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Sources of Perceived Online Social Support: Adaptation of the Online Social Support Scale

By

Erin Sarah Gelgoot

A dissertation submitted in partial satisfaction of the

requirements for the degree of

Doctor of Philosophy

in

Education

in the

Graduate Division

of the

University of California, Berkeley

Committee in charge:

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Spring 2021

Sources of Perceived Online Social Support: Adaptation of the Online Social Support Scale

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Abstract
Sources of Perceived Online Social Support: Adaptation of the Online Social Support Scale
by
Erin Sarah Gelgoot
Doctor of Philosophy in Education
University of California, Berkeley
Professor Frank C. Worrell, Chair

In this study, I examined whether there were differences in online social support by source. The three sources were college friends, pre-college friends, and virtual friends. I adapted a measure of online social support in a sample of 500 undergraduate students who communicated with friends online. Psychometric analyses supported the reliability and validity of scores on the adapted measure. Analysis of variance results indicated a statistically significant effect of friend source on online social support scores, with a large effect size. Follow-up analyses indicated significant pairwise differences in scores between virtual friends and college friends as well as virtual friends and pre-college friends. There was a statistically significant positive correlation with a small effect size between length of friendship and online social support scores for college friends and virtual friends. Independent *t*-test results indicated that there were no statistically significant differences in total online social support scores between males and females, with negligible to small effect sizes. This dissertation contributes to the literature on online social support by offering an adapted measure of online social support by source.

Keywords: online social support, college students, friendships

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Sources of Perceived Online Social Support: Adaptation of the Online Social Support Scale

Computer-mediated communication, defined as communication through technology, facilitates nearly constant opportunities for social connection (James et al., 2017; Rideout et al., 2010; Valkenberg & Peter, 2011; Warschauer, 1997). We communicate online through various channels including social media, messaging apps, videoconferencing platforms, gaming systems, and email. We use technology to maintain existing relationships; for example, college students report that 49% of their in-person friends are also online friends (Reich et al., 2012). We also use technology to make new friends whom we may not have the opportunity to meet in our daily lives. For instance, in a national survey, more than half of teens (57%) reported having made a new friend online (Lenhart et al., 2015).

Historically in the field of psychology, researchers focused on the negative social impacts of technology (Kowalski & Limber, 2013). Those negative impacts included victimization, predatory behaviors, and cyberbullying. However, researchers of computer-mediated communication emphasize the need to study the positive affordances as well as the negative consequences of using technology for communication (Kern, 2014; Kern & Develotte, 2018). Although technology can facilitate negative social experiences, more teens (1 in 3) report a mostly positive effect compared to a negative effect (1 in 4) of social media on their lives (Anderson & Jiang, 2018). Teens state that social media facilitates connection with friends/family (40%), access to news/information (16%), meeting others with same interests (15%), keeping you entertained/upbeat (9%), self-expression (7%), support from others (5%), and learning new things (4%). Many of the aforementioned positive affordances of technology are features of online social support, which is a nascent area of research in psychology (Cole et al., 2017; Nick et al., 2018).

Online social support developed from theories of in-person social support. Social support consists of the psychosocial and material resources provided by partners, friends, and family (Cohen & Wills, 1985). Social support is understood to be a protective factor and is positively related to self-worth and overall life satisfaction and negatively related to anxiety, mortality, and depression (Malecki et al., 2019; Zimet et al., 1988). Social support is also related to positive physical health outcomes (Holt-Lundstad et al., 2010).

Research on in-person social support establishes the need to differentiate perceptions of social support by source, for example, whether social support was received from family, co-workers, friends, or significant others (Holahan & Moos, 1983; Procidano & Heller, 1983; Zimet et al., 1988). Zimet et al. (1988) noted that "studies which fail to consider the source of support may lose important information" (p. 38). Winemiller et al. (1993) echoed these critiques in a review of the literature on the measurement of social support. Winemiller et al. criticized social support researchers for neglecting to pay attention to the source of support and instead vaguely identifying support from "significant or supportive other" (p. 639).

Most measures of online social support are tailored to specific contexts such as Facebook (Indian & Grieve, 2014) or World of Warcraft (Longman et al., 2009). There are two new measures, the Online Social Support Scale (Nick et al., 2018) and the Social Network Scale (SNS; Cole et al., 2017), that assess perceptions of online social support across multiple platforms. These measures contain items that ask about online support from *people online* or *online friends*. People online and online friends are general identifiers that can encompass in-person friends, family, co-workers, partners, as well as online-only connections whom the respondent has never met. Despite the strengths of these measures, they are limited as they do not delineate social support by source.

In the present study, I contribute to the extant literature on online social support by exploring the perceptions of online social support from different sources: college friends, pre-college friends, and virtual friends. In this paper, I first outline types and sources of in-person social support. Second, I review the literature on online social support and describe limitations of its measurement. Third, I propose three sources of online social support. Finally, I present the current study and introduce my hypotheses.

In-Person Social Support

Social support is the psychosocial and material resources provided by others (Cohen & Wills, 1985). Social support is understood to be a protective factor according to two different models: a buffering model and a main effects model (Cohen & Wills, 1985). According to the main effects model, social support is beneficial regardless of whether someone is experiencing stress. According to the buffering model, social support buffers individuals from the negative consequences of stress through "regular positive experiences and a set of stable, socially rewarded roles in the community" (Cohen & Wills, 1985, p. 311).

There are a number of ways to measure social support. Researchers measure social support by counting the number of friends an individual has, assessing received supportive behaviors, or assessing the *perceived* quality of social support (Cohen & Wills, 1985; Haber et al., 2007; Procidano & Heller, 1983). Perceived social support is a psychosocial construct that varies based on the perception of the individual. Perceived social support is the "extent to which individuals believe their needs for support, information, and feedback are supported" (Procidano & Heller, 1983, p. 2) and is negatively correlated with feelings of loneliness, distress, psychopathology, depression, anxiety, and other negative outcomes (Zimet et al., 1988).

Types of Support

There are several definitions of social support (e.g., Barrera Jr. & Ainlay, 1983; Cohen & Wills, 1985; Tardy, 1985; Winemiller et al., 1993). In this paper, I will focus on Cohen and Wills' (1985) definitions because they most closely align with the Online Social Support Scale (Nick et al., 2018), which was adapted for the present study and will be discussed later in the paper. In their paper, Cohen and Wills (1985) summarized four types of social support: esteem/emotional, social companionship, instrumental, and informational. Each of these four types of support is a subscale on the OSSS (Nick et al., 2018).

According to Cohen and Wills (1985), esteem or emotional support demonstrates that a person is accepted, for example, by communicating that a person is valued despite their faults. Social companionship is time spent with others. Social companionship establishes affiliation and connection and has been referred to as belongingness. Informational support is advice, appraisal support, or help given to define, understand, or cope with problems. Instrumental support is tangible support or aid. Although Cohen and Wills described four distinct types of support, they indicated that the different types of support are positively associated with each other. They noted that individuals who report high levels of one type of support are also likely to report high levels of other types of support.

Sources of Social Support

In addition to assessing the four types of support, measures of social support also assess the source of support. Sources of social support refer to whom social support comes from. Examples of sources are parents, peers, teachers, and romantic partners. Reliance on sources of social support varies through the lifespan and shifts developmentally (Malecki & Demaray, 2002, 2003; Procidano & Heller, 1983). For example, perceived support from parents and teachers decreases as students advance from middle to high school and rely more on their peers

(Malecki & Demaray, 2002). Reliance on sources of social support also changes during life transitions or for example, with the death of loved ones (Procidano & Heller, 1983).

To assess perceptions of social support by source, Procidano and Heller (1983) developed a Perceived Social Support (PSS) measure with two scales – one scale for friends (PSS-Fr) and one scale for family (PSS-Fa) – and examined scores on these subscales in a sample of undergraduate students. Findings from this study demonstrated that perceived support scores on the family (α = .90) and friends (α = .88) subscales were internally consistent and independent (r = .24, p < .02). They found that the average time an individual knew their friends was inversely related with PSS-Fr; more recent college friends were perceived as more supportive than childhood friends. Although this pattern might suggest that participants felt closer to friends they just met, the average relationship among participants and their friends and family included in this study was over 9 years long. Similar to findings from other researchers, PSS-Fa scores were more strongly associated with decreases in distress and psychopathology outcomes whereas PSS-Fr scores were more strongly associated with increases in social competence (Malecki & Demaray, 2002; Indian & Grieve, 2014; Procidano & Heller, 1983).

As mentioned by Procidano and Heller (1983), reliance on different sources of social support depends on the age of participants. For example, romantic partners are an unlikely source of social support for elementary school students (Malecki & Demaray, 2002, 2003; Malecki et al., 1999). Rather, for children and adolescents, common sources of social support are parents, teachers, classmates, and close friends. Increases in social support for this age group relate to increases in social skills, self-concept, and academic outcomes, and decreases in drug use, delinquency, anxiety, and depression (Malecki et al., 2019).

Another measure of social support that assesses differences in sources is the Multidimensional Scale of Perceived Social Support (MSPSS; Zimet et al., 1988). The MSPSS was initially developed to measure social support in American adolescents (Dambi et al., 2018). The MSPSS has 12 items and three factors for different sources of social support: family, friends, and significant others. Outcome measures are sensitive to the source of support. For example, for college students, family (r = -.24, p < .01) and friend (r = -.24, p <.01) support were more strongly related to decreases in depression than support from significant others (r = -.13, p < .05; Zimet et al., 1988).

Gender

In addition to developmental differences, there are also gender differences on measures of social support. Overall, females report greater overall social support than males (Zimet et al., 1988) in adult samples as well as elementary and high school samples (Malecki & Demaray, 2002, 2003). Despite greater perceived social support, females typically report more depression and anxious symptoms (Zimet et al., 1988). Researchers speculate that greater symptomology persists despite greater social support because females typically experience more interpersonal stress (Etzion, 1984; Fusilier et al., 1986; Ganster & Victor, 1988).

Online Social Support

Cole and colleagues (2017) examined whether in-person and online social support were separate constructs and adapted items that assess in-person support to create the SNS. The SNS has subscales that assess in-person and online social support and victimization. In a study of 231 undergraduate students, the SNS had Cronbach's alphas of .86 for online social support scores, .85 for in-person social support scores, .83 for online victimization scores, and .83 for in-person victimization scores. Using least squares regression, the authors found a significant relationship (R = .39, $F(2227) = 19.85$, p < .001) between in-person support and online social support. Cole et

al. found that the strength of the correlation increased as in-person social support increased in a curvilinear pattern. For participants with low in-person social support, online social support had a weaker correlation with in-person social support (r = .23). In contrast, for participants with high in-person social support, there was a stronger correlation between in-person and online social support (r = .57).

Cole et al. (2017) did not explore the mechanisms or causes for why some groups reporter higher support. They did however hypothesize that participants with high in-person support might also have high online support because they possess social skills that facilitate social connection in different niches (online and in-person). This hypothesis is based on findings that participants with social anxiety experienced greater support online compared to in-person. Cole et al. called for greater investigation into why some groups might have greater success with accessing online social support compared to in-person social support.

Cole and colleagues (2017) found that both in-person and online social support were associated with positive psychosocial outcomes. Online and in-person support were positively correlated with self-esteem and negatively correlated with dysfunctional attitudes and depressive thoughts and feelings. Yet, in-person support had stronger effects than online support on psychosocial variables. Despite weaker correlations, the researchers still observed significant effects of online support on psychosocial outcomes when controlling for in-person support, thus establishing the value of studying online social support.

Social Network Sites

As previously stated, most research on online social support is context-specific, for example, focused on the context of social network sites. Although the scope of the present study is beyond social network sites, these findings can inform our understandings of online social support. To understand research on online social support, I will summarize findings related to social support and social network sites. In 2018, Liu et al. conducted a meta-analysis on the use of social network sites and social support. Thirty-one studies were included in the analysis and two-thirds of the studies were conducted in the United States. The rest were conducted in China, Belgium, Hong Kong, Malaysia, Greece, Korea, and Taiwan. The majority were conducted with undergraduate or graduate students with an average age of 15.44 to 28 years old; two studies were conducted with middle school students. Overall, these studies indicated that use of social network sites was related to higher online and in-person social support.

Age was a significant moderator of social network site use and social support (B = 0.04, p < .01, R^2 = 0.35, k = 16; Liu et al., 2018). The meta-analysis primarily included data from young adults and college students. For older students, social network site use was more strongly related to social support. Similarly, in high school samples, older teenagers were found to be more responsive on social network sites than younger students (Zaphiris & Sarwar, 2006). The relationship between age and social network site use for adults beyond college-age was not explored. Given that older students had greater responsiveness and higher levels of online support, Liu et al. (2018) suggested that social network sites could offer valuable tools for college students who struggle to adjust to college.

Gender. Liu et al. (2018) found that gender was a significant moderator of social network site use and social support (B = 0.98, p < .05, R^2 = 0.12, k = 19). In the included studies, Liu et al. found that female students received more social support than males when using social network sites. These findings mimic the relationship between gender and in-person social support, in which females typically report higher social support than males (Etzion, 1984; Fusilier et al., 1986; Ganster & Victor, 1988; Malecki & Demaray, 2002, 2003; Zimet et al.,

1988). However, in their study of online social support across various platforms, Cole et al. (2017) found that gender was not a significant predictor of online support. In sum, results are mixed regarding the relationship between gender and online social support.

Types of Support. Liu et al. (2018) found differences in the types of support received on social network sites. They found that emotional ($r = .38$, $p < .001$) and informational ($r = .23$, $p < .05$) support were moderately linked with social network site use, whereas tangible (95% CI [-11, .52]) and esteem support (95% CI [-.17, .37]) were deemed nonsignificant given their confidence intervals. The researchers speculated that social network sites particularly facilitate informational support given that they enable users to send a single message to a large and heterogeneous audience (Valkenberg & Peter, 2011; Vitak & Ellison, 2013; Warschauer, 1997). They also allow constant access and immediate feedback on posts.

Trepte et al. (2015) conducted a longitudinal study on social network sites and social support. Data were collected in Germany from October 2009 to April 2011 on Facebook and studiVZ, the most popular social network sites in Germany at the time. There were 327 participants with a mean age of 25.85 years. Trepte et al. analyzed the role of context and social support by comparing reports of informational, emotional, and instrumental support online to in-person support. They found that over two years, participants reported higher mean scores for informational support online compared to in-person ($F(1, 320) = 133.20$, $p < .001$). In contrast, they found lower mean scores for emotional support ($F(1, 317) = 92.61$, $p < .001$) and for instrumental support ($F(1, 311) = 384.21$, $p < .001$) online compared to in-person.

Online, the type of support offered and received depends on the audience and the platform. For example, Gaysynsky et al. (2015) studied 43 participants ($M_{age} = 23.3$) enrolled in a Facebook group for young adults living with HIV. Analysis of posts and comments demonstrated that participants most often sought emotional support (sympathy, encouragement, prayer, empathy, or relationship support), yet esteem support (validation, compliment, or relief of blame) was most often provided. In this study, the authors treated emotional and esteem support as separate constructs. Yet, as Cohen and Wills (1985) explained, esteem and emotional support are terms that are often used interchangeably.

In another study, in a forum for people with disabilities, emotional and informational support were most frequently offered (Braithwaite et al., 1999). In these examples, participants received support from online-only sources, or people they would not typically meet face-to-face. These findings suggest that experiences of online social support are not universal and vary not only by platform (Chen & Choi, 2011; Haythornthwaite, 2005; Liu et al., 2018; Nick et al., 2018), but more importantly, by whom participants are connecting with online.

The meta-analysis by Liu et al (2018) was limited in scope to findings from social network sites. Liu et al. (2018) highlighted Haythornthwaite's (2005) framework of media multicomplexity, which suggested that close relationships are maintained in private channels such as phone calls or face-to-face conversations, rather than on social media. Therefore, their findings may represent not only behavior on social network sites but interactions between individuals in less intimate and weaker relationships. The present study differs from the studies included in Liu et al.'s (2018) meta-analysis because it includes communication through both private and public channels.

Features of Online Communication

When considering online relationships, it is important to understand the features of computer-mediated communication (CMC; Warschauer, 1997). CMC was originally limited to text-based and computer-mediated interaction. Today, CMC encompasses written

communication through email, texting, or social media platforms as well as audiovisual communication through videoconferencing (Kern, 2014). Valkenberg and Peter (2011) described three features of CMC that "simulate controllability of self-presentation and self-disclosure" (p. 122). These features are anonymity, asynchronicity, and accessibility and are relevant features that impact online relationships. Online, communication can be anonymous by concealing one's audiovisual identity. Instead of seeing someone's face or hearing his or her voice, interlocutors may only share screen names. Communication can be asynchronous; interlocutors can take time to edit responses instead of responding with immediate unpremeditated responses characteristic of in-person communication (Indian & Grieve, 2014; Siegal, 1991; Valkenberg & Peter, 2011; Vygotsky, 1978). Individuals can also communicate synchronously through platforms such as Slack or videoconferencing.

Online communication is highly accessible (Valkenberg & Peter, 2011). Through increased accessibility, CMC facilitates connection with multiple users across space and time (Warschauer, 1997). Users are able to connect with people they would not meet in their daily lives (Valkenberg & Peter, 2011). Accessibility relates to a host of positive social and academic outcomes. Academically, increased accessibility fosters opportunities for students in French classrooms in a non-French-speaking country to connect with native speakers in France (Kern & Develotte, 2018). Socially, increased accessibility allows individuals to connect with like-minded others or people with similar experiences.

One group for whom online relationships are important is LGBT youth (Ybarra et al., 2015). Compared to non-LGBT youth, LGBT youth are more likely to have friends they only know online. One-quarter of LGBT youth in a sample of 5,542 students from across the United States reported having made at least one close friend online. And on the MSPSS (Zimet et al., 1988), LGBT youth rated their online-only friends as more supportive than their in-person friends (Ybarra et al., 2015).

Online groups provide adolescents with alternate platforms for social connection and support. Consequently, online support groups are particularly valuable for adolescents with chronic illness who typically have smaller social networks than their healthy peers due to interruptions in schooling for medical care (Nichols, 1995). Of note, adolescents with cancer report that they prefer to receive emotional support from other teens with cancer rather than their healthy peers, parents, or family members (Suzuki & Kato, 2003). Teens with cancer also prefer to receive informational support from other teens with cancer. These findings are critical given that higher perceived support is related to lower depression, anxiety, and externalizing problems, and higher self-esteem for children with cancer. These findings are mirrored in broader samples of adolescents for whom the enhanced ability to form online connections facilitates the development of self-esteem (Valkenberg et al., 2006).

Online Sources of Social Support

As previously noted, common sources of in-person social support are parents, romantic partners, teachers, and friends. In this study, I focused on perceived social support from three different groups of friends. I focused on friends because I wanted to see if there were differences in perceptions of online social support from people that participants met in-person compared to social support from people they could only meet online. This criterion ruled out a focus on teachers and parents. Further, although individuals might meet romantic partners and friends online, they likely have a greater number of friends.

Defining Groups of Online Friends

I applied features of online communication to define three groups of online friends. In defining these groups, I especially considered the feature of accessibility and how online spaces differ from in-person. I proposed three sources of online friends that are defined by whether friends met online or in-person, the length of their friendship, and their physical access (Table 1). The first group is *college friends*. Friends in this group met in-person in college, for example, in class or an extracurricular club. The second group is *pre-college friends.* Friends in this group met in-person before college and might have met in K–12 school, summer programs, through family friends, and so on. The third group is *virtual friends.* Friends in this group first met online. Virtual friends might have met in online support groups, online gaming groups, or online interest groups.

Pre-COVID-19, physical proximity would have been a defining distinction between the definition of the college friends and pre-college friends groups. At UC Berkeley where data were collected, participants likely would have had greater in-person access to their college friends than to their pre-college friends. Thus, same school attendance would have been a proxy for regular in-person access and served as a defining feature of the college friends group. Given physical distancing recommendations and the closing of campuses for in-person instruction during fall 2020, physical access was not considered as part of the definition for the three friend groups in this study.

The Present Study

There were four main aims of this study. The first aim was to examine the psychometric properties of the revised measure of online social support. The second aim was to determine if there were differences in online social support scores from college friends, pre-college friends, and virtual friends. The third aim was to understand the relationship between length of friendship and online social support. The fourth aim was to examine gender differences in online social support. This is the first study to my knowledge that examines online social support by source.

Research Question 1

My first research question was, are there differences in subjects' perceptions of online social support by source? Researchers of online social support from social network sites (Liu et al., 2018) and other online contexts found that there are differences in how individuals experience social support depending on the online platforms used for communication (Ellis et al., 2013; Indian & Grieve, 2014; Lustria et al., 2009; Suzuki & Kato, 2003; Ybarra et al., 2015). Instead of analyzing differences in online social support by platform, I looked at differences in online social support by source. This approach is supported by theories that suggest that close relationships are maintained in private channels and less intimate relationships are maintained over social networks (Chen & Choi, 2011; Haythornthwaite, 2005; Liu et al., 2018). Consequently, attributing differences in social support to the platform provides a limited explanation for these findings. Although there might be an interaction between platform and source, that question was not explored in this study given the unpredictable updates of digital platforms and the limited research on this topic.

Decades of research on in-person social support indicate differences in perceived social support by source (Dambi et al., 2018; Hall, 2018; Indian & Grieve, 2014; Malecki & Demaray, 2002, 2003; Procidano & Heller, 1983; Zimet et al., 1988). Yet no study has explicitly looked at differences in online social support by source. For the first research question, I focused on the perceived support from different types of friends online: college friends, pre-college friends, and

virtual friends. My first hypothesis was that there would be differences in perceived support by source.

Research Question 2

My second question was, what is the relationship between length of friendship and perceived online social support? By asking this question, I aimed to better understand why there might be differences in online support by source. Researchers on in-person social support found that social support from friends was inversely correlated with length of relationship (Procidano & Heller, 1983). Unlike in-person social support, technology allows friends to connect across boundaries of space and time (Valkenberg & Peter, 2011; Warschauer, 1997). Therefore, I hypothesized that length of friendship would positively correlate with online social support.

Research Question 3

My third research question was, does subjects' gender influence their perceptions of online social support by source? Research findings are mixed regarding the relationship between gender and online social support. In a sample of undergraduate students, Cole et al. (2017) found that gender was not a significant predictor of online support as measured by the Social Network Scale. However, Liu et al. (2018) found in a meta-analysis that females received more social support than males, suggesting that gender moderates the relationship between social network site use and social support. Liu and colleagues' results were similar to findings from the in-person social support literature, which established that females report more overall social support than males (Etzion, 1984; Fusilier et al., 1986; Ganster & Victor, 1988; Malecki & Demaray, 2002, 2003; Zimet et al., 1988). My third hypothesis was that, consistent with findings on in-person support, females would report greater online social support for all sources.

Method

Participants

The sample consisted of 500 undergraduate students from UC Berkeley (Table 2). Eligible participants were undergraduate students over age 18 and Fall 2020 was not their first semester at UC Berkeley. This condition was added to the study because instruction was delivered remotely during the fall 2020 semester due to COVID-19 and would have prevented participating freshmen from meeting college friends in-person.

Measures

Participants were administered an online survey hosted on Qualtrics that included questions about demographics, technology access, different friendships, online social support, in-person social support, loneliness, and depression. In addition, a measure of school belonging and a social anxiety scale (Mini-SPIN; Connor et al., 2001) were administered. These measures were not included in the analyses as they were not relevant to the goals of this study.

Online Social Support

In this study, I adapted Nick et al.'s (2018) Online Social Support Scale (OSSS) to assess social support from three different friend sources (see Appendix A). I used the OSSS because it is the only measure that was created to assess online social support across multiple platforms and therefore was the most appropriate measure to assess for social support from different sources. The first part of the OSSS (Nick et al., 2018) asks participants to rate how much they use 24 different apps and online platforms to connect or interact with other people. The second part of the OSSS has four subscales that represent different types of social support. The four subscales are esteem/emotional, informational, instrumental, and social companionship (Cohen & Wills, 1985). Each subscale has 10 items. Participants rate the frequency of agreement (0 = *never*; 4 = *a lot*) with items such as, "When I'm online, people give me useful advice." In Nick et al.'s (2018)

study, Cronbach alphas were high for each factor (esteem/emotional support, $\alpha = .95$; social companionship, $\alpha = .94$; informational, $\alpha = .95$; instrumental, $\alpha = .95$).

Results from the Nick et al. (2018) study provided evidence for the four types of social support online. Scores on all four subscales of the OSSS were related to self-esteem and Beck's negative cognitive triad. However, only emotional support subscale scores were related to depression. The OSSS had a moderate correlation with the PSS-Fr ($r = .38$, $p < .01$) with a range of correlations from .23 to .49 for each subscale ($p < .01$). Given the size and strength of the correlations, the researchers concluded that there was evidence for convergent validity as well as the unique effects of online social support compared to in-person social support. Finally, Nick et al. found larger betas for in-person compared to online support when regressing self-esteem, depressive thoughts, and depressive symptoms onto in-person or online support.

In this study, the OSSS was adapted and repeated three times, one time for each source of online support: (a) college friends, (b) pre-college friends, and (c) virtual friends. As described below, care was taken in coding of participant responses to see that these groups of friends were mutually exclusive. Items from the OSSS were adapted by replacing the word *people* with the title of each source. For example, when assessing online social support from virtual friends, the item above was reworded as, "When I'm online, my virtual friends give me useful advice." Thirty-eight of the 40 items were reworded and included in the instrument. Two social companionship items were excluded from the final instrument because they could not be easily reworded. A total OSSS score was calculated by totaling the 38 items. A higher score indicated greater online social support. In the present study, online social support scores demonstrated high reliability with alphas above .92 (Table 3).

Before responding to each scale, participants were given a definition of each group and asked if they have communicated online with someone from that group over the last two months. If they answered yes, they proceeded to complete the scale for that group. If they answered *no*, they skipped forward to the next group. In the survey, online communication was defined as all virtual communication that takes place using electronic devices. This refers to all communication that occurs virtually and *does not* occur in-person. It includes communication through platforms such as: text communication sites (e.g., email, text message, Whatsapp, WeChat), audio and/or visual communication platforms (e.g., Facetime audio or visual calls, Whatsapp audio or visual calls, phone calls), social media sites (e.g., Instagram, TikTok, Facebook, Twitter), anonymous discussion apps (e.g., YikYak), forums (e.g., Reddit, 4chan), dating sites/apps (e.g., Match, Tinder), sports/fighting/racing games (e.g., FIFA, Call of Duty), and role-playing/battle arena games (e.g., World of Warcraft).

Describing Each Source

Participants were asked the following questions about each friend source before each administration of the adapted OSSS (Nick et al., 2018). They were asked how many friends they had in that group and to identify which platforms they used to communicate with those friends. They were also asked about length of friendship, where they met, time spent online and in-person together, and to rate the subjective closeness of their relationship.

Length of Friendship. Participants were asked to think about one friend from each group. They were asked to indicate how many years they had known each other. Response options were *less than 1 year, 1 year, 2 years, 3 years, 4 years, 4–10 years,* and *more than 10 years.*

Where They Met. Using an open response question, participants were also asked to describe where they met each friend (see Appendix B). These responses were then coded into

categories. Unclear and inaccurate responses were deemed ineligible and excluded from analyses.

Subjective Closeness. A subjective closeness index (SCI; Gächter et al., 2015) was calculated for each friend source. The SCI is related to the Relationship Closeness Inventory (RCI; Berscheid et al., 1989). The SCI consists of two questions on 7-point Likert scales (1 = *not close at all*; 7 = *very close*). The first question is, "relative to all your other relationships (both same and opposite sex) how would you characterize your relationship with X?" The second question is, "relative to what you know about other people's close relationships, how would you characterize your relationship with X?" A subjective closeness composite was calculated using the sum of scores from the two items. The items were highly correlated with Pearson correlations between .86 and .90.

Time Spent Online and In-Person. Participants were asked on average over the last two months, how many hours per week they spent doing things with each friend group online and in-person. Response options were *less than 1 hour, 1–3 hours, 3–5 hours, 5–10 hours,* and *more than 10 hours.*

In-Person Social Support

Perceived social support was included to establish convergent validity and was measured using the PSS-Fr (Procidano & Heller, 1983) scale. The PSS-Fr measure consists of 20 questions such as "My friends are sensitive to my personal needs." Response options are *no* (0), *yes* (1), and *I don't know* (missing). The following directions were added to the PSS-Fr to ensure that responses were reflective of in-person social support: "The statements which follow refer to feelings and experiences which occur to most people at one time or another in their relationships with friends. Even though we are less able to see our friends in-person due to COVID-19, please consider your typical in-person experiences with friends. For example, consider how you feel when spending time hanging out in-person, getting coffee, or doing activities together." In a study of 222 Indiana University undergraduates, PSS-Fr scores had high reliability with a Cronbach's alpha of .88 and concurrent validity was established as the PSS-Fr had a moderate yet statistically significant negative relationship ($r = -.27$, $p < .01$) with a measure of psychiatric symptoms, the Langner 22-item screening instrument (Langner, 1962). In the present study, in-person social support scores also demonstrated high reliability ($\alpha = 0.87$).

Loneliness

Loneliness was measured using a short-form of the Revised UCLA Loneliness Scale (Russell et al., 1980). The short-form measure includes 4 of the 20 items from the revised measure. On the Revised UCLA Loneliness Scale, participants rate how frequently they agree with items such as, "No one really knows me well." Response options are on a 4-point Likert scale (1 = *never;* 4 = *often*). The short-form measure has two positively-worded and two negatively-worded items. In a study of 237 UCLA undergraduate students, scores on the full scale had high reliability ($\alpha = .96$) and a strong correlation with the Beck Depression Inventory ($r = .62$; Beck et al., 1961) and other related measures. In a study of 162 first-year UCLA college students, scores on the 4-item version of the UCLA Loneliness Scale had moderate reliability ($\alpha = .75$; Russell et al., 1980). Data were not provided regarding the validity of the short-form measure. In the present study, loneliness scores demonstrated moderate reliability ($\alpha = .77$).

Depression

To measure depressive symptomology, the short-form (Cole et al., 2004) of the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977) was used. This scale was developed to measure depressive symptomology in the general population. Higher scores

indicate more depressive symptoms with a range of 0–30. The short form (Cole et al., 2004) consists of 10 items, was validated with 185 undergraduate students, and had moderate reliability (α = .75). In the same study, the CES-D had a strong positive correlation with the Beck Depression Inventory (r = .74; Beck et al., 1961). Following the model of the California Families Project (Corona et al., 2012), the CES-D was modified in two ways to maintain consistency with other instruments. Instead of asking participants how they felt in the past week, participants were asked to rate how frequently over the past month they agreed with items such as "I felt lonely." To reflect that change, the 4-point scale response options were modified by excluding descriptors such as "1–2 days." Responses options were *almost never or never* (0), *sometimes* (1), *a lot of the time* (2), and *almost always or always* (3). In the present study, depression scores demonstrated high reliability (α = 0.85).

Technology Access

Participants were asked if they had access to a personal computer, smartphone, and reliable internet. Response options for each item were *yes*, *no*, and *somewhat*. Additionally, participants were asked to describe their access to cellular data. The response options were *I have enough cellular data, I often run out of cellular data, I have no cellular data,* and *other.*

Demographics

Participants were asked to complete a demographic questionnaire. Data were collected on gender, sexual orientation, ethnicity (Hughes et al., 2016), international student status, and age. Participants were asked about their fall 2020 remote learning plans. They were asked with whom they lived during the fall 2020 semester and where they spent the fall semester.

Procedure

Before collecting data, the method and hypotheses were pre-registered with the Open Science Framework (https://osf.io/). In addition, the study was approved by the Committee for Protection of Human Subjects at the University of California, Berkeley. Funds for this project were provided by a grant from the xLab at UC Berkeley. The xLab allows community members to voluntarily sign up to participate in research studies through a Sona research and participant pool platform. Participants were recruited from the xLab database. Participants were given an electronic consent form that described the compensation ($10 for under 40 minutes of participation) and informed about the rationale, potential risks, and benefits of participation. Data were collected in December 2020 before the end of the fall semester.

Data Analysis Plan

SPSS (Version 27) was used for all analyses with the exception of confirmatory factor analyses which were conducted using Mplus (Version 8). Internal consistency was analyzed using Cronbach's alpha and statistical significance was set at $p < .05$. Little's (1988) tests were used to assess for missing data patterns. Little's Missing Completely at Random (MCAR) tests were not significant, and the hypothesis that data were MCAR was accepted for college friends (χ^2 (508) = 515.218, p = .403), pre-college friends (χ^2 (391) = 315.944, p = .998), and virtual friends (χ^2 (111) = 64.396, p = 1.0). Missingness was low with less than 1% missing responses per variable. This equated to a maximum count of three missing responses per variable. Listwise deletion was applied to handle the missing data given that data are only likely to be biased if more than 10% are missing (Bennet, 2001).

The structural validity of the revised measure was assessed by examining the factor structure of the OSSS for each friend source. Exploratory and confirmatory factor analyses were conducted on the revised OSSS scale (Nick et al., 2018). For convergent validity, I looked at the correlation between the revised OSSS and in-person social support as measured by the PSS-Fr

(Procidano & Heller, 1983). For concurrent validity, I correlated online social support with depression (CES-D short-form; Cole et al., 2004) and loneliness (Revised UCLA Loneliness Scale short-form; Russell et al., 1980). Hierarchical regressions were performed to investigate the relative contribution of the new measure beyond the measure of in-person support as it related to loneliness and depression outcomes.

For Research Question 1, I ran a repeated measures one-way ANOVA to determine if there were differences between online social support from college friends, pre-college friends, and virtual friends. For Research Question 2, I ran correlational analyses to understand the relationship between length of friendship and online social support. For Research Question 3, I ran three independent sample *t*-tests, one for each source of support, to determine if females reported higher online social support compared to males.

Results

Preliminary Analyses

The sample consisted of 500 undergraduate students from UC Berkeley with a mean age of 20.5. Descriptive analyses of students' demographics, fall housing information, remote learning plans, and technology access are presented in Table 2. The largest category of participants identified as female and were juniors in their 3rd or 4th semester. The two largest racial/ethnic groups were Asian and White. This sample was comprised of a greater proportion of Asian students compared to the university's undergraduate body (Berkeley Office of Planning and Analysis, 2021). The majority of participants lived with family and the modal respondent lived locally during the Fall 2020 semester. Almost all participants had high access to personal computers and smartphones as well as internet and cellular data.

Means and standard deviations of OSSS, in-person social support, loneliness, and depression scores are reported in Table 3. Skewness and kurtosis of variables are also presented in Table 3. All variables were generally normally distributed. Reliability estimates for outcome variables were considered acceptable. The in-person social support, depression, and loneliness variables were low to moderately correlated (Table 4).

Describing Friend Sources

Detailed characteristics of the three friend sources can be found in Table 5. Participants reported that they had more college friends than pre-college or virtual friends. For all friend groups, most respondents reported spending less than 1 hour in-person with their friends and between 1–3 hours online with their friends over the two weeks before taking the survey. Most participants knew their college friends for 1 year, their pre-college friends for 4–10 years, and their virtual friends for less than 1 year.

Most participants met their college friends at school, in their living environment, or through clubs and extracurricular activities. Most met their pre-college friends through school, socially (through mutual friends), or through clubs and extracurricular activities. There was greater variation in where participants met their virtual friends, with most reporting having met through social media, gaming, school, chatrooms/forums, or dating/friend-making apps. More detailed information about where participants met their friends can be found in Appendix B.

Participants were asked which online platforms they used to communicate with each group of friends (Table 6). The most common platforms used with all groups of friends were text communication sites, followed by social media sites, followed by audio and/or visual communication platforms. Participants reported using a greater variety of platforms to communicate with their virtual friends compared to their college or pre-college friends.

There was a statistically significant difference with a large effect size ($\eta^2 = .56$) for differences in SCI by friend source, Wilks' Lambda = .44, $F(2, 177) = 110.98$, $p < .017$. A statistically significant and meaningful difference was found in SCI scores between college friends ($M = 11.03$, $SD = 2.63$) and virtual friends ($M = 7.11$, $SD = 3.30$) and SCI scores between pre-college friends ($M = 11.45$, $SD = 2.65$) and virtual friends ($p < .017$). The effect sizes for these differences were in the large range, with a Cohen's d of 1.31 and 1.45 respectively.

Exploratory Factor Analyses

Exploratory factor analysis using principal axis extraction was used to examine the structure of the OSSS item scores. Approximately 43% ($n = 200$) of the college friends sample was selected at random for the exploratory factor analyses. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was .952 and Bartlett's test of sphericity was significant, $\chi^2(703) = 7027.581$, $p < .001$, indicating that the esteem/emotional, social companionship, information, and instrumental scores were factorable. Communality estimates were in the medium to high range (see Tables 7 and 8) and the variable to factor ratio was approximately 20:3, indicating that a sample size of 100 would yield a convergent and admissible solution (MacCallum et al., 1999). Parallel analysis suggested five-factors and the OSSS is based on a four-factor model. Thus, a five-factor model (Table 7) and a four-factor model (Table 8) were extracted using principal axis extraction with an oblique rotation.

Structure coefficients for the five-factor model are reported in Table 7. All items loaded onto the expected factors with the exception of emotional/esteem which split between Factor 2 (8 items) and Factor 5 (2 items). All but one of the items had a salient coefficient (above .40), with the exception of sc9 on Factor 4. Three items had factor loadings below .5 and no items had salient loadings on more than one factor. Factor intercorrelations ranged from low to moderate and were all below .62. The solution accounted for 67.05% of the variance in the scores.

Structure coefficients for the four-factor theoretical model are reported in Table 8. All items loaded onto separate factors as expected with the exception of sc10 which failed to obtain a salient structure coefficient and cross-loaded on the social companionship (.36) and emotional/esteem (.38) factors. All but two of the items—sc9 and sc10— had salient coefficients. Four items had factor loadings below .5 and no items had salient loadings on more than one factor. Factor intercorrelations were between .49 and .64. The solution accounted for 64.95% of the variance in the scores. Given the theoretical model and the nonviable factor (i.e., only two salient coefficients) in the five-factor structure, the four-factor model was accepted.

Confirmatory Factor Analyses

Confirmatory factor analyses were run with the remaining 60% ($n = 265$) of the sample (Table 9). I used the robust weighted least squares (WLSMV) estimator to examine the fit of the 38-item, four-factor model accepted in the exploratory analysis. The WLSMV estimator is recommended for ordinal data. For the three groups of friends, two CFAs were run. The first CFA was run using a four-factor model and the second CFA was run using a higher-order model, given the moderate intercorrelations among the subscales (Tables 7 and 8). The higher-order model was run to provide evidence in support of using a total OSSS score. Fit was considered acceptable if the Tucker-Lewis index (TLI) and comparative fit index (CFI) values were above .90, and the root mean square error of approximation (RMSEA) value was below .08 (Byrne, 2008; Marsh et al., 2004). Fit was considered excellent if the TLI and CFI values were above .95 and the RMSEA value was below .05.

Models 1 and 2 were run for college friends ($n = 265$). In the four-factor model (Model 1), CFI and TLI values were in the excellent range, although the RMSEA value was not in the

acceptable range. For Model 2, I ran a higher-order model of the OSSS with college friends. Again, the CFI and TLI values were considered excellent and the RMSEA was not in the acceptable range. Models 3 and 4 were run for pre-college friends (n = 455). In the four-factor model (Model 3), TLI and CFI values were excellent and the RMSEA value was acceptable. For the higher-order model, the TLI and CFI values were also excellent but the RMSEA value was .08. Models 5 and 6 were run for virtual friends (n = 198). In the four-factor model (Model 5), TLI and CFI values were excellent and the RMSEA value was outside of the acceptable range. For the higher-order model (Model 6), the TLI and CFI values were acceptable and the RMSEA value was .08.

Finally, I ran a maximum likelihood estimation model of the OSSS with college friends to compare results using the method used by the original authors (Nick et al., 2018). The CFI and TLI values were not considered acceptable; however, the RMSEA value was in the acceptable range. Given the high CFI and TLI values, the four-factor and higher-order WLMSV models (see Table 9) were considered acceptable (Marsh et al., 2004). Factor coefficients ranged from .64 to .97 for the four-factor (Table 10) and the higher-order models (Table 11). Internal consistency was examined using alphas and omega estimates (see Table 3). Internal consistency was considered high for all OSSS subscales with alpha and omega estimates between .92 and .96.

Other Validity Evidence

Convergent validity was assessed by correlating the OSSS scores for the three friend groups with PSS-Fr (Procidano & Heller, 1983). As expected, the OSSS scores for each source were positively correlated with PSS-Fr (Table 4). There were positive correlations that were statistically significant for college and pre-college friends. The effect sizes were in the small to moderate range. The correlation of PSS-Fr and OSSS scores for virtual friends was not statistically significant. Based on these results, it was determined that there was evidence of convergent and divergent validity for the OSSS for college and pre-college friends.

For concurrent validity, I correlated online social support with measures of depression (CES-D short-form; Cole et al., 2004) and loneliness (Revised UCLA Loneliness Scale short-form; Russell et al., 1980), and expected a negative relationship (Table 4). The correlations between OSSS and depression were not statistically significant nor meaningful. There were statistically significant negative correlations between OSSS and loneliness scores for college friends and pre-college friends with a small to moderate effect size. Based on these results, it was determined that there was evidence of concurrent validity for the OSSS for college and pre-college friends.

Six hierarchical regressions (Table 12) were performed to investigate the relative contribution of the new OSSS measures beyond the measure of in-person support as they related to depression and loneliness outcomes. For each group of friends, one regression was run for the dependent variable of depression and one for the dependent variable of loneliness. The independent variables were in-person perceived social support and online social support. For depression, the change in variance when online social support was added to the model was not statistically significantly different from zero for all three groups of friends. For loneliness, the change in variance when online social support was added to the model was statistically significantly different from zero for college friends.

Primary Analyses

Differences in Online Social Support by Source

A one-way repeated measures analysis of variance (ANOVA) was conducted to evaluate the null hypothesis that there was no difference in online social support scores for different

friend sources. Participants (n = 177) were included in the analysis if they had complete data and reported having a college, pre-college, and virtual friend. The results of the ANOVA indicated a statistically significant effect of friend source on online social support scores, Wilks' Lambda = .64, $F(2, 177) = 49.05$, $p < .017$. A large effect size was found, $\eta^2 = .36$.

Follow-up analyses using a Bonferroni adjustment indicated that two of the three pairwise differences were significant at the $p < .017$ level (Table 13). Online social support scores from college friends (M = 102.39, SD = 30.58) were not statistically significantly greater than online social support scores from pre-college friends (M = 94.97, SD = 33.26). Online social support scores from college friends and from pre-college friends were statistically significantly greater than online social support scores from virtual friends (M = 75.53, SD = 30.32). Cohen's effect sizes were .88 and .61 respectively and suggested moderate to high practical significance. Hypothesis 1 was accepted as statistically significant and practical differences were found in online social support by source.

Length of Friendship

Hypothesis 2 was partially accepted as there was a statistically significant positive correlation (Spearman's rho) with a small effect size between length of friendship and online social support scores for college (ρ = .12, p = .007) and virtual friends (ρ = .17, p = .008). The correlation between length of friendship and OSSS scores for pre-college friends (ρ = .09, p = .033) was below the minimal interpretable effect size and lacked statistical significance after a Bonferroni adjustment to $p < .017$.

Gender

Table 14 presents means and standard deviations of total online social support scores for males and females. Contrary to Hypothesis 3, independent t-test results indicated that there were no statistically significant differences in total OSSS scores between males and females for college friends $t(441) = 0.15$, p = .88, pre-college friends $t(434) = -.07$, p = .95, or virtual friends $t(186) = -.98$, p = .328. Effect sizes were negligible for college friends (Cohen's d = .02) and pre-college friends (Cohen's d = .01) and small for virtual friends (Cohen's d = .16).

Discussion

In this study, I examined whether there were differences in perceived online social support by source. I adapted Nick et al.'s (2018) Online Social Support Scale for three groups of friends and found evidence of validity for the adapted measure in a sample of 500 undergraduate students. Exploratory and confirmatory factor analyses supported the structural validity of the adapted measure. Convergent validity was supported by positive correlations between OSSS scores for college and pre-college friends and in-person social support. Concurrent validity was supported by negative correlations between OSSS scores for college and pre-college friends and loneliness. However, loneliness scores did not correlate with OSSS scores for virtual friends. A possible explanation is that the items on the Revised UCLA Loneliness Scale (Russell et al., 1980) did not apply to virtual friends whom individuals may never meet in-person. Items such as, "I feel in tune with the people around me," may be interpreted as referring to people who are physically near rather than digitally connected.

Online social support did not contribute additional variance in loneliness and depression scores above and beyond a measure of in-person social support. This finding is not surprising given results from Nick et al.'s (2018) study. First, Nick and colleagues found that only the emotional/esteem support subscale was related to depression. In this study, I examined the total score and found that the correlation between total OSSS score and depression was non-significant. Alternate outcome measures such as the life event scale (LES) as used by Nick et al.

may have been more appropriate. Second, Nick et al. found that the effects of online social support paralleled the effects of in-person social support; however, the main effects of in-person social support on the LES were stronger. Future researchers should use alternate outcome measures to continue to study the effects of online social support compared to in-person social support.

Differences in Online Social Support by Source

Consistent with my first hypothesis, I found that there were statistically significant differences in perceptions of social support by source. Participants reported greater online social support from their college and pre-college friends compared to their virtual friends. These results were expected given the extant findings that there are differences in perceived social support by source (Dambi et al., 2018; Hall, 2018; Indian & Grieve, 2014; Malecki & Demaray, 2002, 2003; Procidano & Heller, 1983; Zimet et al., 1988). No differences were found in OSSS scores between college and pre-college friends. As this is a novel finding, researchers in subsequent studies should use different features to define groups of friends. Findings from this study suggest that when assessing for differences in online social support, it is important to consider whether friends met in-person or online.

Data from this study add nuance to the extant findings that differences in online social support vary depending on which online platforms individuals used (Ellis et al., 2013; Indian & Grieve, 2014; Liu et al., 2018; Lustria et al., 2009; Nick et al., 2018; Suzuki & Kato, 2003; Ybarra et al., 2015). For example, Nick et al. (2018) found that social media had a moderate effect on online social support ($r = .34$, $p < .001$), whereas communicating over text message ($r = .18$, $p < .01$) and participating in online forums ($r = .11$, $p < .05$) had small effects on online social support. Instead of focusing on characteristics of platforms and apps, data from this study allow us to better understand differences in online social support using characteristics of individuals and their relationships. In the future, researchers should study the interaction between source of support and platform used.

Length of Friendship and Online Social Support

Findings were mixed regarding the relationship between length of friendship and online social support. The correlation between length of friendship and OSSS scores for pre-college friends was below the minimal interpretable effect size and lacked statistical significance. Yet, consistent with my second hypothesis, a small yet statistically significant positive correlation was found between length of friendship and online social support for college and virtual friends. The effect size was greatest for virtual friends followed by college friends.

This pattern contrasts the extant finding that social support from friends is inversely correlated with length of relationship (Procidano & Heller, 1983). For participants in this study, it may have been challenging to make new and supportive college friends during the pandemic. Newer college friends likely had limited opportunities to socialize due to COVID-19. A possible explanation for these findings among virtual friends is that it may take more time to develop trust and relationships for friends who met online. Another explanation is that over time, virtual friends may transition to having an in-person relationship leading to greater experiences of social support across contexts.

Gender and Online Social Support

Hypothesis three was rejected as gender differences were not found in total online social support scores. These findings are consistent with Cole et al. (2017) who found that gender was not a significant predictor of online support as measured by the Social Network Scale. Contrary to the findings on in-person social support (Etzion, 1984; Fusilier et al., 1986; Ganster & Victor,

1988; Malecki & Demaray, 2002, 2003; Zimet et al., 1988), there is growing evidence that there are no gender differences in perceptions of online social support. Researchers should use mixed methods approaches to understand why males and females perceive similar levels of social support online, given that females historically have perceived greater social support in-person (Etzion, 1984; Fusilier et al., 1986; Ganster & Victor, 1988; Malecki & Demaray, 2002, 2003; Zimet et al., 1988).

Limitations and Future Directions

In this study, I looked at online social support from three groups of friends. Given findings from this study, future researchers should compare online social support from friends who met in-person to those who met virtually rather than use the three groups as defined in this study. Researchers have found that friendships change over time and that some in-person friendships eventually become exclusively online connections (Cole et al., 2017; Reich et al., 2012). Friends who met virtually may eventually transition to an in-person relationship and vice versa. Future researchers should look at factors other than where friends met such as where they most often interact, whether they spend more time together online or in-person, and physical proximity. Due to COVID-19, these questions could not accurately be examined in this study. Furthermore, following the examples of the in-person literature (Malecki & Demaray, 2002, 2003; Procidano & Heller, 1983), researchers should look at differences in online social support from sources other than friends, such as parents, romantic partners, and teachers.

In the in-person literature, the four types of social support defined by Cohen and Wills (1985) were positively associated with each other. In this study, I did not look at differences in types of support and instead focused on overall differences in online social support by source. Now that these measures have been validated, follow-up studies can be conducted on differences in types of online social support by source. Although these differences do not exist in the in-person literature, we might expect to see differences in types of online social support by source given preliminary findings that the patterns of gender difference and length of friendship differ in the online social support literature.

This study contributes to a growing field that explores different types of online friendships and exchanges of online social support. Individuals with high in-person social support often have high perceptions of online social support (Cole et al., 2017). Yet, we have a limited understanding of individuals who experience greater social support online than in-person. We might use these adapted measures of online social support coupled with other psychosocial measures of social anxiety, demographic variables, or personality measures to better understand the characteristics of individuals who experience support online that they might lack in their daily lives.

The utility of the current measure of online social support is hindered by its length. In this study, the measure was shortened from 40 items to 38 items and maintained very high factor loadings and strong internal consistency. Given the high correlation of items and high factor loadings, it is suggested that future researchers abbreviate the measure to ease participant completion.

In this study, I focused on the benefits of online communication without addressing the potentially negative consequences. This focus was informed by the findings that greater social support is related to physical and mental wellness. The January 6, 2021, Capitol insurrection is an example of the detrimental consequences of the unbridled capability of social media and online platforms to facilitate social networking of conspiracy and hate groups. Exchange of conspiracy theories and misinformation could be considered informational support and certainly,

time spent in chat rooms could be considered social companionship. Online groups that operate 24/7 facilitate constant exchanges of social support even if their mission is one of hate. Future researchers should consider how to balance the positive aspects with the potentially negative aspects of online social support.

Context and Generalizability

This study was conducted at the end of the fall 2020 semester. At the time, the COVID-19 pandemic had shuttered UC Berkeley for almost nine months. Students adapted to online learning and socializing while physically distant. The COVID-19 pandemic likely inflated participants' reliance on online interaction as the state moved in and out of stay-at-home orders. This finding is evident in reports that participants spent less than 1 hour in-person and between 1–3 hours online per week with their friends. Given this context, I decided to delay the study of physical proximity and online social support and instead focused on length of friendship. When students return to regular in-person interactions, it is recommended that the effect of physical proximity on online social support be explored.

The generalizability of the findings of this study are limited in a number of ways. First, data were collected from a convenience sample at a single university. The sample was majority female and compared to UC Berkeley's undergraduate population, the sample had a greater proportion of Asian students and smaller proportion of African American or Black and Chicanx or Latinx students. In the future, it is recommended that researchers study the role of culture on perceptions of online social support. There is evidence that culture moderates the relationship between social network site use and social support (Kim et al., 2011; Liu et al., 2018). In particular, researchers speculate that these findings might reflect differences in help-seeking norms such as when and how it is acceptable to make explicit requests for support.

Instead of directly inquiring about socioeconomic status, I chose to assess access to hardware and software required to access online social support. This sample was privileged in their access, which may also limit the generalizability of this sample; 99% of the sample had reliable access to cellular data and Wi-Fi, as well as personal smartphones and laptop computers. UC Berkeley provided free Wi-Fi hotspots and computers during the pandemic, which may have increased student access.

Overall, the results of this study provide a snapshot of the experiences of college students. Given the limited research on this nascent topic, it is recommended that this study be repeated with more diverse samples that include children, adolescents, and adults. In addition, this topic would benefit from a mixed methods approach. Through a mixed methods approach, we can develop our understanding of how individuals seek support, whom they connect with and why, and how professionals and institutions can support individuals to safely and effectively access online communities.

Implications for Practice

Findings from this study can be used to guide intervention in school and clinical practice. One takeaway is the increased understanding about where college students met their friends both in-person and online. Practitioners could recommend and facilitate more opportunities for students to meet through their academic classes, in their living environments, and through clubs or extracurricular activities. We can also use this information to help students develop online connections. Given that most participants met their virtual friends through social media, gaming, school, chatrooms/forums, or dating/friend-making apps, clinicians can work with clients to identify interests, develop their sense of identity and values, pursue their hobbies, and engage with others on these topics.

In this study, I found that individuals typically spent fewer than three hours socializing in-person or online with their friends and experienced the positive effects of social support. This information can be shared with incoming freshmen or students of any age about the psychological benefits of connecting with others, such as lowered depression and loneliness. In addition to providing access to academic supports like Zoom lectures and educational materials, technology can facilitate social support and support the mental health of college students. Results from this study might be used to further justify policies that support increased and subsidized access to technology for students of all ages who might otherwise struggle to complete their work and connect with others.

Conclusion

In this study, I examined whether there were differences in perceptions of online social from three groups of friends. The groups were college friends, pre-college friends, and virtual friends. Psychometric analyses supported the reliability and validity of scores on the adapted OSSS (Nick et al., 2018) measure. In sum, there was a statistically significant effect of friend source on online social support scores, with a large effect size. There were significant pairwise differences in scores between virtual friends and college friends as well as virtual friends and pre-college friends. There was a statistically significant correlation with a small effect size between length of friendship and online social support scores for college and virtual friends. And there were no statistically significant differences in total online social support scores between males and females, with negligible to small effect sizes.

This study contributes to the growing body of research that explores online social interactions. In this study, I found that perceptions of online social support differed by source. Specifically, differences in online social support were found between friends who met in-person and friends who met online. These data are especially relevant as the COVID-19 pandemic altered life as we knew it. Our experience, at least in North America, with physical distancing led to drastic changes in everyday life. In-person learning and socializing were substituted with online meetings, Zoom calls, and emails. And exchanges of social support shifted online as students used technology to connect with friends from school, childhood, and online spaces. More research will be needed to understand online social support both during and in the wake of COVID-19.

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Table 1

Defining Sources of Online Friend Support

	Friend group	Definition	Met in-person	Physical access	Length of friendship
1	College friends	friends you met in-person at UC Berkeley (e.g., in class, in a dorm, in a club)	√	√	Newer
2	Pre-college friends	friends who do not attend UC Berkeley and who you met in-person before you started attending UC Berkeley (e.g., childhood friends, camp friends, neighborhood friends)	√	X	Older
3	Virtual friends	friends you met online (e.g., in a chatroom, gaming community, online interest or support group)	X	X	Mixed

Table 2

Sociodemographic Characteristics and Technology Access of Participants (N = 500)

Variable	*n*	*%*
Gender		
Female	369	75
Male	114	23
Nonbinary/gender fluid	9	2
Race/ethnicity		
Asian	342	68
White	112	22
Hispanic/Latino/Spanish origin	55	11
Middle Eastern/North African	19	4
Black/African American	9	2
American Indian/Alaska Native	3	< 1
Native Hawaiian/Other Pacific Islander	1	< 1
Distance from campus		
Local (< 5 miles)	226	45
5–50 miles	86	17
50–100 miles	22	4
100–400 miles	106	21
> 400 miles & inside of the U.S.	44	9
Outside of the U. S.	16	3
Roommates		
Family	254	51
Berkeley friends	197	39
Alone	20	4
Friends who never attended Berkeley	7	1
Semesters		
1–2	20	4
3–4	204	41
5–6	131	26
7–8	136	27
9 +	3	< 1
Technology access		
Personal computer	495	99
Personal smartphone	496	99
Internet access		
Yes	416	83
Somewhat	83	17
No	1	< 1
Cellular data		
Enough data	440	88
Often ran out of data	48	10
No data	8	2

Table 3

Descriptive Statistics and Reliability Estimates of Online Social Support, Perceived Social Support, Loneliness, and Depression Measures (N = 500)

Variable	*n*	*M*	*SD*	*S*	*K*	*α*	*ω*
OSSS College friends	458	98.96	28.08	-.11	-.26	.98	.97
Esteem/emotional	463	28.35	7.643			.95	.95
Social companionship	464	21.48	6.54			.93	.93
Informational	463	27.01	7.92			.95	.95
Instrumental	461	22.06	9.30			.93	.93
OSSS Pre-college friends	449	91.03	32.01	-.30	-.18	.98	.98
Esteem/emotional	451	28.02	8.50			.95	.95
Social companionship	453	20.50	7.35			.94	.94
Informational	453	24.98	9.46			.96	.96
Instrumental	452	17.59	10.35			.94	.94
OSSS Virtual friends	197	75.72	30.37	-.07	-.21	.97	.97
Esteem/emotional	198	23.61	9.04			.94	.94
Social companionship	198	18.21	7.35			.92	.92
Informational	197	21.48	9.65			.95	.95
Instrumental	198	12.43	9.71			.93	.93
In-person perceived social support – friends	500	14.40	4.27	-.84	.17	.84	.84
Loneliness	500	8.76	2.46	.19	-.44	.77	.77
Depression	500	14.16	5.99	.10	-.54	.85	.85

Note. OSSS = Online Social Support Scale; *S* = skewness; *K* = kurtosis.

Table 4

Correlations Matrix of OSSS and Related Variables

Variable	OSSS college friends (n = 458)	OSSS pre-college friends (n = 449)	OSSS virtual friends (n = 197)	In-person social support (N = 500)	Depression (N = 500)	Loneliness (N = 500)
In-person social support	.45*	.37*	.04	1.00		
Depression	-.08	-.07	.01	-.28*	1.00	
Loneliness	-.40*	-.31*	-.06	-.65*	.52*	1.00

Note. OSSS = Online Social Support Scale.

* $p < .01$.

Table 5

Descriptive Information About College, Pre-College, and Virtual Friends

Variable	College friends (n = 465)		Pre-college friends (n = 455)		Virtual friends (n = 199)	
	n	%	*n*	%	*n*	%
No. of friends						
1–2	34	7	57	13	92	46
3–5	100	22	161	35	50	25
6–10	129	28	124	27	24	12
> 10	202	43	113	25	33	17
Hours per week in-person/virtual						
< 1	267/88	57/19	317/129	70/28	171/56	86/28
1–3	58/159	13/34	49/153	11/34	19/64	10/32
3–5	42/100	9/22	40/84	9/19	6/45	3/23
5–10	34/53	7/11	24/52	5/11	1/17	< 1/9
> 10	64/65	14/14	25/37	6/8	2/17	1/9
Years of friendship						
< 1	24	5	0	0	130	65
1	151	33	1	< 1	23	12
2	130	28	8	2	13	7
3	119	26	25	6	5	3
4	38	8	47	10	10	5
4–10	2	< 1	270	59	16	8
> 10	1	< 1	104	23	2	1
	M	*SD*	*M*	*SD*	*M*	*SD*
SCI	10.88	2.60	11.27	2.80	6.98	3.30

Note. SCI = Subjective Closeness Inventory.

Table 6

Online Platforms Participants Used to Communicate with Friends

Platform	College friends (n = 465)		Pre-college friends (n = 455)		Virtual friends (n = 199)	
	n	%	*n*	%	*n*	%
Text communication sites	456	98	444	98	137	98
Audio and/or visual communication platforms	392	84	342	75	97	49
Social media sites	412	89	391	86	127	64
Anonymous discussion apps	4	1	2	< 1	5	3
Forums	15	3	5	1	20	10
Dating sites/apps	19	4	4	1	28	14
Sports/fighting/racing games	22	5	33	7	16	8
Role playing/battle arena games	12	3	13	3	19	10
Other	13	3	10	2	17	9

Note. Counts will not add to sample totals because participants could select multiple platforms.

Table 7

Five-Factor Structure Coefficients from Principal Axis Extraction and Oblimin Rotation of the Online Social Support Scale with College Friends (n = 200)

OSSS item	Factor loading					h^2
	1	2	3	4	5	
ee1	-0.05	**-0.73**	0.26	-0.01	-0.08	0.69
ee2	0.09	**-0.77**	-0.03	0.04	0.04	0.72
ee3	0.05	**-0.82**	-0.06	0.08	0.00	0.75
ee4	0.05	**-0.62**	0.21	0.02	0.08	0.71
ee5	0.03	-0.18	0.02	0.09	**0.66**	0.65
ee6	0.10	-0.29	-0.07	0.15	**0.62**	0.77
ee7	0.12	**-0.56**	-0.08	0.17	0.19	0.64
ee8	-0.01	**-0.71**	0.11	0.08	0.12	0.75
ee9	0.01	**-0.72**	0.16	-0.01	0.12	0.76
ee10	0.10	**-0.64**	0.05	0.01	0.21	0.72
sc1	-0.01	-0.04	**0.84**	0.01	0.02	0.75
sc2	0.04	-0.01	**0.84**	0.06	0.00	0.80
sc3	-0.09	-0.14	**0.72**	0.17	-0.07	0.71
sc5	0.24	-0.22	**0.54**	-0.05	0.07	0.71
sc7	0.03	0.00	**0.59**	0.10	0.00	0.45
sc8	0.22	-0.04	**0.58**	0.02	0.02	0.59
sc9	0.40	-0.04	**0.41**	-0.02	0.16	0.61
sc10	0.29	-0.33	**0.36**	-0.10	0.12	0.67
inf1	**0.45**	-0.14	0.09	0.28	0.02	0.66
inf2	**0.63**	-0.01	0.14	0.11	0.07	0.66
inf3	**0.65**	-0.20	0.07	0.04	-0.02	0.71
inf4	**0.70**	0.05	0.11	-0.03	0.25	0.66
inf5	**0.61**	0.00	0.13	0.17	-0.02	0.65
inf6	**0.69**	0.05	0.11	0.13	0.11	0.73
inf7	**0.66**	-0.06	0.03	0.13	0.01	0.66
inf8	**0.60**	-0.21	-0.03	0.20	-0.13	0.70
inf9	**0.59**	-0.39	-0.08	0.06	-0.09	0.72
inf10	**0.56**	-0.21	0.10	0.11	-0.03	0.70
ins1	-0.01	-0.05	0.16	**0.50**	0.12	0.44
ins2	0.26	0.01	0.02	**0.54**	-0.06	0.53
ins3	0.26	0.01	0.11	**0.57**	-0.02	0.65
ins4	0.20	0.02	0.03	**0.71**	-0.04	0.72
ins5	-0.07	-0.12	-0.02	**0.85**	0.01	0.75
ins6	0.12	-0.04	0.03	**0.65**	0.04	0.62
ins7	0.06	-0.05	-0.05	**0.82**	0.05	0.76
ins8	-0.13	-0.02	0.13	**0.82**	0.02	0.69
ins9	0.16	-0.11	0.01	**0.64**	-0.16	0.61
ins10	-0.04	0.08	0.06	**0.60**	0.21	0.44
Eigenvalues	20.16	2.55	1.75	1.59	1.05	
% variance	52.20	5.87	3.79	3.30	1.89	

Construct α	.95	.95	.93	.93.87	
Factor correlation matrix					
Factor 1	1.00				
Factor 2	-.60	1.00			
Factor 3	.53	-.56	1.00		
Factor 4	.62	-.51	.53	1.00	
Factor 5	.25	-.39	.29	.30	1.00

Note. h^2 = communality estimates.

Table 8

Four-Factor Structure Coefficients from Principal Axis Extraction and Oblimin Rotation of the Online Social Support Scale with College Friends (n = 200)

OSSS item	Factor loading				h^2
	1 Informational	2 Instrumental	3 Social companionship	4 Emotional/esteem	
ee1	0.05	-0.09	0.28	**0.60**	0.62
ee2	0.17	-0.03	-0.02	**0.75**	0.70
ee3	0.15	0.00	-0.04	**0.76**	0.70
ee4	0.08	-0.02	0.22	**0.64**	0.70
ee5	-0.12	0.16	0.00	**0.62**	0.41
ee6	-0.02	0.20	-0.08	**0.71**	0.58
ee7	0.13	0.14	-0.08	**0.68**	0.64
ee8	0.02	0.03	0.11	**0.77**	0.75
ee9	0.04	-0.06	0.16	**0.76**	0.75
ee10	0.10	-0.02	0.05	**0.77**	0.72
sc1	-0.04	0.02	**0.87**	0.03	0.76
sc2	0.02	0.06	**0.86**	-0.01	0.80
sc3	-0.06	0.14	**0.76**	0.07	0.70
sc5	0.24	-0.05	**0.54**	0.23	0.71
sc7	0.02	0.10	**0.61**	-0.01	0.45
sc8	0.22	0.02	**0.58**	0.03	0.58
sc9	0.35	0.00	**0.39**	0.14	0.59
sc10	0.29	-0.11	0.36	**0.38**	0.66
inf1	**0.51**	0.23	0.09	0.12	0.66
inf2	**0.65**	0.09	0.12	0.03	0.65
inf3	**0.72**	-0.02	0.06	0.14	0.71
inf4	**0.62**	0.01	0.08	0.12	0.58
inf5	**0.67**	0.13	0.13	-0.05	0.65
inf6	**0.70**	0.12	0.10	0.01	0.71
inf7	**0.72**	0.09	0.02	0.03	0.66
inf8	**0.73**	0.12	-0.02	0.07	0.69
inf9	**0.71**	-0.03	-0.08	0.26	0.71
inf10	**0.64**	0.06	0.09	0.14	0.70
ins1	-0.01	**0.48**	0.16	0.15	0.44
ins2	0.35	**0.48**	0.03	-0.07	0.52
ins3	0.33	**0.51**	0.13	-0.05	0.65
ins4	0.29	**0.64**	0.05	-0.06	0.72
ins5	0.01	**0.78**	0.00	0.14	0.74
ins6	0.17	**0.60**	0.04	0.08	0.62
ins7	0.12	**0.76**	-0.03	0.09	0.76
ins8	-0.08	**0.77**	0.16	0.05	0.69
ins9	0.30	**0.53**	0.04	-0.03	0.58
ins10	-0.07	**0.60**	0.06	0.10	0.42

Eigenvalues	20.16	2.55	1.75	1.59
% variance	52.16	5.83	3.73	3.23
Construct α	.95	.93	.93	.94
Factor correlation matrix				
Factor 1	1.00			
Factor 2	.60	1.00		
Factor 3	.59	.49	1.00	
Factor 4	.64	.50	.60	1.00

Note. h^2 = communality estimates.

Table 9

Fit Indies for OSSS Confirmatory Factor Analyses (38 items)

	Model	*n*	X^2_{S-B}	*df*	CFI	TLI	RMSEA	[90% CI]
1	College friends OSSS (WLSMV 4-factor model)	265	2030.87*	659	.95	.95	.09	[.084, .093]
2	College friends OSSS (WLSMV higher-order model)	265	1996.16*	661	.95	.95	.09	[.083, .092]
3	Pre-college friends OSSS (WLSMV 4-factor model)	455	2516.30*	659	.97	.96	.08	[.075, .082]
4	Pre-college friends OSSS (WLSMV higher-order model)	455	2600.63*	661	.96	.96	.08	[.077, .084]
5	Virtual friends OSSS (WLSMV 4-factor model)	198	1564.56*	659	.95	.95	.08	[.078, .089]
6	Virtual friends OSSS (WLSMV higher-order model)	198	1754.01*	661	.94	.93	.09	[.086, 0.097]
7	College friends OSSS (ML)	261	8168.96*	703	.87	.86	.08	[.071, .081]

Note. OSSS = Online Social Support Scale; WLSMV = weighted least squares mean and variance adjusted estimation; ML = maximum likelihood estimation; CFI = comparative fit index; TLI = Tucker–Lewis index; RMSEA = root mean square error of approximation; CI = confidence interval.

* $p < .01$.

Table 10

Standardized Factor Coefficients for the Four-Factor WLMSV Models for the Online Social Support Scale for College Friends, Pre-College Friends, and Virtual Friends

Subscales	No. of items	College friends	Pre-college friends	Virtual friends
Emotional/Esteem	10	.91 .89 .88 .87 .81	.88 .91 .90 .87 .74	.90 .87 .92 .82 .68
		.83 .84 .92 .94 .90	.84 .85 .91 .94 .91	.74 .74 .85 .97 .89
Social	8	.90 .96 .85 .88 .68	.89 .92 .87 .91 .64	.88 .91 .80 .85 .65
Companionship		.88 .90 .84	.85 .90 .93	.79 .91 .90
Informational	10	.80 .83 .87 .82 .81	.89 .92 .88 .85 .87	.88 .87 .88 .84 .83
		.88 .88 .90 .88 .86	.90 .91 .90 .85 .89	.87 .86 .87 .88 .86
Instrumental	10	.72 .79 .86 .87 .89	.76 .83 .89 .88 .89	.69 .82 .89 .86 .89
		.84 .90 .76 .84 .66	.87 .91 .85 .84 .64	.84 .92 .79 .85 .72

Table 11

Standardized Factor Coefficients for the Higher-Order WLMSV Models for the Online Social Support Scale for College Friends, Pre-College Friends, and Virtual Friends

Subscales	No. of items	College friends	Pre-college friends	Virtual friends
Emotional/Esteem	10	.91 .89 .88 .87 .81	.88 .91 .90 .87 .74	.89 .87 .93 .82 .68
		.83 .84 .92 .94 .90	.84 .85 .91 .94 .91	.73 . 73 .85 .97 .89
Social	8	.90 .96 .85 .88 .68	.89 .92 .87 .91 .64	.88 .90 .80 .85 .65
Companionship		.88 90 .84	.85 .90 .93	.79 .92 .90
Informational	10	.80 .83 .87 .92 .81	.89 .92 .87 .85 .87	.88 .87 .88 .84 .83
		.88 .88 .90 .88 .86	.90 .91 .90 .85 .89	.87 .86 .87 .89 .86
Instrumental	10	.72 .79 .86 .87 .89	.76 .83 .89 .88 .89	.69 .82 .89 .86 .89
		.84 .90 .76 .85 .66	.87 .91 .85 .84 .64	.85 .92 .79 .85 .72
Total	38	.89 .88 .94 .82	.89 .93 .95 .82	.86 .86 .92 .69

Table 12

Hierarchical Regression with OSSS and In-Person Social Support with Loneliness and Depression Outcome Measures

	Model	Adjusted R^2	ΔR^2	ΔF	*df*	Sig. ΔF
Depression						
College						
	1	.08	.08	40.12*	456	< .017
	2	.08	.003	1.46	455	.23
Pre-college						
	1	.08	.08	38.44*	447	< .017
	2	.08	.001	.60	446	.44
Virtual						
	1	.02	.03	5.34*	195	.02
	2	.02	.00	.05	194	.82
Loneliness						
College						
	1	.42	.42	328.92*	456	< .017
	2	.42	.02	12.47*	455	< .017
Pre-college						
	1	.44	.44	354.81*	447	< .017
	2	.44	.004	3.56	446	.06
Virtual						
	1	.39	.39	124.43*	195	< .017
	2	.39	.002	.50	194	.48

* $p < .017$.

Table 13

Pairwise Comparisons of Online Social Support Scores by Friend Source

Friend source	Comparison	Mean difference	*SE*	*p*	[95% CI]
College	Pre-college	7.41	2.81	.03	[0.63, 14.20]
	Virtual	26.85*	2.71	<.017	[20.30, 33.41]
Pre-college	Virtual	19.44*	3.18	<.017	[11.76, 27.12]

* $p < .017$.

Table 14

Means and Standard Deviations of Online Social Support Scale Scores by Gender

Gender	College friends (n = 457)			Pre-college friends (n = 448)			Virtual friends (n = 196)		
	n	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*
Female	346	99.25	27.45	332	91.10	31.29	134	73.52	30.83
Male	97	98.75	29.50	104	91.35	34.09	54	78.31	29.10

Appendix A
Revised Sources of Online Social Support Scale

Now, think about the online platforms you use (social media sites, text communication sites, audio and/or visual communication platforms, anonymous discussion apps, forums, dating sites/apps, sports/fighting/racing games, role playing/battle arena games, etc.).
Rate how often the following things have happened for you while you interacted with your **virtual friends** online over the last two months.

ee1 My **virtual friends** show that they care about me online.
ee2 Online, my **virtual friends** say or do things that make me feel good about myself.
ee3 My **virtual friends** encourage me when I'm online.
ee4 My **virtual friends** pay attention to me online.
ee5 I get likes, favorites, upvotes, views, etc. online from my **virtual friends.**
ee6 I get positive comments online from my **virtual friends**.
ee7 When I'm online, my **virtual friends** tell me they like the things I say or do.
ee8 Online, my **virtual friends** are interested in me as a person.
ee9 My **virtual friends** support me online.
ee10 When I'm online, my **virtual friends** make me feel good about myself.
sc1 When I'm online, I talk or do things with my **virtual friends.**
sc2 My **virtual friends** spend time with me online.
sc3 My **virtual friends** hang out and do fun things with me online.
sc5 My **virtual friends** talk with me online about things we have in common.
sc7 I am part of groups online with my **virtual friends.**
sc8 When I'm online, my **virtual friends** joke and kid around with me.
sc9 My **virtual friends** relate to me through things I say or do online.
sc10 Online, my **virtual friends** make me feel like I belong.
inf1 When I'm online, my **virtual friends** give me useful advice.
inf2 Online, my **virtual friends** provide me with helpful information.
inf3 If I had a problem, my **virtual friends** would help me online by saying what they would do.
inf4 Online, my **virtual friends** would tell me where to find help if I needed it.
inf5 My **virtual friends** help me learn new things when I'm online.
inf6 My **virtual friends** offer suggestions to me online.
inf7 My **virtual friends** tell me things I want to know online.
inf8 When I'm online, my **virtual friends** help me understand my situation better.
inf9 If I had a problem, my **virtual friends** would share their point of view online.
inf10 My **virtual friends** help me see things in new ways when I'm online.
ins1 Online, my **virtual friends** would help me with money or other things if I needed it.
ins2 When I'm online, my **virtual friends** help me with school or work.
ins3 Online, my **virtual friends** help me get things done.
ins4 If I needed a hand doing something, I go online to ask my **virtual friends** to help out.
ins5 Online, my **virtual friends** offer to do things for me.
ins6 Online, my **virtual friends** help me with causes or events that I think are important.
ins7 When I'm online, my **virtual friends** have offered me things I need.
ins8 When I need something, I go online to find a **virtual friend** who might lend it to me.
ins9 When I need a hand with school or work things, I get help from my **virtual friends** online.
ins10 I contact my **virtual friends** online to get help or raise money for things I think are important.

Appendix B
Where Participants Met Their College, Pre-College, and Virtual Friends

Where friends met	College friends (n = 465)	Pre-college friends (n = 455)	Virtual friends (n = 199)
School	126	392	34
Clubs or extracurricular activities	115	18	18
Living situation	164	9	-
Employment	8	4	3
Programs (summer programs, student orientation programs)	57	12	1
Religious community	2	7	-
Socially (through mutual or family friends, at a party/restaurant/gathering)	64	23	6
Greek life	18	-	2
Sports	7	10	-
Gaming	1	1	36
Dating or friend-making app	-	-	22
Social media	-	-	49
Interest group	1	-	16
Chatroom /forum	-	-	22

Note. Participants could indicate multiple places where they met friends, so totals will be greater than number of participants in each category. All responses included in virtual friends analyses reported meeting their friends online. Therefore, if the category is *programs*, the participants indicated that they met in an online program.