics

	Total Sample (*N* = 288)	ADHD Group (*n* = 151)	Comparison Group (*n* = 137)	Group Differences
	M±*SD*	*M*±*SD*	*M*±*SD*	
Age	14.09±0.36	14.06±0.36	14.11±0.35	$t(286)=1.14, p=.26$
Primary Household Income ($USD)[a]	94,686±33,827	87,200±35,005	102,883±30,569	$t(285)=4.05, p<.001$
	N (%)	*N* (%)	*N* (%)	
Female	130 (45.1)	54 (35.8)	76 (55.5)	$X^2(1)=11.27, p<.001$
Race				$X^2(4)=9.18, p=.06$
White	238 (82.6)	123 (81.5)	115 (83.9)	
Black	16 (5.6)	12 (7.9)	4 (2.9)	
Asian	13 (4.5)	3 (2.0)	10 (7.3)	
American Indian/Alaskan	1 (0.3)	1 (0.7)	0 (0)	
Bi/Multiracial	20 (6.9)	12 (7.9)	8 (5.8)	
Hispanic/Latinx	13 (4.5)	6 (4.0)	7 (5.1)	$X^2(1)=0.22, p=.64$
Medication Use				
ADHD	104 (36.1)	103 (68.2)	1 (0.7)	$X^2(1)=141.78, p<.001$
Other Psychiatric	32 (11.1)	25 (16.6)	7 (5.1)	$X^2(1)=9.53, p=.002$
Sleep (including melatonin)	36 (12.5)	27 (17.9)	9 (6.6)	$X^2(1)=8.40, p=.004$
Other psychiatric diagnoses[a,b]	101 (35.1)	69 (45.7)	32 (23.4)	$X^2(1)=15.74, p<.001$
Any externalizing (ODD/CD)	39 (13.5)	33 (21.9)	6 (4.4)	$X^2(1)=18.74, p<.001$
Any anxiety	69 (24.0)	43 (28.5)	26 (19.0)	$X^2(1)=3.56, p=.06$
Any depression	22 (7.6)	14 (9.3)	8 (5.8)	$X^2(1)=1.20, p=.27$

Note. ADHD=attention-deficit/hyperactivity disorder. ODD/CD=oppositional defiant disorder/conduct disorder. Any anxiety=presence of generalized anxiety disorder, social phobia, obsessive-compulsive disorder, and/or posttraumatic stress disorder (PTSD). Any depression=presence of major depression or dysthymia.

[a] Family income and psychiatric diagnoses were assessed at the first time point in the fall of 8th grade, whereas remaining data in this study were collected at the second timepoint in the spring of 8th grade. One family did not provide income information.

[b] Presence of comorbid mental health diagnosis based on parent or adolescent report (only parents were administered ODD and PTSD modules) during the diagnostic interview.

Table 2

Intercorrelations and Descriptive Statistics of Study Variables

Variable	1	2	3	4	5	6	7	8
1. Sex	--	-.20**	.05	-.07	.08	.18**	.08	.26***
2. ADHD Status		--	.04	.14*	-.06	-.03	.16**	.07
3. Daily Online Tech Use			--	.25***	.35***	.28***	.09	.11
4. Cybervictimization				--	.28***	.16**	.27***	.15*
5. Adolescent-report SIEC					--	.45***	.07	.12
6. Parent-report SIEC						--	.08	.02
7. Depression							--	.71***
8. Anxiety								--
Mean	--	--	1.23	0.88	2.48	3.02	0.47	0.46
Standard Deviation	--	--	0.83	1.84	1.02	1.17	0.42	0.36

Note. N = 275. For sex, 0 = male, 1 = female. For ADHD status, 0 = comparison, 1 = ADHD. ADHD = attention-deficit/hyperactivity disorder. SIEC = social integration and emotional connection to social media.
p < .05. **p* < .01. ***p* < .001.

Table 3

Analyses Examining the Interaction of Cybervictimization and Emotional Connection to Social Media in Relation to Depression and Anxiety Symptoms

	Depression			Anxiety		
	Coefficient (SE)	$t(268)$	95% CI	Coefficient (SE)	$t(268)$	95% CI
Adolescent-reported SIEC	$F(6,268) = 6.49^{***}$, $R^2 = .13$			$F(6,268) = 6.59^{***}$, $R^2 = .13$		
Sex	0.10 (0.05)	2.10*	[0.006, 0.20]	0.20 (0.04)	4.72***	[0.12, 0.28]
ADHD status	0.11 (0.05)	2.27*	[0.01, 0.21]	0.07 (0.04)	1.65	[-0.01, 0.15]
Online technology use	0.004 (0.03)	0.12	[-0.06, 0.07]	0.01 (0.03)	0.48	[-0.04, 0.07]
Cybervictimization	-0.06 (0.05)	-1.28	[-0.15, 0.03]	-0.07 (.04)	-1.67	[-0.15, 0.01]
SIEC	-0.04 (0.03)	-1.27	[-0.09, 0.02]	-0.01 (0.02)	-0.23	[-0.05, 0.04]
Cybervictimization × SIEC	0.04 (0.02)	2.66**	[0.02, 0.07]	0.03 (0.01)	2.43*	[0.01, 0.06]
Parent-reported SIEC	$F(6,268) = 7.92^{***}$, $R^2 = .15$			$F(6,268) = 6.42^{***}$, $R^2 = .13$		
Sex	0.12 (0.05)	2.45*	[0.02, 0.22]	0.22 (0.04)	5.16***	[0.14, 0.31]
ADHD status	0.12 (0.05)	2.54*	[0.03, 0.22]	0.07 (0.04)	1.74	[-0.01, 0.16]
Online technology use	0.002 (0.03)	0.08	[-0.06, 0.06]	0.03 (0.03)	1.12	[-0.02, 0.08]
Cybervictimization	-0.09 (0.04)	-2.18*	[-0.17, -0.01]	-0.04 (0.04)	-1.09	[-0.11, 0.03]
SIEC	-0.03 (0.02)	-1.32	[-0.08, 0.02]	-0.04 (0.02)	-1.98*	[-0.08, -0.0002]
Cybervictimization × SIEC	0.04 (0.01)	3.83***	[0.02, 0.07]	0.02 (0.01)	2.05*	[0.001, 0.04]

Note. Bootstrap samples = 5,000. For sex, 0 = male, 1 = female. For ADHD status, 0 = comparison, 1 = ADHD. ADHD = attention-deficit/hyperactivity disorder. SIEC = social integration and emotional connection to social media.
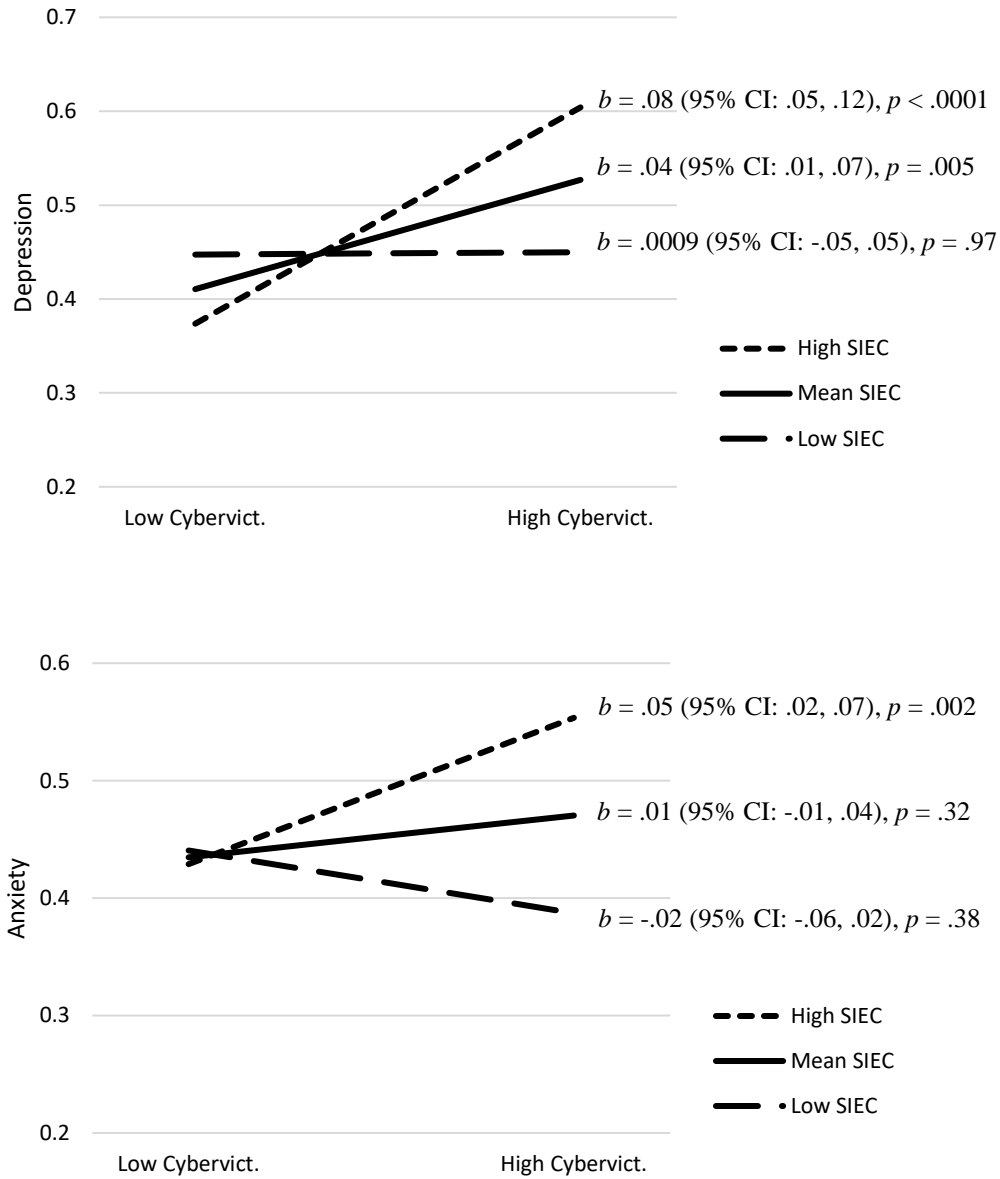*p<.05. **p<.01. ***p<.001.

Figure 1. The association between cybervictimization and depressive symptoms (top panel) and anxiety symptoms (bottom panel) is moderated by adolescent-reported social integration and emotional connection (SIEC) to social media.
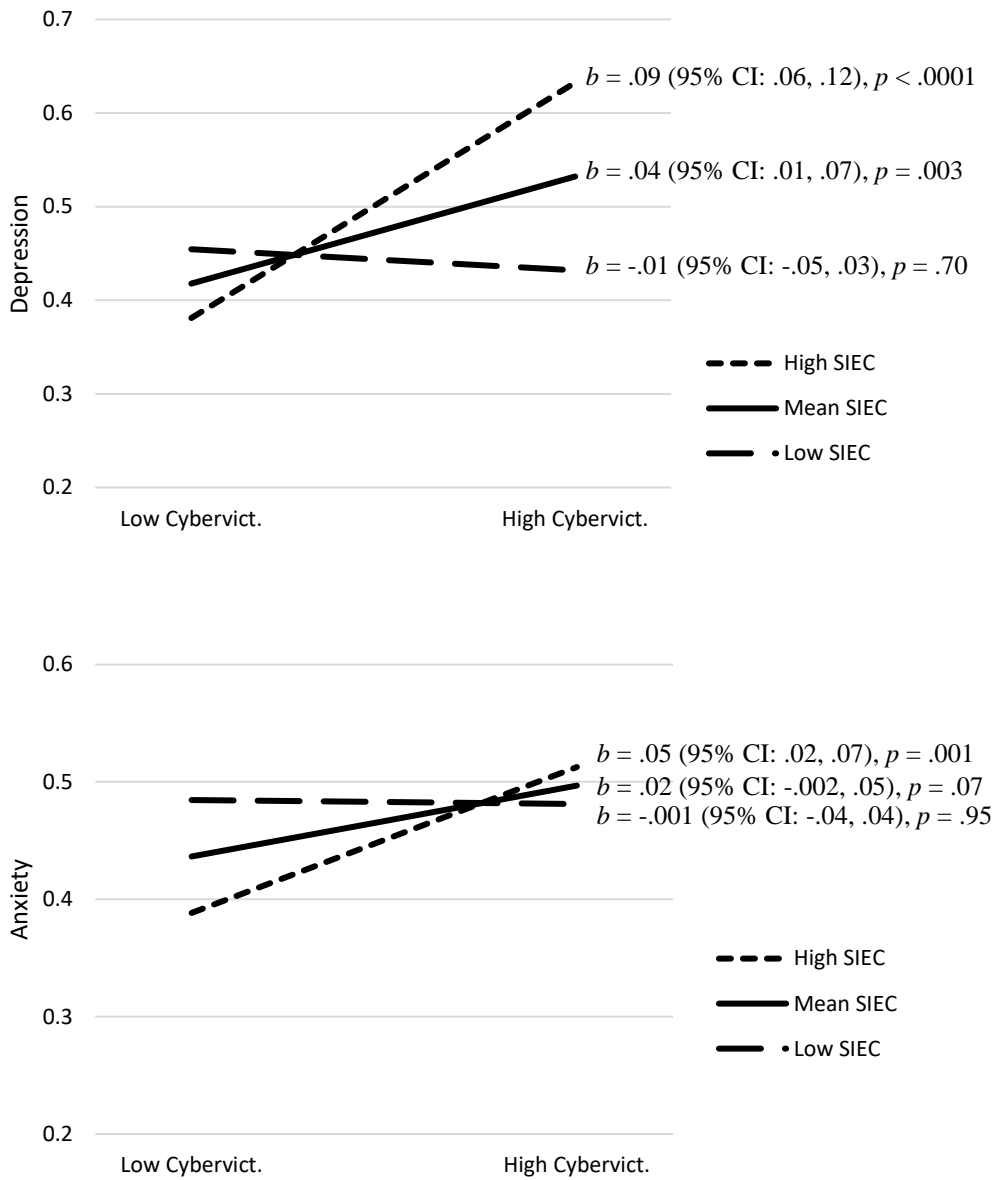
Figure 2. The association between cybervictimization and depressive symptoms (top panel) and anxiety symptoms (bottom panel) is moderated by parent-report of adolescents' social integration and emotional connection (SIEC) to social media.