

Internet Communication and Its Relation to Well-Being: Identifying Some Underlying Mechanisms

Patti M. Valkenburg and Jochen Peter
*Amsterdam School of Communications Research
University of Amsterdam*

The aim of this study was to improve our insight into the relation between Internet communication and well-being. Drawing on a survey of 816 adolescents, we initially found that Internet communication was negatively related to well-being. However, when adolescents' (a) closeness to friends and (b) tendency to talk with strangers online were included in our structural equation model, an opposite pattern of results emerged. First, the direct negative relation between Internet communication and well-being disappeared. Second, via the mediator closeness to friends, Internet communication showed a positive influence on well-being. Third, not Internet communication per se, but Internet communication with strangers accounted for a negative effect on well-being. Fourth, the effects of both Internet communication and Internet communication with strangers on well-being were most adverse for lonely adolescents.

Since the second half of the 1990s, a growing number of studies have investigated relations between Internet use and well-being. Most studies used depression or loneliness measures as indicators of well-being (Gross, Juvonen, & Gable, 2002; Jackson et al., 2004; Kraut et al., 1998, 2002; LaRose, Eastin, & Gregg, 2001; Leung, 2002; Moody, 2001; Morgan & Cotten, 2003; Sanders, Field, Diego, & Kaplan, 2000; Shaw & Gant, 2002; Waestlund, Norlander, & Archer, 2001; Weiser, 2001). Other studies employed measures of life satisfaction or positive and negative affect (Gross et al., 2002; Kraut et al., 2002 [study 2]; Weiser, 2001).

For all types of well-being measures, the studies have yielded mixed results. With respect to depression, three studies reported positive relations with various

types of Internet use (Kraut et al., 1998; Morgan & Cotten, 2003 [for surfing]; Weiser, 2001 [for personal Internet use]), three studies found negative relations (Kraut et al., 2002 [study 1]; Morgan & Cotten, 2003 [for e-mail and chat]; Shaw & Gant, 2002), and six studies found no significant relations (Gross et al., 2002; Jackson et al., 2004; Kraut et al., 2002 [study 2]; LaRose et al., 2001; Sanders et al., 2000; Waestlund et al., 2001). However, when measures of excessive or compulsive Internet use were investigated, studies consistently reported positive relations with depression (Caplan, 2003; Engelberg, & Sjöberg, 2004; Young & Rogers, 1998).

As for loneliness, the Internet effects studies have also yielded inconsistent results. Whereas some studies reported positive relations (Kraut et al., 1998, 2002 [study 2, only for introverts]), others found negative relations (Moody, 2001; Shaw & Gant, 2002), and yet others reported no significant relations (Gross et al., 2002; Kraut et al., 2002 [study 1]; Leung, 2002; Waestlund et al., 2001; Weiser, 2001). Finally, for measures of life satisfaction and positive and negative affect, similarly inconsistent findings were reported (Gross et al., 2002; Kraut et al., 2002 [study 2]; Weiser, 2001).

At least two reasons may account for the inconsistent findings regarding the relation between Internet use and well-being. First, many earlier studies treated the independent variable Internet use as a one-dimensional concept. With some exceptions (e.g., Gross et al., 2002; Morgan & Cotten, 2003), most studies employed only a measure of weekly or daily time spent on the Internet, thereby not distinguishing between different types of Internet use. However, it is widely understood in media-effects literature that different types of media use may result in different outcomes (Culbertson & Stempel, 1986; Holtz-Bacha & Norris, 2001; McLeod & McDonald, 1985). In this article, we focus on one particular type of Internet use, namely Internet communication. We believe that if the Internet is to influence well-being, it will be through its potential to alter the nature of communication and social interaction (see McKenna & Bargh, 2000, for a discussion on this potential of the Internet). Internet communication is defined as the composite of the frequency, intensity, and rate with which the Internet is used for chat or instant messaging (IM).

A second shortcoming in earlier studies is that many authors did not specify why Internet use could be related to well-being. With some exceptions (LaRose et al., 2001; Morgan & Cotten, 2003; Weiser, 2001), most research has treated the relation between Internet use and well-being as a simple main effect. However, several scholars have pointed to the fact that there is no such thing as a direct impact of Internet use (Bargh, 2002; Tyler, 2002). Instead, we need to specify what the mechanisms are that may underlie relations between Internet use and well-being. The aim of our study is to fill this gap in the literature and to investigate some potential underlying processes in the Internet–well-being relation.

In our study, we focused on life satisfaction rather than a depression measure to investigate adolescents' well-being. Although depression is usually highly correlated with life satisfaction (see, e.g., Gross et al., 2002; Weiser, 2001), we believe that life satisfaction is a better indicator of well-being in a nonclinical sample. In this study, well-being is defined as happiness or a positive evaluation of one's life in general (Andrews & Robinson, 1991; Diener, 1984; Diener, Suh, Luca, & Smith, 1999).

This study focused on adolescents for two reasons: First, adolescents are currently the defining users of the Internet (e.g., Lenhart, Madden, & Hitlin, 2005; Madden & Rainie, 2003). They not only spend more time on the Internet than adults, but they also use the Internet more frequently for communication purposes. Second, adolescence, in particular, is characterized by a heightened vulnerability about the self. During adolescence, levels of self-esteem and well-being are highly volatile and most likely to be affected by environmental influences (Harter, 1999; Schaffer, 1996). If Internet communication has the potential to influence well-being, it is most likely to occur during adolescence.

INTERNET COMMUNICATION, CLOSENESS TO FRIENDS, AND WELL-BEING

Generally, one of the more powerful statistical predictors of well-being is the quality of one's social network in general (Pinquart & Sörensen, 2000) and that of close friendships in particular (Hartup & Stevens, 1997). Adolescents with high-quality friendships are more socially competent, self-confident, and happier than adolescents without such friendships (Hartup & Stevens, 1997). Close friendships serve as an effective sounding board against which one's identity can be validated, and they can form a powerful buffer against potential stressors (Bukowski, 2001; Hartup, 2000).

A potential influence of adolescents' closeness to friends on their well-being must be seen against the backdrop of recent developments in adolescents' Internet communication. In the past few years, more and more adolescents have started to use the Internet to maintain their existing friendships (Gross et al., 2002; Valkenburg & Peter, in press). Not long ago, it was difficult, if not impossible, to uphold one's existing social network on the Internet, simply because the greater part of this network was not yet online. However, because the Internet is now progressively used to maintain existing relationships with friends, it is plausible to assume that Internet communication will have positive effects on adolescents' closeness to their friends. After all, if Internet communication is indeed used to nourish existing friendships, it is to be expected that these friendships will benefit from this use.

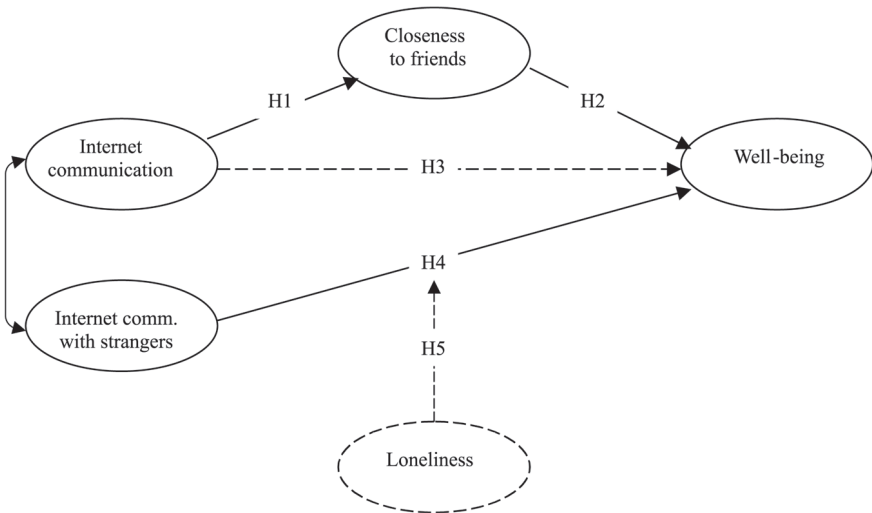


FIGURE 1 Hypothesized model on the relations among Internet communication, Internet communication with strangers, closeness to friends, and well-being, with loneliness acting as a moderator.

If, then, adolescents’ closeness to friends is positively related to their well-being and if Internet communication may affect the closeness to friends, then adolescents’ closeness to friends could, logically, mediate the effect of Internet communication on well-being. In this case, it is to be expected that a potential direct relation between Internet use and well-being will disappear when adolescents’ closeness to friends is included as a mediator. Based on this reasoning, our first three hypotheses, which are modeled in Figure 1, predict that

- H1: Adolescents’ use of Internet communication is positively related to their closeness to friends (see solid path H1 in Figure 1).
- H2: Adolescents’ closeness to friends is positively related to well-being (see solid path H2 in Figure 1).
- H3: A potential direct relation between Internet communication and well-being will disappear when closeness to friends is included as a mediator in the hypothesized model (see broken path H3 in Figure 1).

INTERNET COMMUNICATION WITH FRIENDS OR STRANGERS

The focus on general Internet use in earlier studies has not only obstructed our insight into the differential effects of various types of Internet use on well-being;

it has also led to an ignoring of an essential component of Internet communication, the communication partner. Several scholars have emphasized that the nature of the interaction partner should be taken into account to obtain a true understanding of the dynamics and effects of Internet communication (e.g., Walther & Parks, 2002). In this study, we focus on the type of communication partner that is believed to have adverse effects on adolescents' well-being; the stranger (Gross et al., 2002; Wolak, Mitchell, & Finkelhor, 2003). By Internet communication with strangers we mean adolescents' communication with people on the Internet whom they have never met in real life.

Although the majority of adolescents use the Internet to communicate with existing friends, there is still a group of adolescents who seek online contact with strangers (Gross et al., 2002; Wolak, Mitchell, & Finkelhor, 2002). There is evidence that members of this group encounter more trouble in their lives than those who do not communicate with strangers online (Wolak et al., 2003). We therefore expect that if Internet communication has the potential to affect well-being negatively, those most prone to such effects will be adolescents who often talk with strangers online.

The desire for Internet communication with strangers could be due to several factors. First, adolescents, who are generally at their peak of sensation seeking (Zuckerman, 1979), may find excitement in Internet communication with strangers, for example to experiment with their identity. This motive for communication with strangers occurs most often among extraverted adolescents between 12 and 14 years of age (Valkenburg, Schouten, & Peter, 2005). However, it is also conceivable that lonely adolescents, in particular, seek Internet communication with strangers. Although loneliness does not predict Internet communication per se (Amichai-Hamburger & Ben-Artzi, 2003; Gross et al., 2002; Leung, 2002), it does seem to positively predict Internet communication with strangers (Gross et al., 2002). It is conceivable that the relation between Internet communication with strangers and well-being will be stronger for lonely rather than nonlonely adolescents. After all, lonely adolescents have fewer close friends in their offline lives (Gross et al., 2002) who could act as a buffer against potential distress due to Internet communication with strangers. In this study, we investigate the potentially moderating role of loneliness in the relation between Internet communication with strangers and well-being. Our expectations with respect to this role are formulated in the following two hypotheses:

- H4: Adolescents who often talk with strangers on the Internet display lower levels of well-being than adolescents who often talk with their existing friends (see solid path H4 in Figure 1).
- H5: The potential relation between online communication with strangers and well-being will be stronger for lonely than for nonlonely adolescents (see broken path H5 in Figure 1).

METHOD

Sample

We conducted a survey among 816 adolescents between 10 and 17 years of age ($M = 13.21$, $SD = 1.67$), 52% boys and 48% girls. Of these adolescents, 687 (84%) reported that they used the Internet for IM or chat. The analyses in this article are based on these 687 adolescents. The adolescents were recruited from six elementary, middle, and high schools in the Netherlands. The schools were chosen in such a way that they represented adolescents of all educational levels. After we had obtained parental consent, the questionnaires were administered in the adolescents' classrooms. We made sure that the adolescents had sufficient privacy to fill in the questionnaire. Completing the questionnaire took about 15 min.

Measures

Internet communication. We used three items measuring the frequency, rate, and intensity of Internet communication: (a) "How many days this week have you been online to use chat or IM?" (b) "On the last day that you were online, how many times did you use chat or IM?" and (c) "On the last day that you were online, how long did you use chat or IM?" The first two items required open-ended responses. Response categories for the third item ranged from 1 (*about 15 min*) to 7 (*3 hr or more*). Responses to the three items were standardized. A factor analysis showed that all items loaded on one factor, which explained 58% of the variance. The items formed a unidimensional scale with a Cronbach's alpha of .64, which could not be improved by deleting items.

Closeness to friends. We used four items from the inventory of parent and peer attachment developed by Armsden and Greenberg (1987) to measure adolescents' closeness to friends. These items resulted in the highest factor loadings in a previous Dutch study based on the inventory (Van Ammers et al., 1988). The selected items were "When my friends know that something is bothering me, they ask me about it," "I tell my friends about my problems and troubles," "My friends help me to understand myself better," and "When I am angry about something, my friends try to be understanding." Response categories ranged from 1 (*agree entirely*) to 5 (*disagree entirely*). The items loaded on one factor, which explained 70% of the variance (Cronbach's alpha = .86) and were inversely coded.

Well-being. We used the five-item Satisfaction with Life scale (SWLS) developed by Diener, Emmons, Larsen, and Griffin (1985). Examples of items of this scale are "I am satisfied with my life" and "In most ways my life is close to my ideal." Response categories ranged from 1 (*agree entirely*) to 5 (*disagree*

entirely) and were inversely coded. Cronbach's alpha for the scale was .86, which is comparable to the alpha of .87 reported by Diener et al.

Internet communication with strangers. The frequency with which adolescents used the Internet to communicate with strangers was measured with two items: "When I use the Internet for chat or IM, I do this with people I only know from the Internet" and "when I use the Internet for chat or IM, I do this with people I don't know at all." Response categories ranged from 1 (*never*) to 4 (*almost always*). The correlation between these items was $r = .28$. (Cronbach's alpha .43).

Loneliness. We used the UCLA Loneliness scale (Russell, 1996). From this 20-item scale we selected the eight items with the highest item-total correlations (Items 3, 4, 7, 10, 13, 14, 16, 20; Russell, 1996). Three of these items had a positive wording (e.g., "I often feel close to people") and five a negative wording (e.g., "I often feel alone"). Response categories ranged from 1 (*agree entirely*) to 5 (*disagree entirely*) and were inversely coded. We conducted a principal components analysis on the eight items, which led to a two-factor solution that explained 63% of the variance. The first factor was defined by the five items with a negative wording and the second factor was defined by the three items with a positive wording. Several earlier studies that employed exploratory factor analysis on this scale also found two factors reflecting the direction of item wording (for a review, see Russell, 1996). However, a multidimensional factor structure can lead to serious problems in structural equation modeling (Kishton & Widaman, 1994). Therefore, we decided to use only the five items with a negative wording, which resulted in a Cronbach's alpha of .84.

RESULTS

Descriptive Statistics

Of all 816 respondents, 84% ($n = 687$) reported that they used the Internet for communication (86% girls and 83% boys). When adolescents were online, on average, they used chat or IM for approximately 1 hr. Of the adolescents who used the Internet for chat or IM, 58% reported that they at least sometimes communicated online with people they knew only from the Internet. In addition, 45% of the adolescents reported that they at least sometimes talked with people on the Internet whom they did not know at all.

Adolescents were reasonably happy with their lives. The range of possible scores on the SWLS ranged from 1 (*low satisfaction*) to 5 (*high satisfaction*). Adolescents' mean score on the SWLS was 3.55 ($SD = 0.82$). There were no

gender differences in scores on the SWLS. However, the 14- to 15-year-olds scored somewhat lower on the SWLS than the younger and older adolescents, $F(7, 679) 2.94, p < .01$. This result is in line with developmental research on adolescents, which showed that a drop in well-being in early to middle adolescence is a common phenomenon (e.g., Schaffer, 1996).

Zero-Order Correlations

Before testing our hypothesized model, we present a matrix showing the zero-order correlations among the variables included in the model, as well as their correlations with age and gender. As Table 1 shows, Internet communication was positively related to Internet communication with strangers and closeness to friends but negatively to life satisfaction and was not related to loneliness. Internet communication with strangers was not related to closeness to friends, was related negatively with life-satisfaction, and was related positively with loneliness. Life satisfaction was positively related to closeness to friends and negatively to loneliness, and loneliness was negatively related to closeness to friends. Finally, gender was only related to closeness to friends, whereas age was related to almost all of our independent variables (except for communication with strangers). However, age did lead to a nonlinear relation with talking to strangers (.08, $p < .05$), indicating that 12- to 15-year-olds more often talked to strangers than younger and older adolescents did.

Testing the Hypothesized Model

The hypotheses in our study were investigated with the structural equation modeling software AMOS 5.0 (Arbuckle, 2003). In structural equation modeling, two types of variables can be distinguished: (a) manifest variables, which are

TABLE 1
Zero-Order Correlations Among all Variables in the Model,
Plus Gender and Age

Variables	1	2	3	4	5
1. Internet communication					
2. Internet communication with strangers	.23*				
3. Closeness to friends	.14*	-.02			
4. Life satisfaction	-.11*	-.17*	.13*		
5. Loneliness	.02	.10*	-.16*	-.43*	
Age	.15*	-.03	.15*	-.12*	-.04
Gender (boys)	.00	.03	-.38*	.03	-.05

* $p < .01$.

observed or measured directly; and (b) latent variables, which are derived from manifest variables and represent “true” measures free of measurement error. Latent variables can be estimated from multiple manifest variables with the use of confirmatory factor analysis.

All variables in our model were latent variables. For well-being and closeness to friends, we created two manifest indicators, which is a common procedure in structural equation modeling (Kishton & Widaman, 1994). The first indicator was formed by averaging adolescents’ responses to the odd items on the particular scale, and the second indicator was created by averaging their responses to the even items on the particular scale. The latent construct Internet communication was estimated from the three items measuring adolescents’ frequency, rate, and intensity of online communication. Finally, the latent construct Internet communication with strangers was estimated from the two items that asked respondents how often they communicated with (a) people they knew only from the Internet and (b) people they did not know at all. In total, our structural equation model counted nine observed variables.

For reasons of parsimony, we do not present the measurement model (i.e., the factor-analytic models) in our graphical presentations. However, the measurement model led to a satisfactory description of the data. The factor loadings for the well-being and closeness to friends constructs were all above .73. The factor loadings for Internet communication and Internet communication with strangers, which were based on single-item indicators, were all above .45. The stable factor-analytic models are a valid indicator of the reliability of our latent constructs. After all, when measured satisfactorily, latent constructs represent true scores free of measurement error (Byrne, 2001).

To investigate our hypotheses, we proceeded in four steps. First, we tested the direct relation between Internet communication and well-being (Model 1). Second, we included closeness to friends in our model to investigate whether this construct mediated the relation between Internet communication and well-being (H1 to H3; Model 2). Third, we included Internet communication with strangers in the model to investigate its relation with well-being (H4; Model 3). Finally, we investigated the moderating influence of loneliness on the relation between Internet communication with strangers and well-being by testing whether the overall model would differ for lonely and nonlonely adolescents (H5). We used two indexes to evaluate the fit of our models, the χ^2 test and the root mean square error of approximation (RMSEA). A good model fit is indicated by a nonsignificant χ^2 value (i.e., $p > .05$), and an RMSEA value less than .05 (Byrne, 2001). It must be noted, however, that the χ^2 test often seriously underestimates the model fit in the case of larger samples (Byrne, 2001).

Model 1: Direct relation between Internet communication and well-being. The model in which Internet communication was included as the

exclusive predictor of well-being fit the data well, $\chi^2(4, n = 687) = 7.85, p = .09$, RMSEA = .04. As already apparent from the zero-order correlations in Table 1, Internet communication was negatively related to well-being ($\beta = -.17, p < .001$).

Model 2: The mediating influence of closeness to friends. This model tested whether closeness to friends mediated the relation between Internet communication and well-being. The model fit the data well, $\chi^2(11, n = 687) = 19.21, p = .06$, RMSEA = .03. In accordance with our first hypothesis, Internet communication was positively related to closeness to friends ($\beta = .17, p < .001$). Consistent with our second hypothesis, closeness to friends was positively related to well-being ($\beta = .20, p < .001$). However, contrary to our third hypothesis, the direct relation between Internet communication and well-being did not disappear due to the inclusion of closeness to friends as a mediator. The direct relation between Internet communication and well-being remained significantly negative ($\beta = -.20, p < .001$).

Model 3: Inclusion of Internet communication with strangers. In this model, we included Internet communication with strangers as an additional predictor of well-being (H4). This model fit the data well, $\chi^2(22, n = 687) = 29.99, p = .12$, RMSEA = .02. The positive paths from Internet communication to closeness to friends (H1) and from closeness to friends to well-being (H2) were still significant and in line with our first two hypotheses. However, unlike Model 2, the direct path from Internet communication to well-being was no longer significant. Instead, a significant negative path emerged from Internet communication with strangers to well-being, suggesting that it is not Internet communication per se but Internet communication with strangers that accounts for decreases in well-being. Figure 2, which visualizes Model 3, includes all relations that are hypothesized in H1 to H4. In this model, the nonsignificant path from Internet communication to well-being was removed, $\chi^2(23, n = 687) = 32.20, p = .09$, RMSEA = .02. The reported coefficients in Figure 2 are standardized betas that are all significant at $p < .001$.

The moderating effect of loneliness. Our fifth and final hypothesis predicted that the relation between Internet communication with strangers and well-being would be stronger for lonely than nonlonely adolescents. To investigate this hypothesis, we used AMOS multigroup analysis to examine whether the final model (Model 3), which fit the data of the entire sample, would differ for lonely and nonlonely adolescents. The unconstrained two-group model based on a median split of the loneliness variable fit the data well, $\chi^2(46, n = 687) = 57.55, p = .12$, RMSEA = .02. A model in which the measurement weights (i.e., the factor-analytic models) and the betas were set equal across the lonely and nonlonely adolescents resulted in a nonsignificant χ^2 change, $(8, n = 687) = 4.53, p = .80$.

This means that the structural paths in the model were not significantly different for lonely and nonlonely adolescents.

Although the multigroup analyses did not reveal significant overall differences in the structural paths, there were some remarkable differences in the hypothesized structural paths that are worth mentioning. First, for lonely adolescents, the paths from Internet communication to closeness to friends ($\beta = .06$, *ns*) and from closeness to friends to well-being ($\beta = .08$, *ns*) fell below significance. This suggests that, for lonely adolescents, Internet communication is not related to closeness to friends, and closeness to friends, in turn, is not related to well-being. For nonlonely adolescents, the paths from Internet communication to closeness to friends ($\beta = .22$, $p < .001$) and that from closeness to friends to well-being ($\beta = .18$, $p < .001$) were stronger than observed in the entire sample. This suggests that, in particular for nonlonely adolescents, Internet communication is related to their closeness to friends and, subsequently, their well-being.

Does Our Model Hold for Younger and Older Adolescents and for Boys and Girls?

As Table 1 shows, both gender and age were correlated with some independent, mediating, and dependent variables in our model. To investigate whether our model held for boys and girls and for younger (10–12 years), middle (13–14 years), and older (15–17 years) adolescents, we performed two multigroup analyses, one with gender and one with age as the grouping variable. The unconstrained two-group model for boys and girls fit the data well, $\chi^2(46, n = 687) 60.95$, $p = .07$, RMSEA = .02. The model in which the measurement weights and structural paths

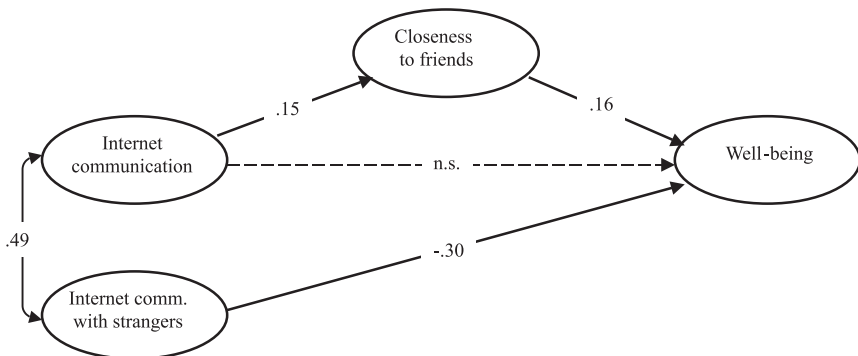


FIGURE 2 Structural equation model of the relations among Internet communication, Internet communication with strangers, closeness to friends, and well-being. The ellipses represent latent constructs estimated from at least two indicators; coefficients represent standardized betas significant at $p < .001$.

(betas) were set equal resulted in a significant χ^2 change, $(8, n = 687) = 15.66, p = .05$. Analyses of the structural paths indicated that the path from Internet communication to closeness to friends was higher for girls ($\beta = .22$) than for boys ($\beta = .17$), whereas the path from closeness to friends to well-being was higher for boys ($\beta = .21$) than for girls ($\beta = .15$). There were no other differences in structural paths between boys and girls, which means that the model found for the whole sample applied to boys and girls.

The unconstraint model for the three-age-group model also fit the data well, $\chi^2(69, n = 687) = 99.9, p = .009, RMSEA = .03$. The model in which the measurement weights and the betas were set equal for the three age groups did not result in a significant χ^2 change, $(16, n = 687) = 17.49, p = .36$, indicating that the model found for the whole sample also held for the three age groups.

DISCUSSION

The aim of this study was to improve our understanding of the relation between Internet communication and well-being. In line with earlier studies (Kraut et al., 1998; Morgan & Cotten, 2003 [for surfing]; Weiser, 2001), we initially found that Internet communication was negatively related to adolescents' well-being. However, when we included some potential underlying mechanisms in the model that followed from earlier literature on either adolescents' well-being (e.g., Hartup & Stevens, 1997) or their Internet use (e.g., Gross et al., 2002), an opposite pattern of results emerged. First, the direct negative relation between Internet communication and well-being disappeared. Second, Internet communication now had a positive relation with well-being via the mediating variable closeness to friends. Third, not Internet communication per se but Internet communication with strangers accounted for a negative effect on well-being.

Our results have several implications for future Internet-effects research. First, it is evident that future research should employ more sophisticated effects models. Our study suggests that Internet communication positively influences adolescents' well-being through the mediating influence of their closeness to friends. To study the Internet-well-being relation more thoroughly, future research should avoid investigating the main effects of Internet use on well-being and at least include measures of friendship quality or social support as mediators.

Two earlier Internet-effects studies suggest that direct relations between Internet use and well-being change when social support variables are included as mediators. LaRose et al. (2001) initially found a nonsignificant Internet-well-being relation, but after inclusion of social support as a mediator, Internet use became indirectly positively related to well-being (i.e., negatively to depression). Likewise, Weiser (2001) initially found a significantly negative relation between personal Internet use and well-being. However, when social

integration was included as a mediator, the direct relation was no longer significant.

However, social support measures do not consistently act as mediating variables. In a study by Morgan and Cotten (2003), a negative direct Internet–well-being relation remained significant after inclusion of social support as a mediator. This latter result is similar to our findings. When we only included closeness to friends as a mediator, the direct path between Internet communication and well-being also remained negative. The direct relation between Internet communication and well-being disappeared only after including Internet communication with strangers.

Thus, our results suggest that it is not Internet communication per se but Internet communication with strangers that accounts for effects on well-being. Therefore, future research should not only differentiate between types of Internet use but also between types of Internet communication. In our view, frequency of Internet communication is an insufficient independent variable in Internet-effects research. To gain a true understanding of adolescents' Internet communication, future research should not only concentrate on how often they communicate online, but also with whom and about what (for a similar reasoning, see Walther & Parks, 2002).

We predicted that the relation between Internet communication with strangers and well-being would differ for lonely and nonlonely adolescents. This hypothesis did not receive support. Nevertheless, our effects model did reveal some remarkable differences between lonely and nonlonely adolescents. For lonely adolescents, both the influence of Internet communication on closeness to friends and that of closeness to friends on well-being were nonsignificant. This implies that for lonely adolescents Internet communication does not seem to enhance the closeness of their existing friendships and, subsequently, their well-being.

An explanation for this could be that lonely adolescents talk more often with strangers on the Internet than do nonlonely adolescents. This reduces their time and opportunities to maintain their already limited number of existing relationships in real life, which, in turn, decreases their levels of well-being. This explanation is supported by the raw correlations in Table 1, which show that lonely adolescents use the Internet more often to talk with strangers, have fewer close friendships, and display lower levels of well-being (see Gross et al., 2002, for similar patterns of results).

Previous research has not consistently specified the role of loneliness in Internet-effects models. In some studies, loneliness is regarded as an independent variable (e.g., Amichai-Hamburger & Ben-Artzi, 2003; McKenna, Green, & Gleason, 2002), in other studies it is regarded as a dependent variable (e.g., Kraut et al., 1998, 2002; Weiser, 2001), and in yet other studies its place in the research model was not exactly specified (e.g., Gross et al., 2002). To our knowledge, no studies have investigated the mediating or moderating role of loneliness. Our study has shown that the relations among loneliness, Internet communication, and

well-being are far more complex than conceptualized in many earlier studies. Even when no direct relations between loneliness and Internet communication are found, loneliness can play an important role in our understanding of the Internet's social effects.

The aim of this study was to test an Internet-effects model that specified some underlying mechanisms of how Internet communication affects adolescents' well-being. Specifying such mechanisms is a crucial step in Internet research. As Bargh (2002) and Tyler (2002) noted, we need less description of the effects of Internet use and more theory about the causal mechanisms by which the Internet has an impact on social involvement. We tested two such potential underlying mechanisms, namely adolescents' closeness to friends and the frequency with which they use the Internet to communicate with strangers. It is possible that other mediators will be equally effective. For a further discussion on the role of mediators in Internet-effects research, see LaRose et al. (2001) and Weiser (2001).

Overall, our study suggests that the Internet is positively related to the closeness of existing adolescent friendships and, via this route, to their well-being. It also suggests that Internet communication with strangers should be taken into account in future studies, because this variable may account for previously found negative relations between Internet communication and well-being. However, we acknowledge that the assumptions in our model were tested with cross-sectional data. There is a vital need for causal–correlational research to investigate the longitudinal relations between Internet communication and the quality of adolescent relationships. Not only are longitudinal designs better able to adequately distinguish causation from covariance, but they are also preeminently suitable to explore the underlying mechanisms by which Internet communication influences adolescents' social relationships.

REFERENCES

- Amichai-Hamburger, Y., & Ben-Artzi, E. (2003). Loneliness and Internet use. *Computers in Human Behavior, 19*, 71–80.
- Andrews, F. M., & Robinson, J. P. (1991). Measures of subjective well-being. In J. R. Robinson, P. R. Shaver, & L. S. Wrightsman (Eds.), *Measures of personality and social psychological attitudes* (pp. 61–115). San Diego, CA: Academic.
- Arbuckle, J. L. (2003). *Amos 5.0* [Computer software]. Chicago: SmallWaters.
- Armsden, G. C., & Greenberg, M. T. (1987). The inventory of parent and peer attachment: Individual differences and their relationship to psychological well-being in adolescence. *Journal of Youth and Adolescence, 16*, 427–453.
- Bargh, J. A. (2002). Beyond simple truths: The human–Internet interaction. *Journal of Social Issues, 58*, 1–8.
- Bukowski, W. M. (2001). Friendships and the worlds of childhood. *New Directions for Child and Adolescent Development, 91*, 93–105.

- Byrne, B. M. (2001). *Structural equation modeling with AMOS: Basic concepts, applications and programming*. Mahwah, NJ: Lawrence Erlbaum Associates, Inc.
- Caplan, S. E. (2003). Preference for online social interaction. A theory of problematic Internet use and psychosocial well-being. *Communication Research, 30*, 625–648.
- Culbertson, H. M., & Stempel, G. H. III (1986). How media use and reliance affect knowledge level. *Communication Research, 13*, 579–602.
- Diener, E. (1984). Subjective well-being. *Psychological Bulletin, 95*, 542–575.
- Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The Satisfaction with Life Scale. *Journal of Personality Assessment, 49*, 71–75.
- Diener, E., Suh, E. M., Lucas, R. E., & Smith, H. L. (1999). Subjective well-being: Three decades of progress. *Psychological Bulletin, 125*, 276–302.
- Engelberg, E., & Sjöberg, L. (2004). Internet use, social skills, and adjustment. *CyberPsychology & Behavior, 7*, 41–47.
- Gross, E. F., Juvonen, J., & Gable, S. L. (2002). Internet use and well-being in adolescence. *Journal of Social Issues, 58*, 75–90.
- Harter, S. (1999). *The construction of the self: A developmental perspective*. New York: Guilford.
- Hartup, W. W. (2000). The company they keep: Friendships and their developmental significance. In W. Craig (Ed.), *Childhood social development: The essential readings* (pp. 61–84). Malden, MA: Blackwell.
- Hartup, W. W., & Stevens, N. (1997). Friendships and adaptation in the life course. *Psychological Bulletin, 121*, 355–370.
- Holtz-Bacha, C., & Norris, P. (2001). “To entertain, inform, and educate”: Still the role of public television. *Political Communication, 18*, 123–140.
- Jackson, L. A., von Eye, A., Barbatsis, G., Biocca, F., Fitzgerald, H. E., & Zhao, Y. (2004). The impact of Internet use on the other side of the digital divide. *Communications of the ACM, 47*(7), 43–47.
- Kishton, J. M., & Widaman, K. F. (1994). Unidimensional versus domain representative parceling of questionnaire items: An empirical example. *Educational and Psychological Measurement, 54*, 757–765.
- Kraut, R., Kiesler, S., Boneva, B., Cummings, J., Helgeson, V., & Crawford, A. (2002). Internet paradox revisited. *Journal of Social Issues, 58*, 49–74.
- Kraut, R., Patterson, M., Lundmark, V., Kiesler, S., Mukopadhyay, T., & Scherlis, W. (1998). Internet paradox: A social technology that reduces social involvement and psychological well-being? *American Psychologist, 53*, 1017–1031.
- LaRose, R., Eastin, M., & Gregg, J. (2001). Reformulating the Internet paradox: Social cognitive explanations of Internet use and depression. *Journal of Online Behavior, 1*. Retrieved October 15, 2004, from <http://www.behavior.net?JOB/v1n1/paradox.html>.
- Lenhart, A., Madden, M., & Hitlin, P. (2005). *Teens and technology*. Washington, DC: Pew Internet and American Life Project.
- Leung, L. (2002). Loneliness, self-disclosure and ICQ (“I Seek You”) use. *CyberPsychology & Behavior, 5*, 241–251.
- Madden, M., & Rainie, L. (2003). *America’s online pursuits. The changing picture of who’s online and what they do*. Washington, DC: Pew Internet and American Life Project.
- McKenna, K. Y. A., & Bargh, J. A. (2000). Plan 9 from cyberspace: The implications of the Internet for personality and social psychology. *Personality & Social Psychology Review, 4*, 57–75.
- McKenna, K. Y. A., Green, A. S., & Gleason, M. E. J. (2002). Relationship formation on the Internet: What’s the big attraction? *Journal of Social Issues, 58*, 9–31.
- McLeod, J. M., & McDonald, D. G. (1985). Beyond simple exposure. Media orientations and their impact on political processes. *Communication Research, 12*, 3–33.
- Moody, E. J. (2001). Internet use and its relationship to loneliness. *CyberPsychology & Behavior, 4*, 393–401.

- Morgan, C., & Cotten, S. R. (2003). The relationship between Internet activities and depressive symptoms in a sample of college freshmen. *CyberPsychology & Behavior*, *6*, 133–141.
- Pinquart, M., & Sörensen, S. (2000). Influences of socioeconomic status, social network, and competence on subjective well-being in later life: A meta-analysis. *Psychology and Aging*, *15*, 187–224.
- Russell, D. W. (1996). UCLA Loneliness Scale (Version 3): Reliability, validity, and factor structure. *Journal of Personality Assessment*, *66*, 20–40.
- Sanders, C. E., Field, T. M., Diego, M., & Kaplan, M. (2000). The relationship of Internet use to depression and social isolation. *Adolescence*, *35*, 237–242.
- Schaffer, H. R. (1996). *Social development*. Malden, MA: Blackwell.
- Shaw, L. H., & Gant, L. M., (2002). In defense of the Internet: The relationship between Internet communication and depression, loneliness, self-esteem, and perceived social support. *CyberPsychology & Behavior*, *5*, 157–170.
- Tyler, T. R. (2002). Is the Internet changing social life? It seems the more things change, the more they stay the same. *Journal of Social Issues*, *58*, 195–205.
- Valkenburg, P. M., & Peter, J. (in press). Preadolescents' and adolescents' online communication and their closeness to friends. *Developmental Psychology*.
- Valkenburg, P. M., Schouten, A.P., & Peter, J. (2005). Adolescents' identity experiments on the Internet: An exploratory survey. *New Media and Society*, *7*, 383–402.
- Van Ammers, E., Dekovic, M. Gerrits, L. A. W., Groenendaal, J. H. A., Hermanns, J. M. A., Meeus, W. H. J., et al. (1988). *Opvoeden in Nederland: Schalenboek* [Education in the Netherlands: Scaling book]. Unpublished report. University of Utrecht, the Netherlands.
- Waestlund, E., Norlander, T., & Archer, T. (2001). Internet blues revisited: Replication and extension of an Internet paradox study. *CyberPsychology & Behavior*, *4*, 385–391.
- Walther, J. B., & Parks, M. R. (2002). Cues filtered in, cues filtered out. Computer-mediated communication and relationships. In M. L. Knapp & J. A. Daly (Eds.), *Handbook of interpersonal communication* (3rd ed., pp. 529–563). Thousand Oaks, CA: Sage.
- Weiser, E. B. (2001). The functions of Internet use and their psychological consequences. *CyberPsychology & Behavior*, *4*, 723–744.
- Wolak, J., Mitchell, K. J., & Finkelhor, D. (2002). Close online relationships in a national sample of adolescents. *Adolescence*, *37*, 441–445.
- Wolak, J., Mitchell, K. J., & Finkelhor, D. (2003). Escaping or connecting? Characteristics of youth who form close online relationships. *Journal of Adolescence*, *26*, 105–119.
- Young, K. S., & Rogers, R. C. (1998). The relationship between depression and Internet addiction. *CyberPsychology & Behavior*, *1*, 25–28.
- Zuckerman, M. (1979). *Sensation seeking: Beyond the optimal level of arousal*. New York: Wiley.

Copyright of *Media Psychology* is the property of Lawrence Erlbaum Associates and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.