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Adolescent Peer Experiences and Prospective Suicidal Ideation: The Protective Role of Online-Only Friendships

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Abstract

Objective: This study examined characteristics of online-only friendships among suicidal and non-suicidal adolescents. In addition, the extent to which adolescents' online-only friendships may offer a protective function, buffering the effects of peer stressors (i.e., friendship stress, relational victimization) on prospective suicidal ideation, was examined.

Method: Adolescents aged 10 to 14 ($n = 630$) were assessed at baseline (Time 1) and one-year follow-up (Time 2). Measures of suicidal ideation, sociometric relational victimization, friendship stress, depressive symptoms, online-only friendship status and quality, and online-only friendship quality compared to in-person friendship quality, were obtained at Time 1 using sociometric procedures and self-report questionnaires. Self-report measures of suicidal ideation were collected at Time 2.

Results: Descriptive results suggested that online-only friendships are relatively common among youth (38.3%), particularly for those experiencing suicidal ideation (46.3%). Suicidal and non-suicidal adolescents reported comparable levels of intimate disclosure within their online-only friendships. Although adolescents without suicidal ideation endorsed more support from in-person friendships, suicidal adolescents endorsed similar levels of support from their online-only and in-person friendships. Moderation analyses indicated that the association between both relational victimization and friendship stress and prospective suicidal ideation was attenuated among youth who reported having one or more online-only friend.

Conclusion: Online-only friendships are common and may offer protective benefits for youth, particularly those experiencing suicidal ideation. Future studies should examine the specific mechanisms by which online-only friendships may confer this benefit.

For many decades, theories have suggested that interpersonal experiences are particularly relevant to suicidal ideation. Past work suggests that interpersonal stressors often precipitate thoughts of suicide, while supportive interpersonal ties may protect individuals at risk (Gallagher & Miller, 2018; King & Merchant, 2008; Van Orden et al., 2010). For example, over 60 years ago, Durkheim theorized that poor social integration leads to heightened risk for suicide (Durkheim, 1951). Linehan's biosocial theory suggests that suicidal ideation occurs in the context of invalidating social environments (Linehan, 1993). Joiner's interpersonal theory of suicide (IPTs) (Joiner, 2005; Van Orden et al., 2010) also emphasizes two social constructs relevant to suicidal ideation, including thwarted belongingness (e.g., feeling isolated from one's community) and perceived burdensomeness (e.g., feeling like a burden on loved ones). Conversely, research indicates that supportive

interpersonal experiences, such as high levels of perceived social support or close friendship quality, may serve as protective factors for individuals at risk for suicide (Gallagher & Miller, 2018).

The role of interpersonal experiences in the risk for, or protection against, suicidal ideation may be especially relevant for adolescents. Note that rates of completed suicide increase 17-fold in the transition from preadolescence to adolescence (Centers for Disease Control and Prevention [CDC], 2014), and suicide remains the second leading cause of death among 10–14 and 15–24 year olds (Boeninger et al., 2010). Adolescents' peer relationships may play a key role in the onset or maintenance of suicidal ideation. Indeed, adolescence is a period during which youth experience an increase in peer-themed stressors (Rudolph, 2008), heightened neural reactivity to interpersonal stress, and increased sensitivity to social reward (Somerville, 2013). In prior work, researchers have identified a number of

peer-related risk factors for adolescent suicidal ideation, including relational victimization (e.g., Massing-Schaffer et al., 2019), chronic close friendship stress (Pettit et al., 2011), and perceived peer rejection (Arango et al., 2016; Prinstein et al., 2000). Data also suggest that high quality close friendships may mitigate suicide risk in adolescence (Bonanno & Hymel, 2010; Czyz et al., 2012). However, more work on the role of peer factors as predictors or protective factors for adolescent suicide is needed, perhaps especially reflecting new forms of peer interaction that have emerged in the last decade.

Contemporary research suggests that adolescents' peer experiences have transformed markedly in their frequency, format, and function (Nesi et al., 2018a, 2018b), mostly due to rapid advances in technology; however, this has not been reflected frequently in research on adolescent suicidality. For example, it is now possible for adolescents to establish "online-only friendships," or friendships that occur entirely online without any in-person interaction (Nesi et al., 2018a). According to recent data, 57% of 13 to 17 year-olds have met a new friend online, and 29% report that they had made more than five friends online (Lenhart, 2015). Furthermore, 77% of adolescents who had met a new friend online reported that they had never met them in person, indicating high rates of online-exclusive friendships within this age group (Lenhart, 2015). Despite the increasing prevalence of online-only friendships among today's adolescents, few studies have examined the relevance of these types of friendships for mental health outcomes, particularly suicidal ideation.

Importantly, a related body of work has begun to examine the impact of the Internet more broadly (e.g., online message boards, online crisis support, exposure to online suicide-related content) on suicidality and self-harm. Although some work has highlighted potential consequences of the Internet for self-injury, including prompting or reinforcing self-harm behaviors (Lewis & Seko, 2016), findings also support a number of benefits, particularly for non-suicidal self-injury (NSSI). In one thematic analysis, participants across multiple studies reported that online activities offered protection against NSSI through mitigation of social isolation, recovery encouragement, emotional self-disclosure, and curbing NSSI urges (Lewis & Seko, 2016). Moreover, data suggest that most young people who self-injure try to seek help online, indicating that the Internet may promote help-seeking behaviors among youth experiencing suicidal and non-suicidal self-injury (Frost & Casey, 2016). Despite these important advances, the association between risk for suicidal

ideation and adolescents' online activities, specifically within online-only friendships, rarely has been studied empirically.

This study thus offers two novel contributions. First, as an initial step toward understanding the potential risk or protective effects of online friendship interactions, we provide descriptive data to characterize the prevalence and quality of online-only friendships among youth with and without a history of suicidal ideation. Second, we examine the extent to which youths' online-only friendships may offer a protective function, moderating the prospective association between peer stressors (i.e., friendship stress, relational victimization) and suicidal ideation one year later, adding to a remarkable dearth of significant prospective predictors of suicidal ideation revealed in prior work (Franklin et al., 2017).

Descriptive data regarding the quality of online-only friendships may reveal a novel source of support for suicidal youth. Despite past research emphasizing the risks associated with online-only friendships for suicidal youth (Marchant et al., 2017), emerging data suggest that youth experiencing suicidal ideation may also form high-quality social interactions online. As noted by Nesi et al. (2018a), the online environment provides a setting in which there are fewer nonverbal cues (e.g., visual, auditory, and context) and in which communication is more asynchronous. For teens who report difficulties in their in-person social relationships, which is common among suicidal adolescents, the increased controllability of online environments may create a safer context for higher-quality social exchanges (i.e., see hyperpersonal communication theories) (Desjarlais & Willoughby, 2010; Tidwell & Walther, 2002; Walther, 1996). Indeed, initial evidence suggests that online-only friendships can be high in quality, particularly in the context of high self-disclosure and longer relationship duration (Chan & Cheng, 2004; Mesch & Talmud, 2007). Unfortunately, little is known about the comparative levels of intimate disclosure within online-only friendships for suicidal and non-suicidal youth. In addition, few researchers have examined how the quality of adolescents' online-only friendships compares to the quality of their in-person friendships, especially among suicidal and non-suicidal youth. Thus, to address these important gaps, the first aim of the current study is to offer descriptive data on the quality of suicidal and non-suicidal adolescents' online-only friendships, particularly compared to that of their in-person friendships.

A second goal of this study was to examine the potential stress-buffering effect of online-only friendships on suicidal ideation over time. According to the social compensation hypothesis proposed within the

computer-mediated communication literature (Ellison et al., 2007; McKenna & Bargh, 2000), individuals with poorer in-person social lives may benefit more from online communication, as online relationships may provide a compensatory social experience (Ybarra et al., 2015). There are numerous mechanisms by which online-only friendships may protect against the effects of peer stress on suicide risk. First, for youth who feel isolated or experience in-person interpersonal difficulties, online forums can present an opportunity to feel connected with others, potentially offering protection against suicidal ideation (De Choudhury & Kiciman, 2017; Marchant et al., 2017). In addition, previous research has documented that adolescents experiencing suicidal ideation may receive social support online from others who are experiencing similar concerns (Marchant et al., 2017). Moreover, prior work suggests that online interactions may contribute to decreased loneliness (Hood et al., 2018) and depressive symptoms, especially among those who are alienated offline. These benefits may be especially relevant in the context of high-quality online-only friendships, including those characterized by high levels of intimate disclosure and low levels of criticism. Thus, in the current study, an initial goal was to examine whether online-only friendships may mitigate the effects of offline peer stress on prospective suicidal ideation among adolescents.

Two forms of peer stress were examined based on prior literature revealing stressors particularly relevant for suicidality, yet rarely examined in longitudinal work on suicide. First, past work suggests that as compared to other forms of peer stress, relational forms of peer victimization are especially associated with internalizing symptoms, including suicidal ideation (Klomek et al., 2008; Massing-Schaffer et al., 2019; Tsypes & Gibb, 2015). However, most prior work has been limited by cross-sectional associations, and few prior studies have examined moderators in the prospective association between victimization and suicide ideation. Second, close friendship stress was examined to address a dearth of prospective longitudinal studies in prior work on this construct.

In the present study, we examine how online-only friendships may be relevant to suicidal ideation in a sample of youth at the adolescent transition, a critical developmental vulnerability period associated with the greatest increases in suicidal ideation. As a preliminary exploration, we compared the prevalence and quality of online-only friendships to the quality of in-person friendships, and also examined the quality of these friendships between adolescents with and without suicidal ideation. It was hypothesized that suicidal

youth would be more likely than non-suicidal youth to report having online-only friendships. It was also hypothesized that adolescents experiencing suicidal ideation would report higher or comparable levels of intimate disclosure in their online-only friendships compared to non-suicidal youth. Further, we expected that adolescents, perhaps especially those experiencing suicidal ideation, would report higher or comparable levels of closeness, similarity, and supportiveness in their online-only friendships compared to their in-person friendships.

A second aim of this study was to examine whether the presence of online-only friendships was a moderator of the prospective association between peer-themed stress (e.g., relational victimization, friendship stress) and suicidal ideation. We hypothesized that having online-only friendships would buffer the harmful effects of peer stressors on suicidal ideation, after accounting for the effects of demographic risk factors, prior ideation and depressive symptoms.

Method

Participants

Participants were 630 adolescents enrolled in Grades 6 and 7 in three middle schools within a southeastern rural region of the U.S. at the start of the study (49.0% female, $M = 11.79$ years; $SD = .70$, range 10 to 14). The sample was racially and ethnically heterogeneous (35.8% Caucasian, 25.4% Hispanic/Latinx, 21.3% African American, 10.8% Multiracial, 6.7% Other Race). School records indicated that 66.7% to 72.1% of students in these schools were classified as economically disadvantaged (North Carolina School Report Cards [NCDPI], 2017). Additionally, 69.5% of students in the district were eligible for free or reduced-price lunch based on district reports.

Procedures

Participants were recruited from three rural public middle schools ($N = 1385$) for a study of peer relations and psychological adjustment. Letters of consent were mailed to all caregivers of students in 6th and 7th grade, with an option to grant or deny consent for their child to participate in this study. Approximately 77% of families ($n = 1059$ families) returned signed forms; 88% ($n = 935$) of these gave consent for their child to participate, yielding a sample that represented 67.5% of the population in this diverse, low-income community.

At Time 1, 873 consented students attended data collection sessions. A proportion of students ($n = 62$)

who initially consented to participate in the study did not attend data collection sessions at Time 1 due to school absences ($n = 10$), withdrawing from the study after parental consent ($n = 16$), withdrawing from the school ($n = 19$), and unknown reasons ($n = 17$). Consented participants who did not attend data collection sessions at Time 1 did not differ from consented participants who participated in Time 1 data collection on grade or schools attended. Students in this district were randomly assigned to each of three middle schools. In two schools, shorter time periods were available for data collection; thus, 243 (27.8%) participants did not complete a portion of survey measures, including those related to online-only friendship. In the current dataset, online-only friendship items were completed by 93.4% of students at School 1, 74.5% at School 2, and 51.6% at School 3. Other than school placement, the 243 adolescents who did not complete online-only friendship items did not differ from the 630 adolescents who were included in analyses below on any study or demographic variables, with the exception of race, $\chi^2(4) = 20.45, p < .001$, with White students more likely to have completed online-only friendship measures and Latinx students less likely to have done so. The final sample for the current study included 630 students.

At baseline, assent and data were obtained using computer-assisted self-interviews (CASI) administered by trained research staff in school. Data were collected at two time points, one year apart. Time 1 data were collected in Winter 2016, and Time 2 data were collected in Winter 2017. Of the 630 students who completed questionnaires at Time 1, 54 (8.6%) did not participate at Time 2 due to moving ($n = 25$), declining participation ($n = 21$), or reason not listed ($n = 8$). Thus, retention rates at Time 2 within this low-income sample were adequate (91.4%, $n = 576$). The 54 participants who did complete Time 2 questionnaires did not differ from those who were retained at Time 2 on any demographic or study variables, with the exception that those who were missing reported lower baseline levels of depressive symptoms, $t(70.69) = -2.48, p = .015$. All procedures were approved by the university human subjects committee.

Measures

Participants completed all measures at baseline (Time 1). At Time 1 and at one-year follow-up (Time 2), participants reported on suicidal ideation.

Online-Only Friendship

Adapting an item from prior work differentiating online-only from in-person friendships (Smahel et al., 2012), adolescents were asked “Do you have any online

friends you have NOT met in person?” Participants were given two response choices, “yes” or “no,” resulting in a dichotomous measure of online-only friendship. Participants who endorsed this initial question were asked several follow-up questions about the platforms through which adolescents met their online-only friends at the time of data collection (i.e., Instagram, Snapchat, Tumblr, Facebook, Twitter, Vine, Google+, Kik or Whatsapp messaging apps, Online pinboards, Discussion boards, Anonymous sharing or question apps) (Lenhart, 2015), as well as several additional items regarding the quality of their online-only friendships, discussed below.

Intimate disclosure with online only friends. To assess levels of intimate disclosure within online-only friendships, adolescents responded to three items derived from the Intimate Disclosure subscale of the Network of Relationships Inventory (Furman & Buhrmester, 1985). These items were only administered to those who reported having at least one online-only friend. Specifically, adolescents rated how much they “talk about everything,” “share secrets and private feelings,” and “talk about things [they] do not want others to know” with online-only friends, using a scale from 1 (*none*) to 5 (*extremely much*). The three items were analyzed using a mean score (Cronbach’s $\alpha = .85$).

Comparative friendship quality. As a preliminary index of adolescents’ perceived comparison between their friendship quality in online-only friendships to in-person friendships, a brief three-item measure was developed. These comparative friendship quality items were only administered to those who reported having at least one online-only friend. Before responding to these items, adolescents were asked to consider their online-only friends (as defined above) and their “in-person friends,” defined as “people who you know offline, even if you also communicate with them online”. Participants were asked to indicate how close they are, how similar they feel in terms of interests and feelings, and how much support they receive from online-only friendships compared to in-person friendships. Each item was rated on a similar 5-point Likert scale, where lower values indicated more positive qualities attributed to *online* friends, and higher values indicated more positive qualities attributed to *in-person* friends. For example, the closeness item was rated on a scale from 1 (*Much closer to ONLINE friends*) to 5 (*Much closer to IN-PERSON friends*), with 3 being “Equally close to online and in-person friends”. These three items were examined individually to evaluate unique associations between each dimension of friendship

quality and suicidal ideation, as well as to gather descriptive information on how online-only and in-person friendships compare in terms of closeness, similarity, and supportiveness.

Relational Victimization

Sociometric procedures were used to collect measures of relational victimization at Time 1. Adolescents were given an alphabetized roster of students in their grade (in counterbalanced order) and asked to nominate an unlimited number of peers “who get left out of activities, ignored by others because one of their friends is mad at them, gossiped about, or have mean things said behind their backs” (Grotzinger & Crick, 1996; Helms et al., 2015). To further clarify this definition, adolescents were informed that friendly or playful teasing, as well as arguments between individuals with similar strength or power, do not qualify as relational victimization (Salmivalli & Peets, 2018). A sum of relational victimization nominations was computed and standardized for each student, within their school and grade. Thus, higher scores indicated higher levels of relational victimization compared to same-grade peers. Sociometric nomination procedures have demonstrated strong reliability and validity in prior studies of adolescent relational victimization (Crick & Grotpeter, 1995) and peer status (Coie & Dodge, 1983).

Friendship Stress

Friendship stress was assessed at Time 1 using a newly developed self-report measure, adapted from the Youth Life Stress Interview (YLSI) (Rudolph & Flynn, 2007). The original semi-structured interview was designed to assess adolescents’ stress levels across several domains, including peers. In the peer stress portion of the interview, assessors use standardized questions to gather objective information about youth friendship stress (e.g., friendship quality; level of trust, support and closeness in friendships; severity of conflict in friendships). This interview has demonstrated excellent reliability and validity (Rudolph & Flynn, 2007). The present measure was developed based on the standardized questions used to assess chronic peer stress in the YLSI, as well as on common peer stressors identified by adolescents during this interview in prior studies. The resulting questionnaire included 11 items designed to assess adolescent friendship stress (e.g., “A friend lied to you;” “A friend started to date someone you had a crush on”). All questions were rated on a 5-point scale ranging from 1 (*never*) to 5 (*very often*). A mean of items was computed, with higher values indicating higher levels of friendship stress. In support of its concurrent

validity, higher scores on this measure were correlated with other measures of poor friendship quality, including friendship conflict ($r = .18, p < .001$) and criticism ($r = .15, p < .001$) on the Network of Relationships Inventory (Furman & Buhrmester, 1985). In addition, internal consistency of this measure was good (Cronbach’s $\alpha = 0.84$).

Depressive Symptoms

Depressive symptoms were measured at Time 1 using the Short Mood and Feelings Questionnaire (MFQ) (Angold et al., 1995). This self-report measure contains 9-items designed to assess symptoms of depression in youth ages 8 to 18. Items include statements such as “I felt miserable or unhappy” and “I didn’t enjoy anything at all.” All items are scored on a 3-point scale from 0 (*not at all true*) to 2 (*mostly true*) for the individual over the past two weeks. Data were analyzed using a mean score of all items, with higher mean scores indicating higher levels of depressive symptoms. Prior research supports the reliability and validity of the MFQ (Daviss et al., 2006). In the current study, internal consistency of this measure was excellent (Cronbach’s $\alpha = 0.92$).

Suicidal Ideation

Suicidal ideation was assessed at Times 1 and 2 using the Suicide Questionnaire (Heilbron & Prinstein, 2010), an 8-item measure assessing the frequency of passive and active suicidal ideation in adolescents using a 5-point Likert scale, from 1 (*never*) to 5 (*almost every day*). Participants were asked to report on the frequency of suicidal ideation over the past year. This measure has demonstrated good psychometric properties in prior research (Heilbron & Prinstein, 2010) and showed excellent internal consistency in the present study at Time 1 (Cronbach’s $\alpha = 0.94$) and Time 2 (Cronbach’s $\alpha = 0.94$). In order to capture the full range of frequency and severity of suicidal ideation in the sample, analyses were performed treating suicidal ideation as both a categorical variable (for descriptive analyses) and a continuous variable (for regression analyses). For descriptive analyses, two groups were created to distinguish participants who had experienced suicidal ideation and those who had not. Given that even low levels of suicidal ideation, including passive ideation, are associated with heightened risk of interpersonal difficulties in youth (Arango et al., 2016), participants were placed in the suicidal group if they endorsed any suicidal ideation, or at least one item on this measure (i.e., summed values greater than 8). For all other analyses, a mean score of all items was

computed, with higher scores indicating higher frequencies of suicidal ideation.

Data Analyses

Preliminary analyses revealed that data were skewed for suicidal ideation at Time 1 (skewness = 3.51) and Time 2 (skewness = 3.13). Values were log-transformed, resulting in reductions in skewness for suicidal ideation at Time 1 (skewness = 2.31) and Time 2 (skewness = 2.20). These values were used to conduct Pearson and point-biserial correlations to examine bivariate associations among all study variables (see Table 1).

Given the skewness and overdispersion of suicidal ideation values (i.e., conditional variance of suicidal ideation greater than conditional means at each value of online-only friendship), a negative binomial regression analysis was conducted using the original (i.e., not log-transformed) values of suicidal ideation. This analysis was used to test the hypothesis that participation in online-only friendships would moderate the longitudinal association between peer stressors (e.g., friendship stress, relational victimization) and suicidal ideation. In order to minimize multicollinearity and facilitate interpretation of results, all continuous predictor variables were mean centered. Two interaction terms were computed (i.e., online-only friendship \times relational victimization and online-only friendship \times friendship stress) and included in a negative binomial regression model predicting Time 2 suicide ideation (Step 3), after controlling for prior ideation, gender, and depressive symptoms (Step 1), and main effects of sociometric relational victimization, friendship stress, and online-only friendship (Step 2). Finally, exploratory analyses were conducted to test possible interaction effects of gender by online-only friendships, as well as three-way interactions of gender by online-only friendships by peer stressors.

Results

Descriptive Statistics

Bivariate correlations among all study variables are presented in Table 1. Significant positive associations were found between intimate disclosure within online-only friendships and friendship stress. Depressive symptoms were negatively associated with comparative friendship quality, indicating that higher levels of depressive symptoms were associated with higher levels of online friendships as compared to in-person friendships. Higher levels of log-transformed suicidal ideation at Time 1 were associated with higher levels of Time 1 depressive symptoms, friendship stress, and Time 2 log-transformed suicidal ideation.

Table 2 shows a comparison of study variables among adolescents with and without online-only friends. At Time 1, 38.3% of adolescents ($n = 241$) reported having at least one online-only friendship. Compared to adolescents without online-only friendships ($n = 389$), adolescents who had at least one online-only friendship reported significantly greater levels of depressive symptoms, log-transformed Time 1 suicidal ideation, and friendship stress. In addition, adolescents with at least one online-only friend were significantly older than those who did not have online-only friendships. Finally, results revealed no significant differences in the reported number of in-person friendships between those who did and did not have online-only friendships $t(628) = -.527, p = .599$.

Prevalence and Nature of Online-Only Friendships

An initial goal of this study was to examine descriptive characteristics of online-only friendships among suicidal and non-suicidal youth. Table 3 presents means and standard deviations of online-only friendship variables, with comparisons by participants with and without

Table 1 Means, standard deviations, and bivariate correlations among study variables.

Variable	M (SD)	1	2	3	4	5	6	7	8	9	10
1. Age	11.80 (0.70)	–									
2. T1 Depressive Symptoms	0.37 (0.48)	-.03	–								
3. T1 Suicide Ideation	1.27 (0.60)	-.04	.63***	–							
4. T1 Online-Only Friendship	–	.09*	.14**	.09*	–						
5. T1 OOF Intimate Disclosure	2.30 (1.05)	.03	.06	.13	–	–					
6. T1 Comparative Friendship Closeness	3.56 (1.39)	.10	-.07	-.07	–	-.08	–				
7. T1 Comparative Friendship Similarity	3.49 (1.24)	.05	-.14*	-.08	–	-.24***	.53***	–			
8. T1 Comparative Friendship Support	3.57 (1.28)	.03	-.14*	-.12	–	-.15*	.53***	.58***	–		
9. T1 Relational Victimization	0.04 (1.06)	.05	.17***	-.02	.06	-.03	-.03	-.00	-.07	–	
10. T1 Friendship Stress	2.17 (0.75)	.04	.38***	.25***	.09*	.19**	-.06	-.08	.01	.05	–
11. T2 Suicide Ideation	1.29 (0.63)	-.02	.31***	.31***	.07	-.07	.00	.06	.02	.09*	.13**

* $p < .05$, ** $p < .01$, *** $p < .001$. OOF = online-only friendship; T1 = Time 1; T2 = Time 2. Pearson correlations are reported for all continuous variables. Point-biserial correlations are reported for online-only friendship. Comparative Friendship Quality refers to comparison of online-only versus in-person friendships. Higher values indicate higher closeness, similarity, and supportiveness perceived within *in-person* friendships, compared to online-only friendship. Values for Suicide Ideation at Times 1 and 2 are log transformed.

Table 2 Comparison of study variables among adolescents with and without online-only friends.

Variable	Total (<i>n</i> = 630) <i>M</i> (<i>SD</i>)	Online-Only Friends (<i>n</i> = 241) <i>M</i> (<i>SD</i>)/ <i>N</i> (%)	No Online-Only Friends (<i>n</i> = 389) <i>M</i> (<i>SD</i>)/ <i>N</i> (%)	<i>t</i> (<i>df</i>)/ χ^2
Age	11.80 (0.70)	11.88 (0.72)	11.75 (0.69)	-2.15 (614)*
T1 Depressive Symptoms	0.37 (0.48)	0.45 (0.50)	0.31 (0.46)	-3.38 (468.75)**
T1 Suicidal Ideation	1.27 (0.60)	1.34 (0.65)	1.23 (0.58)	-2.20 (464.53)*
T1 Relational Victimization	0.04 (1.06)	0.11 (1.25)	-0.01 (0.92)	-1.38 (627)
T1 Friendship Stress	2.17 (0.75)	2.25 (0.74)	2.12 (0.75)	-2.08 (627)*
T2 Suicidal Ideation	1.29 (0.63)	1.26 (0.60)	1.35 (0.69)	-1.77 (573)

p* < .05; *p* < .01.

Values for Suicide Ideation at Times 1 and 2 are mean-centered and log transformed.

Table 3 Comparison of online-only friendship variables between adolescents with and without suicidal ideation.

	Total (<i>N</i> = 630) <i>N</i> (%)	Suicidal Ideation (<i>n</i> = 244) <i>N</i> (%)	No Suicidal Ideation (<i>n</i> = 377) <i>N</i> (%)	χ^2
Presence of Only-Only Friend	241 (38.3) (26.1)	113 (46.3)	124 (32.9)	11.305**
	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>t</i> (<i>df</i>)
Intimate Disclosure with OOFs	2.30 (1.05)	2.41 (1.04)	2.22 (1.06)	-1.45 (233)
Comparative Friendship Quality Dimensions:				
<i>Closeness</i>	3.56 (1.39)	3.45 (1.39)	3.70 (1.36)	1.42 (229)
<i>Similarity</i>	3.49 (1.24)	3.38 (1.17)	3.61 (1.28)	1.39 (224.99)
<i>Supportiveness</i>	3.57 (1.28)	3.34 (1.35)	3.79 (1.19)	2.69 (227)**

p* < .05; *p* < .01.

OOF = online-only friendship.

suicidal ideation.¹ Given that online-only friendship quality variables were only administered to those who reported having at least one online-only friend, these comparisons are limited to that subset of the total sample. The most common social media platforms through which youth formed online-only friendships were Instagram (*n* = 142; 58.9% of all participants with online-only friends), Snapchat (*n* = 91; 37.8%), Messaging apps (*n* = 71; 29.5%), and Facebook (*n* = 65; 27.0%).

Compared to those with no suicidal ideation (*n* = 377; 59.8%), participants with suicidal ideation (*n* = 244; 38.7%) were significantly more likely to have online-only friendships, $\chi^2(1) = 11.31, p = .001$. No significant differences in levels of intimate disclosure within online-only friendships between suicidal and non-suicidal youth were found. However, significant group differences were found in comparative friendship quality (i.e., mean of the three comparative friendship quality items) $t(299) = 2.19, p = .030$. On average, both groups reported higher quality in-person friendships compared to online friendships (i.e., mean values greater than 3). However, the suicidal ideation group reported significantly lower mean scores ($M = 3.34, SD = 1.35$) than the non-ideation group ($M = 3.79, SD = 1.19$), suggesting that adolescents with suicidal ideation reported more comparable levels

of quality between their online-only and in-person friendships than do adolescents without suicidal ideation. This was particularly true for the supportiveness item, $t(227) = 2.69, p = .008$. Gender differences also emerged in the frequency of online-only friends, with prevalence rates higher among boys (*n* = 136, 42.4%) compared to girls (*n* = 105, 34.0%), $\chi^2 = 4.69, p = .03$. No gender differences were found in levels of intimate disclosure within online-only friendships or comparative friendship quality.

Online Only Friendship as a Moderator of the Prospective Association between Peer Stress and Suicidal Ideation

A second goal of this study was to examine the presence of online-only friendship as a moderator of the longitudinal association between peer stressors (e.g., friendship stress, relational victimization) and suicidal ideation. Results (Table 4) revealed a significant main effect of peer-reported relational victimization on suicidal ideation, controlling for prior suicidal ideation, gender, depressive symptoms, friendship stress, and both interaction effects (i.e., relational victimization by online-only friendship; friendship stress by online-only friendship).

¹Supplemental analyses were conducted with groups recalculated using a score of 10 or higher (i.e., at the 75th percentile) on the suicidal ideation measure. Patterns of significant and nonsignificant results remained the same, with the exception that youth with suicidal ideation reported significantly lower scores on the "similarity" variable, $t(df) = 2.29(163.34), p = .024$.

Table 4 Final negative binomial regression model predicting suicidal ideation at Time 2.

	Time 2 Suicidal Ideation			
	<i>B</i> (<i>SE</i>)	<i>Wald</i>	<i>Exp(B)</i>	<i>95% CI</i>
Time 1 Suicidal Ideation	0.01 (0.00)	19.57	1.01	1.01, 1.02***
Depressive Symptoms	0.16 (0.04)	17.21	1.17	1.09, 1.26***
Gender	0.01 (0.03)	0.23	1.01	0.96, 1.07
Online-Only Friendship (OOF)	0.03 (0.03)	0.86	1.03	0.97, 1.09
Relational Victimization	0.07 (0.02)	14.63	1.07	1.03, 1.10***
Friendship Stress	0.06 (0.02)	5.58	1.02	1.01, 1.11*
OOF x Relational Victimization	-0.07 (0.02)	8.22	.93	0.89, 0.98**
OOF x Friendship Stress	-0.12 (0.04)	9.44	.89	0.83, 0.96**

* $p < .05$; ** $p < .01$; *** $p < .001$; Time 1 suicidal ideation calculated as a total score. All other variables mean centered with the exception of Gender and Online-Only Friendship. Gender was coded as 0 for females, and 1 for males. Online-Only Friendship was coded as 1 for presence of at least one online-only friendship, and 0 for no reported online-only friendships. *Exp(B)* refers to incidence rate ratios. OOF = online-only friendship.

Regarding the moderating effects of online-only friendship on relational victimization and prospective suicidal ideation, analyses revealed a significant relational victimization by online-only friendship interaction effect, $B = -0.68$, $SE = 0.24$, $Exp(B) = 0.934$. Thus, compared to the effect of relational victimization on suicidal ideation for those with no online-only friends, the effect of relational victimization on suicide for those with online-only friends decreases by a factor of $(.934 - 1) \times 100 = -6.6\%$.

Regarding the moderating effects of online-only friendship on friendship stress and prospective suicidal ideation, results revealed a significant friendship stress by online-only friendship interaction effect, $B = -.12$, $SE = 0.04$, $Exp(B) = 0.892$. Thus, compared to the effect of friendship stress on suicidal ideation for those with no online-only friends, the effect of friendship stress on suicidal ideation for those with online-only friends decreases by a factor of $(.892 - 1) \times 100 = -10.8\%$.

A series of sensitivity analyses were also conducted. First, as an alternative method of addressing skewness in the suicidal ideation outcome variable, a hierarchical linear regression was conducted using log-transformed values for suicidal ideation. Compared to the results of the primary negative binomial regression analyses, the results of the linear regression showed the same pattern of significant and non-significant associations. Additionally, exploratory analyses were run testing interaction effects of gender by online-only friendships, as well as three-way interactions of gender by online-only friendships by peer stressors. No significant effects emerged. To address the potential for Type I errors and false positives, sensitivity analyses were conducted by testing the model without covariates, (i.e., excluding depression and gender). Findings revealed the same pattern of results, suggesting low likelihood of Type I errors and false positives in the current study.

Discussion

The current study examined online-only friendships, a peer experience uniquely afforded by the social media environment, as well as the possible role of online-only friends as a buffer of the effects of peer stress on adolescent suicidal ideation. Findings reveal that online-only friendships are relatively common among adolescents, and that this experience may be significantly more common among males and youth with suicidal ideation. Furthermore, findings suggest that online-only friendships may offer protective benefits for youth, as the association between important peer stressors (i.e., relational victimization, friendship stress) and suicidal ideation was attenuated among youth who reported the presence of one or more online-only friends. Using a longitudinal design within a large, diverse sample of adolescents, results offer new evidence for the critical relevance of online peer experiences for understanding suicide risk among adolescents.

Findings revealed significant gender differences in the presence of online-only friendships, with adolescent males reporting significantly more online-only friendships compared to females. These results are consistent with prior work indicating that males are more likely to make online friends than females (Lenhart, 2015). The higher rates of online-only friendships among males may relate to the medium through which males develop online friends. Recent data highlight the growing popularity of online gaming among males, with 84% of adolescent males endorsing online video game use in one study (Lenhart, 2015). Moreover, prior work suggests that while males are more likely to make friends through online gaming, females are more likely to make online friends through social media platforms, such as Instagram (Lenhart, 2015). These differences may reflect unique functions of online-only friendships for males and females. For instance, consistent with studies of gender differences in offline friendships (Rose & Rudolph, 2006), online-only friendships may promote shared activities and competitive experiences among males, whereas these friendships may provide opportunities for social conversation and prosocial behaviors for females. However, in the present study, no differences in intimate disclosure within online-only friendships were found among males and females. Further, measures of online gaming were not available. Therefore, more work is needed to understand the differing prevalence rates and potential functions of online-only friendships among adolescent males and females.

Findings from this study also present initial data characterizing the quality of online-only friendships compared to in-person friendships for suicidal and non-suicidal youth. Results suggest that suicidal and non-suicidal

adolescents reported comparable levels of intimate disclosure within their online-only friendships. Further, results indicate that adolescents with suicidal ideation reported similar levels of support from their online-only and in-person friendships compared to adolescents without suicidal ideation, who favored in-person friendships for support. These results offer a unique perspective compared to prior work, which often cites the negative effects of online-only friendships on in-person friendships, particularly for suicidal youth. For instance, proponents of the “poor-get-poorer” hypothesis suggest that adolescents with unstable in-person friendships – which often includes suicidal youth, according to past work – are more likely to use online friendships to escape from and avoid problems with in-person friendships, further barring these youth from opportunities to develop high-quality and supportive in-person friendships (Armstrong et al., 2000; Kraut et al., 2002, 1998). However, adolescents experiencing suicidal ideation in the present study indicated that in-person friendships offered similar levels of support as online-only friendships, and suicidal youth still reported higher quality in-person friendships compared to online-only friendships. Although more research is needed to compare the direct effects of adolescents’ online-only friendships on the quality of their in-person friendships, these findings suggest that online-only friendships may represent a relevant source of support for adolescents experiencing suicidal ideation.

Furthermore, results from this study suggest that for adolescents who had experienced relational victimization (according to peer report) and friendship stress (according to self-report), having at least one online-only friend moderated the negative effects of these experiences on prospective suicidal ideation. The negative effects of relational victimization and friendship stress on future suicide risk were attenuated for those with online-only friends. These findings are consistent with multiple theories of suicide, including the interpersonal theory of suicide (Joiner, 2005; Van Orden et al., 2010), which emphasize the role of social experiences in conferring and protecting against suicide risk. Yet, although theoretical and empirical work has highlighted the critical role of in-person social support in buffering against the negative effects of social stressors (Cohen & Wills, 1985), remarkably little research has examined the association between online forms of social support and suicidal ideation, especially among adolescents.

Some prior work has highlighted the potential risks associated with online relationships, particularly for vulnerable adolescents. For example, studies have emphasized the potential for participation in “deviant communities,” or those in which potentially harmful

behaviors (e.g., suicidality, non-suicidal self-injury) become normalized (Lewis & Seko, 2016; Marchant et al., 2017). Furthermore, the anonymity of online environments presents risks for dangerous or illicit behavior, including the potential for unwanted solicitation, which may worsen mental health concerns (Mitchell et al., 2001). Although acknowledging these risks is crucial, the current study offers a much-needed additional perspective. First, the same features of the social media environment that may facilitate these risks – such as possibilities for anonymity, lack of interpersonal cues, and frequent availability (Massing-Schaffer & Nesi, 2020; Nesi et al., 2018a) – may also facilitate the development of the online-only friendships that offer critical social support for vulnerable adolescents. Indeed, in contrast to prior work highlighting the potential dangers of online-only friendships, a growing body of literature suggests their potential benefits for suicidal youth. For example, online-only friendships can offer increased social support for youth who are marginalized in their offline social environments. For instance, preliminary data suggest that youth who are at-risk for suicide, such as those who are LGBTQ, have specific interests, or have medical conditions, can gain support from online-only friendships who are going through similar experiences (Ybarra et al., 2015). Studies have also demonstrated that interaction with peers through online message boards can also increase emotional support for youth who struggle with psychiatric difficulties, including suicidal ideation and self-injury (De Choudhury & Kiciman, 2017; Marchant et al., 2017). Thus, results from this study add to these literatures by demonstrating that for adolescents who may also feel isolated or who experience stress in their in-person relationships, online-only friendships can offer protective effects against the experience of suicidal ideation.

Implications and Limitations

The current study offers an important extension of prior literature by examining the role of online-only friendships in contributing to suicide risk, with a prospective longitudinal design in a large, diverse sample of adolescents. Whereas prior work has often reported on youths’ online activity, few studies of suicide risk have examined friendships that take place exclusively online. This is particularly important given rapid advances in social media in recent years, which have transformed the social landscape such that nearly all of adolescents’ in-person friends also represent “online friends.” Furthermore, while prior studies have documented the risks inherent in online

friendships for youth (Livingstone & Smith, 2014), the current study suggests a more complex entanglement of risks and benefits for youth experiencing suicidal ideation. Future research must adopt a nuanced perspective, which considers the need to adequately address online risks while maximizing access to online support among vulnerable youth.

Findings suggest that online-only friendships may protect against the negative effects of peer victimization for vulnerable youth. However, the specific mechanisms by which online-only friendships confer this benefit were not examined. For instance, future research should explore additional qualities of these online friendships (i.e., length of friendship, type and timing of social support received) to better characterize this protective effect. More research is also needed to test whether youth turn to online-only friendships for support following victimization experiences, or if adolescents' existing online-only friendships attenuate the negative impact of ongoing victimization. In addition, this study advances prior suicide research by incorporating a peer sociometric nomination procedure to assess relational victimization. However, by using a standard sociometric item, it is not necessarily clear whether relationship victimization occurred within the context of in-person or online-only friendships. Given the fact that peer reports were based on nomination of school classmates, it is unlikely that adolescents' peers were reporting on victimization by online-only friends. In addition, it is likely that the presence of online-only friends can protect against the negative effects of victimization that occurs *both* online and in-person, given known protective roles of online and in-person social support in cyber- and in-person victimization (Cole et al., 2017; Kowalski et al., 2014). However, this possibility should be explored in future work. Further, this study offers an exploratory examination of associations between online-only friendships and suicidal ideation within a community sample, and considers only those with suicidal ideation (rather than suicidal behavior, including attempts). Given the low frequency of suicide attempts over the follow-up period in the current study, we were underpowered to test the interactions of relational victimization and friendship stress by online-only friendship in predicting this important outcome. It will therefore be critical for future studies to look at whether online-only friendship buffer the effect of offline social stressors for suicide attempters, perhaps especially within clinical samples of adolescents, who may be more vulnerable to risks associated with online-only friendships. Finally, although the present study provides interesting data noting the possible benefits of online-only friendships, these effects are indeed small. More work is therefore needed to expand on study findings and validate results from this work.

Conclusion

Adolescents' peer relationships play an integral role in the development, maintenance, and exacerbation of suicidal ideation and behaviors. As youth increasingly turn to digital media as a primary context for social interaction, understanding the unique risk and protective features of this context has become critical. The current study finds that nearly half of youth with suicidal ideation report the presence of an online-only friend, and that these online friendships may be especially important to the social development of youth at risk for suicidal ideation. Online-only friendships, despite their risks, may also offer important protective benefits for vulnerable youth who have experienced relational victimization and friendship stress. The current study highlights the need for a nuanced research agenda, considering both the risks and benefits of online friendships, within the study of adolescent suicide risk.

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