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Adolescent social media use and mental health from adolescent and parent perspectives

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ABSTRACT

This study investigated adolescent and parent reports of adolescent social media use and its relation to adolescent psychosocial adjustment. The sample consisted of 226 participants (113 parent-adolescent dyads) from throughout the United States, with adolescents (55 males, 51 females, 7 unreported) ranging from ages 14 to 17. Parent and adolescent reports of the number of adolescents' social media accounts were moderately correlated with parent-reported DSM-5 symptoms of inattention, hyperactivity/impulsivity, ODD, anxiety, and depressive symptoms, as well as adolescent-reported fear of missing out (FoMO) and loneliness. Lastly, anxiety and depressive symptoms were highest among adolescents with a relatively high number of parent-reported social media accounts and relatively high FoMO. The implications of these findings and need for related longitudinal studies are discussed.

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Because most research on the link between social media activity and psychosocial adjustment is based on young adults, it is not clear how well the findings apply to the generation of adolescents who have never known a world without such platforms and who presumably have frequent contact with social media. Emerging evidence is mixed (Seabrook, Kern, & Rickard, 2016), although there is some indication of a general connection between adolescent social media use and negative indicators of health (e.g., sleep problems, anxiety, lower self-esteem; Ehrenreich & Underwood, 2016; Woods & Scott, 2016). However, there may also be adaptive aspects of social media use for adolescents, such as in perceived connectedness to others. Beyond cohort effects, adolescence may represent a developmental context during which individuals are particularly susceptible to potentially negative impacts of social media given an emphasis on social connectedness during this period and a possibility that social media experiences may engender feelings of exclusion or victimization (see Underwood & Ehrenreich, 2017).

On the other hand, adolescents may experience a number of perceived benefits of social media, including greater connectedness with others via the ease with which they may identify and/or interact with others on social media. Parental perspectives on, and knowledge of, teen social media use, as well as the reported connections between parents and adolescents on social media applications, may also be important in advancing understanding of the role of social media on youth adjustment. Thus, the present study investigated the mental health correlates of social media use and parental monitoring of

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social media use with parent and adolescent informants. Specifically, parents reported on their teens' social media use and symptoms of internalizing and externalizing problems, whereas adolescents provided data on their fear of missing out (FoMO), perceived loneliness, and social media use.

The present study represents an area of ever-growing importance, as approximately 24% of U.S. teens report being on-line "almost constantly" with much of that time being spent on social media applications (Pew Research Center, 2015). However, the potential maladaptive or adaptive developmental and mental health implications of social media activity in youth are relatively undetermined. For instance, it is not clear how parameters of social media activity (e.g., number of accounts, frequency of checking) relate to psychosocial functioning. It has been proposed via Coconstruction Theory that social media allow youth to construct their social media reality based on what they post and their network of followers/friends; consequently, one could expect some degree of continuity between social media experiences and off-line experiences (Underwood & Ehrenreich, 2017). Theoretically, youth who experience more difficulties with inattention or impulsivity may be drawn to the quick, easily accessible format of interacting with others via social media (Burnell & Kuther, 2016). Youth who feel lonely or experience depression or anxiety may prefer interactions with others in these more indirect formats (Shaw & Gant, 2002), underscoring potentially positive aspects of social media for some adolescents.

One of the relatively few quantitative adolescent studies to date noted that more contact with parents on social media was related to better adjustment in terms of lower emotional problems and delinquency (Coyne, Padilla-Walker, Day, Harper, & Stockdale, 2014), pointing to an adaptive role of parental monitoring and supervision of social media activity. Moreover, adolescent-reported social media use and emotional investment in social media have shown a relation to poor sleep quality, anxiety, and depression (Woods & Scott, 2016). These findings, although informative, do not fully address multi-informant perspectives on variables such as frequency and variety of social media use and their relation to an array of indicators of adolescent psychological well-being (e.g., behavioral problems, connectedness to others/loneliness).

Multiple assessment methods, including parental perceptions of adolescents' social media use, allow a more complete picture of how social media use might relate to adolescent adjustment. Further, parental monitoring and closer parent-child connections on social media may promote more adaptive uses of social media, whereas a disconnect between adolescent social media use and parental awareness is potentially problematic in terms of adolescent mental health. This parental awareness may be particularly important, as research has begun to document how specific experiences on social media may translate to problems in adolescent behavioral and emotional adjustment (see Underwood & Ehrenreich, 2017). However, the emerging research provides mixed conclusions on such a connection. For instance, direct measures of social media use have shown no clear association with depression among college students (Jelenchick, Eickhoff, & Moreno, 2013), and a systematic review of studies with adolescent and adult samples shows mixed findings in the relations of anxiety and depression with social media use (Seabrook et al., 2016). That review also emphasized that research in this area has been over-reliant on self-report of both social media use and psychosocial variables of interest. Nevertheless, if correlations between reports of social media activity and adolescent adjustment are apparent, they may serve to inform the circumstances under which adolescents are drawn to social media or its potential deleterious, as well as adaptive, effects.

To this end, research in the area of social media behavior (e.g., Beyens, Frison, & Eggermont, 2016; Przybylski, Murayama, DeHaan, & Gladwell, 2013) has described FoMO as a factor that may explain some motivations for higher activity on social media. Przybylski et al. (2013) describe FoMO as "the desire to stay continually connected with what others are doing" (p. 1841) and distress regarding the possibility that others are having rewarding experiences in one's absence. Recent research with adolescents (Beyens et al., 2016) demonstrated that FoMO is associated with higher Facebook use and preoccupation with feeling unpopular or isolated on Facebook. Because adolescence is a time of heightened desire for connectedness with peers, and many present-day adolescent social connections and interactions take place via social media, FoMO is likely salient for some adolescents. Woods and Scott (2016) suggested that emotional investment in social media, perhaps indicative of FoMO, portends higher distress among individuals who have limited access to social media. Use of social media as well as technology-related anxiety (e.g., distress about not checking social media) has been tied to mood disorder symptoms in young adults (Rosen, Whaling, Rab, Carrier, & Cheever, 2013). Thus, for many adolescents, social media use may be correlated with higher anxiety and mood-related symptoms, particularly for those who are motivated to use social media because of subjective distress such as FoMO.

It is possible that frequent social media use fulfills adolescents' needs for connectedness, but alternatively, social media activity could also signify feelings of loneliness. Adolescents' positive peer affiliations (e.g., Lansford, Dodge, Fontaine, Bates, & Pettit, 2014) and perceived connectedness to peers, family, neighborhood, and school are thought to mitigate some negative outcomes such as delinquency and risk behavior (see Bernat & Resnick, 2009). In college students, the number of an individual's close Facebook friends (i.e., those designated as "close" by respondents) has shown a negative correlation with loneliness (Lemieux, Lajoie, & Trainor, 2013). Likewise, it may be that adolescents who are relatively high on social media engagement report more connectedness to others (i.e., lower loneliness) and that lower loneliness in combination with high social media activity might mitigate internalizing problems (Szwedo, Mikami, & Allen, 2012).

However, it remains unclear whether social media provide a positive or meaningful sense of affiliation and connectedness for adolescents. For instance, it may be that social media activity is tied to greater perceived loneliness and other mental health and psychosocial difficulties. Some evidence among college students suggests that the connection between social media activity and loneliness varies as a function of the type of social media application (i.e., text vs. image; Pittman & Reich, 2016). Furthermore, adolescents may seek out social media when they are less engaged in face-to-face encounters with others or may feel that they are missing out on important social activities when viewing such events on social media. Thus, the

present study considered FoMO and loneliness not only in relation to adolescent social media use but also as potential moderators in the relation between social media engagement and internalizing problems. Overall, it is possible that any association between engagement in social media and anxiety or depression is exacerbated by FoMO and loneliness.

1. The present study and hypotheses

The purpose of the present study was to determine the relations between adolescent social media use and various indices of mental health and psychosocial functioning. We sought to expand some of the initial adolescent research in this area (e.g., Coyne et al., 2014; Woods & Scott, 2016), as we examined parent and adolescent reports of adolescents' use of social media in relation to parent-reported symptoms of DSM-5 disruptive behavior disorders, depression, and anxiety and in relation to adolescents' reported FoMO and loneliness. This study was the first known investigation of the association between both parent and adolescent reports of adolescent social media use and these particular indicators of adjustment. In addition, the present study considered adolescents' loneliness and FoMO as moderators in the connections between social media activity and internalizing symptomatology. The overall research question was: *Are parent-reported symptoms of inattention, hyper-activity/impulsivity, conduct problems (i.e., symptoms of Oppositional Defiant Disorder [ODD] and Conduct Disorder [CD]), depression, and anxiety related to the reported number of adolescents' social media accounts and the frequency with which ad-olescents report checking their social media accounts?* In addition, based on existing studies, the following hypotheses were tested:

1) Moderate relations between adolescent social media use (i.e., number of accounts, the time since adolescents' first social media accounts, parental monitoring) and parent report of the same parameters were expected based on typical cross-informant agreement in child-adolescent behavior and adjustment (Frick, Barry, & Kamphaus, 2010).
2) It was hypothesized that adolescents' loneliness and FoMO would be associated with higher social media activity (i.e., having more accounts, checking accounts more frequently).
3) Higher parental monitoring and higher reported connections (e.g., being friends/following each other's accounts) between parents and adolescents on social media were expected to be associated with indications of better adolescent adjustment (i.e., lower attention-deficit/hyperactivity disorder, oppositional defiant disorder, conduct disorder, depression, and anxiety symptoms; higher connectedness to others in terms of lower subjective loneliness).
4) The expected relations between higher social media activity (i.e., number of accounts, frequency of checking) and inter-nalizing problems (i.e., anxiety, depression) were expected to be exacerbated by adolescent-reported FoMO and loneliness.

2. Method

2.1. Participants

The sample consisted of 226 participants (113 adolescent-parent dyads), with adolescents ranging in age from 14 to 17 ($M = 15.27$ years, $SD = 1.02$). Specifically, data analyses involved 113 matching parent-adolescent dyads with complete survey data. Parents or teens with incomplete data were not included in analyses. Of the adolescent participants, 55 (48.7% of the sample) reported being male, 51 (45.1%) reporting being female, and 7 (6.2%) did not report gender. The self-identified racial/ethnic composition of the adolescents in the study was as follows: 81.4% White/Caucasian, 6.2% Black/African-American, 2.7% Asian, 2.7% Hispanic, 0.9% Native American/American Indian, 5.3% Multi-racial, and 0.9% "Other." Parent respondents were 72 females and 41 males. Median annual household income as reported by parents was $60,000.

The 14-17 year-old age group was selected because it represents a period when adolescents likely have the ability, op-portunity, and autonomy to spend time on social media, as opposed to younger adolescents who may have more limited access. Adolescents who reported no social media activity ($n = 8$) were still included in analyses, as the implications of no social media activity on the variables of interest were also considered important.

2.2. Measures

2.2.1. Social media survey- adolescent version

Adolescents completed a survey, developed for this study, of their social media use with content of items directly reflecting the parameters of interest. The content and format of the survey was developed through consultation with faculty members in psychology who are also parents of adolescents, graduate and undergraduate students in psychology, and high school students to ensure relevance of survey items and clarity of items and response choices. Adolescents were first asked which social media applications, if any, they use (i.e., "Facebook," "Twitter," "Snapchat," "Tumblr," "Instagram," "Other"). They were also asked whether they have any additional ("fake") accounts on any of those applications (8.8% of adolescent participants reported having additional accounts). The survey also asked adolescents questions about a) the basic parameters of their social media use (e.g., the number of social media accounts they have; frequency with which they check social media

accounts; and b) their connectedness/lack of connectedness to their parents on social media. For the number of accounts, responses were on a 5-point scale from *0* to *more than 7*. The frequency of checking social media was assessed on an 8-point scale from *never* to *more than 10 times a day*. For the time since initiation of social media use, responses were made on a 6-point scale from *no use* to *more than 6 years*. Remaining questions (e.g., parental monitoring, being friends with their parents on social media, connections with parents on social media) were in a *yes/no* format.

2.2.2. Social media survey- parent version

Parents completed a similar survey that assessed their perceptions of their child's social media use. The same item format and response scale were used for the adolescent and parent versions of this survey.

2.2.3. DSM checklist

Parents completed an 82-item checklist of symptoms from the 5th edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5; American Psychiatric Association, 2013). DSM symptoms of attention-deficit/hyperactivity disorder (ADHD; with symptoms of inattention and hyperactivity/impulsivity analyzed separately), oppositional defiant disorder (ODD), conduct disorder (CD), anxiety, and depression were assessed to provide a measure of diagnostic features of core externalizing and internalizing problems. Responses were made on a 4-point scale from *Never* to *Very Often* for ADHD, ODD, depression, and anxiety symptoms, whereas symptoms of CD were assessed dichotomously (i.e., whether the teen had ever engaged in the behavior, consistent with DSM-5 criteria). As might be expected, these indices were all significantly inter-related. Among inattention, hyperactivity/impulsivity, ODD symptoms, depressive symptoms, and anxiety symptoms, correlations ranged from $r = 0.65$ to $r = 0.90$. For CD symptoms, correlations with the other indices ranged from $r = 0.19$ to $r = 0.28$.

2.2.4. Fear of missing out survey (FoMOS; Przybylski et al., 2013)

The FoMOS consists of 10 items (e.g., "I get worried when I find out my friends are having fun without me") that assess preoccupation with missing events, including on social media, within one's social circle. Reponses are made on a 5-point scale from *not at all true of me* to *extremely true of me*.

2.2.5. UCLA loneliness scale, 3rd edition (UCLA-3; Russell, 1996)

The 20-item UCLA-3 was used to assess adolescents' subjective sense of feeling lonely or isolated from others. Items (e.g., "How often do you feel alone?") were answered on a 4-point scale, from *Never* to *Often*.

2.3. Procedure

This study was approved by the Institutional Review Board (IRB) at the authors' affiliated university prior to data collection. Potential participants from across the United States were contacted via email by Qualtrics, a company that maintains e-mail addresses and basic demographic information for adults who have expressed interest in participating in survey-based research. Prospective parent participants who had an adolescent between 14 and 17 years of age were e-mailed general information about the present study and a secure link to the parent consent form. Recruitment was aimed at obtaining a sample that matched general demographics of the United States from most recent census data; however, as noted above, the sample of participants was predominantly White/Caucasian. Parents who consented to their participation completed the parent-report instruments and then provided their child's e-mail address to Qualtrics so that adolescent participants could be contacted directly with a link to the adolescent assent form and adolescent-report measures. To help ensure independence and privacy of adolescents' participation, the consent document urged parents to allow adolescent participants to complete measures privately, and e-mail addresses were checked by Qualtrics to make sure that adolescent e-mail contacts did not duplicate those of their parents. Parents received "market points" which could be exchanged for a small amount of money for their participation and that of their child. This incentive could not be provided to adolescent participants, as Qualtrics maintains accounts only for individuals age 18 or older. However, adding this additional step very likely reduced the adolescent response rate (see below).

2.4. Data analysis

All analyses were conducted using IBM Statistics SPSS, Version 24. Pearson correlation coefficients were calculated to assess relations between pairs of continuous variables, including those that address the overall research question and Hypotheses 1 and 2. Point biserial correlations were used to test any relations between dichotomous and continuous variables (e.g., parental monitoring in relation to indicators of adolescent adjustment to test Hypothesis 3; gender in relation to adjustment variables). Phi correlation coefficients were calculated for instances involving two dichotomous variables (e.g., gender with parental monitoring). To test Hypothesis 4, a series of multiple regression analyses were conducted, whereby the independent variable (e.g., parent-reported number of social media accounts) and moderator (e.g., FoMO) were entered simultaneously in an initial step, followed by the inclusion of their interaction (i.e., product) term in the subsequent step. Demographic control variables were included in partial correlation analyses or the regression models as specified below.

3. Results

A total of 334 parents completed their surveys; thus, the present sample represents an adolescent response rate of 33.8%, in light of there being complete data for 113 parent-adolescent dyads as described above. Demographics of the final sample were comparable to the overall sample for whom parent data were received (i.e., 48.7% male vs. 50.0% male; 81.4% White/Caucasian vs. 82.0% White/Caucasian; *median household income* = $60,000 vs. $60,000). Independent samples *t*-tests revealed significant differences in parent-reported number of social media accounts, as well as in each of the parent-reported symptom domains, with the adolescents who did not complete the study scoring higher on each of these variables than those who completed the study, t (445) = 2.58 to 3.86, $p = 0.01$ to $p < .001$. Parents of adolescents who completed their portion of the study were also more likely to report monitoring their child's social media accounts relative to parents of teens who did not complete the study, t (445) = 4.87, $p < .001$.

Descriptive statistics for the study variables and internal consistencies for parent- and adolescent-reported mental health variables are shown in Table 1. Adolescent participants were generally active on social media in that 82.1% of adolescents reported having had social media accounts for at least one year, and 92.9% reported having at least one social media account. Parent reports were largely consistent with these data. Adolescents were reportedly engaged with social media on a consistent basis in that 68.1% of participants reported checking their social media accounts at least once a day. Most adolescents (63.3%) and parents (70.8%) reported that parents monitor the adolescents' social media accounts. Eighty-four adolescents (74.3%) reported being friends with, or connected with, their parents on social media. As might be expected in a community sample (Frick et al., 2010), many of the parent-reported DSM symptom indices were positively skewed, indicating that most adolescents were reported to have relatively low levels of these symptoms. Because their relatively mild skew (Gravetter & Wallnau, 2014), the variables were not transformed for analyses.

Correlations between parent- and adolescent-reports on adolescents' social media use are displayed in Table 2. Regarding the number of accounts adolescents had, adolescent and parent reports were highly correlated. In addition, parent and adolescent reports of the amount of time since adolescents began using social media were highly correlated, $r = 0.74$, $p < .001$. Thus, Hypothesis 1 was not supported in that the interrelations between parent and adolescent reports of adolescent social media use were indicative of strong agreement, rather than the expected moderate agreement. The cross-informant correlation regarding parental monitoring was moderate to strong in magnitude (i.e., $r = 0.69$) but also suggestive of some discrepancy. The mean difference on this dichotomous item (i.e., *yes/no*) between parent reports ($M = 1.71$, $SD = 0.46$) and adolescent reports ($M = 1.64$, $SD = 0.48$) was significant, $t(112) = 2.03$, $p = 0.045$, indicating that parents were somewhat more likely to report monitoring the adolescents' social media accounts than adolescents were to report parental monitoring of their accounts.

We also examined correlations between demographic variables (i.e., gender, age, ethnicity coded as White vs. non-White, family income) and the variables of interest. As shown in Table 2, gender was not correlated with indicators of social media activity in this sample besides likelihood of being friends with parents on social media. Specifically, male adolescents were more likely than females to report being friends with their parents on social media. Not surprisingly, age was positively correlated with parent-reported, $r = 0.30$, $p = 0.001$, and adolescent-reported, $r = 0.30$, $p = 0.002$, time since initiation of social media use. Ethnicity and income were not related to any of the social media variables investigated.

Correlations between demographics and psychosocial adjustment variables were also analyzed. Age and family income were not correlated with any of these variables. Gender was correlated with inattention, $r = -0.30$, $p = 0.002$, and

Table 1
Descriptive statistics for adjustment variables.

Variable (possible range)	M	SD	Range	Skew	α
Parent Report					
# of accounts[a]	2.39	.78	1—5	.88	—
time since first social media account[b]	3.13	.93	1—6	.53	—
parent monitoring of social media[c]	.71	.46	0—1	-.93	—
Attention Problems (0—27)	7.50	5.99	0—27	.97	.93
Hyperactivity/Impulsivity (0—27)	5.22	5.72	0—25	1.49	.94
ODD symptoms (0—24)	5.26	5.35	0—24	1.38	.93
CD symptoms (0—15)	1.48	3.20	0—15	2.94	.94
Anxiety symptoms (0—48)	7.64	9.54	0—48	1.82	.96
Depressive symptoms (0—24)	4.40	5.19	0—24	1.61	.94
Adolescent Report					
# of accounts[a]	2.50	.81	1—5	.70	—
time since first social media account[b]	3.99	1.09	1—6	−1.22	—
parent monitoring of social media[c]	.64	.48	0—1	-.58	—
friends with parents on social media[c]	.74	.44	0—1	−1.13	—
frequency of checking social media[d]	4.96	1.78	1—8	-.62	—
Loneliness (20—80)	40.68	12.04	20—71	.20	.92
FoMO (0—40)	16.53	9.39	0—40	.24	.94

Note: [a] Responses on a 1—5 scale from *0* to *more than 7*; [b] Responses on a 1—6 scale from *no use* to *more than 6 years*; [c] 0 = *no*, 1 = *yes*; [d] Responses on a 1—8 scale from *never* to *> 10 times/day*.

Table 2
Correlations among parent and adolescent reports of adolescent social media use.

	1.	2.	3.	4.	5.	6.	7.
1. # of accounts (parent report)	–	.86***	.39***	.10	.19*	.11	-.02
2. # of accounts (adolescent report)		–	.46***	.15	.25**	.05	-.05
3. frequency of checking			–	.02	.20*	.24*	-.02
4. Parent monitoring (parent report)				–	.69***	.11	.01
5. Parent monitoring (adolescent report)					–	.32**	.04
6. Friends with parents on social media (adolescent report)						–	-.20*
7. Adolescent gender							–

Note: Parent monitoring was coded as 0 = *no*, 1 = *yes*. Friends with parents on social media was coded as 0 = *no*, 1 = *yes*. Gender was coded as 0 = *male*, 1 = *female*.
*p < .05; **p < .01; ***p < .001.

hyperactivity/impulsivity, $r = -0.23$, $p = 0.02$, with males being rated higher than females on these symptoms. Ethnicity was correlated with parent-reported depressive symptoms, $r = 0.20$, $p = 0.04$, and adolescent-reported loneliness, $r = 0.22$, $p = 0.02$, such that Non-White participants tended to score higher on these measures than White participants.

3.1. Parameters of social media use and psychosocial adjustment

Correlations (see Table 3) between the parameters of social media use and parent-reported DSM symptoms of inattention, hyperactivity/impulsivity, ODD, CD, anxiety and depression, as well as adolescent-reported FoMO and loneliness were examined to address the Research Question and to test Hypotheses 2 and 3. Parent and adolescent reports of the number of adolescents' social media accounts were significantly correlated with parent-reported attention problems, hyperactivity/impulsivity, ODD symptoms, anxiety symptoms, and depressive symptoms. Adolescent-reported frequency of checking social media was significantly related to parent-reported hyperactivity/impulsivity, anxiety, and depression. Pertaining to Hypothesis 2, parent- and adolescent-reports of the number of adolescents' social media accounts were positively correlated with adolescent self-reported loneliness and FoMO. Adolescents' reported frequency of checking social media was positively correlated with FoMO.

Table 3 also displays correlations pertaining to parental monitoring of adolescents' social media. Hypothesis 3 was not supported in that parent and adolescent reports of parental monitoring of social media were not related to any of the psychosocial adjustment variables in the present study. In addition, adolescents' reports of whether they were friends with/connected to parents on social media were not related to any of the adjustment variables. Gender was entered as a covariate in the significant correlations involving inattention and hyperactivity/impulsivity because of its significant relation with these symptoms. These partial correlations are reported in Table 3 and indicate virtually no change when controlling for gender. Likewise, findings remain unchanged when controlling for ethnicity in correlations involving depression and loneliness. Thus, the relations of social media activity with psychosocial adjustment appeared to be independent of demographic factors in our sample.

3.2. FoMO and loneliness as moderators

To test Hypothesis 4, the frequency of checking social media activity and number of accounts were entered as predictors in a total of 12 regression models, involving three predictors (i.e., parent-reported number of social media accounts, adolescent-reported number of accounts, adolescent-reported frequency of checking) two moderators (i.e., FoMO and loneliness) and

Table 3
Correlations of social media use with indicators of adolescent well-being.

	# of accounts parent report	# of accounts adolescent report	frequency of checking	parent monitoring (parent report)	parent monitoring (adolescent report)
Inattention	.38*** (.38***)	.40*** (.41***)	.18	.10	.05
Hyperactivity/Impulsivity	.33*** (.33**)	.32** (.32**)	.21* (.21*)	.07	.04
ODD symptoms	.30**	.29**	.14	.13	.02
CD symptoms	.04	-.02	.05	.00	-.03
Anxiety Symptoms	.45***	.38***	.21*	.08	.10
Depressive Symptoms	.46*** (.46***)	.44*** (.44***)	.24* (.24*)	.08	.02
Loneliness	.26** (.26**)	.24* (.24*)	.10 (.10)	-.12	.04
FOMO	.34***	.40***	.35***	.13	.09

Note: Parent monitoring coded as 0 = *no*, 1 = *yes*. Numbers in parentheses are partial correlations controlling for gender. *p < .05; **p < .01; ***p < .001.

two criteria variables (i.e., depressive symptoms, anxiety symptoms) using PROCESS for SPSS (Hayes, 2013). Because of the number of models examined and risk of family-wise error, only effects significant at $p < .004$ were considered relevant for further interpretation.

FoMO. Table 4 displays the results of the full regression models using FoMO as a moderator. As shown in Table 4, there was a significant interaction between parent-reported number of accounts and FoMO in the prediction of anxiety symptoms, $b = 0.34, se = 0.09, p < .001, R^2$ for the model $= 0.39, p < .001$, as well as in predicting depressive symptoms, $b = 0.18, se = 0.05$, $p < .001$, R^2 for the model $= 0.42, p < .001$. These interactions are plotted in Fig. 1a and b, respectively, using the methods described by Hayes (2013) such that points were plotted at $\pm$ 1 *SD* from the *mean* on the predictor and moderator variables (e.g., High FoMO $= 1$ *SD* above the sample *mean* on FoMO). As shown in these figures and consistent with Hypothesis 4, as the number of social media accounts increased and FoMO increased, anxiety and depressive symptoms tended to be relatively higher. Symptoms were reportedly lower as the number of accounts and scores on FoMO decreased. The pattern displayed in Fig. 1 is also indicative of a significant main effect of FoMO. For adolescent-reported number of accounts, the interaction terms were not significant, with positive main effects for number of social media accounts and FoMO evident in the models predicting anxiety, *model* $R^2 = 0.28, p < .001$, and depressive symptoms, *model* $R^2 = 0.34, p < .001$. With adolescent-reported frequency of checking as a moderator, there were also no significant interactions.
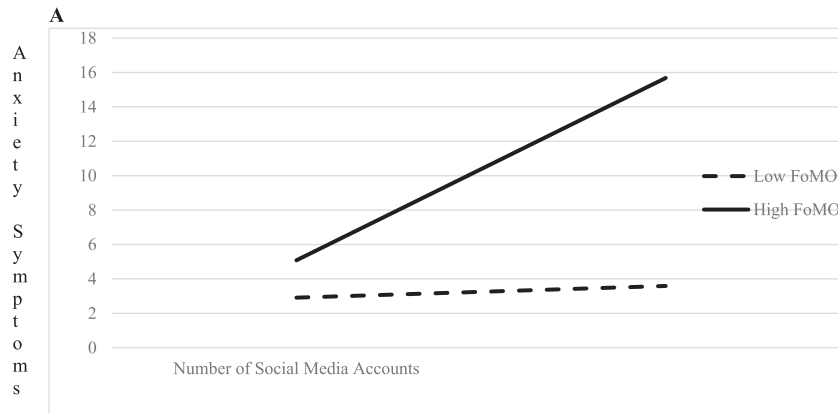
Based on the correlation between ethnicity and depressive symptoms in the present study, the regression models predicting depressive symptoms were repeated controlling for ethnicity, as well as considering ethnicity (i.e., White vs. non-White) as an additional moderator. The interaction between parent-reported number of social media accounts and FoMO remained significant, $b = 0.16, se = 0.05, p = 0.004$, *model* $R^2 = 0.43, p < .001$. In addition, there were no significant main effect or interaction effects for ethnicity. For adolescent-reported number of accounts, the main effects for number of accounts and FoMO remained significant, whereas none of the effects involving ethnicity were significant. In the model using frequency of checking as a predictor, only the main effect for FoMO was significant.

Loneliness. Table 5 shows results of the regression models using loneliness as a moderator. For the models with loneliness as the moderator and parent-reported number of accounts as the predictor, the interaction effects for predicting anxiety, $b = 0.17, se = 0.07, p = 0.01$, *model* $R^2 = 0.44, p < .001$, and depression, $b = 0.09, se = 0.04, p = 0.01$, *model* $R^2 = 0.48, p < .001$, were in the same pattern described above for FoMO but were not significant at the more stringent significance level established for these analyses. The same pattern was evident using adolescent-reported number of accounts as the predictor for both anxiety, $b = 0.17, se = 0.07, p = 0.02$, *model* $R^2 = 0.40, p < .001$, and depression, $b = 0.08, se = 0.04, p = 0.02$, *model* $R^2 = 0.47, p < .001$. Similarly, when frequency of checking social media was used as the predictor variable, the interaction effects with loneliness for predicting anxiety, $b = 0.07, se = 0.03, p = 0.03, R^2$ for the model $= 0.35, p < .001$, and depression, $b = 0.03, se = 0.02, p = 0.05, R^2$ for the model $= 0.40, p < .001$, followed the expected direction (i.e., higher checking frequency x higher loneliness was associated with higher anxiety and depression as well as lower self-esteem). However, again, these interaction effects were not at the significance level established for these analyses. The models predicting depression were repeated with ethnicity serving as an additional control variable and moderator. The pattern of results did not change, and there were no main effects or interactions involving ethnicity for any of these models.
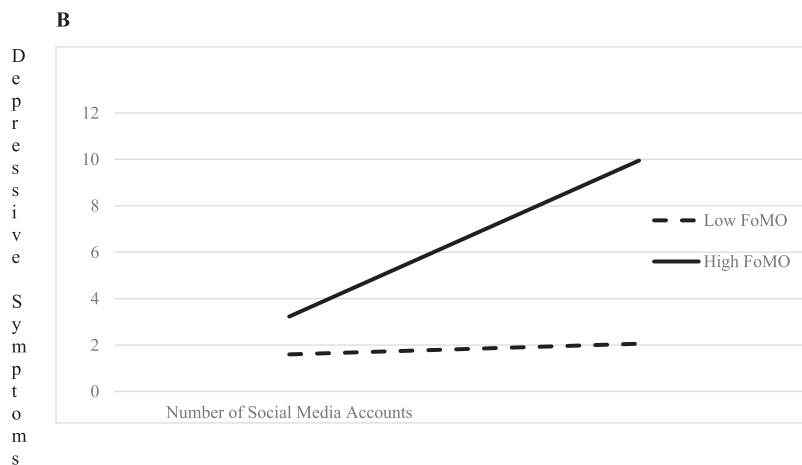
Table 4
Regression analyses using FoMO as a moderator.

	Criterion Variables		
	Anxiety	Depression	Depression (controlling for ethnicity)
Model 1 (Main Effects) R^2	.31***	.36***	.36***
b (se) PARENT REPORT # OF ACCOUNTS	3.94 (1.02)***	2.15 (.54)***	2.15 (.54)***
b (se) FoMO	.37 (.09)***	.22 (.05)***	.22 (.05)***
b (se) ETHNICITY	−	−	.39 (1.02)
Model 2 (Interaction) R^2	.39***	.42***	.43***
b (se) PARENT REPORT # OF ACCOUNTS x FoMO	.34 (.09)***	.18 (.05)***	.16 (.05)***
Model 1 (Main Effects) R^2	.27***	.33***	.33***
b (se) TEEN REPORT # OF ACCOUNTS	2.68 (1.04)*	1.79 (.54)**	1.81 (.55)**
b (se) FoMO	.39 (.09)***	.22 (.05)***	.22 (.05)***
b (se) ETHNICITY	−	−	.62 (1.05)
Model 2 (Interaction) R^2 Δ	.28***	.34***	.35***
b (se) TEEN REPORT # OF ACCOUNTS x FoMO	.15 (.10)	.08 (.05)	.09 (.05)
Model 1 (Main Effects) R^2	.23***	.27***	.27***
b (se) TEEN REPORT FREQ. OF CHECKING	.25 (.48)	.20 (.25)	.19 (.26)
b (se) FoMO	.46 (.09)***	.27 (.05)***	.27 (.05)***
b (se) ETHNICITY	−	−	.36 (1.09)
Model 2 (Interaction) R^2 Δ	.23***	.27***	.28***
b (se) TEEN REPORT FREQ. OF CHECKING x FoMO	.05 (.05)	.03 (.03)	.03 (.03)

Note: Unstandardized effects are shown. *$p < .05$; **$p < .01$; ***$p < .001$.

A

Note: High FoMO, $b = 6.76$, $se = 1.25$, $p < .001$; Low FoMO, $b = .44$, $se = 1.39$, $p = .75$

B

Note: High FoMO, $b = 3.64$, $se = .66$, $p < .001$; Low FoMO, $b = .29$, $se = .73$, $p = .69$

Fig. 1. Interaction between parent-reported number of social media accounts and FoMO in the prediction of A) anxiety symptoms and B) depressive symptoms.

4. Discussion

The present study extended prior research on the implications of adolescent social media activity by considering both adolescent and parent report of adolescents' social media use and a variety of indicators of mental health and adjustment in a community sample of 14–17 year-olds. From both parent and adolescent perspectives, youth in this sample were regularly engaged with social media, although for one third of the sample, this engagement was reportedly less than daily.

Perhaps our most important finding was that social media activity (i.e., the number of accounts adolescents have and their self-reported frequency of checking social media) was moderately, positively related to FoMO and loneliness, as well as with parent-reported hyperactivity/impulsivity, anxiety, and depression. These latter findings are particularly noteworthy in that they cannot be explained by shared source variance, as adolescent-reported social media activity was associated with externalizing and internalizing symptoms as reported by parents. Parent-reported hyperactivity/impulsivity was significantly related to parent-reported internalizing problems in this sample, indicating significant overlap among youth reported as relatively high (or low) on each of these indices.

Nevertheless, there may be different processes that help explain these findings in terms of motivations for social media use. For example, a teen otherwise engaged in mundane activities (e.g., waiting in line, doing homework, being out with friends) who is relatively high in hyperactivity/impulsivity may have a greater urge to engage with social media if the opportunity exists. Youth with higher internalizing symptoms may be drawn to social media as a way to connect to others. Indeed, adolescent-reported loneliness was related to having a higher number of social media accounts in this sample. Prior evidence suggests that adolescent females with internalizing symptoms may use social media in a way consistent with co-rumination with peers who have similar experiences or who offer support (Ehrenreich & Underwood, 2016). Additionally,

Table 5
Regression Analyses Using Loneliness as a Moderator.

	Criterion Variables		
	Anxiety	Depression	Depression (controlling for ethnicity)
Model 1 (Main Effects) R^2	.40***	.45***	.45***
b (se) PARENT REPORT # OF ACCOUNTS	3.94 (.93)***	2.17 (.48)***	2.16 (.49)***
b (se) LONELINESS	.37 (.06)***	.22 (.03)***	.22 (.03)***
b (se) ETHNICITY	–	–	.24 (.94)
Model 2 (Interaction) R^2	.44***	.48***	.48***
b (se) PARENT REPORT # OF ACCOUNTS x LONELINESS	.17 (.07)*	.09 (.04)**	.09 (.04)***
Model 1 (Main Effects) R^2	.37***	.45***	.45***
b (se) TEEN REPORT # OF ACCOUNTS	3.11 (.91)**	2.02 (.47)***	2.03 (.47)***
b (se) LONELINESS	.39 (.06)***	.22 (.03)***	.22 (.03)***
b (se) ETHNICITY	–	–	.48 (.95)
Model 2 (Interaction) R^2 Δ	.40***	.47***	.47***
b (se) TEEN REPORT # OF ACCOUNTS x LONELINESS	.17 (.07)*	.08 (.04)*	.08 (.04)*
Model 1 (Main Effects) R^2	.33***	.38***	.38***
b (se) TEEN REPORT FREQ. OF CHECKING	.81 (.42)	.52 (.22)*	.52 (.22)*
b (se) LONELINESS	.42 (.06)***	.25 (.03)***	.25 (.03)***
b (se) ETHNICITY	–	–	.11 (1.00)
Model 2 (Interaction) R^2 Δ	.35***	.40***	.40***
b (se) TEEN REPORT FREQ. OF CHECKING x LONELINESS	.07 (.03)*	.03 (.02)	.02 (.02)

Note: Unstandardized effects are shown. *$p < .05$; **$p < .01$; ***$p < .001$.

an adolescent's perception that he/she does not compare favorably to others as seen on social media or does not have the types of affiliations with others that he/she perceives on social media may heighten internalizing symptoms. Thus, a perceived discrepancy between one's own experiences and the positive experiences of others that one is missing out on may be a consequence of social media activity. At face value, these findings are suggestive of negative mental health correlates of having a higher number of social media accounts, yet as has been demonstrated with depression (Frison, Subrahmanyam, & Eggermont, 2016), it cannot be determined if these mental health indices are indeed an outcome or precursor of teen involvement with social media and social media experiences such as peer victimization.

Although FoMO is a relatively new focus of adolescent research, it appeared quite relevant in the present sample for understanding adolescent social media use. Specifically, FoMO was related to the indices of adolescent social media activity and moderated the relation between parent-reported social media activity and internalizing problems. This finding extends prior work that has shown FoMO to be related to social media use and to internalizing symptoms (Baker, Krieger, & LeRoy, 2016; Beyens et al., 2016) but that has not reported on its moderating influence in the associations between social media use and well-being. The interaction was not robust in that it did not apply to adolescent-reported social media activity; however, both adolescent-reported number of social media accounts and FoMO contributed significant unique variance to internalizing problems in those regression models.

If FoMO is conceptualized as a motivational variable such that adolescents engage with social media out of distress that they may be socially excluded, it may also be a signal that adolescents with FoMO do not so much approach social media to connect with others but do so to avoid being isolated from them. That is, it may be that social media activity does not necessarily engender internalizing symptoms or that youth with internalizing symptoms gravitate toward social media per se. Instead, social media activity appears to be most specifically tied to internalizing problems among youth who are pre-occupied with being excluded. The moderating effect of loneliness in the present study was weaker but followed the same general pattern and further suggests a negative social impact of social media for youth with internalizing problems. For such youth, viewing social media posts of others' activities may deem one's social media experiences as negative and may also have a subsequent negative emotional impact. On the other hand, those higher in FoMO in the present study who had fewer social media accounts scored lower on internalizing symptoms. In that way, limiting social media activity may have lowered the risk of anxiety or depressive symptoms for youth otherwise concerned with missing out on social activities/interactions. However, the developmental relations between social media activity, FoMO, and internalizing problems need examination, as it is plausible that some youth may experience heightened distress following restrictions on their social media use (Woods & Scott, 2016) or increased feelings of social exclusion. Related social media experiences such as cyber-bullying and/or victimization may also affect these relations (Sampasa-Kanyinga & Hamilton, 2015) and should be a focus of further investigation.

Contrary to our hypotheses, parental monitoring of social media was not associated with adolescent adjustment. One reason for the lack of findings regarding parental monitoring may be that parents in the present sample were more engaged with their adolescents on social media relative to other samples of adolescents (Coyne et al., 2014). Perhaps another explanation for this finding is the use of dichotomous items to assess parental monitoring (e.g., "Do you/your parents monitor

your child's/your social media accounts?"). More critical may be an array of specific behaviors in which parents engage to monitor their child's social media activity or the frequency with which they do so. Coyne et al. (2014) noted the apparent importance of parents and their offspring being connected on social media. However, this variable was not related to behavioral or emotional difficulties in our sample. Rather than negating the importance of parental monitoring in adolescent social media, the present findings may indicate a need to focus on specific aspects of parental involvement.

There are a number of limitations that must be considered in interpreting our findings. First, project resources limited the timeframe and extent to which participant recruitment could occur, and the relatively small sample size reduces the degree to which we can be confident that the results generalize to the broader population of present-day teens. Despite efforts to recruit a demographically representative sample, the dyads who completed the on-line surveys overwhelmingly identified as White/Caucasian, which is consistent with other studies of social media in adolescents (e.g., Coyne et al., 2014; Jelenchick et al., 2013; Woods & Scott, 2016). Thus, efforts are needed to recruit a more racially/ethnically diverse sample to enable a more full understanding of the use and role of social media among today's adolescents. Moreover, the study represents a self-selection bias based on the parents who likely were most interested in participating in the first place and the adolescents who subsequently did so, and despite the procedures noted above, the on-line nature of the data collection raises the possibility that adolescents may not have had complete privacy in completing their measures. There was also some evidence to suggest that adolescents who provided complete data in the present study were relatively better adjusted based on parent report than those who did not.

In addition, the cross-sectional design dictates that the directionality of the relation between social media activity and adolescent functioning cannot be determined. Conceptually, we considered parameters of social media use as predictive of internalizing symptoms, externalizing problems, and loneliness. However, just as easily, difficulties in these domains in addition to attributes such as FoMO could be precursors to higher social media activity, or the relations may be transactional. These possibilities could not be examined in the present study.

Although parent and adolescent *perspectives* on the variables of interest are important in this line of research, and the content of the social media survey items developed for this study directly reflected the constructs of interest, it cannot be determined how well parent- and adolescent-report match actual observable behaviors on variables such as parental monitoring, frequency of checking social media, and adolescents' behavioral functioning. In addition, within specific social media applications (e.g., Facebook, Instagram, Snapchat), adolescents may engage in any number of different activities, may create alternative accounts, or receive notifications from social media applications that are not clearly covered by broad questions about how often they use or check their social media accounts. Thus, more diverse methodologies including mixed methodological studies on the connection between intrapersonal variables and specific social media activities (e.g., Barry, Doucette, Loflin, Rivera-Hudson, & Herrington, 2017; Ehrenreich & Underwood, 2016) with adolescents are needed. Lastly, we were interested in adolescent self-perception of their own feelings of loneliness and FoMO, as well as parent perspectives on adolescent mental health as a way to provide a different informant besides the adolescent on indices of functioning. Future research in this area should also incorporate adolescent report and other sources for assessing mental health symptoms.

Beyond replication of the present findings in larger samples with approaches that address the above limitations, further efforts are needed to consider certain functions of social media use (e.g., to connect with others, to follow celebrities, to post photographs, to express emotions) that might be most relevant for specific indicators of well-being. For example, teens may use social media as an outlet to express feelings in ways that might not be comfortable or suitable in face-to-face interactions or may invest a great deal of time on unique aspects of social media applications. If these functions take the place of meaningful connections to others, an adolescent may experience adjustment problems or mental health difficulties such as those investigated in this study. Alternatively, adolescents from stigmatized groups (e.g., sexual minorities) who use social media for self-education, identity exploration, and community building may instead experience improvement in mental health difficulties, a possibility in need of further empirical exploration. Indeed, attitudes about social media use (e.g., receiving social support) appear to be more closely connected to mental health symptoms in young adults than mere use of social media (Rosen et al., 2013). Thus, the *functions* of adolescent social media use may have particular relevance.

Furthermore, because social media applications seem to be an integral part of many adolescents' lives, there are likely reinforcing aspects of social media that might translate to healthy adjustment for some users. Those potentially positive aspects of social media should be investigated as well through quantitative means to expand on recent qualitative efforts to delineate maladaptive and adaptive uses of social media in adolescents (see Radovic, Gmelin, Stein, & Miller, 2017). It also stands to reason that some reinforcing elements of social media (e.g., quelling concerns of FoMO) may be somewhat maladaptive and represent processes that need to be further examined. Along with other recent studies on adolescents (e.g., Ehrenreich & Underwood, 2016; Woods & Scott, 2016), it is clear that further understanding of the temporal relations between social media activity and youth adjustment is needed as is more investigation of contextual and intrapersonal influences on adolescents' social media experiences. The apparent role of FoMO or stress regarding events on social media, its potential interpersonal consequences, and the ever-increasing ubiquity of social media make this issue one of clinical and developmental importance.

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