Computers in Human Behavior 126 (2022) 107028

Contents lists available at ScienceDirect

Computers in Human Behavior

journal homepage: www.elsevier.com/locate/comphumbeh

Partner influences on ICT use variety among middle-aged and older adults: The role of need for cognition

William J. Chopik [a,*], Jess Francis [b]

[a] Michigan State University, USA
[b] University of Michigan, USA

ARTICLE INFO

Keywords:
Need for cognition
Dyadic influence
Health and retirement study
Unified theory of acceptance and use of technology
Actor-partner interdependence model

ABSTRACT

This exploratory study examined individual and dyadic predictors of variety of ICT use. Need for cognition is associated with engaging in a variety of intellectually stimulating practices and a prominent individual difference predictor of the types of ICTs people use. Participants were a subset of 542 heterosexual couples (N = 1084 individuals; 50% women; M_{age} = 63.65; 83.9% Caucasian) from the Health and Retirement Study with access to the internet. Individuals high in need for cognition were more likely to use ICTs for a variety of reasons. Being married to someone high in need for cognition was associated with a greater variety of ICT ownership, use of ICTs for financial/transactional activities, and use of ICTs for miscellaneous reasons (e.g., research), although these effects were relatively small and the evidence for partner effects was relatively weak according to the distribution of p-values. Partner effects were not significant for social technology or internet-enabling ICTs; cross-partner interactions provided suggestive evidence for compensatory partner effects of need for cognition. Findings are discussed with respect to the relational and contextual determinants of ICT use in older adulthood.

1. Partner influences on ICT use variety among middle-aged and older adults

A great deal of attention has been paid to identifying why people use information and communication technologies (ICTs; e.g., mobile phones, the internet, and social networking sites) in older adulthood (Chen & Chan, 2011; Svendsen et al., 2013). Much of this work to date has focused on individual demographic and psychological characteristics and focused on binary distinctions about whether someone uses one form of ICT. However, individuals do not live in a vacuum and choose various ICTs to seek out information, manage their lives, or connect with others (Hoppmann & Gerstorf, 2009; Kelley & Thibaut, 1978; Tun et al., 2021). In this exploratory study, we examined how a particular characteristic of both individuals and their partners—their need for cognition—was associated with ICT use variety in a sample of 542 middle-aged and older couples (N = 1084 individuals) with access to the internet.

1.1. The influence of close relationships and ICT use

Using ICTs such as mobile phones, the Internet, and social networking sites may help adults maintain connections with their significant others, thereby facilitating access to social support (Cotten et al., 2013) and the ostensible health and well-being benefits of close relationships across the lifespan (Cornwell & Waite, 2009; Diener et al., 2018; Farrell & Stanton, 2019; Kahn & Antonucci, 1980; Lubben & Gironda, 2003; Purol et al., 2020; Wright & Brown, 2017). The benefits of ICT use on older adults' well-being may include lower feelings of loneliness, depression, and social isolation (Chopik, 2016; Cotten et al., 2013; Francis et al., 2016). ICT use is also associated with feelings of connectedness to family members for older adults (Cotten et al., 2013; McMellon & Schiffman, 2002), although ICT-well-being associations are not always found or straightforward despite the large interest in how ICTs affect health and well-being (Orben et al., 2019; Orben & Przybylski, 2019; Schwaba & Bleidorn, 2021).

To date, one relatively neglected topic of study is whether older adults use a *variety* of ICTs rather than if they just use one particular ICT or not. The broader diversity of ICTs in an individual's environment can make parts of their lives easier, enhance the opportunities and methods for communicating with others, and keep people cognitively engaged (Choi et al., 2020; Tun et al., 2021). This can be especially important for older adults who, because of lack of familiarity with ICTs or the

* Corresponding author. Department of Psychology, Michigan State University, 316 Physics Rd., East Lansing, MI, 48824, USA.
E-mail address: chopikwi@msu.edu (W.J. Chopik).

https://doi.org/10.1016/j.chb.2021.107028
Received 7 November 2020; Received in revised form 6 September 2021; Accepted 21 September 2021
Available online 22 September 2021
0747-5632/© 2021 Elsevier Ltd. All rights reserved.

perception of greater barriers, may be less likely to embrace an ecosystem that contains multiple and varied ICTs (Alkhatib et al., 2018; Chopik et al., 2017; Hill et al., 2015). As a result, they may be less likely to reap the benefits of using a variety of different ICTs. However, among older adults, there is likely variation in the degree to which people embrace a diverse set of ICTs. The current study examines some of the precursors of ICT use variety among individuals in the context of their close relationships.

1.2. Why do people use different ICTs? Individual and dyadic factors

1.2.1. Theoretical models predicting individual ICT use

The Unified Theory of Acceptance and Use of Technology (UTAUT)—synthesizes existing technology acceptance research into a single comprehensive theory (Venkatesh et al., 2003): deciding whether or not to use a form of technology can be predicted from (a) how we expect the technology to perform and help us attain a goal (performance expectancy), (b) how much effort we expect to expend and how hard it is to use (effort expectancy), (c) if we think other people think we should use a form of technology (social influence), and (d) factors that make it easier to use a technology or that a system more easily supports its use (facilitating conditions). The UTAUT2 extends UTAUT by adding three additional constructs: hedonic motivation (e.g., do we feel good when we use it?), price (i.e., are the benefits worth the monetary cost?), and habit (i.e., do we use technology in a habitual way?). Since UTAUT (2)'s, and other theoretical models', inception, a great deal of attention has been paid to identifying the sociodemographic factors associated with ICTs people tend to use. For example, men and married individuals are more likely to report using general forms of ICTs, like accessing the internet (Cotten et al., 2014; Kim et al., 2016).

One relatively underexplored extension of the theory is whether similar processes predict whether or not people adopt a *variety* of different ICTs. Importantly, instead of conceptualizing these frameworks as solely interested in whether a person either uses or does not use one particular ICT, they could likely be extended to consider whether people develop diverse environments of ICTs. Doing so could help enrich these theoretical frameworks by acknowledging that people likely rely on different ICTs to serve different purposes and, as a result, perceive different barriers to and receive different benefits from using varied ICTs. But what might predict whether someone uses a *variety* of different ICTs?

An inherent assumption of the UTAUT2 is that if individual characteristics affect any of these processes, those same characteristics likely also facilitate or hinder using a variety of ICTs. Although there have been many studies examining demographic factors affecting these processes (Chen & Chan, 2011), research on psychological factors affecting these processes has relatively lagged (see Mark & Ganzach, 2014; Özbek et al., 2014; Svendsen et al., 2013, for a few exceptions). Nevertheless, researchers have occasionally investigated the impact of personal characteristics on technology use. For instance, Chopik et al. (2017) took the broadest approach to date by examining 17 individual difference constructs from the Health and Retirement Study and their relationship to technology use among middle-aged and older adults. Among the most reliable predictors was need for cognition—the extent to which an individual engages in effortful cognitive activities (Cacioppo & Petty, 1982). Further, of these 17 psychological factors, need for cognition alone explained ICT use through enhancing perceptions of benefits and reducing perceived barriers to ICT use (Chopik et al., 2017). Need for cognition is associated with a host of additional characteristics that aid in the using a variety of ICTs (Oh & Kang, 2021). For example, need for cognition is associated with creative problem-solving ability, time invested in deliberative thinking, a preference for complex tasks, school and professional success, and modestly ($rs < 0.26$) correlated with intelligence (Cacioppo & Petty, 1982; Cacioppo et al., 1996; Lins de Holanda Coelho et al., 2020; Rudolph et al., 2018). Together, all of these related characteristics portend why someone high in need for cognition might use a range of different ICTs. Because people high in need for cognition prefer complex tasks and creative ways of solving and managing life challenges, they likely use a wide range of different ICTs, and this diversity would be reflected in them nominating that they use more and different types of ICTs.

1.2.2. ICT use variety in the context of close relationships

Technology naturally intersects with social relationships. For example, members of social networks often help each other overcome difficulties in using unfamiliar ICTs (Francis et al., 2018). Likewise, technology can often be the source of friction in spousal relationships because partners have their own preferences for ICT use and vary in how big a role it plays in their lives (Helsper & Whitty, 2010; Wardecker et al., 2016). For example, negative partner interactions regarding technology (either when we are interrupted by technology [i.e., technoference] or ignored by our partner while they attend to technology [i.e., phubbing]) and disagreements about technology use are thought to be stressors in romantic relationships that negatively affect relationship quality and increase conflict (Beukeboom & Pollmann, 2021; Halpern & Katz, 2017; McDaniel & Drouin, 2019; McDaniel et al., 2018; VandenAbeele et al., 2019). Although technology might play a significant role in relationship dynamics and interactions, an important question involves identifying psychological characteristics—of both individuals and their partners—that are associated with the variety of ICT use in the first place.

In the UTAUT2 specifically, there are some elements (e.g., social influences) that researchers might use to predict how the social environment affects the diversity of ICT use. For example, one observation from the UTAUT2 is that, if one partner purchases a computer or ICT (or partners split the purchase), the cost of accessing the computer/ICT (one of the individual barriers to use) is dramatically reduced. However, beyond practical examples like these, UTAUT model to date has focused on an individual's *perception* of social actors in their environment and not the *actual characteristics* of social actors, which people may not fully or consciously perceive. Such a focus naturally neglects a number of questions about whether the people around us affect whether or not we use a particular ICT or a variety of ICTs. Knowing more about a social partner's actual psychological characteristics can further enrich our knowledge about social influences affecting ICT use variety.

For example, does having a partner higher in need for cognition (a robust predictor of ICT use) encourage individuals to use various forms of ICTs? There are at least two ways why it might. First, there might be additive effects, in which being high in need for cognition and having a partner high in need for cognition both additively increase the likelihood of using a variety of ICTs. People might use a novel ICT that a partner uses as a way of connecting with them or sharing in on a technology-related experience, in addition to their own disposition and enjoyment of challenging tasks. In line with the UTAUT2 model, partners can also provide nudges to use novel and additional ICTs (Francis et al., 2018). For example, one partner sees another struggling with a task (e.g., managing finances) and encourages the use of an online banking software/client that they might not have considered.

Second, partners' need for cognition levels could interact in a multiplicative way. For example, it is possible that one partner's personality (e.g., their need for cognition) could compensate for the lower levels of need for cognition in their partner. Specifically, people higher in need for cognition might be especially helpful for partners lower in need for cognition—encouraging them to step outside their comfort zones, teaching them about the benefits of novel or additional ICTs, and helping or guiding them through using new ICTs. As a result, ICT variety is more likely in the context of unique multiplicative interactions between partners' need for cognition levels. This is consistent with evidence showing that individuals with higher need for cognition tend to engage more willingly with new and innovative ideas than those with low need for cognition (Wu et al., 2014). Furthermore, individuals with lower need for cognition tend to rely on others to help them formulate

their views (Cacioppo et al., 1996), which would be the case of having a partner high in need for cognition. Having a partner with higher need for cognition could facilitate using a wider variety of ICTs by alleviating the cognitive burden associated with ICT use for individuals (e.g., helping to navigate new and confusing ICTs, troubleshooting ICT uses, discovering helpful uses of ICTs). Alternatively, having a partner high in need for cognition might *decrease* the variety of ICT use. Particularly among middle-aged and older couples, there might be a technological division between partners. A technology-savvy user might assume the primary responsibility of handling technology-related tasks (e.g., handling finances, managing online communication, seeking out [health] information). As a result, being married to someone high in need for cognition might suggest that they dominate all ICT-related tasks, perhaps lowering motivation for their partner to use varied forms of ICTs.

For better and for worse, partners exert a great deal of influence in people's lives, including their decision making (Fitzsimons et al., 2015; Fitzsimons & Finkel, 2015; Hofmann et al., 2015). Thus, it is likely that partners' psychological characteristics have implications for whether people use various ICTs. Further, many of these dyadic processes might occur outside of an individual's conscious awareness; other people and social situations can provide nudges for us to act in different ways without us knowing (Craddock et al., 2015; Lewis & Butterfield, 2007; Thaler & Sunstein, 2008). Thus, merely asking people about how others are influencing them has its limitations. However, an examination of actual partner characteristics in using a variety of ICTs has been conspicuously absent from the literature and models of ICT use.

2. The current study

In the current exploratory study, we focused on need for cognition specifically, given that it has previously been identified as the most consistent individual difference characteristic for predicting ICT use. Over-and-above being high in need for cognition, individuals with partners high in need for cognition might be more likely to use a variety of ICTs as well, given that having a partner who is cognitively engaged in challenging or effortful tasks might encourage individuals to use novel ICTs. We expected that being higher in need for cognition would be associated with more varied ICT use. Further, we explored whether being married to someone high in need for cognition would be associated with a greater variety of ICT use. Finally, we examined different combinations of need for cognition among romantic partners to test whether one person's need for cognition might compensate for their partner's lower levels of need for cognition when it comes to predicting ICT use variety.

3. Method

3.1. Participants

Participants were a subset of 542 middle-aged and older, heterosexual couples ($N = 1084$ individuals; $M_{age} = 63.65$, $SD = 9.36$) from the Health and Retirement Study (HRS) with access to the internet. The current sample is comprised of those who (a) participated in the HRS' 2013 Internet Survey (that included ICT-related questions), (b) participated in the HRS' 2012 Leave Behind Questionnaire (that included the need for cognition measure), and were currently married with data provided by their partners. Participants had 14.15 years of education on average (SD = 2.16) and were mostly Caucasian (83.9%; 7.2% Black/African American, 5.5 Hispanic/Latino, and 3.3% mixed races/other).[1] The current study was not pre-registered.

3.2. Measures

3.2.1. Need for cognition

Need for cognition was measured with a six-item scale created by McArdle et al. (2015) based on broader need for cognition scales (Cacioppo & Petty, 1982). Participants were asked to describe the extent to which each item characterized them on a scale ranging from 1 (*not at all like me*) to 5 (*very much like me*). Sample items include, "The notion of thinking abstractly is appealing to me." and "I only think as hard as I have to" (reverse-scored). Responses were averaged to yield an overall composite of need for cognition ($M = 3.97$, $SD = 1.62$; $\alpha = 0.86$). Two subscales—cognitive enjoyment and cognitive effort—can also be derived from this scale. However, because the subscales were correlated so highly with each other ($r = 0.73$, $p < .001$), we elected to use the broader need for cognition scale in our analyses.

3.2.2. ICT ownership and use

In the current study, we had access to a variety of ICTs that individuals could nominate that they are currently using. Worth noting, this measure was different than a traditional measure that might ask how often a participant uses a particular ICT (Ellis et al., 2019). In this way, our measure of ICT use reflected the *diversity or variety* of different types of ICTs a person could use rather than a quantification of whether or not they are an ICT user or a measure of how often or intensely they used ICTs.

3.2.2.1. ICT ownership. ICT ownership variety was assessed with a checklist of 10 different devices participants owned: (1) a desktop computer, (2) a laptop computer, (3) a tablet computer (such as iPad), (4) an eReader (such as Kindle, Nook), (5) a gaming device (such as Wii, XBox, PlayStation) that connects to the internet, (6) an internet-enabled TV or device to stream internet video (such as Roku, Netflix or Hulu), (7) a smartphone (such as iPhone, Android phone, or Blackberry), (8) a cell phone, other than smartphone, (9) a conventional telephone (landline), and (10) Other. Participants responded with a 1 (*yes*) or 0 (*no*). Responses were summed to yield a count measure of ICT ownership variety ($M = 3.97$, $SD = 1.62$).

3.2.2.2. ICT internet access use. Variety of ICT use to access the internet was assessed with a checklist of seven different devices that participants have used in the last year to connect to the internet in any way. They were instructed to think of all the activities they do in which they might

[1] The inspiration from the current study came from a report on the association between need for cognition and ICT use among individuals (Chopik et al., 2017). Worth noting, this previous study also used data from the HRS, but because these data come from a separate source within the HRS and use different dependent variables, it is not merely a reproduction of previously reported results at the individual level. Data from the current study come from the 2013 HRS Internet Survey, a separate data collection effort from the 2012 module reported on in Chopik et al. (2017). The use of the Internet survey was advantageous for several reasons: (1) the 2012 module only assessed individuals (the 2013 survey sampled households/couples), (2) the 2012 module only assessed social technology use, video game use, and some health-related ICT use, and (3) the 2013 survey was three times the size of the 2012 module.

access the internet, not just email and surfing the web. The devices included: (1) a desktop computer, (2) a laptop computer, (3) a tablet computer (such as iPad), (4) an eReader (such as Kindle, Nook), (5) a gaming device (such as Wii, XBox, PlayStation) that connects to the internet, (6) an internet-enabled TV or device to stream internet video (such as Roku, Netflix or Hulu), and (7) a smartphone (such as iPhone, Android phone, or Blackberry). Participants responded with a 1 (*yes*) or 0 (*no*) to using each of the above ICTs. Responses were summed to yield a count measure of variety of ICT internet access use ($M = 2.44$, $SD = 1.35$).

3.2.2.3. ICT financial and transaction use. For variety of ICTs to use for financial and transaction reasons, participants responded to two separate questions (i.e., "Do you use the internet to access any of the following?" [for the first five items] and "Please indicate whether you have used the internet anytime in the past year for any of the following." [for the latter eight items]). The two responses were combined because all the questions involved managing finances, coordinating a future economic transaction, or executing financial transactions of some sort. Specifically, the activities or services included: (1) bank account, (2) brokerage, retirement, or mutual fund accounts, (3) credit card account, (4) mortgage, (5) utility or other bills, (6) buy an item online, (7) pay bills online, (8) book travel online, (9) buy tickets online (sports, movie, concerts), (10) make a reservation at a restaurant, (11) get a discount coupon, (12) buy or sell something using an online marketplace such as eBay, and (13) buy or sell something using an online classified site such as Craigslist. Participants responded with a 1 (*yes*) or 0 (*no*) to using each of the above ICTs for financial or transactional purposes. Responses were summed to yield a count of the variety of ICT uses for financial and transaction reasons ($M = 5.98$, $SD = 3.13$).

3.2.2.4. ICT social technology. Variety of uses of ICTs for social reasons was assessed with a checklist of five different social networking sites that participants use to communicate with other people: (1) MySpace, (2) Facebook, (3) Twitter, (4) LinkedIn, (5) Other. Participants responded with a 1 (*yes*) or 0 (*no*) to using each of the above social networking sites. Responses were summed to yield a count measure of ICT social technology ($M = 1.34$, $SD = 0.57$).

3.2.2.5. ICT other activity. Finally, the HRS Internet survey included a question that listed any other conceivable reason why people may have used the internet in the past year. These activities were wide-ranging and did not fall as easily into any aforementioned overarching category and were grouped together in the survey. In summing these items together, we labeled this scale as "ICT other activity," but it could also be characterized as general or variety of ICT use or technology literacy that does not fall cleanly into the categories above. The items included using the internet to: (1) send or read e-mail, (2) phone others using Skype, Facetime, or other such services, (3) get recommendations on restaurants, (4) get recommendations on service providers such plumbers or electricians, (5) get news online, (6) follow financial markets, (7) get information about health and healthcare, (8) watch movies or TV shows, (9) research (e.g., ancestry, dictionary, Wikipedia), (10) hobbies or interests (e.g., gardening, woodwork, recipes, household maintenance, quilting, knitting), (11) get directions and maps, (12) take a survey (in addition to this one), and (13) use the internet for work. Participants responded with a 1 (*yes*) or 0 (*no*) to using the internet for each of the above activities. Responses were summed to yield a count measure of variety of ICT use for other/miscellaneous activities ($M = 6.98$, $SD = 3.13$).

3.3. Statistical approach

Multi-level modeling (MLM) procedures recommended for dyadic data analysis were used (Kenny et al., 2006). This MLM approach estimates both *actor effects* (associations between a person's need for cognition and his/her own ICT use) and *partner effects* (associations between a person's need for cognition and his/her partner's ICT use) while accounting for the statistical non-independence of members in a couple. Both actor and partner effects of need for cognition were tested as predictors of variety of ICT ownership, ICT internet access use, ICT financial and transaction use, ICT social technology, and ICT other activity.[2] Statistical analyses were conducted using the SPSS MIXED procedure (Peugh & Enders, 2005).

Following recommended procedures (Kenny et al., 2006), gender was contrast-coded (−1 = men, 1 = women). All continuous predictors were mean-centered prior to their inclusion in the models. Varieties of ICT ownership, ICT internet access use, ICT financial and transaction use, ICT social technology, and ICT other activity served as the dependent measures. Separate multi-level models were conducted predicting each of the ICT outcomes from actor need for cognition and partner need for cognition. Individual-level covariates (age, gender, and education) were also included in each model based on their predictive value in previous research (Kim et al., 2016; Or & Karsh, 2009; Wagner et al., 2010). The partner effects for need for cognition are stronger in models not including these covariates, but we retained and interpreted the models with the covariates included. Interactions between actor and partner need for cognition were tested for the possibility of a multiplicative effect on ICT use (i.e., is ICT variety more common in couples in which both members are high in need for cognition? Or, does one partner's need for cognition compensate for their partner's low need for cognition to predict a greater variety of ICT use?).

4. Results

4.1. Preliminary analyses

Descriptive statistics and bivariate correlations are reported in Table 1 (lower diagonal for men; upper diagonal for women). Need for cognition was associated with more varied ICT use, replicating previous research (Chopik et al., 2017). Partner need for cognition was associated with more varied ICT ownership and varied use across four outcomes (the only exception was for ICT social technology). However, these associations were found only for men, such that wives' need for cognition predicted more variety in ICT use in husbands; husbands' need for cognition was largely unrelated to whether their wives used a variety of ICTs. Older adults were less likely to use a variety of ICTs in general, and people with higher levels of education were more likely to use a variety of ICTs, both of which replicate previous research (Or & Karsh, 2009; Wagner et al., 2010). Different types of ICT use were all significantly intercorrelated: if a person used a variety of ICTs in one cluster, they were also likely to use a variety of ICTs in another cluster. The intra-class correlations (for people nested within dyads) ranged from relatively small to modest in size: ICT ownership (ICC = 0.140), ICT internet access use (ICC = 0.197), ICT financial and transaction use (ICC = 0.029), ICT social technology (ICC = 0.320), ICT other activity (ICC = 0.036), and need for cognition (ICC = 0.065).

[2] Although the ICT variables were count variables, they were all normally distributed, allowing us to proceed with using traditional modeling techniques (e.g., the general linear model). We arrived at this conclusion through visual inspection of histograms and Normal Q-Q plots and skewness/kurtosis values that were non-problematic: ICT ownership (skewness: 0.313; kurtosis: 0.163), ICT internet access use (skewness: 0.790; kurtosis: 0.151), ICT financial and transaction use (skewness: 0.126; kurtosis: 0.988), ICT social technology (skewness: 1.501; kurtosis: 1.516), and ICT other activity (skewness: 0.174; kurtosis: 0.757).

Table 1
Descriptive statistics and bivariate correlations between study variables and ICT use variety.

	1	2	3	4	5	6	7	8	9	*M*	*SD*
1.) Age		-.04	-.08	-.08	-.17***	-.27***	-.21***	-.15**	-.30***	62.38	9.37
2.) Education	.05		.23***	-.02	.26***	.31***	.28***	.18**	.35***	13.99	2.10
3.) Actor Need for Cognition	-.07	.12**		.07	.20***	.22***	.15**	.19***	.22***	3.57	.89
4.) Partner Need for Cognition	-.08	.13**	.07		.07	.08	.06	-.04	.09	3.79	.84
5.) ICT Ownership Variety	-.15***	.25***	.20***	.10*		.74***	.36***	.21***	.49***	4.13	1.66
6.) ICT Internet Access Use Variety	-.29***	.27***	.21***	.10*	.72***		.44***	.34***	.54***	2.53	1.40
7.) ICT Financial and Transaction Use Variety	-.14**	.27***	.07	.14**	.41***	.47***		.29***	.59***	6.01	3.08
8.) ICT Social Technology Variety	-.08	.24***	.04	.08	.23***	.21**	.28***		.38***	1.27	.53
9.) ICT Other Activity Variety	-.23***	.37***	.23***	.17***	.49***	.59***	.62***	.28***		6.65	2.92
M	64.93	14.32	3.79	3.57	3.81	2.35	5.94	1.44	6.39		
SD	9.19	2.21	.84	.89	1.57	1.30	3.18	.62	3.04		

Note. $N = 1014$ heterosexual couples (50% men; 50% women). Correlations and descriptive statistics for men are in the lower diagonal; correlations and descriptive statistics for women are in the upper diagonal. $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.

4.2. Is having a partner high in need for cognition associated with ICT use?

We formally modeled actor and partner effects of need for cognition predicting each of the five ICT outcomes. These analyses accounted for the interdependence of couples' ICT use variety and allowed for the simultaneous estimation (and controlling) of actor need for cognition, partner need for cognition, and the control variables. The results from these analyses, including both unstandardized estimates and effect sizes, can be seen in Table 2. Reproducing the bivariate correlations above, higher actor need for cognition was associated with more varied ICT use across all the outcomes (*r*s = 0.07-0.18). However, partner need for cognition was also important. Being married to someone high in need for cognition was associated with more varied ICT ownership ($r = 0.07$), using more ICTs for finances and transactions ($r = 0.08$), and using more ICTs for other activities ($r = 0.09$). Thus, higher actor need for cognition was associated with more varied ICT use overall. Partner need for cognition was associated with more ICT ownership and ICT use for financial and other reasons but not associated with ICT internet access or ICT social technology.[3] Women were more likely to own a variety of ICTs, access the internet with a wider range of ICTs, and less likely to use ICTs for social technology reasons compared to men. Consistent with the bivariate correlations reported above, older participants and participants with lower levels of education were less likely to use and own each type of ICT.

Based on the bivariate correlations, there appeared to be gender differences in the partner associations of need for cognition on ICT variety. However, the moderating effect of gender was non-significant for actor and partner effects for ICT ownership (*p*s > .65), ICT internet access use (*p*s > .83), ICT financial and transaction use (*p*s > .37), ICT social technology (*p*s > .11), and ICT other activity (*p*s > .23). Thus, although partner need for cognition predicted ICT use variety among men but not women in Table 1, the magnitude of these effects was largely comparable when examined in the context of multi-level modeling (and controlling for age, gender, education, actor need for cognition, and the non-independence of the couples' ICT use variety).

4.3. Does one partner's need for cognition compensate for their partner's low need for cognition when predicting ICT use variety?

We next tested whether being married to someone higher in need for cognition "compensates" for being low in need for cognition when deciding whether or not to use a variety of ICTs. In other words, do people benefit from having a partner high in need for cognition? To test these questions, we added an actor need for cognition × partner need for cognition interaction to the aforementioned models in Table 2. This interaction was not significant for ICT ownership variety ($p = .12$), ICT social technology ($p = .39$), and using more ICTs for other uses ($p = .10$). However, the interaction term was significant for ICT internet access use ($r = 0.10$, $p = .03$) and using more ICTs for financial or transactional purposes ($r = 0.11$, $p = .01$). Decomposing these interactions revealed that partners who are low in need for cognition are more likely to use more ICTs for internet access and financial purposes if they are paired with someone who is high in need for cognition. Thus, partners low in need for cognition may benefit from (i.e., their low levels are compensated by) individuals high in need for cognition and are encouraged by these partners to use more ICTs to access the internet and for financial purposes. Specifically, when partners are high in need for cognition, actors' need for cognition was not associated with their ICT internet use variety ($p = .06$) or using more ICTs for financial or transactional purposes ($p = .65$). However, when partners are low in need for cognition, actor need for cognition was a stronger predictor of using a variety of ICTs to access the internet ($r = 0.20$, $p < .001$) and for financial or transactional purposes ($r = 0.12$, $p = .001$). This pattern of results can be seen in Fig. 1 (for ICT internet access use) and Fig. 2 (for ICT financial and transaction use).

4.4. Evaluating the evidence for partner influences on ICT use variety

The results presented thusfar provide some suggestive evidence that being married to a partner high in need for cognition might be associated with somewhat greater ICT use variety. However, we want to provide some additional context to temper our results by presenting them in an honest way. Specifically, the effects were relatively small (*r*s < 0.09) and not significant at all for two types of ICT use variety (social technology and internet access). This is important to highlight as well because, given the number of substantive tests conducted (e.g., 15 total if actor and partner interactions are considered), many of these effects would likely not survive even a liberal correction. Further, in the context of null hypothesis testing, when p-values are predominantly distributed between $0.01 < p < .05$, the general consensus is that the results provide

[3] The ICT Other Activity category was formed for two reasons: (1) these ICTs did not as closely align with the other ICT categories and (2) the HRS survey asked for responses to these miscellaneous ICTs separately. Although our main analyses used an aggregated measure of other ICTs, we also ran a series of supplementary analyses in which the main models were used to predict each ICT Other Activity separately (0 = no, 1 = yes). These analyses can be found in Supplementary Table 1. Actor need for cognition was significantly associated with greater ICT use for phoning others ($r = 0.09$), following financial markets ($r = 0.07$), doing research ($r = 0.14$), engaging in hobbies ($r = 0.09$), getting directions/maps ($r = 0.09$), taking surveys ($r = 0.10$), and using the internet for work ($r = 0.11$). Partner need for cognition was associated with greater individual ICT use for following financial markets ($r = 0.09$) and doing research ($r = 0.07$). In sum, there were not clear patterns within this other category for how actor and partner need for cognition was associated with these types of ICTs. We feel retaining the aggregate measure in the main text is worthwhile because it captures a variety of ICTs and actor/partner associations across them, but the supplement provides this category broken down into its individual components.

Table 2
Multi-level model analyses predicting ICT use variety.

ICT Ownership Variety					95% Confidence Interval		
	b	*SE*	*t*	*p*	LB	UB	*r*
Intercept	3.96	.06	70.98	<.001	3.85	4.07	
Actor Need for Cognition	.27	.05	4.98	<.001	.17	.38	.16
Partner Need for Cognition	.11	.05	2.02	.04	.003	.22	.07
Age	-.02	.01	−4.04	<.001	-.03	-.01	-.14
Gender	.18	.04	4.65	<.001	.10	.25	.19
Education	.15	.02	6.76	<.001	.11	.19	.21
ICT Internet Access Use Variety					95% Confidence Interval		
	b	*SE*	*t*	*p*	LB	UB	*r*
Intercept	2.43	.04	54.48	<.001	2.34	2.52	
Actor Need for Cognition	.24	.04	5.51	<.001	.16	.33	.18
Partner Need for Cognition	.07	.04	1.60	.11	-.02	.16	.05
Age	-.04	.005	−8.02	<.001	-.05	-.03	-.28
Gender	.09	.03	2.86	.004	.03	.15	.12
Education	.15	.02	8.29	<.001	.11	.19	.26
ICT Financial and Transaction Use Variety					95% Confidence Interval		
	b	*SE*	*t*	*p*	LB	UB	*r*
Intercept	5.94	.10	56.60	<.001	5.73	6.15	
Actor Need for Cognition	.23	.11	2.07	.04	.01	.45	.07
Partner Need for Cognition	.26	.11	2.32	.02	.04	.47	.08
Age	-.06	.01	−4.87	<.001	-.08	-.03	-.19
Gender	.02	.09	.27	.79	-.15	.20	.01
Education	.37	.05	7.97	<.001	.28	.47	.26
ICT Social Technology Variety					95% Confidence Interval		
	b	*SE*	*t*	*p*	LB	UB	*r*
Intercept	1.34	.02	54.88	<.001	1.30	1.39	
Actor Need for Cognition	.06	.03	2.14	.03	.005	.11	.09
Partner Need for Cognition	-.005	.03	-.17	.86	-.06	.05	-.01
Age	-.01	.003	−2.92	.004	-.01	-.002	-.14
Gender	-.08	.02	−3.33	.001	-.12	-.03	-.18
Education	.05	.01	4.41	<.001	.03	.07	.19
ICT Other Activity Variety					95% Confidence Interval		
	b	*SE*	*t*	*p*	LB	UB	*r*
Intercept	6.49	.09	71.73	<.001	6.31	6.67	
Actor Need for Cognition	.49	.10	5.06	<.001	.30	.68	.16
Partner Need for Cognition	.26	.10	2.72	.007	.07	.45	.09
Age	-.08	.01	−7.83	<.001	-.09	-.06	-.29
Gender	.13	.08	1.71	.09	-.02	.28	.07
Education	.45	.04	11.30	<.001	.37	.53	.34

Note. Gender: 1 = men, 1 = women. LB: Lower Bound, UB: Upper Bound.

only weak or suggestive evidence for an effect (Benjamin et al., 2018; Lakens, 2015; Simonsohn et al., 2014). Thus, it is important to note the preliminary and suggestive nature of the current findings—it could be the case that partner's characteristics affect the variety of ICTs that individuals use. However, it is likely that the effects are relatively small and not consistently found. As a result, it is important to replicate the associations found here in a larger sample.

5. Discussion

This exploratory study examined individual and spousal (i.e., partner) predictors of ICT use variety. Replicating previous work, we found that higher levels of need for cognition were associated with more varied ICT use. Being married to someone with high need for cognition was associated with more varied ICT ownership, using more ICTs for financial and transaction purposes, and using more ICTs for a variety of other uses (but not social technology or internet-enabling ICTs). Finally, there were a few scenarios in which people married to someone high in need for cognition compensated for low levels of need for cognition. These partner effects were relatively small, and the evidence for partner effects was only suggestive.

5.1. Individual and social considerations of ICT use variety

Although existing theoretical models (e.g., UTAUT [2]) proposed that social influences can affect whether or not someone decides to use a variety of ICTs, research and theorizing of these influences have been focused primarily on what individuals *think* about social influences rather than measuring the actual characteristics of social actors in their environments. For example, in Venkatesh et al. (2003)'s original conceptualization of the UTAUT, they considered three root constructs to exemplify social influence: subjective norms (e.g., what people think most other people think they should do; Ajzen, 1991), social factors (e.g., an internalization of subjective culture and interpersonal agreements; Thompson et al., 1991), and image (e.g., whether using an ICT will enhance a person's status; Moore & Benbasat, 1991). However, each of these manifestations of social influence is conceptualized from the individual's perspective—what individuals think about others, their culture, their relationships, and how others see them. The current study extended the construct of social influence by taking into account a psychological characteristic of partners—their need for cognition—which had been previously identified as a predictor of individual ICT use variety.

That need for cognition predicted ICT use variety replicates previous

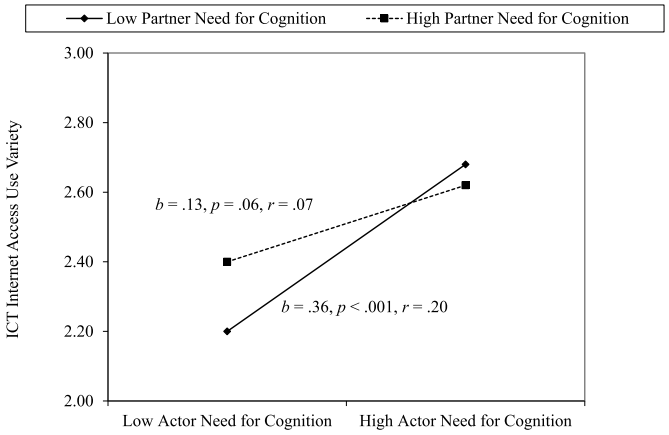

Fig. 1. The interaction between actor and partner need for cognition predicting ICT internet access use variety.

work (Chopik et al., 2017). It also extends previous work by showing that need for cognition predicts a broader variety of ICTs—need for cognition was associated with owning a wide diversity of ICTs, using more Internet-enabled ICTs, using more ICTs for financial and transaction management, using more social ICTs to connect with others, and using more ICTs from a catch-all category of ancillary ICT uses and technology literacy. We think that need for cognition predicts ICT use variety because individuals high in this trait see more benefits of ICTs, perceive fewer barriers to ICT use, enjoy engaging in cognitively challenging tasks, and enjoy using technology more broadly. As a result, they are broader in the number and range of ICTs that they are likely to use.

Being married to someone high in need for cognition was associated with owning more ICTs, using more ICTs for financial and transaction management, and using more ICTs for other reasons (e.g., technology and Internet literacy). However, the effects were small and provided only suggestive evidence. Having a partner high in need for cognition was not associated with ICT use variety for social technology or accessing the internet. It is intuitive why partner characteristics are at least partially associated with using more and different ICTs. After all, many of these devices are shared within a household (e.g., desktop computers), although not all of them are (e.g., smartphones). The intraclass correlations provide some evidence for this. Although in many cases, the correlations of ownership and use within couples were relatively small (ICT_{ICCs} ranged from .029 to .320; $M = 0.144$). The magnitude of the ICCs suggests that, although there is some spousal similarity in ICT use, it is not so large that knowing that one person owns or uses an ICT necessarily means that their partner also owns or uses an ICT. In households that contain a particular ICT, people may be more likely to use that ICT for finances and to search for information in isolation from their partner (at least using the ICT, if not also making decisions about finances or information in isolation as well). Often, the ICC was so low that there may be little spousal similarity in ICT ownership and use. Such discordance is important—if couples are too similar in owning and using multiple ICTs, one person's characteristics would be unlikely to affect their partner's ICT use (because they would be so similar—if one person had an ICT, their partner would too). Importantly though, even in the cases in which there was higher spousal similarity in ICT ownership/use variety, our analytic approach partially accounts for this by controlling for an individual's need for cognition and the non-independence of couples (e.g., that there would be a shared correlation in ICT ownership because people live together).

The ways that partners *did not influence* individuals were also interesting—there were few implications for using a variety of ICTs for social and internet accessibility reasons. One possibility is that the use of internet-based ICTs (e.g., desktops, smartphones) may be so ubiquitous that people have little influence over whether their partners use them (although see below for the interaction between partners' need for cognition). Another explanation is that using ICTs for social connections (who are not a romantic partner) and to access the internet is more closely related to individual processes on average (e.g., if individuals are more tech-savvy, regardless of their partner's traits) or involve a more complex interaction of both individual and partner characteristics than what is considered here. Future research can more thoroughly examine why social influences are stronger for some types of ICT use variety but not others.

There was also some evidence for a compensatory effect of need for cognition on ICT use variety, which is occasionally found in the literature on the dyadic effects of personality on health and well-being (Chopik & Lucas, 2019; Nickel et al., 2017; Roberts et al., 2009; van Scheppingen et al., 2019). Specifically, being married to a partner high in need for cognition was more strongly associated with ICT use variety among people lower in need for cognition. These compensatory effects were not seen for all variables—only for internet-connected ICTs and using more ICTs for financial and transaction management. Although some internet-connected ICTs are shared with partners within a household, it is an untested assumption about whether both members of a couple *use* that technology (e.g., just because there is a tablet in the household does not mean both partners use it). Indeed, we found that using more internet-based and finance-related ICTs depends on a combination of traits within couples—if both members are high in need for cognition, they both tended to use more ICTs. These findings further justify considering the psychological characteristics of others in an individual's social environment in affecting their decisions and life outcomes (Card et al., 2011; Chopik & O'Brien, 2017; Ledermann & Macho, 2009; Overall et al., 2010; Simpson et al., 2012; Simpson & Rholes, 2012).

Finally, we found that older adults and people with lower levels of education were less likely to own and use a variety of ICTs, consistent with previous research (Or & Karsh, 2009; Wagner et al., 2010). Women were more likely to own more ICTs and use them to access the internet (but less likely to use more social technology ICTs) compared to men. Such inconsistent findings reflect the ambiguity in gender differences in the literature as well—with some studies finding greater use among men (given their greater educational or technological opportunities; Kim et al., 2016) or greater use among women (Dhir et al., 2016). And yet others find that, even if there are gender differences, they rarely moderate associations between psychological characteristics and ICT use (e.g., Lian & Yen, 2014). Some of these inconsistencies in gender differences could be attributable to the opposing influences of age and birth cohorts on men and women. For example, older women may have had limited access to ICTs (historically, as a cohort). Yet older women may also be more likely to use various ICTs because, on average, they have

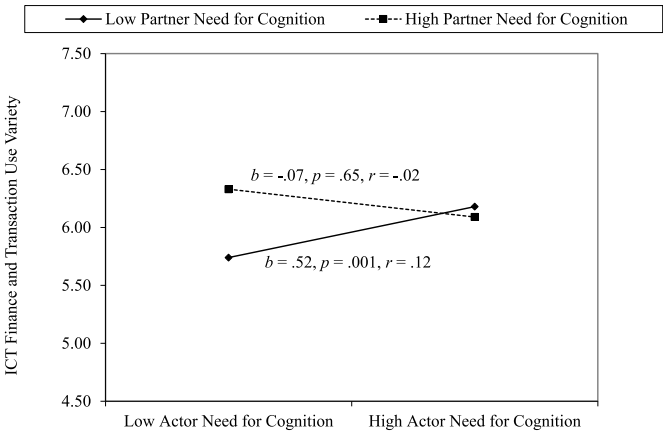

Fig. 2. The interaction between actor and partner need for cognition predicting ICT finance and transaction use variety.

fewer functional difficulties than older men (developmentally, with increasing age). In our study, these effects are confounded, highlighting the importance of examining gender differences in ICT variety use across cohorts and the lifespan. Finally, worth noting, many studies do not look at as broad a set of ICTs as we did in the current study. Doing so in future work might reveal why gender differences are found in some domains (e.g., general, social uses) and not others (e.g., financial).

5.2. Limitations and future directions

There are important limitations of the current study to acknowledge. First, our study was cross-sectional, which limits our ability to infer causal relationships. For example, it could be the case that using ICTs may fundamentally change the way that we (or our partners) view and think about complex problems (e.g., using ICTs might increase need for cognition). Future research can examine the co-development of need for cognition and ICT use variety both within and across couples over time (see Chopik et al., 2018; Schwaba & Bleidorn, 2021, for examples among individuals and couples). Second, our ICT measure consisted of a checklist of ICT use. This is problematic because we did not directly ascertain participants' specific motivations for using an ICT or how often they used each particular ICT. It was merely a measure of ICT use variety (i.e., a count of how many different ICTs a person had/used). In future work, it is important to measure not only why people use technology but also the specific ways they motivate their partners' ICT use. Third, and finally, the current study's findings are preliminary because we did not have formal measures of partner influence. In other words, without measuring the specific mechanisms we proposed, we ultimately are not sure how and why being married to a partner high in need for cognition encouraged greater ICT use variety for individuals. We proposed that the reasons involved subtle (or not-so-subtle) nudges or encouragement in trying out a novel or additional ICT. However, this was not formally measured, and future research that does measure these dyadic processes can have more confidence in the effects of partner influence on ICT use variety for individuals.

5.2.1. Constraints on generality

It is also important to note the degree to which these and other limitations impose restrictions on how our results can be generalized to other populations, measures, and studies moving forward (see Simons et al., 2017). For example, our study was comprised of predominantly White and entirely opposite-sex romantic couples who were middle-aged and older. Likewise, because the participants came from the HRS Internet Survey, all participants likely had at least one ICT—a type of technology that enabled them to participate in the current study. Because of these demographic characteristics, our findings should be interpreted in light of these considerations. Caution should be given in assuming that the associations described here would necessarily be found in more diverse samples and those with and without ready access to a variety of ICTs. For example, because many of the participants were born and grew up without the presence and wide availability of ICTs, their experiences with technology are likely very different than those of future cohorts of middle-aged and older adults. It is important that our results are appropriately contextualized given these constraints on generality. Finally, the effects were relatively small, and partner effects were only present for some of the dependent variables and suggestive for others. Given the aforementioned concerns regarding the replicability of the effects and the weak evidence of the partner effects, we encourage large, pre-registered examinations of partner influences on ICT use variety moving forward.

6. Conclusion

This exploratory study examined individual and dyadic predictors of ICT use variety in a large sample of middle-aged and older couples. We found that need for cognition—both among individuals and their partners—predicted greater ICT ownership and use variety. We also found that, for some ICTs, being married to someone high in need for cognition buffered against the reticence that individuals low in need for cognition felt about technology. Our findings provide affirmations and extensions of models of ICT use (Venkatesh et al., 2003) and encourage future researchers to consider the psychological characteristics of social actors in the environment and how these characteristics affect how individuals interact with technology.

Credit author statement

William J. Chopik: Conceptualization, Methodology, Formal analysis, Data curation, Writing – original draft, Writing – review & editing, Visualization, Supervision, Project administration, Funding acquisition. Jess Francis: Writing – original draft, Writing – review & editing.

Author note

Jessica Francis, Institute for Social Research, University of Michigan. William J. Chopik, Department of Psychology, Michigan State University.

Acknowledgements

The Health and Retirement Study is conducted by the Institute for Social Research at the University of Michigan, in support with grants from the National Institute on Aging (U01AG009740) and the Social Security Administration. The first author was supported by a grant from the National Institute of Aging (2 R03 AG054705-01A1). We thank Joshua Confer, Lindsay Ackerman, and Peiqi Lu for comments on a previous version of the manuscript.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.chb.2021.107028.

References

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179–211. https://doi.org/10.1016/0749-5978(91)90020-t

Alkhatib, S., Waycott, J., Buchanan, G., & Bosua, R. (2018). Privacy and the internet of things (IoT) monitoring solutions for older adults: A review. In E. Cummins, A. Ryan, & L. K. Schaper (Eds.), *Connecting the system to enhance the practitioner and consumer experience in healthcare* (pp. 8–14). IOS Press.

Benjamin, D. J., Berger, J. O., Johannesson, M., Nosek, B. A., Wagenmakers, E. J., Berk, R., Bollen, K. A., Brembs, B., Brown, L., Camerer, C., Cesarini, D., Chambers, C. D., Clyde, M., Cook, T. D., De Boeck, P., Dienes, Z., Dreber, A., Easwaran, K., Efferson, C., … Johnson, V. E. (2018). Redefine statistical significance. *Nature Human Behaviour, 2*(1), 6–10. https://doi.org/10.1038/s41562-017-0189-z

Beukeboom, C. J., & Pollmann, M. (2021). Partner phubbing: Why using your phone during interactions with your partner can be detrimental for your relationship. *Computers in Human Behavior, 124*, 106932. https://doi.org/10.1016/j.chb.2021.106932

Cacioppo, J. T., & Petty, R. E. (1982). The need for cognition. *Journal of Personality and Social Psychology, 42*(1), 116–131. https://doi.org/10.1037/0022-3514.42.1.116

Cacioppo, J. T., Petty, R. E., Feinstein, J. A., & Jarvis, W. B. G. (1996). Dispositional differences in cognitive motivation: The life and times of individuals varying in need for cognition. *Psychological Bulletin, 119*(2), 197.

Card, N. A., Selig, J. P., & Little, T. (2011). *Modeling dyadic and interdependent data in the developmental and behavioral sciences*. Routledge.

Chen, K., & Chan, A. H. S. (2011). A review of technology acceptance by older adults. *Gerontechnology, 10*(1), 1–12.

Choi, Y. K., Thompson, H. J., & Demiris, G. (2020). Use of an internet-of-things smart home system for healthy aging in older adults in residential settings: Pilot feasibility study. *JMIR aging, 3*(2), Article e21964.

Chopik, W. J. (2016). The benefits of social technology use among older adults are mediated by reduced loneliness. *Cyberpsychology, Behavior, and Social Networking, 19*(9), 551–556. https://doi.org/10.1089/cyber.2016.0151

Chopik, W. J., Kim, E. S., & Smith, J. (2018). An examination of dyadic changes in optimism and physical health over time. *Health Psychology, 37*, 42–50.

Chopik, W. J., & Lucas, R. E. (2019). Actor, partner, and similarity effects of personality on global and experienced well-being. *Journal of Research in Personality, 78*, 249–261.

Chopik, W. J., & O'Brien, E. (2017). Happy you, healthy me? Having a happy partner is independently associated with better health in oneself. *Health Psychology, 36*, 21–30. https://doi.org/10.1037/hea0000432

Chopik, W. J., Rikard, R. V., & Cotten, S. R. (2017). Individual difference predictors of ICT use in older adulthood: A study of 17 candidate characteristics. *Computers in Human Behavior, 76*, 526–533. https://doi.org/10.1016/j.chb.2017.08.014

Cornwell, E. Y., & Waite, L. J. (2009). Social disconnectedness, perceived isolation, and health among older adults. *Journal of Health and Social Behavior, 50*(1), 31–48.

Cotten, S. R., Anderson, W. A., & McCullough, B. M. (2013). Impact of internet use on loneliness and contact with others among older adults: Cross-sectional analysis. *Journal of Medical Internet Research, 15*(2), e39.

Cotten, S. R., Ford, G., Ford, S., & Hale, T. M. (2014). Internet use and depression among retired older adults in the United States: A longitudinal analysis. *Journals of Gerontology Series B: Psychological Sciences and Social Sciences, 69*(5), 763–771. https://doi.org/10.1093/geronb/gbu018

Craddock, E., vanDellen, M. R., Novak, S. A., & Ranby, K. W. (2015). Influence in relationships: A meta-analysis on health-related social control. *Basic and Applied Social Psychology, 37*(2), 118–130.

Dhir, A., Pallesen, S., Torsheim, T., & Andreassen, C. S. (2016). Do age and gender differences exist in selfie-related behaviours? *Computers in Human Behavior, 63*, 549–555. https://doi.org/10.1016/j.chb.2016.05.053

Diener, E., Lucas, R. E., & Oishi, S. (2018). Advances and open questions in the science of subjective well-being. *Collabra: Psychology, 4*(1). https://doi.org/10.1525/collabra.115

Ellis, D. A., Davidson, B. I., Shaw, H., & Geyer, K. (2019). Do smartphone usage scales predict behavior? *International Journal of Human-Computer Studies, 130*, 86–92. https://doi.org/10.1016/j.ijhcs.2019.05.004

Farrell, A. K., & Stanton, S. C. E. (2019). Toward a mechanistic understanding of links between close relationships and physical health. *Current Directions in Psychological Science, 28*(5), 483–489. https://doi.org/10.1177/0963721419855657

Fitzsimons, G. M., & Finkel, E. J. (2015). Goal interdependence. *Current Opinion in Psychology, 1*, 10–13. https://doi.org/10.1016/j.copsyc.2014.11.015

Fitzsimons, G. M., Finkel, E. J., & vanDellen, M. R. (2015). Transactive goal dynamics. *Psychology Review, 122*(4), 648–673. https://doi.org/10.1037/a0039654

Francis, J., Kadylak, T., Cotten, S. R., & Rikard, R. V. (2016). When it comes to depression, ICT use matters: A longitudinal analysis of the effect of ICT use and mattering on depression among older adults. In C. Stephanidis (Ed.), *HCI international 2016 – posters' extended abstracts: 18th international conference, HCI international 2016 toronto, Canada, july 17–22, 2016 proceedings, Part II* (pp. 301–306). Springer International Publishing. https://doi.org/10.1007/978-3-319-40542-1_49.

Francis, J., Kadylak, T., Makki, T. W., Rikard, R. V., & Cotten, S. R. (2018). Catalyst to connection: When technical difficulties lead to social support for older adults. *American Behavioral Scientist, 62*(9), 1167–1185. https://doi.org/10.1177/0002764218773829

Halpern, D., & Katz, J. E. (2017). Texting's consequences for romantic relationships: A cross-lagged analysis highlights its risks. *Computers in Human Behavior, 71*, 386–394. https://doi.org/10.1016/j.chb.2017.01.051

Helsper, E. J., & Whitty, M. T. (2010). Netiquette within married couples: Agreement about acceptable online behavior and surveillance between partners. *Computers in Human Behavior, 26*(5), 916–926. https://doi.org/10.1016/j.chb.2010.02.006

Hill, R., Betts, L. R., & Gardner, S. E. (2015). Older adults' experiences and perceptions of digital technology: (Dis)empowerment, wellbeing, and inclusion. *Computers in Human Behavior, 48*, 415–423. https://doi.org/10.1016/j.chb.2015.01.062

Hofmann, W., Finkel, E. J., & Fitzsimons, G. M. (2015). Close relationships and self-regulation: How relationship satisfaction facilitates momentary goal pursuit. *Journal of Personality and Social Psychology, 109*(3), 434–452. https://doi.org/10.1037/pspi0000020

Hoppmann, C. A., & Gerstorf, D. (2009). Spousal interrelations in old age—a mini-review. *Gerontology, 55*(4), 449–459. https://doi.org/10.1159/000211948

Kahn, R. L., & Antonucci, T. C. (1980). Convoys over the life course: Attachment, roles, and social support. In P. B. Baltes, & O. Brim (Eds.), *Life-span development and behavior* (pp. 253–286). Academic Press.

Kelley, H. H., & Thibaut, J. W. (1978). *Interpersonal relations: A theory of interdependence*. Wiley.

Kenny, D. A., Kashy, D. A., & Cook, W. L. (2006). *Dyadic data analysis*. Guilford Press.

Kim, J., Lee, H. Y., Christensen, M. C., & Merighi, J. R. (2016). Technology access and use, and their associations with social engagement among older adults: Do women and men differ? *Journal of Gerontology: Series B, 72*(5), 836–845. https://doi.org/10.1093/geronb/gbw123

Lakens, D. (2015). *How a p-value between 0.04-0.05 equals a p-value between 0.16-0.17. The 20% Statistician*. http://daniellakens.blogspot.com/2015/03/how-p-value-between-004-005-equals-p.html.

Ledermann, T., & Macho, S. (2009). Mediation in dyadic data at the level of the dyads: A structural equation modeling approach. *Journal of Family Psychology, 23*(5), 661–670. https://doi.org/10.1037/a0016197

Lewis, M. A., & Butterfield, R. M. (2007). Social control in marital relationships: Effect of one's partner on health behaviors. *Journal of Applied Social Psychology, 37*(2), 298–319.

Lian, J.-W., & Yen, D. C. (2014). Online shopping drivers and barriers for older adults: Age and gender differences. *Computers in Human Behavior, 37*, 133–143. https://doi.org/10.1016/j.chb.2014.04.028

Lins de Holanda Coelho, G., Hanel, P. H. P., & Wolf, L. J. (2020). The very efficient assessment of need for cognition: Developing a six-item version. *Assessment, 27*(8), 1870–1885. https://doi.org/10.1177/1073191118793208

Lubben, J. E., & Gironda, M. W. (2003). Centrality of social ties to the health and well-being of older adults. In B. Berkman, & L. Harooytan (Eds.), *Social work and health care in an aging world: Informing education, policy, practice, and research* (pp. 319–350). Springer.

Mark, G., & Ganzach, Y. (2014). Personality and internet usage: A large-scale representative study of young adults. *Computers in Human Behavior, 36*, 274–281. https://doi.org/10.1016/j.chb.2014.03.060

McArdle, J., Rodgers, W., & Willis, R. (2015). *Cognition and Aging in the USA (CogUSA) 2007-2009 inter-university consortium for political and social research* ([distributor]).

McDaniel, B. T., & Drouin, M. (2019). Daily technology interruptions and emotional and relational well-being. *Computers in Human Behavior, 99*, 1–8. https://doi.org/10.1016/j.chb.2019.04.027

McDaniel, B. T., Galovan, A. M., Cravens, J. D., & Drouin, M. (2018). "Technoference" and implications for mothers' and fathers' couple and coparenting relationship quality. *Computers in Human Behavior, 80*, 303–313. https://doi.org/10.1016/j.chb.2017.11.019

McMellon, C. A., & Schiffman, L. G. (2002). Cybersenior empowerment: How some older individuals are taking control of their lives. *Journal of Applied Gerontology, 21*(2), 157–175.

Moore, G. C., & Benbasat, I. (1991). Development of an instrument to measure the perceptions of adopting an information technology innovation. *Information Systems Research, 2*(3), 192–222.

Nickel, L. B., Iveniuk, J., & Roberts, B. W. (2017). Compensatory conscientiousness redux: A direct replication of Roberts, smith, jackson, and edmonds (2009). *Social Psychological and Personality Science, 8*(1), 29–35. https://doi.org/10.1177/1948550616662026

Oh, J., & Kang, J.-h. (2021). Converting a digital minority into a digital beneficiary: Digital skills to improve the need for cognition among Korean older adults. *Information Development, 37*(1), 21–31. https://doi.org/10.1177/0266666919888570

Orben, A., Dienlin, T., & Przybylski, A. K. (2019). Social media's enduring effect on adolescent life satisfaction. *Proceedings of the National Academy of Sciences, 116*(21), 10226–10228. https://doi.org/10.1073/pnas.1902058116

Orben, A., & Przybylski, A. K. (2019). Screens, teens, and psychological well-being: Evidence from three time-use-diary studies. *Psychological Science, 30*(5), 682–696. https://doi.org/10.1177/0956797619830329

Or, C. K. L., & Karsh, B.-T. (2009). A systematic review of patient Acceptance of consumer health information technology. *Journal of the American Medical Informatics Association, 16*(4), 550–560. https://doi.org/10.1197/jamia.M2888

Overall, N. C., Fletcher, G. J. O., & Simpson, J. A. (2010). Helping each other grow: Romantic partner support, self-improvement, and relationship quality. *Personality and Social Psychology Bulletin, 36*(11), 1496–1513. https://doi.org/10.1177/0146167210383045

Özbek, V., Alnıaçık, Ü., Koc, F., Akkılıç, M. E., & Kaş, E. (2014). The impact of personality on technology acceptance: A study on smart phone users. *Procedia - Social and Behavioral Sciences, 150*, 541–551. https://doi.org/10.1016/j.sbspro.2014.09.073

Peugh, J. L., & Enders, C. K. (2005). Using the SPSS mixed procedure to fit cross-sectional and longitudinal multilevel models. *Educational and Psychological Measurement, 65*(5), 717–741. https://doi.org/10.1177/0013164405278558

Purol, M. F., Keller, V. N., Oh, J., Chopik, W. J., & Lucas, R. E. (2020). Loved and lost or never loved at all? Lifelong marital histories and their links with subjective well-being. *The Journal of Positive Psychology*, 1–9. https://doi.org/10.1080/17439760.2020.1791946

Roberts, B. W., Smith, J., Jackson, J. J., & Edmonds, G. (2009). Compensatory conscientiousness and health in older couples. *Psychological Science, 20*(5), 553–559.

Rudolph, J., Greiff, S., Strobel, A., & Preckel, F. (2018). Understanding the link between need for cognition and complex problem solving. *Contemporary Educational Psychology, 55*, 53–62. https://doi.org/10.1016/j.cedpsych.2018.08.001

Simonsohn, U., Nelson, L. D., & Simmons, J. P. (2014). p-Curve and effect size: Correcting for publication bias using only significant results. *Perspectives on Psychological Science, 9*(6), 666–681. https://doi.org/10.1177/1745691614553988

Schwaba, T., & Bleidorn, W. (2021). Log on and prosper? Little evidence for codevelopment between psychological adjustment and technology use in older adulthood. *Journal of Gerontology: Series B, 76*(1), 67–77. https://doi.org/10.1093/geronb/gbaa073

Simons, D. J., Shoda, Y., & Lindsay, D. S. (2017). Constraints on generality (cog): A proposed addition to all empirical papers. *Perspectives on Psychological Science, 12*(6), 1123–1128.

Simpson, J. A., Griskevicius, V., & Rothman, A. J. (2012). Consumer decisions in relationships. *Journal of Consumer Psychology, 22*(3), 304–314.

Simpson, J. A., & Rholes, W. S. (2012). Adult attachment orientations, stress, and romantic relationships. In P. Devine, & A. Plant (Eds.), *Advances in experimental social psychology* (Vol. 45, pp. 279–328). Academic Press. https://doi.org/10.1016/B978-0-12-394286-9.00006-8.

Svendsen, G. B., Johnsen, J.-A. K., Almås-Sørensen, L., & Vittersø, J. (2013). Personality and technology acceptance: The influence of personality factors on the core constructs of the technology acceptance model. *Behaviour & Information Technology, 32*(4), 323–334. https://doi.org/10.1080/0144929X.2011.553740

Thaler, R. H., & Sunstein, C. R. (2008). *Nudge: Improving decisions about health, wealth, and happiness*. Penguin Books.

Thompson, R. L., Higgins, C. A., & Howell, J. M. (1991). Personal computing: Toward a conceptual model of utilization. *MIS Quarterly*, 125–143.

Tun, S. Y. Y., Madanian, S., & Mirza, F. (2021). Internet of things (IoT) applications for elderly care: A reflective review. *Aging clinical and experimental research, 33*(4), 855–867.

van Scheppingen, M. A., Chopik, W. J., Bleidorn, W., & Denissen, J. J. A. (2019). Longitudinal actor, partner, and similarity effects of personality on well-being. *Journal of Personality and Social Psychology, 117*(4), e51–e70. https://doi.org/10.1037/pspp0000211

Vanden Abeele, M. M. P., Hendrickson, A. T., Pollmann, M. M. H., & Ling, R. (2019). Phubbing behavior in conversations and its relation to perceived conversation intimacy and distraction: An exploratory observation study. *Computers in Human Behavior, 100*, 35–47. https://doi.org/10.1016/j.chb.2019.06.004

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly*, 425–478.

Wagner, N., Hassanein, K., & Head, M. (2010). Computer use by older adults: A multi-disciplinary review. *Computers in Human Behavior, 26*(5), 870–882. https://doi.org/10.1016/j.chb.2010.03.029

Wardecker, B. M., Chopik, W. J., Boyer, M. P., & Edelstein, R. S. (2016). Individual differences in attachment are associated with usage and perceived intimacy of different communication media. *Computers in Human Behavior, 59*, 18–27. https://doi.org/10.1016/j.chb.2016.01.029

Wright, M. R., & Brown, S. L. (2017). Psychological well-being among older adults: The role of partnership status. *Journal of Marriage and Family, 79*(3), 833–849.

Wu, C.-H., Parker, S. K., & De Jong, J. P. (2014). Need for cognition as an antecedent of individual innovation behavior. *Journal of Management, 40*(6), 1511–1534.