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Recommended Citation

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Cover Page Footnote

This manuscript is based on an undergraduate honors thesis completed by the third author. Data are not publicly available due to ethical restrictions but are available on request from the corresponding author. We have no known conflict of interest to disclose. We thank our undergraduate students for their assistance with study design and data collection. Correspondence concerning this article should be addressed to Karen P. Kochel, Associate Professor of Psychology, Department of Psychology, 114 UR Drive, University of Richmond, Virginia 23173. E-mail: kkochel@richmond.edu https://orcid.org/0000-0003-0729-5668

COLLEGE STUDENTS' LONELINESS, FEELINGS ABOUT SOCIAL MEDIA, AND DEPRESSIVE SYMPTOMS DURING COVID-19: Between and Within-Person Temporal Associations

by Karen Kochel, University of Richmond; Catherine L. Bagwell, Davidson College; Samara Rosen, University of Richmond

INTRODUCTION

Following the onset of the COVID-19 pandemic, the majority of institutions of higher education in the United States implemented strict health protocols to mitigate virus transmission (Moreland et al. 2023). Social distancing, in particular, substantially altered the social landscape on college campuses by reducing or eliminating academic events, athletic competitions, student organization meetings, campus-wide social activities and other social networking opportunities that are typically available to undergraduate students (American College Health Association 2020). Because the desire for interpersonal attachments represents a fundamental human motivation (i.e., need-to-belong theory; Baumeister and Leary 1995), restrictions on social interactions have the potential to undermine adaptive development, especially among undergraduate students, many of whom are engaged in identity exploration, relationship building, and other key developmental tasks characteristic of emerging adulthood, a phase in the life course that follows

ABSTRACT:

During COVID-19, many institutions of higher education implemented health protocols that reduced college students' in-person interactions and prompted an uptick in their social media use. Although social media has often been implicated in the *development* of psychosocial difficulties, we tested an alternate hypothesis – that, during the pandemic, *students' feelings about social media for interpersonal connection* (i.e., FSMIC), would contribute to *reductions* in loneliness and depressive symptoms. To investigate temporal associations between loneliness, FSMIC, and depression, we estimated random-intercept cross-lagged panel models (RI-CLPM), permitting the disaggregation of between- and within-person effects. Participants (N = 517 undergraduates, M_{age} = 19.52, SD = 1.26) recruited from two institutions completed measures in Fall 2020 (Time 1), Winter 2021 (Time 2), and Spring 2021 (Time 3). Results, which partially supported the hypothesis that positive FSMIC would diminish psychological difficulties, provided evidence for reciprocal within-person effects between loneliness (but not depression) and FSMIC. Students who reported more positive FSMIC than was usual for them at one time point experienced less loneliness than was usual for them at the subsequent time point; moreover, students who experienced less loneliness than was usual for them reported more positive subsequent FSMIC. Findings further showed that students who scored higher than expected on loneliness at one time point experienced higher than expected levels of depression at the next time point. Evidence indicates that positive feelings about social media may have been adaptive during COVID-19, which has implications for how educational leadership leverages social media to promote college students' psychosocial adjustment.

adolescence and precedes adulthood (Arnett 2000). Indeed, there is mounting evidence for the perspective that college students as a whole evidenced heightened risk for psychosocial maladjustment, including loneliness and depression, following the onset of COVID-19 (e.g., Tasso, Sahin, and San Roman 2021).

In an effort to adapt to the pandemic and particularly social distancing protocols, it is conceivable that college students turned to virtual platforms, especially social media (broadly defined as digital tools for creating and sharing content with the goal of communication and social engagement, e.g., Nesi, Choukas-Bradley, and Prinstein 2018a, 2018b), to satisfy their need for interpersonal connectedness. Support for this conjecture comes from studies that point to an uptick in social media use among young people during COVID-19 (e.g., Rosen et al. 2022). In general, researchers concur that college students experienced increases in loneliness, depression, and social media use during the pandemic; however, it is less clear how—or if—social media affected their psychosocial adjustment. Knowledge about the developmental implications of positive versus negative feelings about social media during a period characterized by restricted face-to-face interactions has the potential to inform the way educational leaders leverage social media as a tool for promoting student engagement, retention, and overall success.

Temporal Associations Between Loneliness and Depressive Symptoms

According to the need-to-belong theory, belonging is a basic motivational need that is vital to developing and maintaining intimate, positive, and durable relations with others (Baumeister and Leary 1995). The need to belong may be especially pronounced among emerging adults for whom establishing and maintaining close interpersonal bonds is developmentally significant (Shaver, Furman, and Buhrmester 1985). A scarcity or absence of satisfying interpersonal relationships resulting in a lack of belonging may therefore be particularly likely to elicit loneliness among college students. Often conceptualized as a distressing feeling resulting from a perceived discrepancy between one's desired and achieved levels of social interaction (Perlman and Peplau 1981), loneliness has been implicated in the development of depression.

An alternate premise is that depression contributes to increases in loneliness. According to interpersonal theories of depression (Rudolph 2009), individuals who are symptomatic for depression may exhibit social-behavioral deficits (e.g., reassurance seeking, excessive self-focus, social withdrawal) that breed social rejection and other relationship disturbances. To the extent that these social-behavioral deficits interfere with depressed individuals' engagement in healthy interpersonal relationships, loneliness is a possible consequence.

Each of these competing theoretical perspectives has garnered some support. For example, evidence from longitudinal studies of American, British, and Chinese college students suggests that loneliness contributes to increases in depressive symptoms across shorter lags (e.g., six months or less; Shi, Wang, and Zhu 2023; Wei, Russell, and Zakalik 2005) and longer lags (e.g., one year or more; Liu et al. 2020). Findings from other studies, however, show that college students with heightened depressive symptoms are prone to subsequent increases in loneliness (Conti et al. 2023). Support has also been found for reciprocal relations between loneliness and depressive symptoms. For instance,

Vanhalst and colleagues (2012) reported that in a Belgian sample of college students, loneliness predicted depressive symptoms across two, one-year lags whereas depressive symptoms forecasted loneliness from Time 1 to Time 2 (but not Time 2 to Time 3). Similarly, in a sample of Chinese college students during the early months of the pandemic, loneliness predicted depression, and depression predicted loneliness across two, one-month lags (Wu, Wu, and Tian 2022).

Social Media Use: A Double-Edged Sword

Social media use has become nearly universal among adolescents and emerging adults. It is integrated into their daily lives and has changed the ways in which they connect and interact with others, leading to questions about whether and how social media affects psychosocial adjustment and well-being, including loneliness and depression (e.g., Valkenberg 2022). Existing empirical evidence primarily from before the pandemic is mixed (see Hamilton, Nesi, and Choukas-Bradley 2022; Keles, McCrae, and Grealish 2020; Meier and Reinecke 2021; Nowland, Necka, and Cacioppo 2018; Valkenburg 2022 for reviews). Some findings suggest that social media undermines well-being. For example, links between social media use and psychological distress, including loneliness, anxiety, and depression, prompted the US Surgeon General to issue an advisory calling attention to concerns about the negative effects of social media use on adolescent mental health (US Office of the Surgeon General 2023). Nevertheless, other findings show no significant association between social media use and mental health in adolescents and emerging adults (e.g., Berryman, Ferguson, and Negy 2018). Still other evidence is consistent with the perspective that social media use can contribute in positive ways to psychosocial adjustment and well-being. For example, social media use can decrease loneliness when it is used to enrich existing relationships, such as by facilitating interpersonal intimacy, or even to establish new friendships (Nowland, Necka, and Cacioppo 2018).

Recent perspectives argue for moving away from sweeping conclusions about social media use as positive, negative, or neutral for well-being and instead evaluating how specific ways in which students engage with social media, or other individual differences, help explain associations with psychosocial adjustment (Underwood, George, and Burnell 2023). Though researchers have most often administered measures that are quantifiable (e.g., number of likes or views, frequency of and fluctuations in use) or provided information about activity type (e.g., social networking, video sharing, gaming; Hamilton, Nesi, and Choukas-Bradley 2022), the psychosocial impact of social media is thought to depend on the specific measures used, complicating our interpretation of results across studies and assessment of when and in what ways social media is "good" or "bad." It has been suggested that nuanced approaches to studying social media effects, including those that focus on individual differences in, timing of, and motives for social media use, hold the most promise for advancing our understanding of social media and well-being (Hamilton, Nesi, and Choukas-Bradley 2021; Underwood, George, and Burnell 2023).

This study's primary aim was to explicate the nature of associations between college students' feelings about using social media as a means for connecting with others (i.e., feelings about social media for interpersonal connection [FSMIC]) and two indices of psychosocial adjustment—loneliness and

depressive symptoms—during COVID-19. In this study, we focused on a specific, qualitative aspect of emerging adults' relationship with social media—the extent to which they perceive an emotional connection to social media as a valuable tool for engaging with others. To investigate this aim, we employed a random-intercept cross-lagged panel model (RI-CLPM) framework, which is useful for uncovering within-person variability, and evaluated associations between self-reports of loneliness, FSMIC, and depressive symptoms at three time points: fall 2020, winter 2021, and spring 2021.

Recent studies including within-person analyses reveal considerable heterogeneity in the size and direction of effects of social media on psychosocial adjustment from person to person (e.g., Pouwels et al. 2021), even finding that effects of social media on adjustment can vary from positive to negative within individual adolescents across time (Valkenberg et al. 2021). A primary advantage of RI-CLPM is that it disaggregates between-person effects from within-person effects (Hamaker, Kuiper, and Grasman 2015). The latter are expected to be especially important in research on social media use because within-person effects provide information about intraindividual change; for example, does a student's fluctuations around their mean score on FSMIC predict similar fluctuations around their mean score on loneliness across time?

A second advantage of RI-CLPM is that it permits the investigation of the relative strength of bidirectional pathways and, in turn, facilitates inferences about temporal precedence. For instance, if the predictive pathway from FSMIC to depressive symptoms had a moderate effect size compared to a small (but significant) effect size for the pathway leading from depressive symptoms to FSMIC, findings would provide support for (a) reciprocal

longitudinal relations, and (b) FSMIC as a stronger precipitant than consequence of depressive symptoms. We estimated a model inclusive of paths leading from FSMIC to each psychosocial variable, from each psychosocial variable to FSMIC, and from loneliness to depressive symptoms and vice versa across two lags (i.e., from Time 1 to Time 2 and from Time 2 to Time 3). Thus a secondary aim of this study was to investigate temporal, within-person associations between loneliness and depression.

Study Overview and Implications for Educational Leadership

The purpose of this study was to elucidate the temporal patterning of associations between college students' self-reports of loneliness, FSMIC, and depressive symptoms across three time points within one academic year during the COVID-19 pandemic. We expected that the circumstances of the pandemic, and especially the restrictions on students' in-person interactions, may have created conditions under which positive feelings toward social media would serve a protective function. Specifically, reports of more positive FSMIC may signal a willingness to use social media to establish and/or nurture social connections within a virtual space, which has the potential to mitigate risk for psychosocial difficulties. Consistent with this perspective, our first hypothesis was that positive FSMIC would contribute to *reductions* in loneliness and depressive symptoms. On the basis of previous research, our second hypothesis was that college students' loneliness and depressive symptoms would be closely associated both contemporaneously and prospectively, with each psychosocial variable functioning as both a predictor and consequence of the other variable.

This study has the potential to advance

knowledge in at least two important ways. First, the pandemic provides a unique context marked by unprecedented isolation. By exploring prospective associations between college students' FSMIC, loneliness, and depressive symptoms during COVID-19, this study has the potential to improve our understanding of how feelings about, and motivations underlying, social media use have implications for college student well-being. Second, we used RI-CLPM to provide information about intraindividual change in across-time linkages between social media and psychosocial adjustment among college students. This represents an extension over most prior work, which tends to be cross-sectional and/or to focus on between-person effects only (see Valkenburg et al. 2022).

An improved understanding of social media's association with psychosocial adjustment may have important implications for leaders in higher education. College is often a transitional period both developmentally and ecologically; that is, most students are simultaneously progressing from adolescence to emerging adulthood *and* navigating new academic and social spaces, which increases their susceptibility to psychological and social distress (Conley et al. 2014). Because psychological and social factors are determinants of academic achievement and persistence in college (Eisenberg, Golberstein, and Hunt 2009; Nicpon et al. 2006), educational leaders are increasingly exploring, and in some cases prioritizing, strategic initiatives that foster psychosocial adjustment (e.g., Abrams 2022).

In particular, discoveries about the precise ways that social media facilitates student well-being have the potential to lead to institutional investment in, and the strategic use of, social media for this purpose. For example, perhaps educational leaders can leverage social media to promote mental health

and wellness content, capitalize on the power of peer influence, and/or foster students' social integration into the campus community. Given the likelihood that social media will (continue to) play an integral role in the lives of college students, it is critical that educational leadership is informed about the ways social media may enhance or undermine college students' well-being.

Method
Participants

Participants were 517 college students (57.4% female, 42.0% male, 0.6% nonbinary; M_{age} = 19.52, SD = 1.26) recruited from two midsized, residential liberal arts institutions in the southeastern United States. The percent of the sample drawn from each institution (71.2% vs. 28.8%) is approximately proportional to the institutions' reported student enrollments (3,161 vs. 993).

First-year students comprised 25.3% of the sample, 39.6% of participants were second-year students, 13.4% of the sample were in their third year, 19.5% of students were in their fourth year, and 2.2% in their fifth year. The majority of the sample was from the United States (87.0% domestic; 13.0% international). First-generation students (i.e., students whose parents do not hold a bachelor's degree) comprised 21.6% of our sample, and 22.4% reported receiving a Pell Grant, or federal funding that supports undergraduates displaying exceptional financial need.

Half (49.4%) of the sample self-identified as white, 22.2% as Asian, 7.8% as Black or African American, 7.4% as Hispanic or Latino, and 1.9% reported another race or ethnicity. Multiracial participants (11.3%) were those who identified as belonging to more than one race category. Participant demographics approximate those at the two institutions

from which we recruited.

Participants reported the highest level of education for their primary caregiver: 12.3% of primary caregivers completed some or all of high school, 11.5% completed some college, 27.8% received a bachelor's degree, 27.6% received a master's degree, 19.4% received a doctorate, medical, or law degree, and 1.4% reported completing some other form of graduate degree. Participants also reported family income: 8.3% reported a family income under $25,000, 12.9% reported $25,000–$49,999, 14.6% reported $50,000–$74,999, 12.9% reported $75,000–$99,999, 19.4% reported $100,000–$149,999, and 31.8% reported a family income of over $150,000.

Procedure

Data were collected in late October/early November 2020 (T1), January/early February 2021 (T2), and early May 2021 (T3), during COVID-19. The pandemic significantly disrupted the educational experience of students, including those at residential colleges. At the two institutions from which we recruited participants, most (70%) elected to return to campus and live in on-campus housing at the start of the fall 2021 semester. Other students lived at home (20.7%), or they lived off campus but not at home (8.7%). Courses were taught in a variety of formats, such as in person, hybrid (half online and half in person), and fully online. Notably, classes that were held in person required masks and social distancing, which limited interactions among students. Even participants fully on campus still had at least some online classes: just 18.2% reported no online classes, and 27.3% reported four or more online classes. Some students had no in-person classes (27.5%) whereas a mere 17.8% of students reported having four or more in-person classes. The institutions also imposed other restrictions that substantially altered numerous aspects of campus life, especially those that typically involve social interactions (e.g., student organizations, athletics, dining).

The principal investigators obtained permission to conduct research from each university's Institutional Review Board. Study personnel sent recruitment messages through the daily email forum that notifies students about on-campus events and distributed an electronic flyer via email and GroupMe. Recruitment materials included a link and QR code to a web-based survey.

Undergraduates who were at least eighteen years old and enrolled in either institution were eligible to participate. Participants provided informed consent and were told that their responses would be kept confidential, they could withdraw consent at any point, and they could skip questions they did not wish to answer. Participants independently completed the twenty-five-minute survey on psychosocial and academic adjustment during COVID-19 in a location they chose. After survey completion, they were directed to a debriefing page that provided a description of the study purpose and listed resources for students experiencing psychological distress. Participants received an Amazon gift code as compensation. We omitted data for four participants because they completed their survey in fewer than ten minutes, which was not realistically possible, based on survey piloting.

Measures

• Loneliness

Participants completed the ten-item Loneliness in Context scale to assess feelings of loneliness in college (Asher and Weeks 2014). Participants were asked to what extent they agree with a list

of statements, such as "Class is a lonely place for me" and "My free time is a lonely time for me." Participants responded on a five-point Likert scale (1 = *strongly disagree* to 5 = *strongly agree*). We computed a loneliness score for each participant by averaging across the ten items (α = 0.90–0.92).

• Feelings about Social Media Use for Interpersonal Connection

To evaluate participants' emotional stake in social media and their use of social media to connect with others, we administered the Social Integration and Emotional Connection subscale of the Social Media Use Integration Scale (Jenkins-Guarnieri, Wright, and Johnson 2013). The six-item subscale includes items like "I feel disconnected from friends when I have not logged on to social media" and "Social media plays an important role in my social relationships." Participants reported their level of agreement using a six-point Likert scale ranging from *strongly disagree* =1 to *strongly agree* = 6. We computed scores for FSMIC by averaging the subscale's six items for each participant (α = 0.84–0.86).

• Depressive Symptoms

We used the twenty-item Center for Epidemiologic Studies Depression Scale (Radloff 1977) to index depressive symptoms. Participants were given a list of feelings or experiences and asked to indicate on a four-point Likert scale (0 = *rarely or none of the time* to 3 = *most or all of the time*) how often they had experienced them over the past few weeks. Items included "I was bothered by things that usually don't bother me" and "I felt everything I did was an effort." Traditional scoring of this measure, which involves summing across items, yielded means and standard deviations of 22.97 (11.76), 22.25 (11.89),

and 22.30 (11.57), respectively, where scores of sixteen or greater may reflect risk for clinical depression. To facilitate convergence of structural equation models, however, we rescaled the depression measure by calculating a mean score per participant. Reliability was high (α = 0.92 at T1, T2, and T3).

Data Analytic Strategy

At T1 of data collection, 517 students participated. At T2 and T3, there were 432 and 426 participating students, respectively. Attrition from T1 to T3 was 17%. Attrition accounted for all missing data (i.e., there was no construct-level missingness). We analyzed data in M*plus* 8.3 (Muthén and Muthén 1998–2017) using full-information maximum-likelihood, which is thought to produce results that are robust to the presence of missing data (Enders 2022).

We first conducted preliminary analyses, including descriptive statistics and bivariate correlations. Second, we estimated a series of random-intercept cross-lagged panel models (RI-CLPM; Hamaker, Kuiper, and Grasman 2015) to investigate prospective, bidirectional associations between loneliness, FSMIC, and depressive symptoms at three time points (fall, winter, spring) during the 2020–21 academic year. The inclusion of random intercepts permits the decomposition of data into between-person effects and within-person effects. Whereas between-person effects reveal information about relatively stable differences in associations between constructs across individuals (e.g., Are students with more positive FSMIC at lower risk for depressive symptoms or loneliness compared to students with less positive FSMIC?), within-person effects reflect within-person fluctuations over time from the person's own mean (e.g., Does change in a student's

FSMIC predict that student's change in depressive symptoms or loneliness over time?).

To evaluate the fit of our structural equation models, we used the Root Mean Square Error of Approximation (i.e., RMSEA), the Comparative Fit Index (i.e., CFI), and the Tucker-Lewis Index (i.e., TLI). Values ≤ 0.08 for RMSEA and ≥ 0.90 for CFI and TLI suggest acceptable fit (Hu and Bentler 1999; Little 2013). We also reported each model's $ML\chi^2$ goodness-of-fit statistic and examined $\Delta ML\chi^2$ across nested models to identify the best-fitting model.

Results
Preliminary Analyses

Descriptive statistics and a bivariate correlation matrix appear in Table 1. Mean scores on each construct were similar across time. The means for loneliness and FSMIC were at approximately the midpoint of their respective scales. For depression, the sample means at each time point indicated that, on average, participants reported experiencing symptoms "some or a little of the time." It is noteworthy, however, that traditional scoring of the measure (i.e., summing rather than averaging each participant's item-level responses) yielded mean scores exceeding what is often considered clinical risk. The modest skewness and kurtosis values for all study variables do not provide evidence for data nonnormality.

The within-construct associations of loneliness, depressive symptoms, and FSMIC use were positive and large (> 0.50; Cohen 2013) as were correlations between loneliness and depressive symptoms. Associations between loneliness and FSMIC, and depressive symptoms and FSMIC, were generally small (0.10 < r < 0.30; Cohen 2013), though four of these correlation coefficients were < 0.10 and not significant.

Random-Intercept Cross-Lagged Panel Models

We estimated a baseline RI-CLPM (Figure 1)

Variable	1	2	3	4	5	6	7	8	M	SD	Skewness	Kurtosis
1. T1 Lone	−								2.770	0.875	0.105	−0.570
2. T2 Lone	0.715	−							2.721	0.909	0.118	−0.550
3. T3 Lone	0.637	0.767	−						2.761	0.915	0.209	−0.414
4. T1 Depr	0.723	0.614	0.587	−					1.149	0.588	0.320	−0.485
5. T2 Depr	0.587	0.682	0.584	0.746	−				1.113	0.595	0.397	−0.502
6. T3 Depr	0.494	0.572	0.715	0.672	0.712	−			1.115	0.578	0.366	−0.284
7. T1 FSMIC	0.210	0.194	0.175	0.185	0.177	0.150	−		2.800	1.083	0.187	−0.529
8. T2 FSMIC	0.169	0.179	0.117	0.167	0.161	0.160	0.739	−	2.954	1.053	0.013	−0.387
9. T3 FSMIC	0.139	*0.072*	*0.095*	0.120	*0.068*	*0.077*	0.710	0.793	3.038	1.087	−0.014	−0.493

Note. Correlations are significant ($p < 0.05$) unless in italics. T1 = Time 1; T2 = Time 2; T3 = Time 3; Lone = loneliness; Depr = depressive symptoms; FSMIC = feelings about social media for interpersonal connection.

Table 1: Descriptive Statistics and Bivariate Correlations.

that included a random intercept per construct (e.g., RI_{dep}) to capture stable between-person variance and a latent factor per construct at each time point (e.g., W_{DEP1}–W_{DEP3}) to permit an examination of associations at the within-person level. Factor loadings on random intercepts and on latent factors were constrained to 1. We estimated all autoregressive (or carryover) stability paths (e.g., $W_{DEP1} \rightarrow W_{DEP2}$) and cross-lagged (or spillover) paths (e.g., $W_{LON1} \rightarrow W_{DEP2}$). We also estimated covariances between the random intercepts, between the T1 within-person latent factors, and between the covariances of the residuals of the T2 and T3 within-person latent factors. We fixed the correlations between the random intercepts and the within-person latent factors to 0.

Nested Model Comparisons

As shown in Table 2, the fit of the baseline RI-CLPM was acceptable ($RMSEA$ = 0.055, CFI = 0.998, TFI = 0.980). We then estimated Models 2–4 to examine time invariance. Model 2 included equality constraints on autoregressive paths per variable (e.g., $W_{DEP1} \rightarrow W_{DEP2}$ and $W_{DEP2} \rightarrow W_{DEP3}$ constrained to equality) and the same spillover paths at different lags (e.g., $W_{LON1} \rightarrow W_{DEP2}$ and $W_{LON2} \rightarrow W_{DEP3}$ constrained to equality). The resulting model achieved acceptable fit ($RMSEA$ = 0.042, CFI = 0.996, TFI = 0.988), and there was not a significant degradation in fit according to a chi-square comparison of nested models ($\Delta\chi^2$ = 15.24, Δdf = 9, p = 0.08); thus we retained Model 2. In Model 3 we imposed equality

Note. Standardized coefficients presented for stability and cross-lagged paths, covariances between T1 variables, and covariances between residuals of T3 variables. Covariances between residuals of CDEP2 and CFSMIC2, CDEP2 and CLON2, and CFSMIC2 and CLON2 (not pictured) are 0.02 (ns), 0.54 (p < 0.05), and −0.04 (ns), respectively. Factor loadings on WFSMIC1, WFSMIC2, and WFSMIC3 constrained to 1 (not pictured). Dashed lines reflect paths with nonsignificant parameters. Dep1/2/3 = Time 1/2/3 depressive symptoms; Fsmic1/2/3 = Time 1/2/3 feelings about social media for interpersonal connection; Lon1/2/3 = Time 1/2/3 loneliness; RI = Random intercept; W = Within-person (centered) factor. * *p* < 0.05; ^ *p* < 0.08
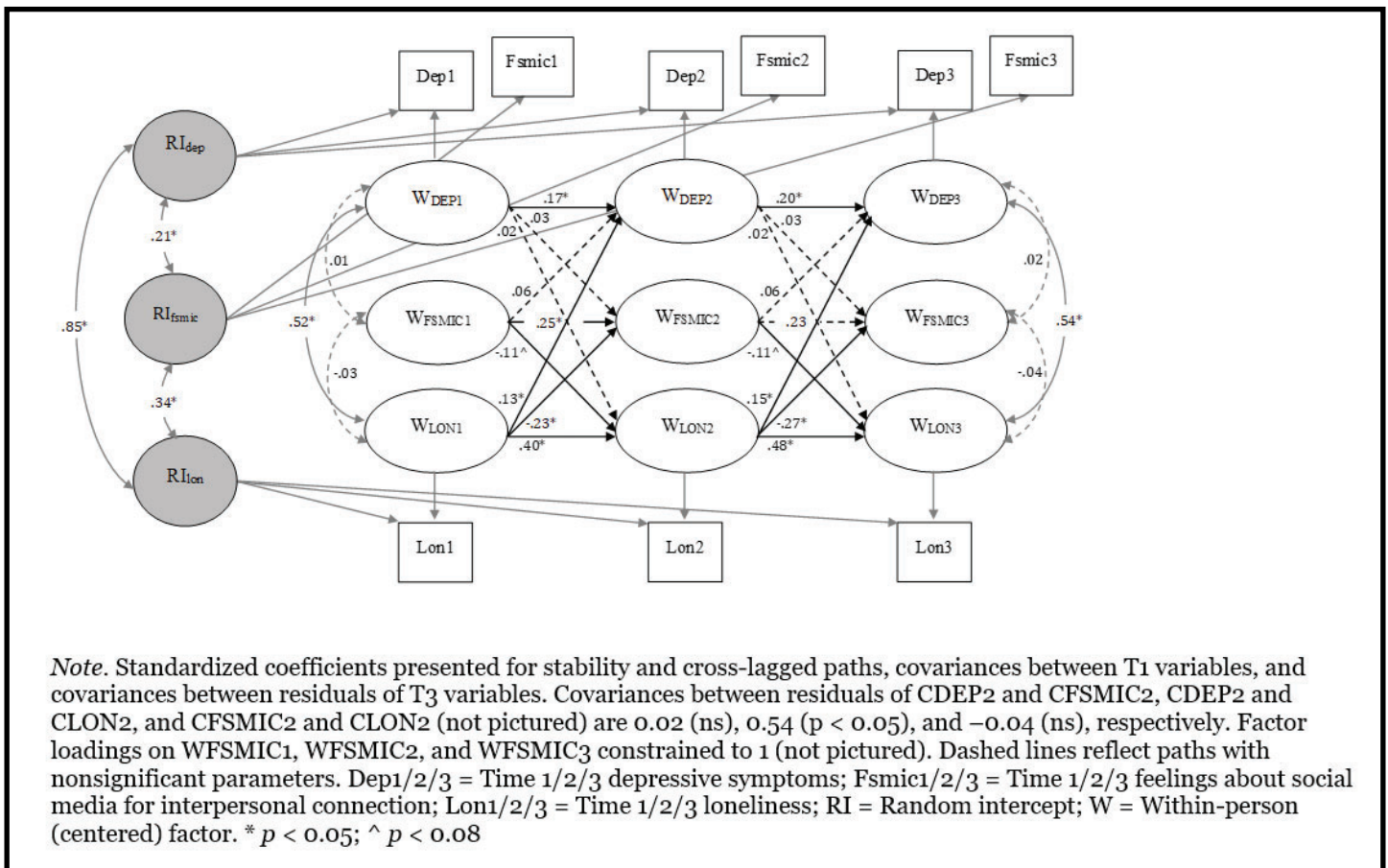
Figure 1: Random-Intercept Cross-Lagged Panel Model of Depressive Symptoms, Feelings about Social Media, and Loneliness

constraints on observed means per variable over time (e.g., Lon1, Lon2, and Lon3 constrained to equality). Fit indices ($RMSEA$ = 0.073, CFI = 0.982, TFI = 0.965) suggest that the model was tenable, but a chi-square difference test ($\Delta\chi^2$ = 45.173, Δdf = 6, p < 0.001) did not support the retention of Model 3. We estimated a fourth model in which we constrained residual variances of within-person factors across time (e.g., W_{LON2} with W_{DEP2} constrained to equal W_{LON3} with W_{DEP3}). Fit was acceptable ($RMSEA$ = 0.035, CFI = 0.996, TFI = 0.992), and compared to Model 2, Model 4 did not evidence a decrement in fit ($\Delta\chi^2$ = 6.546, Δdf = 6, p = 0.36). We retained Model 4 as our final model.

Interpreting Parameter Estimates

Standardized path estimates appear in Figure 1. At the between-person level, there were significant positive correlations between depressive symptoms and FSMIC (β = 0.21), depressive symptoms and loneliness (β = 0.85), and FSMIC and loneliness (β = 0.34), suggesting that college students with higher, compared to lower, scores on one variable (e.g., depressive symptoms) reported higher scores on the other variable (e.g., FSMIC) at the same time.

After controlling for between-person associations, positive, within-person correlations remained only between depressive symptoms and loneliness at each time point (β_{T1} = 0.52, β_{T2} = 0.54, β_{T3} = 0.54). These correlations imply that students who scored higher (or lower) than their expected depressive symptoms scores also tended to score higher (or lower) than their expected loneliness score at the same time.

We observed positive carryover stability effects in depressive symptoms and loneliness at both lags (i.e., from T1 → T2 and from T2 → T3), whereas for FSMIC there was evidence of stability from T1 → T2 but not T2 → T3. A stability effect from T1 → T2 indicates that students who scored higher (or lower) than their expected score on a T1 variable were likely to experience the same deviation from their score on the corresponding T2 variable. Carryover stability

Model	χ^2	df	Δdf	$\Delta\chi^2$	RMSEA	CFI	TLI	Retain?
Baseline RI-CLPM	7.705	3	–	–	0.055 [0.000, 0.105]	0.998	0.980	–
Model 2: Autoregressive and cross-lagged paths constrained[a]	22.919	12	9	15.214	0.042 [0.013, 0.068]	0.996	0.988	Yes
Model 3: Grand means constrained[b]	68.092	18	6	45.173	0.073 [0.055, 0.092]	0.982	0.965	No
Model 4: Residual variances of within-person factors constrained[b]	29.464	18	6	6.546	0.035 [0.006, 0.057]	0.996	0.992	Yes

[a] Compared to baseline Model.
[b] Compared to Model 2.
RMSEA = Root Mean Square Error of Approximation; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index.

Table 2: Comparison of Fit Indices for Random-Intercept Cross-Lagged Panel Models

effects for depressive symptoms and FSMIC were small; for loneliness, stability effects were approaching moderate.

There were positive and significant cross-lagged associations leading from T1 loneliness → T2 depressive symptoms (β = 0.13) and from T2 loneliness → T3 depressive symptoms (β = 0.15) suggesting that a college student who experienced higher levels of loneliness than was expected for that student at T1 (or T2) scored higher on depressive symptoms than was expected for that student at T2 (or T3). Cross-lagged pathways from T1 loneliness → T2 FSMIC (β = −0.23) and from T2 loneliness → T3 FSMIC (β = −0.27) were significant in the negative direction. The other direction of effect, or paths from T1 FSMIC → T2 loneliness (and from T2 FSMIC → T3 loneliness), were negative and marginally significant (βs = −0.11, p = 0.07). These findings lend some support for bidirectional effects such that a lower-than-expected T1 (or T2) loneliness score for an individual predicted, and was predicted by, a higher-than-expected T2 (or T3) FSMIC score for that student. Effect sizes for cross-lagged paths were consistently small. Among the spillover effects, those leading from loneliness to FSMIC were more robust than vice versa (i.e., FSMIC to loneliness) and similar in magnitude to the pathways from loneliness to depressive symptoms.

Discussion

This study's findings advance knowledge about temporal associations between college students' loneliness, FSMIC, and depressive symptoms over the course of an academic year. The public narrative about social media tends to emphasize harmful mental health outcomes associated with its use (e.g., Twenge 2017); however, our results imply that

considering contextual factors—in this case, a global pandemic characterized by high levels of isolation—may be important for understanding the developmental implications of social media. Our study adds to a growing body of literature that underscores the utility of qualitative indices of social media use for shedding light on social media's association with more versus less adaptive development (Hamilton, Nesi, and Choukas-Bradley 2022).

Our RI-CLPM analyses revealed two particularly noteworthy temporal patterns—ones that have the potential to inform how educational leadership leverages social media as a means for promoting student well-being. First, college students' loneliness both influenced and was influenced by students' FSMIC. Second, loneliness predicted, but was not predicted by, depressive symptoms across time.

Bidirectional Associations between FSMIC and Loneliness

Results provide some evidence for bidirectional associations between FSMIC and loneliness. A student who scored higher than their expected score on T1 FSMIC was likely to score below their expected score on T2 loneliness. The reverse was also true (i.e., a student who scored higher than their expected score on T1 loneliness was likely to score lower than their expected score on T2 FSMIC), with this bidirectional pattern replicating across the second lag (i.e., from T2 to T3). The fact that more positive FSMIC were predictive of lower levels of loneliness could indicate a greater willingness to use virtual platforms, including social media, to maintain and strengthen social connections during the pandemic.

Notably, although the associations were bidirectional, effect size estimates suggest that the loneliness-to-FSMIC link was stronger than the

FSMIC-to-loneliness link. Students who were lonelier at one time point reported less positive feelings about using social media for social connection several months later. Lonely individuals often report feeling socially threatened, which may, in turn, fuel patterns of negative thinking about their social world (Hawkley and Cacioppo 2010). In our study, we obtained evidence to suggest that students who reported a higher level of loneliness than was normal for them were subsequently likely to view social media as being an undesirable, unrewarding, or otherwise unacceptable mechanism for forming and/or maintaining interpersonal connections. Consistent with this perspective, research indicates that lonely people tend not to view social stimuli (e.g., social media use for interpersonal connection) as rewarding as nonlonely people (see Nowland, Necka, and Cacioppo 2018).

Interestingly, whereas within-person effects revealed that students with higher-than-expected loneliness scores subsequently reported lower-than-expected FSMIC scores, the between-person analyses revealed a positive relationship between loneliness and FSMIC; that is, on average, high levels of loneliness were associated with more positive FSMIC. These findings mean that individuals with high, compared to low, levels of loneliness evidenced more favorable feelings about social media as a tool for engaging with others; however, at the individual level, a student's fluctuations around their mean score on loneliness predicted similar fluctuations—in the opposite direction—around their mean score on FSMIC. Taken together, these findings provide a better understanding of the complex relationship between college students' loneliness and social media and underscore the utility of decomposing between- and within-person variance via analytic strategies such as RI-CLPM.

College Students' Loneliness Predicts Subsequent Depressive Symptoms

Theoretical perspectives such as the need-to-belong theory, or the notion that interpersonal belonging is a fundamental human need (Baumeister and Leary 1995), and the self-determination theory, which suggests that human relatedness is essential for optimal psychological functioning (Ryan and Deci 2000), help explain why loneliness may play a role in the etiology of depression. Indeed, we obtained evidence for pathways leading from loneliness to depressive symptoms across both lags, but not the reverse. This pattern of findings has been reported in at least three earlier studies with college-based samples (Liu et al. 2020; Shi, Wang, and Zhu 2023; Wei, Russell, and Zakalik 2005), and in a fourth investigation, authors found evidence for bidirectional effects, but loneliness emerged as a relatively stronger predictor of depression than the opposite (Vanhalst et al. 2012).

Among studies conducted following the onset of COVID-19, one provided evidence for bidirectional associations (Wu, Wu, and Tian 2022) and another for the pathway from depressive symptoms to loneliness but not vice versa (Conti et al. 2023). One possible explanation for discrepant findings across studies is that prospective associations between loneliness and depression are reciprocal across the lifespan but take longer than the length of these studies (i.e., between six months and three years) to emerge. A second possibility is that differences across investigations in participant demographics and study design contributed to inconsistencies in results. For example, participants in one study were first-year students recruited from an institution in the midwestern United States, whereas anoth-

er study sample was psychology students from a university in Belgium (Vanhalst et al. 2012); moreover, some researchers investigated temporality using structural equation modeling with a single lag (Wei, Russell, and Zakalik 2005), cross-lagged panel modeling with two lags (Vanhalst et al. 2012), or RI-CLPM with three lags (Shi, Wang, and Zhu 2023) whereas others conducted regression analysis (e.g., Conti et al. 2023; Liu et al. 2020). Research is needed to reconcile discrepant findings, but for reasons outlined below, we contend that our use of a methodologically rigorous within-person design bolsters the credibility of our study results, including those about the temporal links between loneliness and depression.

Summary of Key Contributions

The fact that we conducted panel modeling with random intercepts is one way that this study's findings extend existing knowledge. Researchers have tended not to investigate social media and well-being using longitudinal designs (Valkenburg et al. 2022). Panel modeling, specifically, provides the most rigorous test of temporality by permitting the examination of bidirectionality across two or more lags while controlling for prior levels of each variable. Conducting an RI-CLPM enabled us to control for between-subject variance and, in turn, gain insight into intraindividual differences. Our use of a within-person design is also advantageous from a theoretical perspective, given that a social media effect is indeed change *within an individual* as a result of social media (Valkenburg et al. 2022).

Another notable contribution of our study is that it sheds light on the nature of predictive links between college students' social media and psychosocial adjustment *in the midst of COVID-19.*

Higher-than-normal isolation may have created circumstances in which positive feelings about social media resulted in (a) greater use of virtual platforms for interpersonal connection, and/or (b) optimism about maintaining interpersonal connection. This may have reduced risk for subsequent loneliness. It also possible that, during COVID-19, loneliness was so keenly felt by college students that it was the driver of their depressive symptoms as opposed to vice versa.

Limitations and Future Directions

Despite these contributions, our study has some limitations. For example, we investigated prospective associations between FSMIC with loneliness and depression across two lags within a single academic year at two midsized liberal arts institutions in the United States. Studies that shed light on the temporal patterning of links between social media and psychosocial adjustment across a greater number of lags, over the longer term, and/or among students at institutions with differing characteristics (e.g., size, location, demographics) have the potential to reinforce the plausibility of findings reported here.

Although the longitudinal design of our study is a strength because two lags, or three data points, allow us to observe patterns across time, the fact that longitudinal designs have been uncommon makes it somewhat difficult to interpret our findings in the context of relevant prior work. Indeed, scholars have noted that a limitation of the literature on social media and well-being is that much of it is correlational, precluding inferences about causality (e.g., Valkenburg et al. 2022). More longitudinal studies, including ones that shed light on within-person effects, are warranted. Replicating our findings is also

necessary because effect sizes (i.e., the magnitude of parameter estimates), and particularly those for the cross-lagged paths, were small and thus should be interpreted accordingly.

It is also important to note that because our measure of social media focused on students' feelings about using social media as a means for emotional connection and social integration, it is possible that students who were particularly lonely did not feel positively about using social media for interpersonal connection but nevertheless engaged in the (potentially maladaptive) use of social media. For instance, it is conceivable that lonely students are prone to passive lurking (reading social media feeds and observing others through social media but not connecting actively), a behavior that seems to be associated with heightened loneliness and negative adjustment in adolescents and adults (Frison and Eggermont 2016; Nowland, Necka, and Cacioppo 2018; Underwood and Ehrenreich 2017). Likewise, in a sample of college students in China, Zhou and colleagues (2020) found that, during the pandemic, increases in *problematic* internet use predicted corresponding increases in students' mental health challenges.

The fact that our investigation occurred from fall 2020 to spring 2021, amid the COVID-19 crisis, is valuable in that we currently have a limited understanding of the varied ways in which the pandemic affected, and continues to affect, the developmental trajectories of college students. At the same time, it is possible that studies conducted in the midst of COVID-19 might have limited generalizability, given the unprecedented circumstances surrounding the pandemic, including the massive restructuring of the collegiate experience and ensuing lack of in-person interactions. Despite these limitations, this study's findings, in the context of a larger literature on

college students' social media use and well-being, provide educational leaders with an evidence base that has the potential to inform their strategic use of social media for facilitating college students' integration into the campus community and overall psychosocial adjustment.

Implications for Educational Leadership

There is mounting evidence for the perspective that loneliness has the potential to undermine college students' adaptive development. For example, evidence obtained within this study and others (Shi, Wang, and Zhu 2023; Vanhalst et al. 2012; Wei, Russell, and Zakalik 2005) suggests that loneliness increases vulnerability for depression. Other research shows that college students' loneliness has implications for academic performance and retention (Strayhorn 2018).

The immediate crisis of COVID-19, including the unprecedented social isolation, has subsided; nevertheless, it stands to reason that college students' risk for loneliness remains elevated. Because students may attend college far from home, study abroad, and/or disperse for summers and semester breaks, continuity in their face-to-face relationships with close others is often disrupted, posing risk for loneliness. Accordingly, educational leaders' prioritization of initiatives that facilitate social connections and psychological well-being is paramount for increasing student success.

Social media may, in some cases, function as a viable alternative to in-person interactions by providing college students with a means through which to establish and/or strengthen interpersonal ties with one another and with faculty, staff, and alumni. Our findings indicate that students who felt more positively about social media for this purpose

at one time may have felt less lonely several months later. This finding and others like it are important because they (a) challenge the widespread narrative that social media is mostly bad and poses a significant threat to student well-being, and (b) imply that social media may represent a promising avenue for health promotion in higher education.

In an era in which social media is ubiquitous, study findings are relevant to educational leaders because they underscore the potential utility of digital interactions for facilitating college students' social connectedness and mitigating their risk for loneliness. Particularly in view of the immense amount of time that emerging adults devote to social media (Underwood, George, and Burnell 2023), education leaders may be well served to think creatively about how to harness the power of social media for good.

REFERENCES

Abrams, Zara. 2022. "Student Mental Health Is in Crisis. Campuses Are Rethinking Their Approach." *Monitor on Psychology 53*, no. 7 (October). https://www.apa.org/monitor/2022/10/mental-health-campus-care.

American College Health Association. 2020. *ACHA Guidelines: Considerations for Reopening Institutions of Higher Education in the COVID-19 Era*. Silver Spring, MD: ACHA.

Arnett, Jeffrey Jensen. 2000. "Emerging Adulthood: A Theory of Development from the Late Teens through the Twenties." *American Psychologist 55*, no. 5: 469–80. https://doi.org/10.1037/0003-066X.55.5.469.

Asher, Steven R., and Molly S. Weeks. 2014. "Loneliness and Belongingness in the College Years." In *The Handbook of Solitude: Psychological Perspectives on Social Isolation, Social Withdrawal, and Being Alone*, edited by Robert J. Coplan and Julie C. Bowker, 283–301. Hoboken, NJ: John Wiley & Sons.

Baumeister, Roy. F., and Mark R. Leary. 1995. "The Need to Belong: Desire for Interpersonal Attachments as a Fundamental Human Motivation." *Psychological Bulletin* 117, no. 3: 497–529.

Berryman, Chloe, Christopher J. Ferguson, and Charles Negy. 2018. "Social Media Use and Mental Health among Young Adults." *Psychiatric Quarterly* 89: 307–14. https://doi.org/10.1007/s11126-017-9535-6.

Cohen, Jacob. 2013. *Statistical Power Analysis for the Behavioral Sciences*. New Jersey: Lawrence Erlbaum.

Conley, Colleen S., Alexandra C. Kirsch, Daniel A. Dickson, and Fred B. Bryant. 2014. "Negotiating the Transition to College: Developmental Trajectories and Gender Differences in Psychological Functioning, Cognitive-Affective Strategies, and Social Well-Being." *Emerging Adulthood* 2, no. 3: 195–210. https://doi.org/10.1177/2167696814521808.

Conti, Chiara, Roberta Lanzara, Ilenia Rosa, Markus M. Müller, and Piero Porcelli. 2023. "Psychological Correlates of Perceived Loneliness in College Students before and during the COVID-19 Stay-at-Home Period: A Longitudinal Study." *BMC Psychology* 11, no. 1: 1–11. https://doi.org/10.1186/s40359-023-01099-1.

Eisenberg, Daniel, Ezra Golberstein, and Justin B. Hunt. 2009. "Mental Health and Academic Success in College." *The BE Journal of Economic Analysis & Policy* 9, no. 1. https://doi.org/10.2202/1935-1682.2191.

Enders, Craig. K. 2022. *Applied Missing Data Analysis*. New York: Guilford Press.

Frison, Eline, and Steven Eggermont. 2016. "Exploring the Relationships between Different Types of Facebook Use, Perceived Online Social Support, and Adolescents' Depressed Mood." *Social Science Computer Review* 34, no. 2: 153–71. https://doi.org/10.1177/0894439314567449.

Hamaker, Ellen L., Rebecca M. Kuiper, and Raoul P. P. P. Grasman. 2015. "A Critique of the Cross-Lagged Panel Model." *Psychological Methods* 20, no. 1: 102–16. https://doi.org/10.1037/a0038889.

Hamilton, Jessica L., Jacqueline Nesi, and Sophia Choukas-Bradley. 2022. "Reexamining Social Media and Socioemotional Well-Being among Adolescents through the Lens of the COVID-19 Pandemic: A Theoretical Review and Directions for Future Research." *Perspectives on Psychological Science* 17, no. 3: 662–79. https://doi.org/10.1177/17456916211014189.

Hawkley, Louise C., and John T. Cacioppo. 2010. "Loneliness Matters: A Theoretical and Empirical Review of Consequences and Mechanisms." *Annals of Behavioral Medicine* 40, no. 2: 218–27. https://doi.org/10.1007/s12160-010-9210-8.

Hu, Li-tze, and Peter M. Bentler. 1999. "Cutoff Criteria for Fit Indexes in Covariance Structure Analysis: Conventional Criteria Versus New Alternatives." *Structural Equation Modeling: A Multidisciplinary Journal* 6, no. 1: 1–55. https://doi.org/10.1080/10705519909540118.

Jenkins-Guarnieri, Michael A., Stephen L. Wright, and Brian Johnson. 2013. "Development and Validation of a Social Media Use Integration Scale." *Psychology of Popular Media Culture* 2, no. 1: 38–50. https://doi.org/10.1037/a0030277.

Keles, Betul, Niall McCrae, and Annmarie Grealish. 2020. "A Systematic Review: The Influence of Social Media on Depression, Anxiety and Psychological Distress in Adolescents." *International Journal of Adolescence and Youth* 25, no. 1: 79–93. https://doi.org/10.1080/02673843.2019.1590851.

Little, Todd. D. 2013. *Longitudinal Structural Equation Modeling*. New York: Guilford Press.

Liu, Huijun, Mengru Zhang, Qing Yang, and Bin Yu. 2020.

"Gender Differences in the Influence of Social Isolation and Loneliness on Depressive Symptoms in College Students: A Longitudinal Study." *Social Psychiatry and Psychiatric Epidemiology* 55: 251–57. https://doi.org/10.1007/s00127-019-01726-6.

Meier, Adrian, and Leonard Reinecke. 2021. "Computer-Mediated Communication, Social Media, and Mental Health: A Conceptual and Empirical Meta-Review." *Communication Research* 48, no. 8: 1182–1209. https://doi.org/10.1177/0093650220958224.

Moreland, Sarah, Nicole Zviedrite, Faruque Ahmed, and Amra Uzicanin. 2023. "COVID-19 Prevention at Institutions of Higher Education, United States, 2020–2021: Implementation of Nonpharmaceutical Interventions." *BMC Public Health* 23, no. 1: 164. https://doi.org/10.1186/s12889-023-15079-y.

Muthén, Linda K., and Bengt Muthén. 2017. *Mplus User's Guide: Statistical Analysis with Latent Variables*. Los Angeles: Muthén & Muthén.

Nesi, Jacqueline, Sophia Choukas-Bradley, and Mitchell J. Prinstein. 2018a. "Transformation of Adolescent Peer Relations in the Social Media Context: Part 1—A Theoretical Framework and Application to Dyadic Peer Relationships." *Clinical Child and Family Psychology Review* 21: 267–94. https://doi.org/10.1007/s10567-018-0261-x.

Nesi, Jacqueline, Sophia Choukas-Bradley, and Mitchell J. Prinstein. 2018b. "Transformation of Adolescent Peer Relations in the Social Media Context: Part 2—Application to Peer Group Processes and Future Directions for Research." *Clinical Child and Family Psychology Review* 21: 295–319. https://doi.org/10.1007/s10567-018-0262-9.

Nicpon, Megan Foley, Laura Huser, Elva Hull Blanks, Sonja Sollenberger, Christie Befort, and Sharon E. Robinson Kurpius. 2006. "The Relationship of Loneliness and Social Support with College Freshmen's Academic Performance and Persistence." *Journal of College Student Retention: Research, Theory & Practice* 8, no. 3: 345–58. https://doi.org/10.2190/A465-356M-7652-783R.

Nowland, Rebecca, Elizabeth A. Necka, and John T. Cacioppo. 2018. "Loneliness and Social Internet Use: Pathways to Reconnection in a Digital World?" *Perspectives on Psychological Science* 13, no. 1: 70–87. https://doi.org/10.1177/1745691617713052.

Perlman, Daniel, and L. Anne Peplau. 1981. "Toward a Social Psychology of Loneliness." *Personal Relationships* 3: 31–56.

Pouwels, J. Loes, Patti M. Valkenburg, Ine Beyens, Irene I. van Driel, and Loes Keijsers. 2021. "Social Media Use and Friendship Closeness in Adolescents' Daily Lives: An Experience Sampling Study." *Developmental Psychology* 57, no. 2: 309–23. https://doi.org/10.1037/dev0001148.

Radloff, Lenore Sawyer. 1977. "The CES-D Scale: A Self-Report Depression Scale for Research in the General Population." *Applied Psychological Measurement* 1, no. 3: 385–401. https://doi.org/10.1177/014662167700100306.

Rosen, Aviana O., Ashley L. Holmes, Nekane Balluerka, Maria Dolores Hidalgo, Arantxa Gorostiaga, Juana Gómez-Benito, and Tania B. Huedo-Medina. 2022. "Is Social Media a New Type of Social Support? Social Media Use in Spain during the COVID-19 Pandemic: A Mixed Methods Study." *International Journal of Environmental Research and Public Health* 19, no. 7: 3952. https://doi.org/10.3390/ijerph19073952.

Rudolph, Karen D. 2009. "The Interpersonal Context of Adolescent Depression." In *Handbook of Adolescent Depression*, edited by Susan Nolen-Hoeksema and Lori M. Hilt, 377–418. Mahwah, NJ: Erlbaum.

Ryan, Richard M., and Edward L. Deci. 2000. "Self-Determination Theory and the Facilitation of Intrinsic Motivation, Social Development, and Well-Being." *American Psychologist* 55, no. 1: 68–78. https://doi.org/10.1037/0003-066X.55.1.68.

Shaver, Phillip, Wyndol Furman, and Duane Buhrmester. 1985. "Transition to College: Network Changes, Social Skills, and Loneliness." In *Understanding Personal Relationships: An Interdisciplinary Approach,* edited by Steve Duck and Daniel Perlman, 193–219. Thousand Oaks, CA: Sage Publications, Inc.

Shi, Xuliang, Anqi Wang, and Ya Zhu. 2023. "Longitudinal Associations among Smartphone Addiction, Loneliness, and Depressive Symptoms in College Students: Disentangling Between- and Within-Person Associations." *Addictive Behaviors* 142: 107676. https://doi.org/10.1016/j.addbeh.2023.107676.

Strayhorn, Terrell L. 2018. *College Students' Sense of Belonging: A Key to Educational Success for All Students*. New York: Routledge.

Tasso, Anthony F., Nesrin Hisli Sahin, and Gabrielle J. San Roman. 2021. "COVID-19 Disruption on College Students: Academic and Socioemotional Implications." *Psychological Trauma: Theory, Research, Practice, and Policy* 13, no. 1: 9–15. https://doi.org/10.1037/tra0000996.

Twenge, Jean M. 2017. "Have Smartphones Destroyed a Generation?" *The Atlantic*, September 2017. https://www.theatlantic.com/magazine/archive/2017/09/has-the-smartphone-destroyed-a-generation/534198/.

Underwood, Marion K., and Samuel E. Ehrenreich. 2017. "The Power and the Pain of Adolescents' Digital Communication: Cyber Victimization and the Perils of Lurking." *American Psychologist* 72, no. 2: 144–58. https://doi.org/10.1037/a0040429.

Underwood, Marion. K., Madeleine J. George, and Kaitlyn Burnell. 2023. "Socially Networked Lives: How Adolescents and Young Adults Engage with Social Media." In *APA Handbook of Adolescent and Young Adult Development*, edited by Lisa J. Crockett, Gustavo Carlo, and John E. Schulenberg, 307–21. American Psychological Association, 2023. https://doi.org/10.1037/0000298-019.

US Office of the Surgeon General. 2023. "Surgeon General Issues New Advisory about Effects Social Media Use Has on Youth Mental Health." Washington, DC: US Department of Health and Human Services.

Valkenburg, Patti M. 2022. "Social Media Use and Well-Being:

What We Know and What We Need to Know." *Current Opinion in Psychology* 45: 101294. https://doi.org/10.1016/j.copsyc.2021.12.006.

Valkenburg, Patti M., Ine Beyens, Adrian Meier, and Mariek M. P. Vanden Abeele. 2022. "Advancing Our Understanding of the Associations between Social Media Use and Well-Being." *Current Opinion in Psychology* 47: 101357. https://doi.org/10.1016/j.copsyc.2022.101357.

Valkenburg, Patti, Ine Beyens, J. Loes Pouwels, Irene I. van Driel, and Loes Keijsers. 2021. "Social Media Use and Adolescents' Self-Esteem: Heading for a Person-Specific Media Effects Paradigm." *Journal of Communication* 71, no. 1: 56–78. https://doi.org/10.1093/joc/jqaa039.

Vanhalst, Janne, Koen Luyckx, Eveline Teppers, and Luc Goossens. 2012. "Disentangling the Longitudinal Relation between Loneliness and Depressive Symptoms: Prospective Effects and the Intervening Role of Coping." *Journal of Social and Clinical Psychology* 31, no. 8: 810–34. https://doi.org/10.1521/jscp.2012.31.8.810.

Wei, Meifen, Daniel W. Russell, and Robyn A. Zakalik. 2005. "Adult Attachment, Social Self-Efficacy, Self-Disclosure, Loneliness, and Subsequent Depression for Freshman College Students: A Longitudinal Study." *Journal of Counseling Psychology* 52, no. 4: 602–14. https://doi.org/10.1037/0022-0167.52.4.602.

Wu, Jianfen, Yunpeng Wu, and Yu Tian. 2022. "Temporal Associations among Loneliness, Anxiety, and Depression during the COVID-19 Pandemic Period." *Stress and Health* 38, no. 1: 90–101. https://doi.org/10.1002/smi.3076.

Zhou, Nan, Hongjian Cao, Fenge Liu, Lulu Wu, Yue Liang, Jianjie Xu, Haoran Meng et al. 2020. "A Four-Wave, Cross-Lagged Model of Problematic Internet Use and Mental Health among Chinese College Students: Disaggregation of Within-Person and Between-Person Effects." *Developmental Psychology* 56, no. 5: 1009–21. https://doi.org/10.1037/dev0000907.