ADOLESCENTS ON THE NET: INTERNET USE AND WELL-BEING

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ABSTRACT

With the growing popularity of Internet communication applications among adolescents, the Internet has become an important social context for their development. This paper examined the relationship between adolescent online activity and well-being. Participants included 156 adolescents between 15 to 18.4 years of age who were surveyed about their access to and use of the Internet. Participants also completed measures of loneliness and perceived social support. An ANOVA suggested that loneliness was not related to the total time spent online, nor to the time spent on e-mail, but was related to participants' gender. Regression analyses suggested that gender and participants' perceptions regarding their online relationships were the only variables that predicted loneliness. Adolescents who felt that their relationship with online partners was one that they could turn to in times of need were more lonely. However, perceived support from significant others was not related to time spent online, time on e-mail, participants' relationships with online partners, and to their perceptions about these relationships. The implications of our results for researchers, parents, and other lay persons are discussed.

Among adolescents, the Internet has become indispensable for instrumental purposes such as school work and information gathering, as well as for communication purposes. The communication applications of the Internet, such as e-mail, instant messaging, blogs, and chat rooms have entrenched themselves in the lives of adolescents (Boneva, Quinn, Kraut, Kiesler, & Shklovski, 2006; Craig, 2003; Gross, 2004; Schiano, Chen, Ginsberg, Gretarsdottir, Huddleston, & Isaacs, 2002) and the Internet has become an important social context in the

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lives of adolescents today. In fact a national survey of adolescents (10-17 years of age) revealed that in the year before they were surveyed, 25% of Internet users had formed casual online friendships and 14% had formed close friendships or even romantic relationships (Wolak, Mitchell, & Finkelhor, 2002). Questions abound as to the impact of online socio-communicative activities on adolescent well-being. The goal of the present study is to examine the relationship between adolescents' online communicative activity and loneliness and perceived social support.

Research on Internet Use and Adolescent Well-Being

Research suggests that adolescents use a variety of Internet applications such as instant messaging, bulletin boards, chat rooms, and blogs to connect with their peers (Boneva et al., 2006; Gross, 2004) and to explore typical adolescent issues such as sexuality, identity, and partner selection (Smahel, Subrahmanyam, & Greenfield, 2005). Given the extent of adolescents' Internet use (Roberts, Foehr, & Rideout, 2005), the concern is that this use displaces activities important for adolescent development such as physical activities and social interactions with peers that occur in face-to-face contexts and over the phone (see Subrahmanyam, Kraut, & Gross, & Greenfield, 2001). The Displacement hypothesis suggests that because time is a finite quantity, time spent on the Internet comes at the expense of other daily activities, in particular those involving face-to-face social interactions (Nie & Hillygus, 2002). In this view, Internet use displaces adolescents' "real interactions" with peers and family, and thus may substitute weak ties for strong ones (Granovetter, 1973; Krackhardt, 1994). Kraut, Patterson, Lundmark, Kiesler, and others (1998) characterize weak ties as relationships that have superficial and easily broken bonds, infrequent contact, and narrow focus. Research suggests that weak ties typically provide less consequential social support than more intimate ties (Krackhardt, 1994; Wellman, 1996). An alternative possibility is that adolescents who are lonely and who mostly have weak ties in their offline lives are drawn to the Internet for the interaction opportunities that it affords.

Some research suggests that greater use of the Internet is associated with declines in adolescents' well-being (Kraut et al., 1998), and with weaker social ties (Kraut et al., 1998; Sanders, Field, Diego, & Kaplan, 2000). Frequent Internet users were more likely to report lower levels of attachment to close friends (Mesch, 2001), and frequency of Internet use was negatively related to adolescents' perception about the quality of family relationships (Mesch, 2003). However, other research has not

found a link between adolescents' time online and psychological well-being (e.g., dispositional or daily well-being, loneliness, depression) (Gross, Juvonen, & Gable, 2002; Wastlund, Norlander, & Archer, 2001) as well as aspects of social networks, such as size of local and distant social circles and amount of face-to-face communication (Kraut, Kiesler, Boneva, Cummings, Helgeson, & Crawford, 2002).

One reason for this conflicting pattern of findings may be that the aforementioned research simply used the time spent online to measure Internet use and did not distinguish between different kinds of use; for instance, e-mailing and chatting with school friends might contribute to well being, surfing the web for information about sports, music, or movies might have no impact on well-being, and chatting with strangers and/or accessing pornographic materials might actually threaten well-being. In fact, Heitner (2004) reported that type of Internet activity (not social, asynchronous social, and synchronous social) was related to limited peer status, social introversion, and social withdrawal among a sample of adolescents. Similarly Mazalin and Moore (2004) found that time spent in chatrooms, online browsing, and games was related to higher levels of social anxiety and less mature identity statuses among older adolescent and young adult males, but not females.

There is also evidence that teens' offline lives might mediate the impact of their online activities (Gross et al., 2002; Kraut et al., 2002). For instance, Kraut et al. (2002) reported that among extroverted teens, Internet use was associated with declines in loneliness; Gross et al. (2002) found that adolescents who reported feeling lonely or socially anxious on a given day were more likely to communicate that day via instant messaging with people they did not know very well. It is becoming clear that in order to assess the impact of Internet use on well-being we need to consider multiple aspects of adolescent Internet activity in addition to time spent online. Extant research has not done this and the present study addresses this gap in the literature with regard to two important indices of adolescent well-being: loneliness and perceived social support from parents and close friends.

Loneliness and Perceived Social Support During Adolescence

Adolescents have to deal with many changes including the nature of their bodies, relationships with peers and parents, and increased autonomy. Not surprisingly, loneliness is common and quite intense during adolescence (e.g., Brennan, 1982; Woodward, 1988). Peplau and Perlman (1982) have defined loneliness as a psychological state resulting from discrepancies between an individual's desired and actual

relationships. Research suggests that adolescents' loneliness is related to peer relations (Degirmencioglu, 1995; Valas, 1999; Storch, Brassard, & Masia-Warner, 2003) as well as to self-esteem, family strengths, and mother-adolescent communication (Brage & Meredith, 1993). For instance, a study of adolescents' friendship networks revealed that participants who had a cohesive, highly interconnected friendship network reported less loneliness, less depressed mood, and more support from their friends (Degirmencioglu, 1995).

Similarly, adolescents with lower self-esteem report greater loneliness (Brage & Meredith, 1993). Peplau, Miceli, and Morasch (1982) have suggested that low self-esteem impairs social competence thus increasing the risk for loneliness. Harter (1985) has suggested that perceived regard for oneself may be directly influenced by perceived regard or support from others; she has suggested that such social support "in the form of positive regard from others" predicts global feelings of self. Research suggests that social support from significant others is important for psychological well-being (Sarason, Sarason, & Pierce, 1990; Nada-Raja, McGee, & Stanton, 1992), and is particularly important during adolescence when many changes are occurring (Kef & Dekovi, 2004).

The Present Study

Since the communication applications of the Internet (e.g., instant messaging and chat rooms) are used by adolescents to interact with both known and unknown peers, we asked whether such use may be related to their well-being. For instance, is well-being related to whether an adolescent communicates with strangers versus friends? Does the extent of adolescents' relationships with their online partners (e.g., whether they have telephoned them, met them in person), and their perceptions about these relationships (e.g., whether they would approach them in an emergency) relate to their well-being? The present study examined the relationships between adolescents' Internet use, particularly communication activities, and their feelings of loneliness and perceived support from significant others, such as close friends and parents. Internet use was assessed by asking participants about their access to the Internet, the total time they spent online, time spent on e-mail, and where (e.g., home versus school, bedroom versus den) they typically accessed the Internet. In addition, we also obtained information about their online communication partners—their knowledge about and familiarity with them, the nature and extent of their online relationships, and their perceptions about

their online relationships. Loneliness was measured by the Roberts Revision of the UCLA Loneliness Scale, and perceived social support was measured by Harter's Social Support Scale for Children (SSS-C).

Based on findings from prior studies, we hypothesized that overall time spent on the Internet would not be related to loneliness or perceived support. In contrast, because e-mail may help adolescents maintain contact with friends and family, we hypothesized that time spent communicating via e-mail would be related to loneliness and perceived support; specifically, adolescents who spent more time communicating via e-mail would be less lonely and would report greater support from parents and close friends. Similarly because communication with online acquaintances may be more superficial than communication with offline friends, we expected that participants who communicated with online acquaintances, who reported a stronger relationship with these online partners, and who felt that they could turn to online partners in times of emergency would report greater loneliness and less support from close friends and parents. As the Internet appears to be narrowing the gender gap in the use of technology (Subrahmanyam, Kraut, Greenfield, & Gross, 2001), we hypothesized that there would be no gender differences in the relationship between Internet use and well-being; i.e., the relationship between Internet use and well-being would not vary as a function of users' gender.

METHOD

Sample

A total of 192 participants, 94 male (M = 16.2 years) and 98 female (M = 16.0 years) completed the three measures. These respondents represented a wide age range, from 12.8 to 18.4 years. Given the complexity and variety of transitions that occur within this age range, we analyzed only the data from respondents who were between 15 to 18.4 years (M = 16.5 years; N = 156); of this latter group, 78 were male and 78 were female. The sample was ethnically diverse, with 40.4% White, 35.9% Asian (Asian, Asian-Indian, and Pacific Islander), 15.4% Latino/Hispanic (Not White), 1.9% African American, and 6.4% Other categories. Participants were recruited from a private high school that serves the San Gabriel valley of Los Angeles County.

Measures

Internet access questionnaire. This questionnaire, created by the authors, contained a variety of questions about participants' Internet use.

In this paper, we only report and analyze participants' responses to questions about their Internet access and use, such as the total time spent online, time spent on e-mail, and place of access. In addition, we analyzed data about their online partners (e.g., strangers, offline friends), their knowledge of and familiarity with their online partners, their relationship with their online partners, and perceptions about these relationships.

The Roberts Revision of the UCLA Loneliness Scale (RULS) (Roberts, 1986) was adapted from the UCLA Loneliness Scale, which is one of the most widely used instruments in the literature on loneliness (Mahon, Yarcheski, & Yarcheski, 1995). It consists of eight items to measure loneliness among adolescents and was designed to be brief for use with this age group. Each item contains a Likert-type response format; four items were positive (*I feel in tune with people around me)* and four were negative (*I lack companionship*). For each statement, participants were asked to choose from one of four categories, *never* to *often.* Roberts (1986) reported good internal consistency ($\alpha = 0.78$) for the scale; we also obtained good internal consistency ($\alpha = 0.72$).

The Social Support Scale for Children (SSS-C) (Harter, 1985) measures respondents' perceptions regarding the availability of others to whom they can turn in times of need, and their degree of satisfaction with that support. It consists of 24 items that assess respondents' perceived support from parents, classmates, teachers, and close friends. Each item has a forced-choice structure, with two statements (e.g., *Some kids don't have a close friend who cares about their feelings* and *Other kids do have a close friend who cares about their feelings*). Respondents have to first choose which statement is most like them and then rate how true that statement is for them (*Really true for me* or *Sort of true for me*). Since time online was most likely to displace time spent with family and close friends, only the data from the *Parents and Close Friends* subscale were analyzed in this study.

Although the scale was designed for use with children between 8 and 12 years of age, we adapted it for adolescents by using the word *teenagers* instead of *kids* in the statements. Harter (1985) has reported acceptable levels of internal consistency (α's ranging from 0.72 to 0.82) for the subscales. The internal consistency for our sample was acceptable for the two subscales of interest in this study—Close friends ($\alpha = 0.73$) and Parents ($\alpha = 0.70$).

Procedure

All participants were recruited from a large private high school. Testing was conducted with the assistance of the school's teachers,

who handed out copies of the three measures to participants for whom we had received informed consent and assent forms. Each measure included a cover sheet containing detailed instructions for completion; for the two standardized measures, the instructions provided by the test developers were used. Participants were not asked for any identifying information and remained anonymous. They completed the measures in class and returned them to the teacher at the end of the class period. The entire procedure took 30 to 45 minutes to complete.

Scoring and Analysis

For the RULS, positive items were reverse coded and responses to each item were assigned a score that ranged from 0 for *never* to 3 for *often.* Scores for each item were summed to yield a total score that ranged from 0 to 24, with a higher score indicating greater loneliness. Since the scores of the RULS were on an interval scale, they were analyzed using parametric methods of analyses, including ANOVA, correlation, and regression.

On the SSS-C, the rankings for each item received a score from 4 to 1, with 4 standing for the highest level of support (*really true that my parents treat me like a person*) and 1 the lowest level of support (*really true that my parents don't treat me like a person*). As there were six items in a subscale, the maximum possible raw score for each subscale was 24. The average score for each subscale was obtained by dividing the raw score by 6; a higher score indicated greater social support in that domain. Since the rankings were on an ordinal scale, the data were analyzed using the non-parametric method of Chi-square analysis. For these analyses, we grouped participants into a low- and high-parent and friend support group based on whether their scores on the Parent and Close friend subscales were above or below the respective mean of the subscale.

RESULTS

Access to and Use of the Internet

A majority of our respondents (94.9%) reported having access to the Internet, with 87.8% reporting home Internet access. Chi-square analyses revealed no gender [$\chi^2(1, N = 156) = 0.00, p = 1.00$] or ethnic group differences [$\chi^2(4, N = 156) = 2.43, p = 0.66$] with regard to Internet access in our sample. Participants reported spending an average of 85 minutes per day or 9¾ hours per week online. A between-subjects ANOVA on the time spent online per week with gender and

ethnic group as between-subjects factors yielded no reliable main effects or interactions (all $ps > .05$). Participants reported spending an average of 25 minutes per day or 2 hours and 50 minutes per week on e-mail. As before, there were no gender or ethnic group differences in the time spent on e-mail (all $ps > .05$).

Although participants had access to the Internet outside of the home, the majority reported that they used the Internet *mostly at home* (55.8%) or *only at home* (14.7%); 9% reported using the Internet *only outside their home* and 9% reported using the Internet *mostly outside the home.* Among those with Internet access at home, 40.4% reported accessing the Internet in their room; a smaller percentage reported that they had to access the Internet in a common space such as a family room (28.2%) or dining room (5.1%). Interestingly, 13.5% reported that they were usually with a friend, and 12.2% were usually with a family member.

Knowledge of and Relationships with Chat Partners

Participants were asked whether they knew the identity of their chat partners and also the extent of their relationships with them. Whereas 23.7% responded that they did not know the identity of their chat partners, 26.9% responded that they knew the identity of some of their chat partners, and 21.8% knew the identity of all of their chat partners; 27.6% of the respondents did not answer the question, presumably because they did not go to chat rooms. When questioned about their relationship with chat partners whose identity they knew, 23.7% responded that their chat partner was a very good friend with whom they hang out all the time, 21.8% responded that their partner was a friend with whom they hang out occasionally, 3.2% responded that they were an acquaintance whom they rarely meet, and 3.8% responded that they had never met their chat partner; 47.4% of the respondents did not answer this question. Chi-square analyses revealed no gender differences (all $ps > .05$) in the above trends.

Participants were also questioned about the kinds of interactions they had had with people they had met online and about their perceptions regarding these relationships. The majority (59.0%) of the respondents reported that they had never met their online acquaintances in person. Only 12.2% (19 adolescents) reported meeting online acquaintances more than three times; 15.4% of the respondents did not answer this question. Similarly, 51.3% reported that they had never spoken on the telephone with an online acquaintance, and 14.1% reported that they had spoken on the telephone more than 3 times; data were missing for 15.4% of the sample. Finally, only 26.9% (42 adolescents) re-

ported that an online acquaintance had become a good friend. Interestingly, 4.5% of the sample reported that they would definitely approach an online acquaintance in case of a problem or emergency, 11.5% said they probably would, 22.4% said they definitely would not, and 15.4% were not sure; 46.2% of respondents did not answer this question. As found previously, there were no gender differences in participants' interactions with their online acquaintances and their perceptions regarding these relationships (all $ps > .05$).

Loneliness

The total score on the RULS ($M = 8.4$, $SD = 4.5$) yielded a measure of loneliness for the participants in our study. We were interested in assessing whether loneliness was related to the overall amount of time spent online and time spent on e-mail and whether there were any gender differences in this relationship. To quantify the overall time spent online, we created the Internet use variable, with three levels of use—Low use (0–420 minutes/week), Medium use (between 421 and 840 minutes/week) and High use (841 minutes/week or more). E-mail use was also quantified—Low use (0-60 minutes/week), Medium use (61-200 minutes/week), and High use (201 minutes/week or more). The total score on the RULS was analyzed by a 2 X 3 X 3 (Gender X Internet use X E-mail use) between-subjects ANOVA. Only a main effect of gender [$F(1, 131) = 4.47$, $p < .05$] was obtained; planned comparisons showed that compared to girls ($M = 7.5$), boys ($M = 9.3$) had higher scores on the RULS regardless of the amount of Internet use or e-mail use they reported.

The above analysis suggested that loneliness was not related to either the overall amount of time spent online or to the time spent on e-mail. Next we conducted a correlational analysis to test the relationship between loneliness (as measured by the Total score on the RULS) and other aspects of adolescents' Internet use, such as their communication partners (Knowledge of chat partner's identity, Familiarity with chat partner) and the nature of their relationship with online acquaintances (Meeting an online acquaintance in person, Telephoning an online acceptance, Online acquaintance now a good friend, Approaching an online acquaintance in an emergency) (see Table 1). Examination of Table 1 suggests that because there was no reliable relation between loneliness and knowledge of a chat partner's identity and familiarity with him/her ($ps > .05$), this was not analyzed further. With regard to loneliness and relationships with online acquaintances, no reliable relationship was found between loneliness and Meeting an online ac-

Table 1.

Intercorrelations Between Loneliness and Chat Partner Variables

(Sample Size in Parenthesis)

Variables	1	2	3	4	5	6	7
1.Loneliness	--	-0.15 (155)	0.13 (82)	0.12 (131)	0.17 (131)	0.17 (131)	0.37* (83)
2.Knowledge of chat partner's identity		--	-0.48* (75)	0.03 (109)	0.09 (109)	0.17 (109)	-0.02 (64)
3.Familiarity with chat partner			--	0.03 (78)	0.10 (78)	0.17 (78)	-0.03 (50)
4.Meeting an online acquaintance in person				--	0.57* (132)	0.26* (131)	0.25* (78)
5.Telephone an online acquaintance					--	0.38* (131)	0.21 (78)
6.Online acquaintance now a good friend						--	0.01 (78)
7.Approach online acquaintance in emergency							--

quaintance in person, Telephoning an online acquaintance, and Online acquaintance now a good friend (all $ps > .05$). However, there was a reliable relationship between loneliness and Approaching an online acquaintance in an emergency ($p < .01$). The sign of the correlation coefficient suggested that participants who reported that they would definitely contact an online acquaintance in an emergency reported greater loneliness as measured by the Total score on the RULS than those who said they would definitely not.

Next we conducted a linear regression analysis to see if this relationship would hold when controlling for participants' gender and other aspects of their relationship with online acquaintances. The variable to be predicted was the total score on the RULS; the predictor variables were entered in a single step and included gender (male = 1, female = 2), whether a subject had met an online acquaintance in person, whether he/she had spoken on the telephone with an online acquaintance, whether an online acquaintance was now a good friend, and whether he/she would approach an online acquaintance in an emergency. The regression analysis yielded an adjusted R square of 0.23 [$F(5, 70) = 5.50$, $p < .01$]; the summary of the regression analysis is presented in Table 2. The regression coefficients indicate that the total score on the RULS was significantly higher for participants who were male and who responded that they would approach an online acquaintance in an emergency.

Perceived Social Support from Parents and Close Friends

The mean on the Parent subscale was 2.41 ($SD = 1.15$) and on the Close Friends subscale it was 2.60 ($SD = 1.24$). There was a reliable correlation between participants' scores on the Parent and Close Friend subscales [$r(N = 156) = 0.895$, $p < .01$]. Chi-square analyses revealed no effect of gender, overall time online, and time on e-mail (all $ps > .05$) on perceived support from parents and close friends. Chi-square analyses also revealed no reliable differences (all $ps > .05$) between the high parent support and low parent support groups with regard to participants' knowledge of their chat partner's identity and familiarity with their chat partner. We also found no reliable differences ($ps > .05$) between the two groups with regard to the following variables: whether he/she had spoken on the telephone with an online acquaintance and whether he/she would approach an online acquaintance in an emergency. However, the results of the chi-square analysis approached significance for two variables: whether participants had met an online acquaintance [χ^2 (3, $N = 132$) = 6.82, $p = 0.07$] and whether an online acquaintance had become a good friend [χ^2 (1, $N =$

Table 2.

Summary of the Regression Analysis for Variables Predicting the Total Score on the RULS

Variable	Beta	t	p value
Constant		5.654	.000
Gender	-0.33	-3.23	.002*
Meeting Online acquaintance	0.05	0.40	0.69
Telephone online acquaintance	0.09	0.66	0.51
Online acquaintance to good friend	0.18	1.55	0.13
Approach Online acquaintance in an emergency	0.25	2.23	0.03*

Note. Adjusted $R^2 = 0.23$

132), $p = 0.06$]. With regard to meeting an online acquaintance in person, 67% of the participants in the low parent support group reported that they had never done so, 9% reported meeting an online acquaintance once, 6% reported meeting two or three times, and 18% reported meeting more than three times; among the high parent support group 70% reported that they had never done so, 14% had met more than once, 2% two or three times, and 14% had met more than three times. Further, 41% of participants in the low parent support

group reported that an online acquaintance was now a good friend whereas only 26% of participants in the high parent support group did so.

A similar analysis revealed no reliable differences (all $ps > .05$) between the high friend support and low friend support groups with regard to participants' knowledge of their chat partner's identity and their familiarity with their chat partner. We also found no reliable differences (all $ps > .05$) between the two groups with regard to whether a subject had met an online acquaintance in person, whether he/she had spoken on the telephone with an online acquaintance, whether an online acquaintance was now a good friend, and whether he/she would approach an online acquaintance in an emergency.

DISCUSSION

As a group, adolescents are the biggest consumers of the Internet, particularly its communication applications. Concerns have been raised that such online interactions displace face-to-face or "real" interactions, are characterized by weak ties, and so threaten well-being. We undertook this study to get a better understanding of the relationship between adolescents' Internet use and their psychological well-being as measured by their self-reported loneliness and perceived social support from significant others.

Before discussing the results relevant to our hypotheses concerning Internet use and well being, we note two important trends regarding Internet use that emerged. First, in our sample of urban adolescents, there were no gender and ethnic group differences in participants' access to the Internet. This is contrary to the digital divide in Internet access previously found in other surveys (e.g., Roberts et al., 2005). We believe that one reason for this finding could be that our participants were recruited from a parochial school in Los Angeles and so may have come from families that felt it was necessary to provide their children with access to this technology.

Secondly, we found no gender differences in the time spent online by our participants. The lack of a gender difference in Internet use is relevant because boys have tended to spend more time on earlier forms of computer technology such as computer and video games (see Subrahmanyam & Greenfield, 1998). Our finding is consistent with other research suggesting that the Internet may be helping to narrow the gender gap that was typical in the use of earlier generations of computer applications (Subrahmanyam, Kraut, Greenfield, & Gross, 2001).

Informal uses of technology such as games and the Internet may serve as entry points to technology in general (Greenfield & Subrahmanyam, 1998). Although the narrowing of the gender gap in an informal use of technology might be a portend for the future, it is too early to predict whether the gender gains in computer and Internet use will translate into more female participation in the field of computer science, a notoriously male-dominated field.

With regard to Internet use and well-being, our results showed that neither the total amount of time online nor time on e-mail was related to loneliness and perceived support from parents and close friends. Although we had hypothesized that total time online would not be related to indices of well-being, we had predicted that time on e-mail would be. We believe that one reason why we did not find a link between e-mail time and well-being was that participants might have had difficulty estimating the time they spent on e-mail separate from other online activities. This is particularly so because high-speed Internet access allows users to have multiple Internet-based applications open at the same time and seamlessly shift among them. In fact, given the wide variety of Internet uses possible these days, future research should use computer software to automatically record the time spent on various online activities. Such an approach might help make sense of the contradictory findings of current research regarding time online and well-being.

Although we had expected that participants' time online would not be related to well-being, we had hypothesized that their communication partners and extent of their relationship with them would be related to well-being. Contrary to our expectations, loneliness was not related to whether participants knew and were familiar with their online partners but was related to participants' gender and their perceived relationship with their online partners. Participants who were male and who reported that they would approach an online friend in an emergency reported greater loneliness. Apparently, adolescents who felt that their relationship with online partners was one that they could turn to in times of need were also more lonely. Perceived support was also not related to knowledge and familiarity with chat partners as well as to the extent of participants' relationships with online partners. There was some indication that participants who reported receiving less support from their parents were more likely to have met an online acquaintance and to have become good friends with him or her. Finally, although males reported greater loneliness than females, as predicted, we did not find any gender differences in the relationships between Internet use and well-being.

Our finding that participants' loneliness was related to their perceptions of their relationship with online acquaintances could have been due to one of two reasons. One possibility is that adolescents who feel they can depend on their online relationships become lonely because of the weaker nature of such ties. Another possibility is that some participants' unrealistic perceptions about friendships and relationships contribute both to their feelings of loneliness and to their belief that they can rely on online partners in the event of an emergency. The correlational nature of our study does not allow us to choose between these two possibilities, but reiterates that there are three possible ways in which loneliness, social support, and Internet use may be related. First, loneliness and low social support may be a result of Internet use; second they may be a cause of Internet use, and third they may serve as a moderator of the effects of Internet use. Clearly the relationship between Internet use and well-being is complex, and future work must begin to distinguish among these different mechanisms.

An important issue concerning adolescent Internet use is the extent to which they interact with strangers online and the kinds of relationships they have with them. The majority of the adolescents in our sample had not met their online partners in person and only a small minority reported meeting their online acquaintances in person and speaking with them on the telephone. This finding suggests that most online relationships remain in the online realm. In fact, only a small proportion reported that they had become good friends with an online acquaintance and that they probably would approach these acquaintances in an emergency. For this small group of adolescents, the Internet may actually offer a venue for social interaction and provide opportunities to form relationships (Bargh & McKenna, 2004). However, our results indicate that they may also be most at risk with regard to well-being, and future research on the effects of Internet use may need to target them in particular. Furthermore, given our finding that most adolescents access the Internet from their homes and in the privacy of their rooms, it is particularly important for parents to be aware of the extent of their adolescents' relationship with partners they meet online.

Our results confirm our hypothesis that there would be no gender differences in the relationship between Internet use and well-being and we speculate that it may have been due to the lack of gender differences in Internet access and use in our sample. However, it is interesting that the male adolescents in our study were more lonely.

Our finding that males reported more loneliness is contrary to prior findings of no gender differences in adolescent loneliness (Brage & Mredith, 1993) as well as greater loneliness among females (Brennan & Auslander, 1979; Medora & Woodward, 1986; Woodward & Frank, 1988). One possible explanation for this reversal is that the advent of chat and instant messaging has provided female adolescents with previously unavailable avenues for social exploration and interaction, making them less lonely (Subrahmanyam, Greenfield, & Tynes, 2004).

It is also important to address limitations of this study. One is the self-report nature of the data and the fact that such data are subject to memory loss and various biases in responding. Also, as discussed earlier, asking participants to estimate the amount of time they spend online and on different activities is inherently problematic. Finally, there were missing data on a number of questions either because the question was not relevant to a participant (e.g., if a participant did not have an online relationship he/she did not respond to further questions about the relationship) or because the participant chose not to answer it. Because of the anonymous nature of our survey, we were not able to obtain clarifications from our participants.

This study has implications both for researchers and for all those involved in the lives of adolescents. First, it highlights the importance of recognizing that the Internet has become an integral part of the social context surrounding today's adolescents. Unfortunately developmental research has not begun to systematically include the Internet as a contextual factor when studying adolescent development. No doubt the challenge has been the changing nature of the Internet and the difficulties inherent in keeping up with these changes. However, because adolescents are the early adopters of this technology, and to a large extent determine how they use it (Greenfield & Subrahmanyam, 2003), it is even more important to consider the Internet when studying adolescent development. This study also suggests that when examining the relationship between adolescent Internet use and development, it is important for researchers to go beyond measures of time spent online. Because of the sheer diversity of Internet use that is available, researchers must instead consider particular aspects of Internet use that are likely to be relevant for the issue under study. Of course one must also not forget that adolescents' interactions and uses of the Internet are likely to be very different from those of the adult researcher.

Our results are also relevant to parents, teachers, and others who are concerned about the well-being of adolescents. While there is no

question that chat rooms can be dangerous places (Mitchell, Finkelhor, & Wolak, 2001; Smith, 2004), with proper supervision they can provide a venue for social interaction for adolescents who are lonely and who feel they do not receive support from their parents and close friends. Our study also suggests that when parents and others assess adolescents' Internet use, it is not enough to consider only the time that they spend online. Even more important is what they do, who they interact with, and the kinds of relationships they have with their online partners. Other aspects of Internet use also need to be taken into account depending on the issue under consideration. In conclusion, given that the Internet is here to stay and has become an integral part of adolescents' lives, more research is needed in order to understand how it can help them navigate the period of adolescence.

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