

The Benefits of Social Technology Use Among Older Adults Are Mediated by Reduced Loneliness

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Abstract

Technology has the ability to enhance and enrich the lives of older adults by facilitating better interpersonal relationships. However, few studies have directly examined associations between technology use for social reasons and physical and psychological health among older adults. The current study examines the benefits of technology use in 591 older adults from the 2012 wave of the Health and Retirement Study ($M_{age}=68.18$, $SD=10.75$; 55.5% female). Social technology use was assessed through five technology-based behaviors (i.e., using e-mail, social networking sites, online video/phone calls, online chatting/instant messaging, using a smartphone). Attitudes toward the usability and benefits of technology use were also assessed. Older adults had generally positive attitudes toward technology. Higher social technology use was associated with better self-rated health, fewer chronic illnesses, higher subjective well-being, and fewer depressive symptoms. Furthermore, each of the links between social technology use and physical and psychological health was mediated by reduced loneliness. Close relationships are a large determinant of physical health and well-being, and technology has the potential to cultivate successful relationships among older adults.

Introduction

THE RECENT ADVANCES IN TECHNOLOGY and online social networking can have large implications for the health and well-being of older adults. Technology makes it easier for older adults to connect with their loved ones and has made life more convenient on the whole. Interestingly, much of the previous research on technology use among older adults has focused on the reasons why older adults do not use technology. Despite this focus, a growing number of studies have revealed some mental health benefits that come along with using technology and the Internet more often.^{1,2} Do the benefits of technology also extend to physical health? If so, why would greater technology use predict better mental and physical health among older adults? The current study examines the association between using technology for social connection and health and well-being.

Older Adults and Social Technology Use

Previous research on technology use across the life span has focused on the “digital divide,” or how there are large disparities in technology and Internet use between younger and older adults.^{3–5} This research paints a bleak picture of older adults—that they lack the ability and motivation to adapt to a changing technological landscape. Many older

adults feel anxious and intimidated by the thought of using new technologies or their security.^{6–8} Although there are certainly differences in people’s ability and willingness to learning a new technology,⁹ the picture of older adulthood may be less bleak than many of these studies suggest. Many more older adults also acknowledge the benefits of technology use.¹⁰ Older adults think technology makes it easier to reach people, stay in touch with the people they like, and meet new people.¹¹ Technology also supports existing social activities with friends and enhances convenience in many life domains (e.g., seeking out information).¹² In short, older adults think the benefits of technology greatly outweigh the costs and challenges of technology.¹³ Despite the attention that the digital divide has garnered in recent years, a large proportion of older adults use technology to maintain their social networks and make their lives easier. In fact, there may be portions of the older population that use technology as often as younger adults.¹⁴

The Benefits of Social Technology Use

There are a growing number of studies touting the purported benefits of technology and Internet use. Using the Internet (often measured as a yes/no response to whether someone regularly uses the Internet) is associated with lower depression and loneliness and higher levels of social support,

life satisfaction, purpose in life, and social capital (e.g., bonding with others and bridging social networks).^{1,15,16} Older adults often report using technology to prevent feelings of loneliness.¹⁷ Indeed, there is a prospective link between Internet use and reduced depression that is mediated by decreases in loneliness and social isolation.² However, there are also a few studies showing no relationship between technology/Internet use and depression, quality of social relationships, and well-being.^{18,19} There are also concerns that technological advances may even further isolate older adults from society, possibly leading to worse outcomes.^{20,21} Thus, there is some empirical evidence for a link between technology/Internet use and higher well-being, but also some studies and conceptual reasons why technology use may be unrelated or even detrimental to well-being.

If technology does indeed reduce loneliness and enhance social networks, this could lead to better physical health among older adults. Loneliness and social isolation are predictors of poor health and mortality.²² On a practical level, social relationships reduce stress and depression, which can enhance physical health.²³ Individuals in older adults' social networks have the ability to pressure and persuade them to adhere to medical treatments, leading to faster recovery after an illness.²⁴ Health behavior and illnesses also spread through social networks and are coordinated within relational dyads.^{25,26} Finally, the personality and health behavior of individuals in an older adult's social network can be the antecedents to positive health changes, irrespective of that individual's initial personality and health behavior.^{27,28}

The Current Study

The current study examined the benefits of using technology for social connection among older adults. It was hypothesized that technology use would be associated with better health and well-being. Furthermore, the mediating role of (reduced) loneliness in the relationship between technology use and mental and physical health was examined.

Older adults' attitudes about the usability and benefits of technology are also reported. These attitudes focus on the perceived usability and usefulness of social technology to re-examine the perception that older adults are not motivated to learn new technologies or find them too difficult to use.⁴

Method

Sample and procedure

The Health and Retirement Study (HRS) is a nationally representative and prospective panel study that has surveyed >22,000 Americans aged 50+ every 2 years.^{29,30} The current study reports on psychological, health, and covariate data collected in 2012. The University of Michigan's Institute for Social Research is responsible for the study and provides extensive documentation about the protocol, instrumentation, sampling strategy, and statistical weighting procedures.

In 2012, a subsample of participants received an experimental module that asked questions about technology use. I limited the current sample to the 591 participants (55.5% female; $M_{\text{age}} = 68.18$, $SD = 10.75$) who had full data on all the measures of interest. The mean number of years of education was 13.28 years ($SD = 2.70$). The ethnic composition of the sample was Caucasian (73.9%), African American (17.9%),

Hispanic (6.1%), and mixed races/other (2.0%). The majority of the sample was in a committed relationship (64.5%).

The current sample differed from the broader HRS sample. The current sample was older ($d = 0.12$), had more years of education ($d = 0.12$), and had more Caucasian respondents (73.9% vs. 68.2%) and fewer Hispanic respondents (6.1% vs. 11.3%), $\chi^2(3) = 18.23$, $p < 0.001$. The two samples were similar on all other demographic variables.

Measures

Technology use for social connection. Technology use was assessed with a checklist of five mediums that are used to enhance social connection. Participants indicated whether they used (a) e-mail, (b) social networks such as Facebook or Twitter, (c) online (or Internet-based) video or phone calls, such as Skype, (d) online chatting or instant messaging, and (e) a smartphone, such as an iPhone or Blackberry. Responses were summed to create an index, such that higher values indicated more technology use.

Evaluation of technology. A subset of individuals from the current study ($Ns = 212\text{--}366$) completed items related to attitudes (e.g., the benefits, drawbacks, satisfaction, and difficulty) toward technology use. This subset differed from the broader HRS sample in similar ways to the previously selected sample. Participants only completed these items if they acknowledged using any of the aforementioned technologies for social connection. Respondents indicated (yes or no) to whether technology saves time, increases flexibility in communication, is easy to use, is a necessity for them, is easily available, if they are opposed to learning new technologies, if technology is too expensive, too complicated, too hard to learn, takes too much time to learn, and whether it is difficult to keep up with changes in technology. Overall satisfaction with social technology use was measured with a single item "Thinking about the technologies you use for communication, how satisfied are you?" on a four-point scale ranging from 1 (*not satisfied at all*) to 4 (*very satisfied*). Perceived difficulty in using technology was measured with a single item "Once you learned how to use them, how difficult have they been to use?" on a four-point scale ranging from 1 (*not difficult at all*) to 4 (*very difficult*).

This subset of items evaluating technology was included to assess older adults' attitudes toward technology and test the accuracy of the stereotype that older adults find technology too complicated to use or do not understand the benefits of technology. Knowing participants' general attitudes and willingness to engage with social technology can inform the likely effectiveness of interventions aimed at increasing technology use among older adults. If older adults present a general unwillingness to engage with technology or find that technology does not benefit them, this information is useful for researchers and practitioners alike.

Loneliness. Loneliness was assessed with an 11-item scale developed for large-scale surveys.³¹ Participants responded with how much of the time they felt each statement described them on a three-point scale ranging from 1 (*hardly ever or never*) to 3 (*often*). Sample items included "You lack companionship?," "That there are people you feel close to? (reverse-coded)," and "Isolated from others?" Responses were averaged to yield an overall score of loneliness for participants ($\alpha = 0.89$).

Subjective health. Self-rated health was assessed with a single item, “Would you say your health is excellent, very good, good, fair, or poor?” Participants rated their health on a scale ranging from 1 (*poor*) to 5 (*excellent*).³²

Chronic conditions. An index of eight major chronic conditions was computed for each participant. Chronic conditions included (1) high blood pressure, (2) diabetes, (3) cancer or a malignant tumor of any kind (excluding minor skin cancer), (4) lung disease, (5) coronary heart disease, including heart attacks, angina, and congestive heart failure, (6) emotional, nervous, or psychiatric problems, (7) arthritis or rheumatism, and (8) stroke. Each participant self-reported eight physician-diagnosed conditions. The number of chronic conditions was summed so that higher values reflected more health problems.

Subjective well-being. Subjective well-being was assessed with the Satisfaction with Life Scale.³³ Participants rated the extent to which they agreed with each of five items, on a scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Sample items include, “In most ways, my life is close to ideal” and “I am satisfied with my life.” Responses were averaged to compute an overall score of subjective well-being ($\alpha=0.88$).

Depression. Depression was measured with a modified eight-item version of the Center for Epidemiological Studies Depression Scale (CES-D).³⁴ Participants responded to a checklist of eight depressive symptoms that they reported feeling in the past week (feeling depressed, felt everything they did was an effort, restless sleep, happiness, lonely, enjoyed life, sad, felt unmotivated). Internal consistency for the CES-D was high ($\alpha=0.83$), which is consistent with prior research using this shorter version of the CES-D.

Results

How do older adults evaluate technology?

The response rates and distributions of the technology attitude items are presented in Table 1. Overall, older adults had very positive attitudes toward technology. Many individuals noted that technology saves time, increases flexibility in communication, is easy to use, is necessary, and readily available. Over 70% of the sample reported that they were open to learning new technologies. Furthermore, 95.6% of older adults reported that they were at least *somewhat satisfied* with the technologies they use for communication.

Older adults also noted some challenges to technology use. Nearly half the sample reported that technology is hard to learn and takes too much time to learn. A larger proportion of people said that technology is too expensive, too complicated, and that it was difficult to keep up with changes in technology. Nevertheless, when asked how difficult technology was to use after they had learned how, 77.2% of older adults said that using technology was either *not very difficult* or *not difficult at all*.

Is technology use associated with better health and well-being?

Preliminary results. Descriptive statistics and correlations among primary study variables are shown in Table 2. As predicted, greater technology use was associated with lower

TABLE 1. OLDER ADULTS' EVALUATION OF TECHNOLOGY

<i>Variable</i>	<i>n</i>	<i>Percentage</i>
Saves time	363	83.5 (yes)
Flexibility in communication	364	92.0 (yes)
Easy to use	364	74.7 (yes)
Technology is a necessity	365	61.9 (yes)
Easily available	212	75.0 (yes)
Overall satisfaction with technology	366	49.7 (very satisfied) 45.9 (somewhat satisfied) 2.7 (not very satisfied) 1.6 (not satisfied at all)
Opposed to learning new technologies	225	72.0 (no)
Too expensive	220	60.9 (yes)
Too complicated	216	69.0 (yes)
Too hard to learn	211	49.8 (yes)
Too much time to learn	219	46.6 (yes)
Difficult to keep up with changes	221	75.6 (yes)
Difficult to use	364	33.0 (not difficult at all) 44.2 (not very difficult) 21.2 (somewhat difficult) 1.6 (very difficult)

Ns ranged from 211–366.

loneliness, better health, fewer chronic illnesses, and lower depression. Technology use was unrelated to subjective well-being at the bivariate level. Also as predicted, loneliness was associated with worse health, more chronic illnesses, lower subjective well-being, and higher depression. The associations were the same when controlling for age, gender, and years of education with one exception: technology use became a significant predictor of life satisfaction, $\beta=0.12$, $p=0.01$.

Women reported lower loneliness but higher depression compared to men. Older adults reported lower technology use, less loneliness, higher subjective well-being, less depression, but more chronic illnesses. Measures of health, illnesses, subjective well-being, and depression were intercorrelated in expected directions.

Does loneliness mediate the association between technology use and health and well-being?

Follow-up analyses tested whether technology use reduced loneliness, which then predicted health, illness, subjective well-being, and depression. This constitutes a mediational analysis in which loneliness mediates the association between technology use and physical and mental health. Technology use was significantly associated with loneliness (the mediator; M), and with health, illness, subjective well-being, and depression (the outcomes; Y). Loneliness was also a significant predictor of health, illness, subjective well-being, and depression—justifying the use of mediational analyses.³⁵

To test whether loneliness mediated the association between technology use and health, illnesses, subjective well-being, and depression, four mediation analyses were conducted using Hayes' PROCESS macro (i.e., Model 4 with 5,000 bootstrap samples).³⁶ As shown in Figure 1, technology use predicted lower loneliness, which in turn was associated with better self-

TABLE 2. CORRELATIONS AMONG PRIMARY STUDY VARIABLES

	Mean (SD)	1	2	3	4	5	6	7
1. Gender								
2. Age	68.18 (10.75)	-0.06						
3. Technology use	1.37 (1.42)	0.03	-0.41***					
4. Loneliness	1.55 (0.44)	-0.12**	-0.09*	-0.10*				
5. Subjective health	3.26 (1.05)	0.01	-0.06	0.20***	-0.26***			
6. Chronic illness	2.27 (1.49)	0.01	0.26***	-0.20***	0.14**	-0.49***		
7. Subjective well-being	4.76 (1.52)	-0.04	0.18***	0.06	-0.45***	0.40***	-0.19***	
8. Depression	1.31 (1.82)	0.11**	-0.08*	-0.09*	0.36***	-0.36***	0.30***	-0.38***

Ns range from 589 to 591. Gender: -1 = male, 1 = female.

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$.

rated health (Estimate: 0.02, 95% CI [0.006, 0.044], Sobel test = 2.30, $p = 0.02$), fewer chronic illnesses (Estimate: -0.02, 95% CI [-0.046, -0.005], Sobel test = -2.07, $p = 0.04$), higher subjective well-being (Estimate: 0.06, 95% CI [0.014, 0.100], Sobel test = 2.46, $p = 0.01$), and lower depression (Estimate: -0.06, 95% CI [-0.110, -0.015], Sobel test = -2.43, $p = 0.02$).

Supplementary analysis. Because each of the dependent variables was correlated with one another, it is possible that these intercorrelations are being confounded with each other, such that the mediation model could be reproducing the same analysis because of the shared variance of these variables. To address this, a multivariate structural equation model was constructed, in which technology use predicted loneliness and loneliness predicted each of the four outcomes simultaneously. Models were fit using AMOS 22.³⁷ Residual error variances for each variable were estimated, and regression paths were estimated from social technology use to loneliness and four additional paths from loneliness to each of the four dependent measures. The four dependent variables were allowed to covary so that the correlations between them were estimated at the same time that the technology-loneliness-mental/physical health link was being tested (see Supplementary Fig. S1 for estimates; Supplementary Data are available online at www.liebertpub.com/cyber). The structural model fit the data well ($\chi^2(4) = 7.59$, $p < 0.001$, comparative fit index [CFI] = 0.96, root mean-squared error of approximation [RMSEA] = 0.10)

and was consistent with the mediational analysis reported above—technology use predicted lower levels of loneliness. Furthermore, loneliness predicted worse subjective health, more chronic illnesses, worse subjective well-being, and greater depression.

Discussion

The current study examined the association between social technology use and mental and physical health. The link between technology use and mental and physical health was mediated by loneliness, such that technology use predicted lower loneliness, which predicted better mental and physical health.

The observation that social technology confers health benefits through decreases in loneliness is consistent with disparate literatures on technology use and health among older adults.²² The mediating link of loneliness clarifies the association between technology and mental health, which may help explain why some previous studies failed to find an association between the two.^{18,19} The current study also revealed that social technology has physical health benefits as well. The fact that older adults' attitudes toward technology were positive also dispels the perception that older adults lack the motivation to use and learn about technology or that technology may be particularly "harmful" for older adults' social relationships.^{3-5,21} To the contrary, older adults recognized the benefits of technology use for social relationships and increasing capacity for convenience—it made communication easier and saved time. Older adults

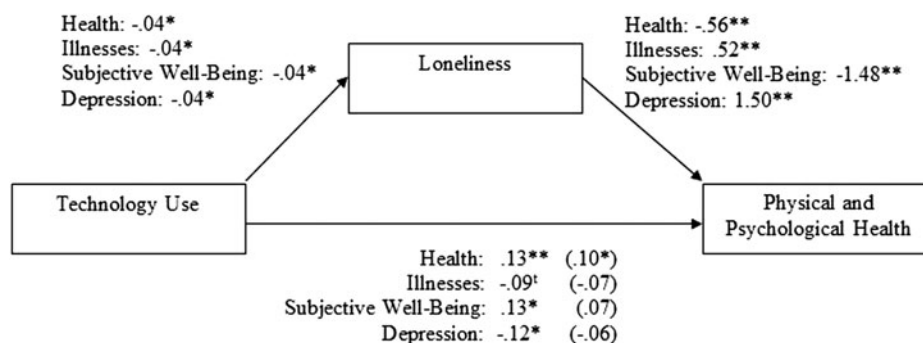


FIG. 1. Unstandardized regression coefficients representing the relationship between technology use, loneliness, and subjective health, chronic illness, subjective well-being, and depression. The effect of technology use in physical and psychological health, controlling for loneliness, is in parentheses. Covariates include age, gender, and years of education. $†p < 0.10$, * $p < 0.05$, ** $p < 0.001$.

also expressed a willingness to learn new technologies. This finding should give practitioners hope—it means that older adults are willing and able to learn new technologies, and the use of these technologies could benefit their mental and physical health over time.

Perhaps the clearest application of social technology use to successful aging is through its ability to keep older adults engaged with life.^{21,38} Although the current study focused on loneliness as the mechanism linking technology use to better mental and physical health, the possibility that technology could increase social support is an additional consideration. The benefits of engaging with life are particularly evident with respect to older adults' relationships with other people.^{21,38} Social networks provide individuals with multiple sources of support—both emotional and instrumental.^{39,40} Emotional support involves providing individuals with non-tangible support, like helping someone feel valued, supported, and accepted. Social technology can also be a source of instrumental support, which is a more tangible form of support that involves concrete ways that individuals can help one another, like financial assistance or services. Unfortunately, emotional and instrumental support were not measured in HRS, but examining how technology further embeds older adults within their existing social networks is an exciting avenue for future research.

Limitations

The most notable limitation of the current study was that it was cross-sectional. In the absence of multiple waves of data on all variables, it is unclear whether technology use predicts better physical and mental health or whether better physical and mental health predicts more technology use (or both). Longitudinal data on technology use and mental and physical health will enable researchers to track whether increases in technology use over time are correlated with improvements in physical and mental health.^{2,41–43}

Conclusion

The current study demonstrated that social technology use can be beneficial for older adults. Greater technology use was associated with better self-rated health, fewer chronic conditions, higher subjective well-being, and lower depression. The current study extends previous theoretical and empirical work on the benefits of social technology in many ways. It provides a confirmatory test of previous research on the benefits of Internet use among older adults by showing that new technologies can also confer these benefits, particularly with respect to health outcomes.² It also provides a psychological mechanism through which technology can improve the lives of older adults. Previous research had been limited by considering technology use and quality of life in isolation of one another, rather than testing the psychological links between the two. The current study also challenges the assumption that older adults lack the skill and motivation to engage with new technologies, providing an exciting opportunity to further integrate technology into the lives of older adults.

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