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Parents as a resource: Communication quality affects the relationship between adolescents'

internet use and loneliness

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Abstract

The authors examined the influence of parent-adolescent communication quality, as perceived by the adolescents, on the link between adolescents' Internet use and loneliness, controlling for perceived family support in general terms. Adolescents ($N = 216$, $M_{age} =$ 15.80 years) provided data on Internet use, loneliness, Internet-related parent-adolescent communication, and perceived family support. Moderated regression analyses showed that Internet-related communication quality determined whether more extensive Internet use was associated with more loneliness. This moderation effect remained significant when perceived family support in general terms was controlled for. Gender and age of the participants did not influence the findings. Implications for successful Internet-related parenting strategies are discussed.

Keywords: Internet use, loneliness, parental mediation, communication quality, family support

Parents as a Resource: Communication Quality Affects the Relationship between

Adolescents' Internet Use and Loneliness

The Internet is an integral part of people's lives, and adolescents are among the

Internet's most avid users (Rideout, Foehr, & Roberts, 2010). The rise of the Internet has

been accompanied by worries regarding its impact on the health and well-being of children

and adolescents. Although previous research pointed at Internet-related risks for the

psychological development of adolescents, adaptive functions of Internet use exist as well

(Valkenburg & Peter, 2011). In this respect, one major challenge for research in this field is

to identify factors that increase the likelihood of a positive impact of the Internet on

children's and adolescents' development and that decrease the likelihood of a negative

impact. The present research focused on loneliness as an indicator of adolescents' healthy

versus problematic development. We assumed that the direction and magnitude of the link

between Internet use and loneliness is influenced by the quality of Internet-related parent-

adolescent communication. As a major extension of previous research, we investigated

whether Internet-related communication quality plays a role that goes beyond the influence

of the adolescent's perceived support by his or her family in general terms.

Internet Use and Loneliness

Loneliness (i.e., perceived social isolation, Cacioppo et al., 2002) is an important

marker of adolescent psychosocial development. Loneliness at an early age has been

identified as a predictor of low health status later in life (Cacioppo et al., 2002; Caspi,

Harrington, Moffitt, Milne, & Poulton, 2006). Since the advent of the Internet in the 1990s,

researchers have examined the relationship between the use of this technology and

loneliness (cf. Subrahmanyan & Smahel, 2011). Whereas some theoretical approaches

suggest that internet use is related to less loneliness and well-being, others have pointed at a

potential increase of loneliness: On the one hand, the Internet provides ample opportunities

to connect with classmates, family members or strangers who share similar interests.

Moreover, the possibility of anonymous and asynchronous communication may contribute

to a perceived controllability of a communication which may in turn facilitate the

development of close relationships (McKenna & Bargh, 1999; Valkenburg & Peter, 2011).

On the other hand, Internet use has been connected to a decrease in offline interactions (Nie

& Hillygus, 2002), and the development of more superficial relationships and weaker social

ties (Subrahmanyan & Lin, 2007). Moreover, the high accessibility of communication

partners and information as well as the Internet's anonymity have been related to particular

risks such as unsolicited approaches by strangers or messages by (online-) friends and

acquaintances that are intimidating or offensive. Such potentially harmful forms of

communication may be occasional and unintended by the sender; however, they may also

be massive and meant to systematically hurt the communication partner (cyberbullying, cf.

Kowalski, Limber, & Agatston, 2012; Tokunaga, 2010).

In recent years, a number of empirical studies have quantified the relationship

between Internet use and the psychosocial well-being of children and adolescents.

Regarding internalizing problems such as loneliness or depression (e.g., Achenbach, 1991),

the empirical findings are somewhat inconsistent. Data collected by Kraut and colleagues

(1998) suggested that the Internet is a communication technology that leads to more

loneliness, a finding referred to as the "Internet paradox". However, over the last 14 years,

several studies have failed to find a relationship between Internet use and loneliness or

other internalizing problems (e.g., Gross, Juvonen, & Gable, 2002; Kraut et al., 2002).

Some studies even highlighted that socially anxious and lonely individuals may particularly

benefit from the Internet due to the better control of one's communication online

(McKenna & Bargh, 1999; Peter, Valkenburg, & Schouten, 2005). Nevertheless, other

studies supported the notion of a maladaptive relationship between Internet use and

internalizing problems, as indicated by the time spent on the Internet, chatting or browsing

the web, and internalizing problems (e.g., Deniz, 2010; Hu, 2009; Stepanikova, Nie, & He,

2010; Ybarra, Alexander, & Mitchell, 2005).

A recent meta-analysis (Huang, 2010) summarized previous findings on the

relationship between Internet use and psychosocial well-being (relationships with

depression, loneliness, self-esteem, and life satisfaction were observed). Based on 43

independent results of adolescent and adult samples, an average correlation of $r = -.05$ was

found, indicating that greater Internet use was related to less well-being. When the data on

loneliness were observed separately (37 independent results), the average effect size

amounted to $r = .02$, pointing out a very small relationship in a sense that more Internet use

is related to more loneliness. Importantly, the results further indicated that the effect sizes

were heterogeneous. However, an analysis of moderator effects showed non-significant

effects of potential moderators, including the type of Internet use, the indicator of well-

being, Internet use assessment, and participant age and gender.

We assume that the heterogeneity of the findings on the relationship between

Internet use and adolescents' well-being is partly due to the influence of uninvestigated yet

potent moderating factors which determine the strength (and direction) of this association.

Internet use does not influence individuals in one and the same way (cf. McKenna &

Bargh, 1998). The link between Internet use and well-being may be strong and negative among some adolescents, because they are vulnerable to the risks and fail to profit from the opportunities of the internet but weaker or even reversed among others. Results on the Big Five personality factors support this assumption (van der Aa et al., 2009). The detrimental relationships between daily internet use, compulsive internet use, and loneliness were found to be less strong among individuals with high scores in extraversion, agreeableness, or emotional stability. However, personality is one, but likely not the only, variable that influences the relationship between internet use and loneliness. For adolescents, the influence of parents might be a key factor.

Do Parents Play a Role?

Even though young people become increasingly autonomous during adolescence, there is little doubt about the critical role of parents in their psychosocial development (Simpkins et al., 2009; Steinberg & Morris, 2001). The influence of parents to mediate or mitigate the potential (negative) role of media on the children's development has been examined for many years now (e.g., Clark, 2011; Dorr, Kovaric, & Doubleday, 1989; Nathanson, 1999). The term *parental mediation* is typically used as a label for media-related parenting and related research; however, it needs to be noted that this expression does not imply that parenting variables function as mediators in the statistical sense (cf. Clark, 2011). Although research on media and parenting focused on children and TV for the most part, the results appear to be relevant for older samples and the Internet as well. With respect to media use in mid- to late adolescence (e.g., 13-18 years of age), active parenting strategies, i.e., communicating with adolescents about the media they use, appears to be more promising than trying to set rules and restrict adolescents' media use, as

indicated by studies on adolescent TV use (Nathanson, 1999; 2002; Nathanson & Cantor, 2000).

Research on the influence of parental mediation regarding Internet use is sparse, but points in a similar direction: Restriction can be ineffective, as potentially detrimental events online may take place in spaces that are considered safe by parents and restrictions on Internet activities may be circumvented by the adolescents (Lee & Chae, 2007; Mesch, 2009). Parent-adolescent conversations on the nature, content, and potential risks of websites appear to be more successful (Holtz & Appel, 2011; Lee & Chae, 2007). Taken together, these findings suggest that parents may be unable to successfully monitor and control adolescents' online activities. Nonetheless, parents can have an impact on whether or not Internet use has detrimental effects on adolescent development. We assume that one major beneficial role that parents can play regarding adolescents' Internet use is that of a resource: Open parent-adolescent communication can prepare adolescents for the potential opportunities but also risks of the Internet. Moreover, whenever adolescents are confronted with potentially harmful content on the Internet, those who feel that they can have a productive conversation with their parents about their Internet experiences and related issues will be better able to cope with these potential stressors than those who feel that a conversation with their parents would be worthless. In line with this prediction, one recent study showed that adolescents' perception of qualitatively good communication with parents predicted less compulsive Internet use (van den Eijnden, Spijkerman, Vermulst, van Rooij, & Engels, 2010).

Despite its recent contributions, the literature on internet-related parent-adolescent communication and parental mediation more generally is limited because the parenting

variables may be confounded with family support in general terms. A good part of the

positive effects of active parental mediation practices might be explained as being the result

of a better parent-child relationship in general terms, which predicts fewer behavior

problems among children and adolescents (van den Eijnden et al., 2010). To rule out

alternative explanations, an examination of the influence of parenting variables with and

without family support as a control variable is needed.

The Present Study and Hypotheses

The aim of the present study was to examine the influence of parent-adolescent

communication quality on the relationship between internet use and adolescents'

psychosocial development, thereby extending previous research in key regards: First,

previous studies on Internet parental mediation focused on Internet-related problems such

as compulsive Internet use and being a victim of cyber-bullying and identified factors that

contribute to these domain-specific criteria (Lee & Chae, 2007; Mesch, 2009; van den

Eijnden et al., 2010; but see Holtz & Appel, 2011). Extending this line of research, our

emphasis was on loneliness, a domain-independent indicator of adolescent maladaptation.

Second, the previous studies on Internet parental mediation focused on the direct

relationship between parenting variables and the criterion of interest (e.g., Holtz & Appel,

2011; Lee & Chae, 2007; Mesch, 2009; van den Eijnden et al., 2010). For testing our

assumption that perceived communication quality serves as a resource, however, we

believe that this variable is more appropriately conceived as a moderator, i.e., a factor that

modifies the strength (and direction) of the relationship between Internet use and behavior

problems. Third, one serious point of criticism that applies to virtually all previous research

on parental mediation is the potential confounding of active parental mediation with the

protective influence of family support in general terms. According to our resource assumption, communication quality should have an impact even when perceived family support in general terms is statistically controlled for. If perceived family support already explained parental mediation results, validity concerns regarding this whole line of research could be raised.

Based on our general assumption that parents can serve as a resource, we predicted that adolescents who feel that they have – or could have – constructive conversations about the Internet with their parents will be able to cope with the challenges associated with Internet use substantially better than adolescents who lack this resource. We hypothesized that high communication quality between adolescents and parents moderates the relationship between Internet use and loneliness. Due to the very small average effect sizes in previous research (Huang, 2010) we could not expect a significant association between Internet use and loneliness on average. Among those with low communication quality, however, more Internet use should be related to greater loneliness. For participants who report a high communication quality, we assume the relationship to be neutral or to turn positive – as mastered challenges and the opportunities provided by the Internet may contribute in positive ways to adolescents' psychosocial development (Valkenburg & Peter, 2011). The moderation effect outlined above is expected to hold even when perceived family support in general terms is statistically controlled for.

To rule out the possibility that any media parenting variable might affect the relationship between internet use and loneliness, we additionally examined the perceived frequency of parent-adolescent communication about the internet as a moderating variable.

Method

Participants and Procedure

Austrian secondary school students participated in an online survey. Potential

participants were contacted through a youth online survey panel (www.opionioncorner.at),

with the help of school mailing lists, or with announcements at popular Internet forums.

The software used for presenting the experiment and collecting data, EFS-survey,

monitored and blocked potential repeat responders through IP protocols (cf. Gosling,

Vazire, Srivastava, & John, 2004). The participants worked on the measures outlined below

as part of a larger set of questionnaires. Participation was voluntary, anonymous, and

included informed consent of the participants. The data collection followed the local ethical

procedures as well as the guidelines of the German Psychological Society (DGPs) and the

Association of German Psychologists (BDP). Students who completed the entire

questionnaire were included in the analyses. Participants were 216 adolescents aged 13 to

18 years ($M = 15.80$, $SD = 1.47$) with a mixed but somewhat above-average schooling

background (i.e., the majority of students went to schools that prepare for the Austrian

University entrance qualification *Matura*. Other schools qualify for more applied careers).

The majority were female ($n = 150$, 69%).

Measures

The means, standard deviations, and zero-order correlations of all variables are

displayed in Table 1.

Internet use. Internet use was measured in terms of the average time spent on the

Internet per day. The responses were scored in 30-minute intervals, ranging from 0 = *no

time*, 1 = *less than 30 minutes*, 2 = *30 minutes to 1 hour*, …, to 12 = *more than 5.5 hours*.[1]

Participants in our sample spent on average about 1.5 hours on the Internet per day (cf.

Table 1). Moreover, Internet use patterns were assessed by asking how often the

participants used the Internet for various activities, such as playing games, doing research

(e.g., for homework), writing e-mails, communicating in chats, or visiting online social

networking sites (e.g., facebook, myspace, youtube). The response options were 1 = *very*

rarely or not at all, 2 = *rarely*, 3 = *occasionally*, 4 = *often, and* 5 = *very often*. Patterns of

Internet use in our sample were very homogeneous: Visiting online social networking sites

was the most frequent activity, with 87% of our sample visiting such sites often or very

often (see VAMA, 2011, for similar results for Austrian adolescents between ages 14 and

19). By contrast, only 10% of the participants reported playing games (ego-shooter, role-

playing games, and others) at least occasionally. The homogeneous Internet use patterns in

our sample did not provide sufficient variance for further analyses of online gaming or

visiting social networking sites. Thus, all analyses on Internet use reported below were

based on the average quantity of daily Internet use.

   Perceived communication quality. The perceived quality of Internet-related

parent-adolescent communication was measured with a three-item scale introduced by van

den Eijnden and colleagues (2010), which was translated to German. The development of

this scale was based on earlier research which examined the quality of parental

communication in relation to adolescents' substance use (Spijkerman, van den Eijnden, &

Huiberts, 2008). The items asked adolescents about their feelings when they talk about their

Internet use with their parents ("I feel comfortable", "I feel understood", "I feel taken

seriously"). The responses were scored on a 5-point scale (1 = *not true at all* to 5 =

completely true). In line with previous research, the scale showed good internal

consistency, as indicated by Cronbach's α = .91. The scale's mean was located around the

midpoint of the possible scores (M = 3.16, SD = 1.15) and the moderate relationship with

perceived family support (r = .42, p < .001) points at the construct validity of the scale.

To examine whether communication quality rather than communication frequency

affected our results, we used two additional items that measured the perceived *frequency* of

parent-adolescent communication ("How often do you talk with your parents about the time

spent on the internet", "How often do you talk with your parents about your activities on

the internet", 5-point scale from 1 = *at no time* to 5 = *very often*, Cronbach's α = .77).

Loneliness. We assessed loneliness with the 4-item short version of the UCLA

Loneliness Scale (Hays & DiMatteo, 1987; Döring & Bortz, 1993). A sample item is "No

one really knows me well". The response format was a 5-point scale from 1 = *not true at all*

to 5 = *completely true* (Cronbach's α = .68).

Perceived family support. Perceived family support was measured with the four

perceived family support-items of the Multidimensional Scale of Perceived Social Support

(Zimet, Dahlem, Zimet, & Farley, 1988). A sample item is "I can discuss problems with my

family"; responses ranged from 1 = *do not agree at all* to 7 = *agree completely* (Cronbach's

α = .92).

Results

We hypothesized that perceived communication quality would influence (moderate)

the relationship between Internet use and loneliness. Moreover, we assumed that the

moderation effect would remain significant even after family support was controlled for. To

examine these hypotheses, we conducted a hierarchical regression analysis with loneliness

as the criterion variable. Age and gender served as control variables and were entered in

Step 1. Internet use and perceived communication quality were entered in Step 2. In Step 3,

the product of Internet use and perceived communication quality was entered in order to

test the interaction effect. Moreover, we examined whether or not this effect persisted when

a measure of family support was controlled for. Thus, the final regression involved family

support as an additional predictor (Step 4). The predictor variables were z-standardized and

the interaction term was calculated on the basis of the standardized variables (Aiken &

West, 1991). To further interpret the interaction, we conducted simple slope analyses

conditioned one standard deviation above and below the mean of Internet use and perceived

communication quality, respectively.

Communication Quality and Loneliness

The control variables, gender and age, which were entered in Step 1, were not

significantly associated with loneliness, $F (2, 213) = 0.52$, $p = .59$, $R^2 = .01$. The results of

Steps 2 to 4 of the hierarchical regression analysis are reported in Table 2. The results

presented for Step 2 reveal that loneliness was not significantly associated with the amount

of Internet use, however, a main effect of communication quality was observed. Our core

assumption involved a significant interaction between the time spent with the Internet and

communication quality which was indeed observed in Step 3, $B = - 0.10$, $SE_B = 0.04$, $\beta = -$

.16, $p = .02$, $\Delta R^2 = .03$. Most importantly, the interaction effect remained significant when

family support was entered in the fourth step of the regression, $B = -0.08$, $SE_B = 0.04$, $\beta = -$

.12, $p = .04$, $\Delta R^2 = .02$. Thus, although family support explained a substantial portion of the

variance in loneliness, $B = -0.26$, $SE_B = 0.05$, $\beta = -.39$, $p < .001$, $\Delta R^2 = .12$, the results

suggest that Internet-related communication quality influences the link between Internet use

and loneliness, over and above general family support.

Figure 1 shows the moderation effect of perceived communication quality on the Internet use-loneliness relationship in detail. Loneliness increased with the time spent on the Internet, but only if perceived communication quality was low. Simple slope analyses yielded a significant effect of Internet use on loneliness in participants who reported low perceived communication quality, $B = 0.13$, $SE_B = 0.06$, $\beta = .18$, $p = .03$, $\Delta R^2 = .02$. The sign of this trend was reversed in participants with a rather high communication quality, but this simple slope was non-significant, $B = -0.03$, $SE_B = 0.06$, $\beta = -.04$, $p = .63$, $\Delta R^2 = .00$. Moreover, we found an effect of perceived communication quality on loneliness among heavy Internet users ($M = + 1$ SD), $B = -0.17$, $SE_B = 0.06$, $\beta = -.25$, $p = .005$, $\Delta R^2 = .03$, but not among participants who used the Internet less frequently ($M = - 1$ SD), $B = -0.01$, $SE_B = 0.06$, $\beta = -.02$, $p = .85$, $\Delta R^2 = .00$.

One further result needs to be noted. The 'main effect' of perceived communication quality, or more precisely, the conditional effect of perceived communication quality at the mean score of Internet use (Internet use was z-standardized, thus $M = 0$) is not significant anymore, once perceived family support is controlled for ($p = .051$). Caution is warranted when interpreting conditional effects of predictor variables that are factors of an interaction effect within the same regression equation (e.g., Hayes, Glynn, & Huge, 2012; Whisman & McClelland, 2005). That said, this finding is in line with our general assumption and the results reported above, indicating that perceived communication quality is particularly important for adolescents who use the internet extensively.

Additional Analyses

We further tested whether perceived family support served as a resource on its own right by entering the interaction between Internet use and family support in an additional Step 5 of the hierarchical regression analysis. In our sample, the Internet use x family support interaction effect on loneliness was not significant ($t < 1$), whereas the Internet use x communication quality interaction remained significant, $B = -0.09$, $SE_B = 0.04$, $\beta = -.15$, $p = .04$. This underscores our interpretation that perceived quality of Internet-related parent-adolescent communication is a resource over and above perceived family support.

We also scrutinized the results with regard to differences between male and female adolescents. We conducted a supplementary analysis that was identical to our main hierarchical regression analysis (Table 2, full equation) except that two additional two-way interactions (gender by perceived communication quality; gender by Internet use) and one three-way interaction were added (gender by perceived communication quality by Internet use). None of the three interaction effects added significantly to the prediction of loneliness (ts < 1.3, ps $> .20$), indicating that the results obtained do not vary with adolescents' gender. A parallel analysis with age as a potential moderator yielded similar results: Neither the two-way interactions (age by perceived communication quality; age by Internet use) nor the three-way interaction (age by communication quality by Internet use) predicted loneliness (ts < 1, ps $> .40$). Thus, it appears that our findings are not significantly influenced by adolescents' age within our group of 13 to 18 year old secondary school students.

Finally, we inspected associations between loneliness and the perceived *frequency* of parent-adolescent communication, our alternative parenting variable. The latter was

neither directly related to loneliness, nor did we find significant interaction effects between communication frequency and Internet use (ts < 1; ps $>. 50$). When communication frequency was included as an additional control variable in our main equation (Table 2), the Internet x communication quality interaction remained significant, $B = -0.08$, $SE_B = 0.04$, $p = .047$.

Discussion

The Internet provides opportunities, but also risks, for children and adolescents (Valkenburg & Peter, 2011). Adolescents can easily connect with classmates, family members or strangers, and the anonymity of the Internet may provide a playground for self-presentation and self-disclosure. However, aspects of the Internet that may foster connectedness and contribute to less loneliness may have a downside: Using the internet, adolescents will almost inevitably encounter potentially harmful material and face potentially wearing situations, such as incidents of social rejection or teasing which can lead to feelings of lower connectedness and loneliness. Empirical studies on the relationship between internet use and loneliness have been somewhat inconclusive; meta-analytic analyses identified a heterogeneous set of findings with no relationship on average (Huang, 2010).

The research presented here was based on the assumption that the size and possibly the direction of the relationship between Internet use and loneliness depends on third variables; more specifically, we hypothesized the relationship to vary with the resource of the quality of adolescents' internet-related communication with their parents. The present study demonstrated that perceived communication quality (cf., van den Eijnden et al., 2010) determines whether or not the amount of Internet use is associated with loneliness.

Negative associations of heavy Internet use were present only in adolescents who reported low Internet-related communication quality. In adolescents with high communication quality, no such negative effects were found. Our findings extend the literature on media related parenting which focused on older children's and adolescents' TV use (cf., Clark, 2011), or examined internet-related problems such as compulsive Internet use (Lee & Chae, 2007; Mesch, 2009; van den Eijnden et al., 2010). Unlike studies that investigated correlations or main effects of parenting variables with well-being and related constructs, our findings show that perceived parent-adolescent communication quality is particularly relevant for adolescents who use the Internet extensively. High quality communication, as perceived by the adolescent, is particularly beneficial for those who expose themselves to the opportunities, challenges, and risks of the Internet for a longer time span.

As a substantial extension of previous research on parental mediation we were able to demonstrate that the impact of perceived communication quality goes beyond family support in general terms. This result underscores the notion that Internet-specific parenting can positively influence adolescents' well-being in its own right – independent of more general parenting strategies and parent-child attachment (cf. Brumariu & Kerns, 2010). Our finding strengthens the validity of previous findings on parental mediation and points at the need to distinguish between media-related parenting and more general, domain-unspecific variables.

Although our study was not specifically addressed to cyberbullying (i.e., instances when "internet-based applications are used to systematically intimidate or insult a person in order to humiliate, embarrass, or hurt that person", Valkenburg & Peter, 2011, p. 124), our results on the benefits of parent-adolescent communication quality are congruent with case

studies, interviews with adolescents, and quantitative studies in this field (e.g., Kowalski et al., 2012; Tokunaga, 2010). Amount of daily Internet use was found to be positively related to being a victim of cyberbullying (Hinduja & Patchin, 2008) which is in turn associated with indicators of internalizing behavior problems such as depression, social anxiety, and loneliness (e.g., Juvonen & Gross, 2008; Sahin, 2012). Parents can play a key role in dealing with cyberbullying, be it by providing psychological support, or by initiating actions to stop bullying (Kowalski et al., 2012). However, adolescents often refrain from talking to their parents about negative experiences online (Agatston, Kowalski, & Limber, 2007). Many severe cases of cyberbullying have in common that cyberbullied adolescents did not report these incidents to their parents (or any other adult), even if the bullying already caused massive psychological distress (case study from a parent's perspective: Halligan, 2012; see also Dooley et al., 2009). Interviews suggest that adolescents often do not talk with their parents about negative experiences on the Internet because they anticipate being misunderstood or they fear access to the internet would be restricted after telling (Kowalski et al., 2012). This literature corresponds to our notion that perceived communication quality can influence the relationship between Internet use and the well-being of adolescents.

Despite the contributions of our work, its limitations should be acknowledged. First, the results of this study are correlational and do not provide insights into the direction of the relationship between Internet use and loneliness. To our understanding, the relationship between media use and maladaptive development is best modeled as a reciprocal relationship (Bandura, 1999). Both directions of causal effects are likely to be present and to depend on each other. Not only may Internet use enhance loneliness, higher loneliness

may lead to more Internet use: Theory and empirical evidence suggests that situational loneliness increases tendencies to reconnect with others. The Internet provides one way to connect with friends, acquaintances, or strangers. Individuals who perceive themselves as socially isolated, however, tend to interpret social information as threatening and produce negative expectations of social interactions. Negative social expectations can, in turn, serve as a self-fulfilling prophecy, as they increase the likelihood that others' behavior will indeed be negative (Cacioppo & Hawkley, 2009). Thus, loneliness may initiate Internet use, which fosters feelings of loneliness due to negative or negatively perceived experiences online. Our research suggests that this maladaptive relationship is more likely to occur for adolescents who do not perceive their parents as high-quality communication partners. Future studies with longitudinal and experimental designs would be desirable, in order to disentangle these bi-directional causal effects.

Second, our study was based on an online sample. In recent years web-based assessment has become a standard method for social scientists, and methodological reviews point at satisfactory psychometric properties of web-based surveys (cf. Denissen, Neumann, & van Zalk, 2010; Gosling et al., 2004). However, like in other web-based studies, the educational background of our sample was above average (Pullmann, Allik, & Realo, 2009). We assume that the findings reported above do not vary with regard to the sample's educational background. Moreover, previous experiences with online research suggest that the online mode of assessment did not critically affect our findings (e.g., Denissen et al., 2010). Still, future studies on parenting and the internet are encouraged to test our predictions based on traditional offline assessment and a sample with a more representative educational background.

Third, in our sample, we found little variance regarding what the Internet was used for. The great majority of our participants were regular users of social networking sites, which provide opportunities to read and post personal information or to chat online. However, our sample varied substantially with regard to the time spent online, which served as our main predictor variable. It was not the primary goal of this investigation to examine which Internet use practices are likely to have a positive or negative influence on adolescent development. To this end, the use of media diaries is encouraged, to enable a fine-grained analysis of adolescents' media use patterns.

Conclusion

Based on our findings, parents of adolescent children are advised to strive to be people teenagers like to talk to about the Internet. High communication quality (as perceived by the adolescents) decreases the likelihood of Internet use being associated with more loneliness, and increases the likelihood of it being associated with less loneliness. This influence goes beyond the positive effects of family support in general terms. To our knowledge, no study to date has directly addressed how parents can endeavor to be perceived in such ways, but experiences gathered in the area of TV viewing suggest that parents' media literacy can be one prerequisite (Dorr & Rabin, 1995; Gentile & Walsh, 2002).

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Footnotes

[1] The data of seven participants who scored higher than 12 was set at 12 (winsorizing) in

order to limit the influence of extreme values.

Table 1

Means, Standard Deviations, and Intercorrelations of the Studied Variables

Variables	M	SD	1	2	3	4	5	6
1. Gender[a]	-	-						
2. Age	15.8	1.47	.15*					
3. Internet use	4.79	3.14	-.13	.20**				
4. Communication quality	3.16	1.15	.10	.08	-.12			
5. Communication quantity	2.16	0.92	.06	-.01	-.02	.22**		
6. Family support	5.47	1.39	.00	-.13	-.16*	.42***	.28***	
7. Loneliness	2.04	0.68	-.02	.06	.15*	-.31***	-.12	-.47***

Note. $N = 216$.

[a] 0 = male, 1 = female

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 2

Hierarchical Linear Regression, Loneliness as the Criterion (Step 2 to Step 4)

Variable	Step 2				Step 3				Step 4			
	B	*SE_B*	β	*p*	*B*	*SE_B*	β	*p*	*B*	*SE_B*	β	*p*
Intercept	2.02	0.08		< .001	2.01	0.08		<.001	2.02	0.07		<.001
1. Gender[a]	0.03	0.1	.02	.789	0.03	0.1	.02	.789	0.01	0.09	.00	.937
2. Age	0.04	0.05	.06	.350	0.04	0.05	.06	.361	0.01	0.04	.01	.908
3. Internet use	0.07	0.05	.11	.118	0.07	0.05	.11	.115	0.05	0.04	.07	.242
4. Communication quality	-0.21	0.04	-.31	<.001	-0.20	0.04	-.29	<.001	-0.09	0.05	-.13	.051
5. Internet use x Communication quality					-0.10	0.04	-.16	.015	-0.08	0.04	-.12	.044
6. Family support									-0.26	0.05	-.39	<.001
R^2 (Adj. R^2)	.12 (.10)				.14 (.12)				.26 (.24)			
ΔR^2	.11				.03				.12			
F			6.87	<.001			6.83	<.001			4.25	<.001
ΔF			13.16	<.001			6.02	.015			33.07	<.001

Note. N = 216. Continuous predictors were *z*-standardized.
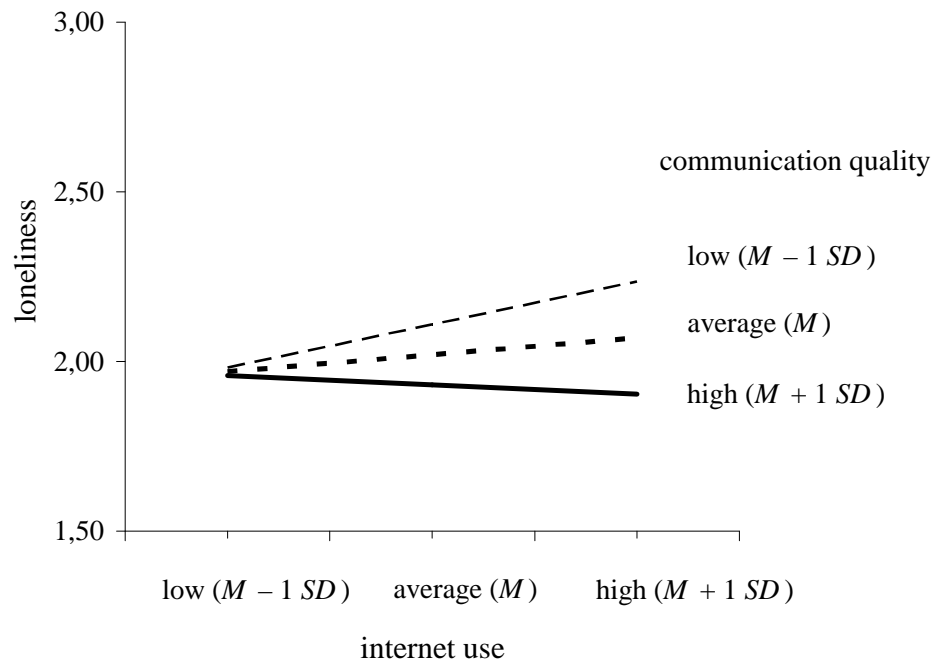
[a] 0 = male, 1 = female

Figure 1.

Figure 1. Interaction between amount of Internet use and communication quality on
loneliness.