The Impact of Smartphone Technology Use on Adults' Face-to-Face Relationships

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Abstract

The impact of smartphone technology use on adults' face-to-face relationships is poorly understood. The current study examined how emerging and older adults use smartphone technology in Canada (i.e., frequency and dependency) and compared the impact of smartphone technology use on their face-to-face relationships with friends, a family member, and a romantic partner. Participants included 426 adults aged 18 to 73 (M = 28.54, SD = 13.27; 79.7% females). For all analyses, two age groups were created; emerging adults ages 18 to 25 (n = 230) and older adults ages 40 and above (n = 72). Emerging adults reported greater use of and dependency on smartphone technology compared to older adults. However, an inability to control one's smartphone technology use predicted poorer face-to-face relationships with friends, a family member, and a romantic partner for both emerging and older adults. Perceptions that smartphone communication was more enjoyable than offline relations were associated with poorer relationships with a family member for older adults only. Educational efforts and tracking software may help adults to recognize how they are using technology and recognize how it may negatively impact their face-to-face relationships.

The Impact of Smartphone Technology Use on Adults' Face-to-Face Relationships

The emergence and advancements of information and communication technology (ICT) has significantly altered how individuals socialize and communicate. The first smartphone, the Simon Personal Communicator, was created in 1992 and was used for making phone calls, sending and receiving e-mails, and sending faxes (Heathman, 2017). At that time, smartphone technology was primarily used by large scale companies as a business tool, but as technology has changed so has its purpose (Aoki & Downes, 2003; Gerhart, 2017). Today, smartphone technology is used to browse the internet, watch videos, and video chat. As smartphone technology is increasingly intertwined in adults' lives, it is important to consider how it is being used and the impact it may have. The current study examines how adults use smartphone technology and assesses the impact of smartphone technology use on their face-to-face relationships with friends, a family member, and a romantic partner.

The Use of Smartphone Technology

In Canada, access to smartphone technology continues to increase. In 2016, 76% of Canadian adults aged 18 or older reported owning a smartphone compared to 55% in 2014 (Catalyst Canada, 2016). The research also shows that these rates differ by age group. For example, in 2016, 94% of Canadians between the ages of 15 and 34 years owned a smartphone compared to 69% of Canadians between the ages of 55 and 64 years, and 18% of Canadians 75 and older (Statistics Canada, 2016). Unfortunately, rates of smartphone ownership were not available for the 34 to 54 years age group in Canada. Access to smartphone technology also differs among adult men and women in Canada. In

2015, 72% of men versus 63% of women reported owning a smartphone (Poushter, 2016). These statistics demonstrate that access to smartphone technology is the highest in the early (i.e., ages 20 to 40) or emerging (i.e., ages 18 to 25) adulthood periods, particularly for men. Although smartphone ownership is increasing among Canadian adults, research is limited on Canadian adults' use of smartphone technology, the impact that it has on their face-to-face relationships, and whether there are differences across age groups or gender.

Past research has shown conflicting results regarding smartphone technology use. For example, Burnell and Kuther (2016) found no differences in the use of smartphone technology between emerging adults (ages 18-25) and young adults (ages 26-40). However, Davey and Davey (2014) suggest that adults between the ages of 25 and 34 report the highest rates (62%) of smartphone technology use worldwide. Adults often use smartphone technology to communicate with others, check social media, and watch videos. Younger and older adults show comparable text messaging rates (86% and 85% respectively) and use text messaging in similar ways (e.g., to develop and maintain existing face-to-face relationships by coordinating plans and arranging times for face-to-face communication) (Catalyst Canada, 2017; Pettigrew, 2009). However, the use of social media apps differs across age groups and gender. Social media apps such as Facebook, Snapchat, Instagram, and Twitter are all used by adults to develop or maintain social relationships (Ellison, Steinfield, & Lampe, 2007; Sutcliffe, Binder, & Dunbar, 2018) and are particularly popular among emerging adults. For example, 77% of emerging adults between the ages of 18 and 24 use Facebook Messenger compared to 46% of those between the ages of 50 and 64 (Catalyst Canada, 2017). Similarly, 63% of emerging adults between the ages of 18 and 24 reported using Snapchat versus only 6%

of older adults between the ages of 50 and 64 (Catalyst Canada, 2017). Snapchat usage begins to decrease after the age of 25 (Smith & Anderson, 2018). In recent years, Snapchat has increased in popularity, especially among emerging adults, as 82% report using the app daily and 71% use the app multiple times throughout the day (Smith & Anderson, 2018). In comparison to men, women are also more likely to use social media apps like Snapchat, Instagram, and Pinterest (Smith & Anderson, 2018). One study found that 39% of adult females in the United States reported using Instagram compared to 30% of adult males; 31% of adult females used Snapchat compared to 23% of adult males; and 41% of adult females used Pinterest compared to 16% of adult males (Smith & Anderson, 2018). It has also been found that women mostly use smartphone technology as a communication tool while men mostly use smartphone technology to search the internet and play games (Sánchez-Martínez & Otero, 2009).

Despite these differences, high rates of smartphone technology use among adults of all ages is becoming a greater concern. According to Twenge and Martin (2018), the use of smartphone technology for 40 or more hours per week can be classified as smartphone overuse, which is equivalent to nearly six hours per day or more. Adolescents who used smartphone technology for 3 to 5 hours per week reported greater happiness than those who used smartphone technology for 40 or more hours per week or those who did not use smartphone technology (Twenge & Martin, 2018). Adults who overuse smartphone technology may become addicted to the technology, experience diminished impulse control, and be more easily distracted (Gerhart, 2017). These experiences may create challenges for adults trying to regulate their use of smartphone technology. Burnell and Kuther (2016) found that adults who easily compare themselves to others, consider social networking sites to be supportive, or experience difficulties with self-regulation are

at the greatest risk of overusing smartphone technology. Research also suggests that adults may not recognize how much they are actually using smartphone technology. For example, Andrews, Ellis, Shaw, and Piwek (2015) developed a smartphone app that recorded participants' use of smartphone technology and found that University staff and students' actual use of smartphone technology (i.e., objective assessment) was more than double their self-reported estimated amount. Thus, objective assessments may provide a more accurate perspective of adults' use of smartphone technology. In the current study, both subjective and objective assessments of smartphone technology use will be used to better understand these patterns among adults.

Impact of Smartphone Technology on Adults' Face-to-Face Relationships

Despite increasing access and use of smartphone technology, questions remain about the potential impact it has on adults. Some evidence shows that the use of smartphone technology can have a positive impact on adults' lives. For example, it may increase opportunities for business and distance learning, provide adults with important healthcare information, provide up-to-date reporting on current events around the world, and be a source of entertainment (Sarwar & Soomro, 2013). Smartphone technology also provides greater opportunity for altruistic behaviours and social connectivity. In recent years, GoFundMe accounts have become increasingly popular; and in a 2011 survey, American adults reported that modern technology made it easier for them to donate money and provide emotional support to those who needed it (Purcell, & Smith, 2011; Waytz & Gray, 2018). This was evident in 2014, with the Amyotrophic Lateral Sclerosis (ALS) "ice-buck-challenge" as the use of smartphone technology helped people spread the

word raising more than 115-million dollars for the ALS Association (Rogers, 2016; Waytz & Gray, 2018).

Smartphone technology can increase sociability for adults. Some studies, for example, have illustrated that the use of smartphone technology can enhance sociability for people with autism, hearing loss, and physical restrictions (Waytz & Gray, 2018). Therefore, the technology is not limited to the general population. For romantic couples specifically, smartphone technology is viewed as an important resource for promoting emotional and relational connectedness within a relationship (Döring & Dietmar, 2003; Pettigrew, 2009). For example, adults can instantly communicate with each other via smartphone technology at any time, which can increase their feelings of connectedness (Hertlein & Ancheta, 2014). Burke and Kraut (2016) also found that adults reported greater psychological well-being and feelings of connectedness when they received personalized and meaningful messages from Facebook friends to whom they felt close. Thus, smartphone technology can positively enhance adults' face-to-face relationships when they are making connections with those they care about (e.g., friends, family, and romantic partners).

One study, that examined the experiences of smartphone technology use among Portuguese women, ranging in age from 51-years-old to 65-years-old, found that for empty nesters specifically, smartphone technology served as a source of safety, entertainment, and connection to the outside world (Gatinto, 2018). Smartphone technology allowed empty nesters to stay connected with their children who had grown up and moved away from home (Gatinto, 2018). For others, such as the elderly and those with mobility issues, smartphone technology can be necessary to help them maintain the

strong face-to-face relationships that they once had (Waytz & Gray, 2018). Overall, smartphone technology can act as a source of social support for older adults because it allows older adults to find and connect with others who have similar abilities and common interests. This is particularly useful to anyone who has friends, family members, or a romantic partner who lives or works in a different location, which is often the case for older adults.

In contrast to the positive effects, adults' face-to-face interactions are decreasing in quality and quantity as smartphone technology advances (Drago, 2015). In an experimental study, Misra, Cheng, Genevie, and Yuan (2016) found that when participants placed their smartphone on the table or held it in their hand while engaging in face-to-face conversation, the quality of the conversation decreased from the perspective of the other participant. Misra et al. (2016) also found that the presence of smartphone technology was more distracting when the two people were familiar with each other, as opposed to being strangers. Specifically, the presence of smartphone technology can decrease perceptions of closeness, trust, empathy, and understanding during face-to-face interactions (Przybylski & Weinstein, 2012). Simply having a smartphone present while interacting with others can be problematic for some adults, however, it is the continuous use of the technology which can increase the negative impact on adults' face-to-face relationships.

The growing dependency on smartphone technology is becoming an increasing concern for many adult relationships as it can distract adults from the company that is in their presence (Rotondi, Stanca, & Tomasuolo, 2017). Some restaurants have banned any mobile device (including smartphones) to ensure that customers are engaging in face-to-

face communication (Forbes, 2013). At home, Turkle (2012) found that many young children suggest that their parents would rather spend their time using their smartphones than engaging in face-to-face interactions with them. Instead of spending time with their children or finding creative ways to keep their children entertained, parents may use smartphone technology as a way to keep their children quiet (Sumati & Gambhir, 2016). Therefore, smartphone technology has taken on the role of babysitter in the lives of many young families (Sumati & Gambhir, 2016).

Research has also shown decreases in friendship quality and time spent with friends for adults who overuse smartphone technology (Rotondi et al., 2017). Drago (2015) found that 46% of university students communicated with friends and family more frequently via smartphone technology than in face-to-face interactions. In India, smartphone technology is increasingly suggested as a reason for divorce (Sumati & Gambhir, 2016). Although accumulating evidence shows that smartphone technology may individually impact friendships, family dynamics, and romantic relationships, it remains unclear whether the impact of smartphone technology use varies based on the type of adult relationship (e.g., family, friends, or romantic partner) or the adults' age or gender.

Growing evidence also shows that the use of smartphone technology can be particularly detrimental for emerging adults who are more likely to use the technology as a replacement for face-to-face communication (Catalyst Canada, 2017). Given the high rates of smartphone ownership and social media use among emerging adults, it is clear that the socialization aspects of smartphone technology are important. However, the use of smartphone technology during face-to-face communication can negatively impact adults' relationship satisfaction with friends, family members, and romantic partners

(Roberts & David, 2016). When compared to emerging adults, older adults may be more sensitive to disruptions in face-to-face communication caused by smartphone technology use (e.g., body language and lack of eye contact) (Kadylak et al., 2018). Thus, the use of smartphone technology among emerging adults may be negatively impacting the relationships that they have with older adults (e.g., parents and grandparents).

The Current Study

The current study examined the smartphone technology experiences of Canadian adults. Specifically, the study examines how emerging and older adults use smartphone technology (frequency, dependency) and compared the impact of smartphone technology use and dependency on their face-to-face relationships with friends, a family member, and a romantic partner. It was hypothesized that emerging adults would both use and be more dependent on smartphone technology than older adults. It was also expected that the use of smartphone technology would have a positive impact on the maintenance of face-to-face relationships for older adults, whereas the use of smartphone technology would have a negative impact on face-to-face relationships for emerging adults. This study also explored the smartphone technology experiences of men and women. It is important to understand how smartphone technology is being used and the impact it may have on adults' relationships as technology continues to play a larger role in society.

Method

Participants

Participants included 426 undergraduate students at Grenfell Campus, Memorial University of Newfoundland and Labrador and members of the general public. Participants ranged in age from 18 to 73 (M_{age} = 28.54 years, *SD* = 13.27; 79.7% females) with the majority of the sample reporting a Caucasian background (91%). Approximately half of the participants completed some university education, a complete bachelor's degree, or graduate degree (54.50%).

Participants were recruited through the psychology participant pool at Grenfell Campus, and through posters and social media platforms such as Facebook. The posters were placed around Grenfell Campus and shopping centres in the Corner Brook area. A brief description of the study and a link to the survey were provided during the recruitment process. The participants completed the survey after giving informed consent.

Procedure

The online questionnaire was administered via Qualtrics and participants were notified of the ongoing study via Facebook, the psychology participant pool at Grenfell Campus, and posters. Once they clicked on the link, participants were directed to the informed consent page (Appendix A). By clicking on the next screen, consent was assumed, and participants were presented with the questionnaire (Appendix B). The questionnaire took participants approximately 10 minutes to complete. After the completion of the questionnaire, participants were directed to an information/debriefing form (Appendix D).

Materials

The following materials were used to complete the online questionnaire: an informed consent form (Appendix A), questionnaire (Appendix B), and an information/debriefing form (Appendix D).

The online questionnaire assessed participants' smartphone technology use and dependency, and their relationships with their friends, a family member, and a romantic partner. The questionnaire (Appendix B) was divided into four sections.

Smartphone technology use. Participants were asked to self-report their access to and basic use of smartphone technology. For example, if participants indicated that they currently own a smartphone, they were asked to report their average use on a given day during the week and weekend. Participants were also asked about their most used smartphone apps (e.g., text messaging, social media, e-mail). To gain a more objective assessment of smartphone technology use, participants were asked to report on information given in a Screen Time app that is currently available on all iPhones. For example, participants were asked about their average use of their iPhones per day, how many times they picked up their iPhones per day, and the apps that they used most frequently on average.

Smartphone dependency. Participants were asked about their dependency on smartphone technology. A total of fourteen questions were adapted from the Japanese Version of the Smartphone Dependence Scale (J-SDS; Ezoe, Iida, Inoue, & Toda, 2016). Past research has shown that each of the subscales and the overall scale have demonstrated strong reliability (i.e., α ranging from 0.69 to 0.87). Four-items from the Craving and Withdrawal subscale asked participants about their feelings of anxiety

related to their smartphone technology use or non-use (e.g., “I feel anxious when I forget to take my smartphone with me”). Six items from the Overuse and Tolerance subscale asked participants about their ability to control their use of smartphone technology (e.g., “I have tried to reduce my smartphone use but always fail”). Four-items from the Virtual Life Orientation subscale asked participants whether smartphone communication was more enjoyable than their offline relations (e.g., “I feel that smartphone conversations are more enjoyable than face-to-face conversations.”). Participants rated their experience with each item on a 4-point Likert scale (0 = *strongly disagree*, 1 = *disagree*, 2 = *agree*, 3 = *strongly agree*). The items were summed for each subscale with higher scores representing greater dependency on smartphone technology (Cronbach’s α ranged from 0.77 to 0.90).

Relationships with friends, a family member, and a romantic partner. Participants were asked about their relationships with friends, a family member, and a romantic partner. Five questions that focused specifically on relationships were adapted from the Mobile Phone Problem Use Scale (MPPUS; Bianchi & Philips, 2005). Past research has shown that the complete MPPUS has strong reliability (i.e., α = 0.93). Five-items asked participants about the impact of smartphone technology use on their relationships with friends (e.g., “My friends complain about my smartphone use”). The same five questions were used to assess the impact of participants’ smartphone technology use on their relationships with a family member (e.g., “My mother complains about my smartphone use”) and a romantic partner (e.g., “My partner complains about my smartphone use”) respectively. Participants were asked to specify which family member they would be reporting about. One-item from the J-SDS (Ezoe et al., 2016) asked participants if they preferred using smartphone technology over spending time with

other people (e.g., “I prefer to use my smartphone over spending time with my family”). Three-items, developed by the researcher, asked participants about their relationship satisfaction and use of smartphone technology while in the presence of others (e.g., “I get annoyed when my partner is on their smartphone when we are spending time together”). Participants rated their experience with each item on a 4-point Likert scale (0 = *strongly disagree*, 1 = *disagree*, 2 = *agree*, 3 = *strongly agree*). Respective items were summed for each scale with higher scores representing a more negative impact of smartphone technology use on adults’ face-to-face relationships (Cronbach’s α ranged from 0.58 to 0.65).

Demographics. Participants were asked questions about their age, gender, ethnicity, and level of education.

Data Analysis Plan

All analyses were conducted using IBM SPSS Statistics 25.0. To test the hypotheses, two age groups were created; emerging adults ages 18 to 25 (n = 230) and older adults ages 40 and above (n = 72). Descriptive statistics and bivariate correlations were computed to examine the relationships among all study variables separately for emerging and older adults. Three multiple hierarchical regression analyses were also computed using the ‘enter’ method to examine whether smartphone technology use and smartphone dependency predicted adults’ face-to-face relationships with friends, a family member, and a romantic partner. The same variables were entered as predictors in all three models. In Step 1, age, gender, and education were included as covariates. Smartphone technology use during the week (i.e., Monday to Friday) and smartphone dependency (i.e., craving and withdrawal, overuse and tolerance, and virtual life orientation) were also included in Step 1. In Step 2, two-way interactions between age

group (emerging, older) and the smartphone dependency measures were added. Two-way interactions between gender and the smartphone dependency measures were added in Step 3. However, none of these interactions were significant and were excluded from the models presented below. Variables were entered in a stepwise fashion to examine the independent effects of the individual predictors and interactions separately for explaining the variance in adults' face-to-face relationships.

Results

Descriptive Statistics

Smartphone technology ownership was high across all participants; 99.1% of emerging adults, 86.1% of older adults, 100% of men, and 94.2% of women. However, the primary use of smartphone technology differed across age group and gender. For example, 73.7% of emerging adults reported using smartphone technology mostly for social media compared to 37.1% of older adults. Both women and men also reported using smartphone technology mostly for social media (66.4% vs. 62%). Text messaging was the next most common form of smartphone technology use for both age groups and gender. Older adults reported higher levels of text messaging compared to emerging adults (25.8% vs. 15.8%) and men reported higher levels of text messaging than women (23.9% vs. 17%). Emerging adults reported a greater preference to talk to others via smartphone technology than to have face-to-face conversations compared to older adults (58.3% vs. 50%).

Independent samples *t*-tests were used to examine differences in means and standard deviations between emerging and older adults across all variables (see Table 1). Emerging adults reported greater smartphone technology use than older adults, $t(81) = 3.70$, $p = .003$. Emerging adults also reported greater dependency on smartphone technology, such as Craving and Withdrawal, $t(288) = 2.84$, $p = .005$ and Overuse and Tolerance, $t(288) = 6.57$, $p < .001$, compared to older adults. However, significant differences were not found on the Virtual Life Orientation subscale between emerging and older adults, $t(288) = -.27$, $p = .786$. Compared to older adults, emerging adults reported a more negative impact of smartphone technology on their relationships with

friends, $t(288) = 3.24$, $p = .001$, a family member, $t(249) = 4.48$, $p < .001$, and a romantic partner, $t(183) = 3.72$, $p < .001$.

Bivariate correlations between study variables are presented in Table 2. Participants' self-reported average use per day during the week (Monday-Friday) was significantly associated with iPhone owners' average time spent on their iPhones per day ($r = .52$). Due to the strong correlation between subjective and objective assessments of technology use, and the high percentage of participants who reported their subjective use of technology (95.6%) versus 70.9% of iPhone users, the subjective measure was used for all analyses. For emerging adults, smartphone technology use was significantly associated with smartphone dependency on all three subscales (r range = .14 to .24) and their relationships with friends, a family member, and a romantic partner (r range = .19 to .27). Thus, emerging adults who used smartphone technology more reported greater dependency on smartphone technology and poorer relationships with friends, a family member, and a romantic partner. However, for older adults, smartphone technology use was not significantly associated with any of the smartphone dependency subscales (r range = -.02 to .21) or relationships with friends, a family member, or a romantic partner (r range = .04 to .22).

Hierarchical Regression Models

Predictors of adults' face-to-face relationships with friends. As shown in Table 3, Step 1 of the model was significant, $F(7, 279) = 18.20$, $p < .001$ and predicted 31% of the variance in face-to-face relationships with friends. When individual predictors were considered, greater use of smartphone technology ($\beta = .16$, $p = .002$) and greater smartphone dependency in the Overuse and Tolerance ($\beta = .26$, $p < .001$) and in the

Craving and Withdrawal (β = .24, p < .001) subscales predicted poorer face-to-face relationships with friends. Adding two-way interactions between age group and the smartphone dependency subscales in Step 2 of the model resulted in both a significant increase to R^2: $F_{inc}(3, 276) = 2.70$, $p = .046$ and a significant overall model, $F(10, 276) = 13.78$, $p < .001$. However, none of the individual two-way interactions were significant.

Predictors of adults' face-to-face relationships with a family member. As shown in Table 4, Step 1 of the model was significant, $F(7, 240) = 14.84$, $p < .001$ and predicted 30% of the variance in face-to-face relationships with a family member. The majority of the participants reported on their relationship with their mother (45.8%). When individual predictors were considered, greater smartphone dependency in the Craving and Withdrawal (β = .24, p = .001) and the Overuse and Tolerance (β = .22, p = .002) subscales predicted poorer face-to-face relationships with a family member. Age group (β = -.15, p = .014) and gender (β = .19, p = .001) also predicted poorer face-to-face relationships with a family member. In particular, women and emerging adults reported poorer face-to-face relationships with a family member. Adding two-way interactions between age group and the smartphone dependency subscales in Step 2 of the model resulted in both a significant increase to R^2: $F_{inc}(3, 237) = .2.83$, $p = .04$ and a significant overall model, $F(10, 237) = 11.48$, $p < .001$. As shown in Figure 1, there was a significant interaction between age group and scores on the Virtual Life Orientation subscale (β = .57, p = .005). For older adults, higher scores on the Virtual Life Orientation subscale were associated with poorer relationships with a family member. Specifically, older adults reported poorer face-to-face relationships with a family member when they viewed smartphone communication as being more enjoyable than their offline

relations. For emerging adults, relationships with a family member were not impacted by scores on the Virtual Life Orientation subscale.

Predictors of adults' face-to-face relationships with a romantic partner. As shown in Table 5, Step 1 of the model was significant, $F(7, 174) = 13.42$, $p < .001$ and predicted 35% of the variance in face-to-face relationships with a romantic partner. When individual predictors were considered, greater smartphone dependency in the Overuse and Tolerance subscale ($\beta = .43$, $p < .001$) predicted poorer face-to-face relationships with a romantic partner. Gender ($\beta = -.13$, $p = .036$) also predicted poorer face-to-face relationships. In particular, men reported poorer face-to-face relationships with a romantic partner. Adding two-way interactions between age group and the smartphone dependency subscales in Step 2 of the model did not result in a significant increase to R^2: $F_{inc}(3, 171) = 1.89$, $p = .133$, although, it did lead to a significant overall model, $F(10, 171) = 10.11$, $p < .001$.

Discussion

The use of smartphone technology has increased rapidly in recent years; however, the impact of its use remains poorly understood, particularly among adults. Although research has examined how smartphone technology impacts adults' face-to-face relationships with specific individuals such as friends or family members (Drago, 2015; Rotondi, Stanca, & Tomasuolo, 2017), it is unknown whether the impact varies by the type of relationship. The current study addressed this gap in the literature by examining emerging and older adults' smartphone technology use and dependency, and the impact it has on their face-to-face relationships with friends, a family member, and a romantic partner. As expected, the use and dependency of smartphone technology was greater for emerging adults in comparison to older adults. Also as expected, smartphone technology use had a negative impact on the maintenance of face-to-face relationships for emerging adults. However, the hypothesis that smartphone technology use would have a positive impact on the maintenance of face-to-face relationships for older adults was not supported.

Overall, smartphone technology use and smartphone dependency were greater among emerging adults than older adults. On average, emerging adults reported using their smartphones one hour more per week than older adults. Consistent with past research (Statistics Canada, 2016), emerging adults also reported greater access to smartphone technology than older adults. Greater access to smartphone technology may increase opportunities for use as well as an increase dependency on the technology. For example, emerging adults reported using social media apps such as Facebook, Instagram, Twitter, and Snapchat more frequently than older adults. Research shows that greater use

of social media apps is associated with greater dependency on and addiction to smartphone technology (Jeong, Kim, Yum, & Hwang, 2016). Smartphone technology use was also significantly correlated with smartphone dependency for emerging adults but not older adults. Taken together, it is possible that the specific uses of smartphone technology among emerging adults contribute to a greater dependency on the technology. However, further research is needed to explore the mechanisms that can help to understand the links between smartphone use and dependency.

The findings also show that emerging adults reported poorer face-to-face relationships in comparison to older adults. Emerging adults' use of and dependency on smartphone technology, such as social media apps may be decreasing their relationship satisfaction with friends, family members, and romantic partners. In the current study, emerging adults reported that conversations using smartphone technology were more frequent than their face-to-face conversations in comparison to older adults. Research has found that university students communicate with friends and family more frequently via smartphone technology (Drago, 2015). It is possible that emerging adults' preference for smartphone technology may be serving as a replacement for face-to-face communication (Catalyst Canada, 2017). Smartphone technology use was significantly correlated with all types of face-to-face relationships for emerging adults, but not older adults. This provides further support that emerging adults' smartphone technology use and dependency are negatively impacting the relationships they have with friends, family members, and romantic partners for male and female adults.

Findings from the hierarchical regression models show that smartphone technology use and smartphone dependency had a differential impact on the type of

adults' face-to-face relationship. For example, greater smartphone technology use and smartphone dependency predicted poorer face-to-face relationships with friends for both emerging and older adults. This is consistent with Rotondi et al. (2017) who found that adults spent less time with their friends and were less satisfied with their friendships when they reported greater use of smartphone technology.

For face-to-face relationships with a family member, there was a significant interaction between age group and scores on the Virtual Life Orientation Subscale. Specifically, emerging adults' relationship quality with a family member did not significantly change if they viewed smartphone communication as more enjoyable than offline relations. However, when older adults viewed smartphone technology communication as being more enjoyable than face-to-face communication, it had a more negative impact on their face-to-face relationships with a family member. This significant difference between emerging and older adults could be due to emerging adults' familiarity with smartphone technology. Emerging adults who have grown up with smartphone technology may be more able to balance smartphone technology with face-to-face communication. Older adults who are still adapting to a life with smartphone technology may be experiencing more difficulties balancing smartphone technology with face-to-face communication. Indeed, Kadylak et al. (2018) found that older adults were more sensitive to disruptions in face-to-face communication caused by smartphone technology (e.g., body language and lack of eye contact) than younger generations, such as emerging adults. Future research is needed to examine when these patterns begin and how they transition throughout adulthood. Children and adolescents often observe their parents' use of smartphone technology and develop similar habits to them (Lauricella,

Wartella, & Rideout, 2015), which is consistent with Albert Bandura's Observational Learning (Bandura, Grusec, & Menlove, 1966). Therefore, children and adolescents are not only impacted by their own use of smartphone technology, but also their parents' use of smartphone technology (Sumati & Gambhir, 2016; Turkle, 2012), and the habits that they develop early on may carry into adulthood.

Overall, emerging adults and women reported poorer face-to-face relationships with a family member. This may be because of their preference to talk to others via smartphone technology than in face-to-face conversations. Specifically, emerging adults and women reported the greatest use of social media apps, which may negatively impact their face-to-face relationships with family members. Because the current study only focused on a relationship with only one family member, future research is needed to understand the impact that smartphone technology use has on additional family dynamics such as the relationships between parents and children or between siblings.

Adults' relationships with a romantic partner were least impacted by their smartphone technology use and smartphone dependency. It was found that men reported poorer face-to-face relationships with a romantic partner than women, and this may be due to men having greater access to smartphone technology than women. The finding supports Roberts and David's (2016) study, where they found that increased smartphone technology use was associated with decreases in relationship satisfaction. However, these researchers were unable to determine whether associations differed for men and women. In the current study, men and women reported poorer face-to-face relationships with different individuals. This difference may be due to both genders' use of smartphone technology while in the presence of specific individuals. For example, women may be

using smartphone technology more while in the presence of a family member and men may be using smartphone technology more while in the presence of a romantic partner. Future research is needed to further understand why men and women experience poorer face-to-face relationships with different individuals (friends, a family member, a romantic partner) due to their use of smartphone technology.

However, one finding consistent across all regression models was that higher scores on the Overuse and Tolerance smartphone dependency subscale predicted poorer face-to-face relationships. In other words, adults who were unable to control their use of smartphone technology reported more relationship problems with friends, a family member, and a romantic partner. Adults who use smartphone technology more may have less time to spend with others. It is also possible that the use of smartphone technology creates a distraction that reduces the quality of face-to-face interactions (Rotondi et al., 2017). In order to maintain healthy face-to-face relationships, adults must recognize how their use of smartphone technology, including smartphone dependency, may impact their relationships with friends, family members, and romantic partners.

Implications

The current findings show that adults' use of smartphone technology and dependency on smartphone technology both have a negative impact on their face-to-face relationships that varies by age group (emerging vs. older adults) and type of relationship. Educational efforts that target the use of smartphone technology have typically focused on children and adolescents. For example, efforts to promote technology netiquette are often discussed at school when technology use is becoming more frequent. They are also

emphasized in online resources such as NetSmartz and MediaSmarts that provide parents with useful tips to reduce their children's use of smartphone technology. However, resources that promote positive uses of smartphone technology among adults are limited. These resources can help adults to make informed decisions regarding their own use of smartphone technology. It is also important for adults to recognize how smartphone tracking apps, such as Screen Time, Moment, and Space App, can allow them to monitor their use of smartphone technology. For example, these apps may send reminders to smartphone users to take a break from their smartphone's screen and engage with people in face-to-face situations. Screen Time is an app that is already built into iPhones, so it is very accessible to iPhone users. However, not all adults own iPhones. Including smartphone tracking apps directly within the technology (e.g., do not have to download anything) may make it easier for adults to track how they are using the technology. Although these smartphone tracking apps are still relatively new, they have been shown to increase productivity and discipline while curbing smartphone technology use and dependency (Rooksby, Asadzadeh, Rost, Morrison, & Chalmers, 2016).

Limitations

The current study highlights the impact of smartphone technology use on face-to-face relationships among adults. However, it has some limitations. First, the use of a modified version of the Mobile Phone Problem Use Scale in the current study may have impacted the reported psychometric properties of the scale. For example, only questions that targeted aspects of individuals' relationships were used. Response options were also adjusted from a 10-point Likert scale to a 4-point Likert scale to increase ease of interpretation. Second, the cross-sectional study design only provided a snapshot of

adults' use of smartphone technology at one point in time. A longitudinal study could highlight how adults' smartphone technology use and dependency varies from day-to-day or week-to-week and how this may impact their face-to-face relationships over time. Third, some participants viewed their romantic partner as being one of their family members. Sixty-three participants chose to answer questions about their relationship with a romantic partner during the family portion of the questionnaire. Thus, for these participants, there was no available information regarding their relationship with a family member. Counterbalancing the order of the questions may be necessary to gain more information about each type of relationship. Finally, an insufficient sample size of participants over the age of 59 resulted in comparisons made between emerging adults and a more flexible older adult age group ranging from 40 to 73 years of age. Further research is needed to compare how adults of different ages (early, middle or late adulthood) use technology and how this may impact their face-to-face relationships.

Conclusion

Despite these limitations, the current study contributes to the research that examines adults' use of smartphone technology and the impact that it has on their face-to-face relationships. Emerging adults both used more and were more dependent on smartphone technology than older adults. However, smartphone technology use negatively impacted face-to-face relationships for both emerging and older adults, and these patterns differed by the type of relationship. An inability to control one's use of smartphone technology predicted poorer face-to-face relationships with friends, a family member, and a romantic partner. Specifically, older adults reported poorer face-to-face relationships with a family member when they perceived that their smartphone

communication was more enjoyable than offline relations. Overall, adults' smartphone technology use and dependency are negatively impacting their face-to-face relationships. Adults need to recognize how their use of technology impacts how they socialize and communicate with others in face-to-face situations.

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Table 1

Descriptive Statistics for Emerging and Older Adults

Variables	Emerging adults	Older adults
	M (*SD*)	*M* (*SD*)
1. Age group	20.39 (1.88)*	52.04 (9.16)*
2. Smartphone use	5.01 (1.47)*	4.03 (1.94)*
3. Craving and withdrawal	9.99 (2.57)*	8.95 (2.51)*
4. Overuse and tolerance	16.68 (3.28)*	13.45 (3.94)*
5. Virtual life orientation	8.36 (2.47)	8.45 (2.64)
6. Relations with friends	11.54 (2.08)*	10.52 (2.64)*
7. Relations with family	13.07 (2.65)*	11.16 (2.32)*
8. Relations with a partner	12.72 (2.60)*	11.12 (2.73)*

Note. Relations = relationships. *Mean levels differ significantly ($p < .05$) between emerging and older adults.

Table 2

Bivariate Correlations

Variables	1	2	3	4	5	6	7	8
1. Gender	—	.10	.09	.06	-.04	.03	.19**	-.04
2. Smartphone use	.07	—	.19**	.24*	.14**	.27*	.23**	.19**
3. Craving and withdrawal	.05	-.02	—	.52*	.39*	.41*	.39*	.34*
4. Overuse and tolerance	.11	.21	.67*	—	.36*	.38*	.37*	.43*
5. Virtual life orientation	.11	.07	.62*	.54*	—	.24*	.13	.21**
6. Relations with friends	.11	.22	.54*	.61*	.54*	—	.42*	.51*
7. Relations with family	.45**	.04	.42**	.38**	.62*	.48**	—	.38*
8. Relations with a partner	.01	.13	.42**	.66*	.54*	.71*	.47**	—

Note. Relations = relationships. Correlations for emerging adults are represented above the diagonal and correlations for older adults are represented below the diagonal.

**p <.05, *p < .001.

Table 3

Predictors of adults' face-to-face relationships with friends

	Step 1				Step 2			
Variables	*B*	SE	*β*	95% CI	*B*	SE	*B*	95% CI
Age group	-.05	.30	-.01	-.64; .54	.05	.33	.01	-.61; .71
Gender	.01	.29	.00	-.56; .58	-.04	.29	-.01	-.60; .53
Education	-.10	.09	-.06	-.27; .07	-.12	.09	-.07	-.29; .05
Smartphone use	.23	.07	.16**	.08; .37	.23	.07	.17**	.09; .38
Craving and withdrawal	.21	.05	.24*	.10; .32	.22	.19	.26	-.14; .60
Overuse and tolerance	.16	.04	.26*	.08; .24	.02	.12	.03	-.23; .26
Virtual life orientation	.08	.05	.09	-.02; .18	-.18	.17	-.19	-.51; .16
Age group x Craving and withdrawal					-.02	.16	-.03	-.32; .29
Age group x Overuse and tolerance					.11	.10	.25	-.08; .30
Age group x Virtual life orientation					.21	.14	.30	-.06; .48
R^2	.31*				.33**			

Note. ** $p < .05$, * $p < .001$.

Table 4

Predictors of adults' face-to-face relationships with a family member

	Step 1				Step 2			
Variables	*B*	SE	*β*	95% CI	*B*	SE	*β*	95% CI
Age group	-1.03	.42	-.15**	-1.85; -.21	-1.51	.46	-.22**	-2.42; -.61
Gender	1.30	.38	.19**	.55; 2.04	1.19	.38	.17**	.45; 1.93
Education	-.12	.11	-.06	-.34; .11	-.12	.11	-.06	-.33; .10
Smartphone use/week	.12	.10	.07	-.08; .31	.11	.10	.07	-.08; .31
Craving and withdrawal	.25	.07	.24**	.11; .40	.42	.25	.39	-.07; .90
Overuse and tolerance	.16	.05	.22**	.06; .27	.35	.16	.46**	.03; .66
Virtual life orientation	.03	.07	.02	-.12; .16	-.57	.22	-.51**	-1.0; -.13
Age group x Craving and withdrawal					-.15	.20	-.17	.55; .25
Age group x Overuse and tolerance					-.15	.12	-.27	-.39; .10
Age group x Virtual life orientation					.50	.18	.57**	.15; .86
R^2	.30*				.33*			

Note. ** $p < .05$, * $p < .001$.

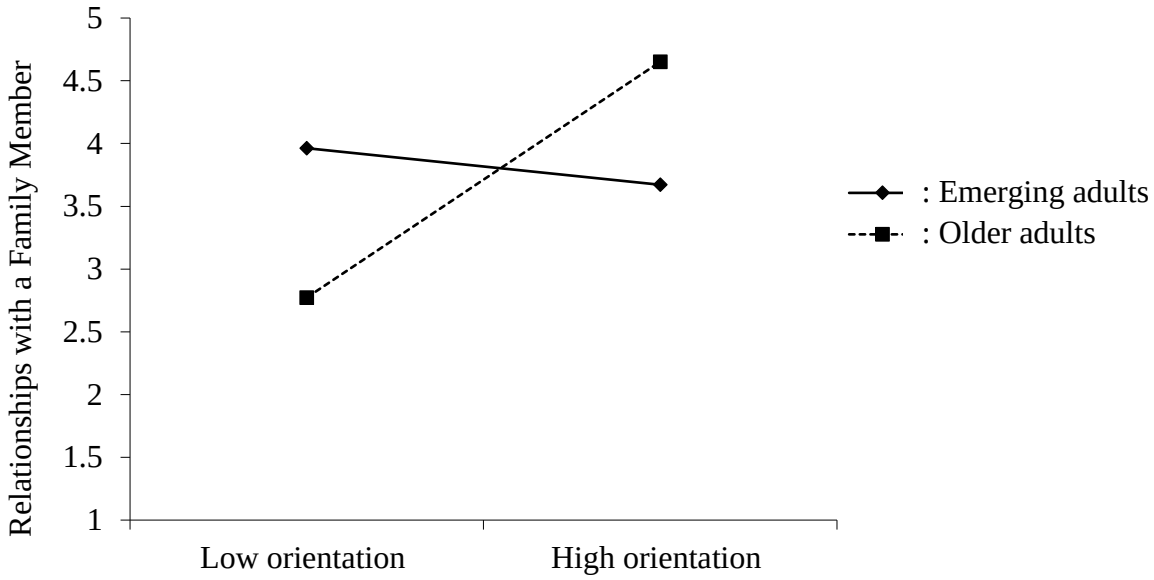


Figure 1.

The interaction between virtual life orientation and relationships with a family member for emerging adults and older adults.

Table 5

Predictors of adults' face-to-face relationships with a romantic member

	Step 1				Step 2			
Variables	*B*	SE	*β*	95% CI	*B*	SE	*β*	95% CI
Age group	-.59	.41	-.10	-1.41; .22	-.74	.45	-.12	-1.62; .15
Gender	-.93	.46	-.13**	-1.83; -.02	-.97	.46	-.13*	-1.87; -.07
Education	-.18	.13	-.09	-.44; .09	-.16	.13	-.08	-.42; .10
Smartphone use/week	.14	.11	.08	-.07; .35	.13	.11	.08	-.09; .34
Craving and withdrawal	.09	.08	.09	-.06; .25	.50	.25	.48	-.01; .10
Overuse and tolerance	.33	.06	.43*	.21; .45	.15	.18	.20	-.20; .50
Virtual life orientation	.13	.08	.11	-.02; .28	-.31	.24	-.27	-.78; .17
Age group x Craving and withdrawal					-.34	.20	-.45	-.75; .06
Age group x Overuse and tolerance					.14	.13	.27	-.12; .39
Age group x Virtual life orientation					.36	.19	.43	-.01; .73
R^2	.35*				.37			

Note. ** $p < .05$, * $p < .001$.

Appendix A

The Impact of Smartphone Use on Adults' Face-to-Face Relationships

Informed Consent Form

The purpose of this Informed Consent Form is to ensure you understand the nature of this study and your involvement in it. This consent form will provide information about the study, giving you the opportunity to decide if you want to participate.

Researchers: This study is being conducted by Sophia Hewitt as part of the course requirements for Psychology 4951 and Psychology 4959 (Honours Project in Psychology I and II) under the supervision of Dr. Brett Holfeld.

Purpose: The study investigates the impact of smartphone use on adults' face-to-face relationships. The results will be used to write an Honours thesis and for a presentation at the Nick Novakowski Student Conference held in April 2019 at Grenfell Campus. The study may also be published in the future.

Task Requirements: You will be asked to complete a short online questionnaire regarding your smartphone use and experiences, and your relationships with friends, family members, and your romantic partner. There are no right or wrong answers and you may omit any questions you do not wish to answer. By participating in this study, you acknowledge that you are at least 19 years old.

Duration: The online questionnaire will take approximately 10 minutes to complete.

Risks and Benefits: There are no obvious risks or benefits involved with your participation in this study.

Anonymity and Confidentiality: Your responses will be anonymous and confidential. Please do not include any identifying information in your responses to the questions. IP addresses will not be collected. All information will be analyzed and reported on a group basis. Thus, individual responses cannot be identified. Although we are not collecting any identifying information, the online survey company, Qualtrics, hosts the information on private Canadian servers. All information will also be held on a password protected computer during the duration of the project

Right to Withdraw: Your participation in this research is completely voluntary and you are free to stop participating at any time. However, once you finish this survey and click submit, your data cannot be removed because we are not collecting any identifying information and therefore we cannot link data to individuals' responses.

Contact Information: If you have any questions or concerns about the study, please feel free to contact Sophia Hewitt at sah876@grenfell.mun.ca or her supervisor, Dr. Brett Holfeld at 709-639-2740 or bholfeld@grenfell.mun.ca. As well, if you are interested in knowing the results of the study, please contact Sophia Hewitt or Dr. Brett Holfeld after April 5th, 2019. You may also attend the Nick Novakowski Student Conference held in April 2019 at Grenfell Campus to hear about the results of the study.

This study has been approved by an ethics review process in the psychology program at Grenfell Campus, Memorial University of Newfoundland and is in compliance with Memorial University's ethics policy.

Please keep this copy for your records.

By proceeding to the next page, consent is implied if you are at least 19 years old.

Appendix B

The Impact of Smartphone Use on Adults' Face-to-Face Relationships

A smartphone is a mobile phone that performs many of the functions of a computer. Smartphones typically have a touchscreen interface, Internet access, and an operating system capable of running downloaded applications.

PART 1. ***Please answer the following questions about your smartphone use.***

1) Do you currently own a smartphone?

   Yes _____ No_____

2) On average, how many hours do you spend on your smartphone in a given day during the week (Monday – Friday)

Less than 1 hour | 1 hour | 2 hours | 3 hours | 4 hours | 5 hours | More than 5 hours

3) On average, how many hours do you spend on your smartphone in a given day during the weekend (Saturday – Sunday)

Less than 1 hour | 1 hour | 2 hours | 3 hours | 4 hours | 5 hours | More than 5 hours

4) What do you use your smartphone mostly for?

   a. Text messaging
   b. Making or receiving phone calls
   c. Facetime/Skype
   d. Social Media (e.g., Facebook, Instagram, Twitter, etc.)
   e. E-mail
   f. Playing games
   g. Other _____

5) What type of smartphone do you currently own?

iPhone_____ Android _____

Please answer the following questions if you have an iPhone. The questions are related to the iOS 12 update. Please swipe right on the main page of your iPhone and scroll down to the bottom of the page to find an app called Screen Time. Click on this app and select "*Last 7 days*" on the top of the page. Answer the following questions based on the information presented. Which Update?

6) On average, how much time do you spend on your iPhone each day?

_____

7) On average, how many times did you pick up your iPhone each day?

_____

8) What are your top 3 most used apps on your iPhone?

1. _____
2. _____
3. _____

PART 2. ***Please answer the following questions about your experiences while using your smartphone.***

9) I am anxious when I forget to take my smartphone with me.

0	1	2	3
Strongly Disagree	Disagree	Agree	Strongly Agree

10) I am anxious when I am not able to use my smartphone.

0	1	2	3
Strongly Disagree	Disagree	Agree	Strongly Agree

11) I would not be able to tolerate not having a smartphone.

0	1	2	3
Strongly Disagree	Disagree	Agree	Strongly Agree

12) My smartphone is on my mind even when I am not using it.

0	1	2	3
Strongly Disagree	Disagree	Agree	Strongly Agree

13) I have reduced my study and/or work time due to smartphone use.

0	1	2	3
Strongly Disagree	Disagree	Agree	Strongly Agree

14) I have reduced my hobby time due to smartphone use.

0	1	2	3
Strongly Disagree	Disagree	Agree	Strongly Agree

15) I involuntarily touch my smartphone.

0	1	2	3
Strongly Disagree	Disagree	Agree	Strongly Agree

16) I have tried to reduce my smartphone use but always fail.

0	1	2	3
Strongly Disagree	Disagree	Agree	Strongly Agree

17) Spending a lot of time on my phone has become a habit.

0	1	2	3
Strongly Disagree	Disagree	Agree	Strongly Agree

18) I use my smartphone for longer periods of time than I intended.

0	1	2	3
Strongly Disagree	Disagree	Agree	Strongly Agree

19) I feel that smartphone conversations are more enjoyable than face-to-face conversations.

0	1	2	3
Strongly Disagree	Disagree	Agree	Strongly Agree

20) Conversations using my smartphone are more frequent than face-to-face conversations.

0	1	2	3
Strongly Disagree	Disagree	Agree	Strongly Agree

21) I express my feelings better via my smartphone than by talking face-to-face with people.

0	1	2	3
Strongly Disagree	Disagree	Agree	Strongly Agree

22) It is difficult to communicate with other people without using my smartphone.

0	1	2	3
Strongly Disagree	Disagree	Agree	Strongly Agree

PART 3. ***Please answer the following questions about your relationships with your friends.***

23) My friends complain about my smartphone use.

0	1	2	3
Strongly Disagree	Disagree	Agree	Strongly Agree

24) If I didn't have my smartphone, my friends would have a hard time getting in touch with me.

0	1	2	3
Strongly Disagree	Disagree	Agree	Strongly Agree

25) I use my smartphone to talk to friends when I feel lonely or isolated.

0	1	2	3
Strongly	Disagree	Agree	Strongly

Disagree Agree

26) My friends don't like it when my smartphone is turned off.

0	1	2	3
Strongly Disagree	Disagree	Agree	Strongly Agree

27) I try to hide from my friends the amount of time I spend on my smartphone.

0	1	2	3
Strongly Disagree	Disagree	Agree	Strongly Agree

28) I prefer to use my smartphone over spending time with my friends.

0	1	2	3
Strongly Disagree	Disagree	Agree	Strongly Agree

29) I get annoyed when my friends are on their smartphones when we are spending time together.

0	1	2	3
Strongly Disagree	Disagree	Agree	Strongly Agree

30) When I go out with friends, I often use my smartphone.

0	1	2	3
Strongly Disagree	Disagree	Agree	Strongly Agree

31) Overall, I am satisfied with my relationship with my friends.

0	1	2	3
Strongly Disagree	Disagree	Agree	Strongly Agree

PART 3. ***Please answer the following questions about your relationships with your family.***

32) Please identify the family member who you will be answering the following questions about.

a. Mother
b. Father
c. Daughter
d. Son
e. Brother
f. Sister
g. Other, please specify _____

33) My family complains about my smartphone use.

0	1	2	3
Strongly Disagree	Disagree	Agree	Strongly Agree

34) If I didn't have my smartphone, my family would have a hard time getting in touch with me.

0	1	2	3
Strongly Disagree	Disagree	Agree	Strongly Agree

35) I use my smartphone to talk to family when I feel lonely or isolated.

0	1	2	3
Strongly Disagree	Disagree	Agree	Strongly Agree

36) My family doesn't like it when my smartphone is turned off.

0	1	2	3
Strongly Disagree	Disagree	Agree	Strongly Agree

37) I try to hide from my family the amount of time I spend on my smartphone.

0	1	2	3
Strongly Disagree	Disagree	Agree	Strongly Agree

38) I prefer to use my smartphone over spending time with my family.

0	1	2	3

Strongly Disagree	Disagree	Agree	Strongly Agree

39) I get annoyed when my family members are on their smartphones when we are spending time together.

0	1	2	3
Strongly Disagree	Disagree	Agree	Strongly Agree

40) When I go out with my family, I often use my smartphone.

0	1	2	3
Strongly Disagree	Disagree	Agree	Strongly Agree

41) Overall, I am satisfied with my relationship with family.

0	1	2	3
Strongly Disagree	Disagree	Agree	Strongly Agree

<u>PART 3.</u> ***Please answer the following questions about your relationship with your romantic partner*****.**

42) Do you currently have a romantic partner?

Yes _____ No _____

43) How would you describe the gender of your partner?
   a. Male
   b. Female
   c. Other, please specify _____
   d. I prefer not to answer

44) How long have you been in your current relationship?

_____ months _____ years

45) My partner complains about my smartphone use.

0	1	2	3
Strongly	Disagree	Agree	Strongly

Disagree Agree

46) If I didn't have my smartphone, my partner would have a hard time getting in touch with me.

0	1	2	3
Strongly Disagree	Disagree	Agree	Strongly Agree

47) I use my smartphone to talk to my partner when I feel lonely or isolated.

0	1	2	3
Strongly Disagree	Disagree	Agree	Strongly Agree

48) My partner doesn't like it when my smartphone is turned off.

0	1	2	3
Strongly Disagree	Disagree	Agree	Strongly Agree

49) I try to hide from my partner the amount of time I spend on my smartphone.

0	1	2	3
Strongly Disagree	Disagree	Agree	Strongly Agree

50) I prefer to use my smartphone over spending time with my partner.

0	1	2	3
Strongly Disagree	Disagree	Agree	Strongly Agree

51) I get annoyed when my partner is on their smartphone when we are spending time together.

0	1	2	3
Strongly Disagree	Disagree	Agree	Strongly Agree

52) When out with my partner, I often use my smartphone.

0	1	2	3
Strongly Disagree	Disagree	Agree	Strongly Agree

53) Overall, I am satisfied with my relationship with my romantic partner.

0	1	2	3
Strongly Disagree	Disagree	Agree	Strongly Agree

PART 4. ***Please answer the following questions about yourself.***

54) How old are you? _____ years old

55) How would you describe your gender?

e. Male
f. Female
g. Other, please specify _____
h. I prefer not to answer

56) How would you describe your race or ethnicity? _____

57) What is the highest educational level that you have completed?

a. Elementary School
b. Junior High School
c. High School diploma
d. Some post-secondary education
e. Complete post-secondary diploma/ certificate
f. Some university education
g. Complete Bachelor's degree
h. Graduate degree

Appendix C

Advertisement

Facebook:

Hello everyone,

I am conducting a study about the impact of smartphone use on adults' face-to-face relationships. In this study, you will be asked to answer a short online questionnaire about your smartphone use and relationships with people in your life (e.g., friends, family, and a romantic partner). The survey will take you about 10 minutes to complete and it has also been approved by the psychology ethics review process at Grenfell Campus, Memorial University of Newfoundland. Participation is completely voluntary, so, if you would like to participate you can simply click the link below. Thank you!

Appendix D

Smartphone Use and its Impact on Adults' Face-to-Face Relationships

Debriefing Form

Thank you for participating in my study that examined the impact of smartphone use on adults' face-to-face relationships with friends, family members, and romantic partners.

If you have any questions or concerns about the study, please feel free to contact myself, Sophia Hewitt, at sah876@grenfell.mun.ca or my supervisor, Dr. Holfeld at bholfeld@grenfell.mun.ca. As well, if you are interested in knowing the results of the study, please contact myself or Dr. Holfeld after April 5th, 2019.

This study has been approved by an ethics review process in the psychology program at Grenfell Campus, Memorial University if Newfoundland and has been found to be in compliance with Memorial University's ethics policy. If you have ethical concerns about the research (such as the way you have been treated or your rights as a participant), you may contact the chair of the Grenfell Research Office, Dr. Daniel Nadolny, at 709-639-4874 or dnadolny@grenfell.mun.ca.

Thank you for your participation. It is greatly appreciated.

Appendix E

Smartphone Use and Relationships

Sophia Hewitt Supervised by Dr. Brett Holfeld

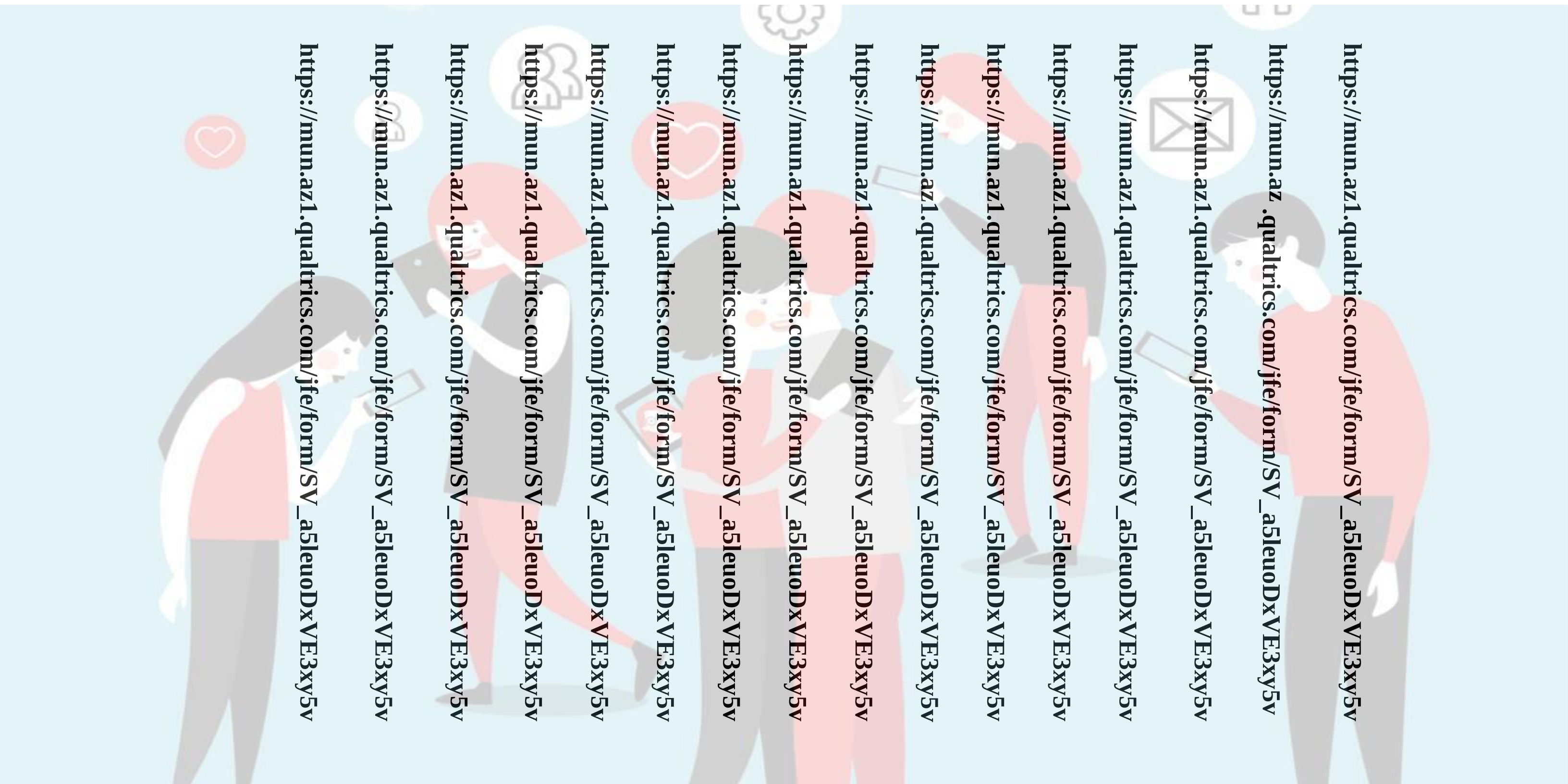
PARTICIPANTS NEEDED!!!

As a part of my Honours Thesis, I will be investigating the effects of smartphone use on face-to-face relationships with friends, family, and your romantic partner.

I am looking for participants to be involved in my research. The online questionnaire will take approximately 10 minutes to complete; and is completely voluntary and anonymous.

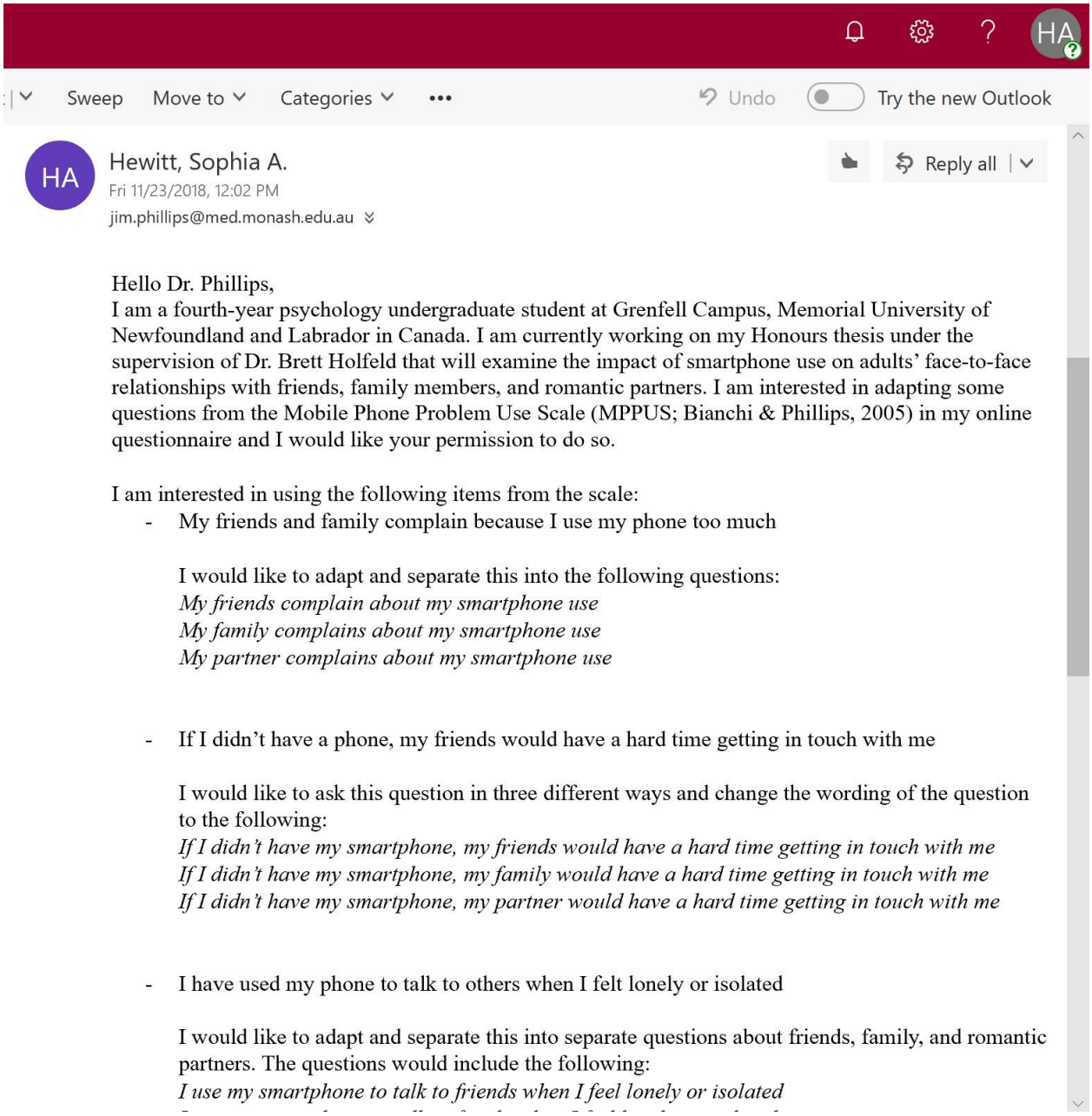
If you are interested, please go to the following link to participate in the study:

https://mun.az1.qualtrics.com/jfe/form/SV_a5leuoDxVE3xy5v



Appendix F

Permission to use Developed Scales



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HA

Hewitt, Sophia A.

Fri 11/23/2018, 12:02 PM

jim.phillips@med.monash.edu.au

Reply all

Hello Dr. Phillips,
I am a fourth-year psychology undergraduate student at Grenfell Campus, Memorial University of Newfoundland and Labrador in Canada. I am currently working on my Honours thesis under the supervision of Dr. Brett Holfeld that will examine the impact of smartphone use on adults' face-to-face relationships with friends, family members, and romantic partners. I am interested in adapting some questions from the Mobile Phone Problem Use Scale (MPPUS; Bianchi & Phillips, 2005) in my online questionnaire and I would like your permission to do so.

I am interested in using the following items from the scale:

- My friends and family complain because I use my phone too much

  I would like to adapt and separate this into the following questions:
  My friends complain about my smartphone use
  My family complains about my smartphone use
  My partner complains about my smartphone use

- If I didn't have a phone, my friends would have a hard time getting in touch with me

  I would like to ask this question in three different ways and change the wording of the question to the following:
  If I didn't have my smartphone, my friends would have a hard time getting in touch with me
  If I didn't have my smartphone, my family would have a hard time getting in touch with me
  If I didn't have my smartphone, my partner would have a hard time getting in touch with me

- I have used my phone to talk to others when I felt lonely or isolated

  I would like to adapt and separate this into separate questions about friends, family, and romantic partners. The questions would include the following:
  I use my smartphone to talk to friends when I feel lonely or isolated

I use my smartphone to talk to friends when I feel lonely or isolated
I use my smartphone to talk to family when I feel lonely or isolated
I use my smartphone to talk to my partner when I feel lonely or isolated

- My friends don't like it if my phone is turned off

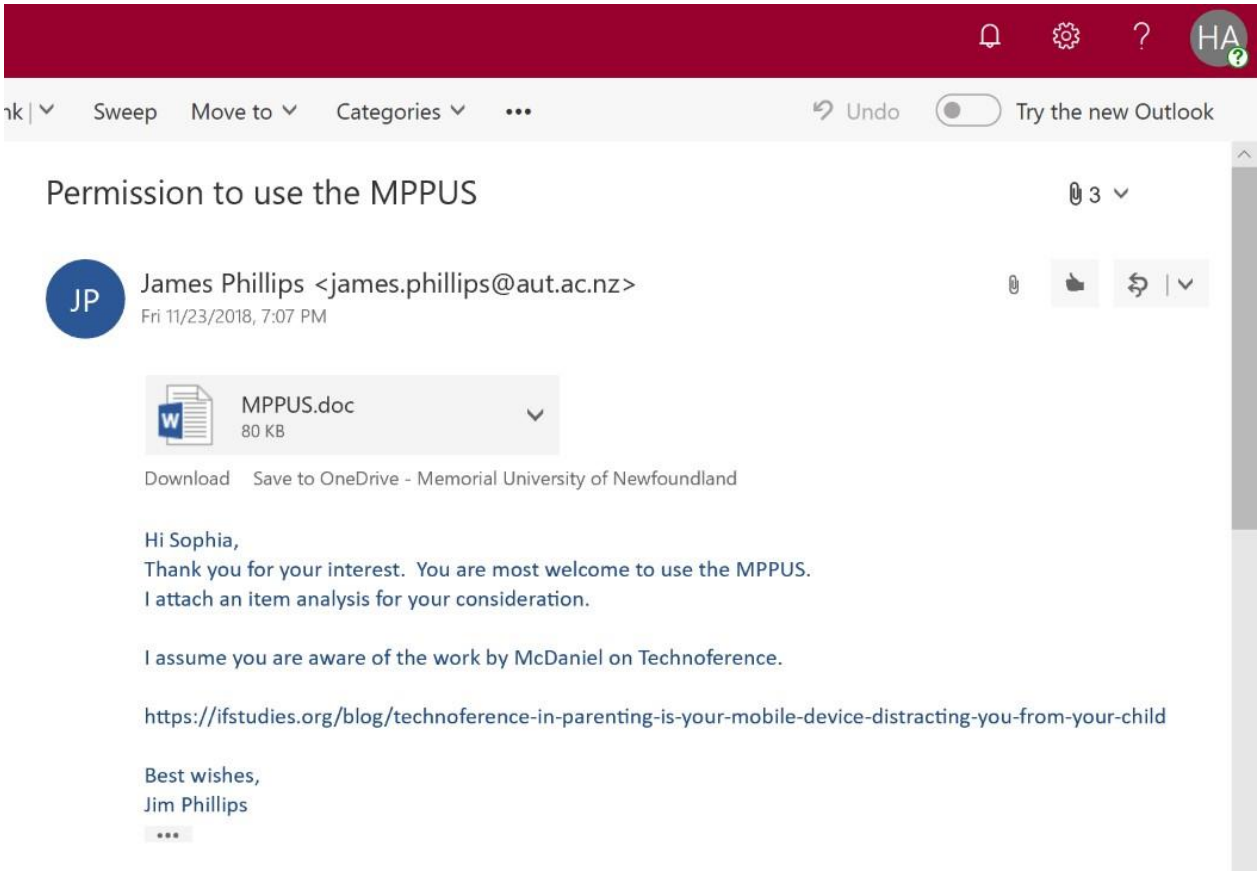
  I would like to ask the same question regarding family and romantic partners
  My family doesn't like it if my phone is turned off
  My partner doesn't like it if my phone is turned off

- I have tried to hide from others the amount of time I spend talking on the phone

  I would like to ask this question in three different ways, while changing the wording to the following:
  I try to hide from my friends the amount of time I spend on my smartphone
  I try to hide from my family the amount of time I spend on my smartphone
  I try to hide from my partner the amount of time I spend on my smartphone

I am also interested in using a reduced version of the scale with modified response options. Instead of a 10-point Likert scale ranging from *1 (not true)* to *10 (true)* I would like to use a 4-point Likert scale ranging from *0 (strongly disagree)* to *3 (strongly agree)*, so that the response options are consistent throughout my online questionnaire.

Thank you for your time and consideration,
Sophia Hewitt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James Phillips <james.phillips@aut.ac.nz>
Fri 11/23/2018, 7:07 PM
MPPUS.doc
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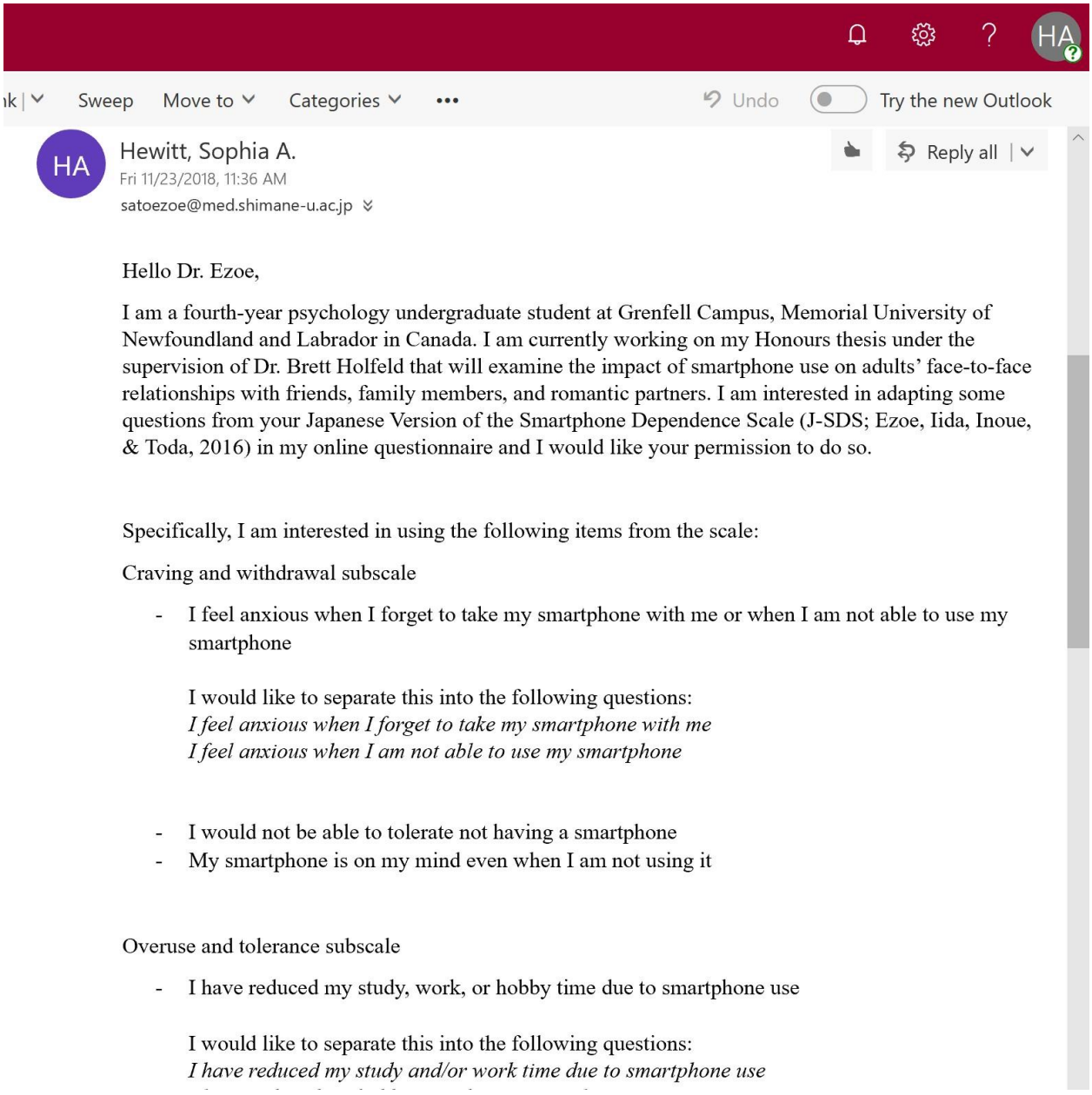
Hi Sophia,
Thank you for your interest. You are most welcome to use the MPPUS.
I attach an item analysis for your consideration.
I assume you are aware of the work by McDaniel on Technoference.
https://ifstudies.org/blog/technoference-in-parenting-is-your-mobile-device-distracting-you-from-your-child
Best wishes,
Jim Phillips



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HA

Hewitt, Sophia A.

Fri 11/23/2018, 11:36 AM

satoezoe@med.shimane-u.ac.jp

Reply all

Hello Dr. Ezoe,

I am a fourth-year psychology undergraduate student at Grenfell Campus, Memorial University of Newfoundland and Labrador in Canada. I am currently working on my Honours thesis under the supervision of Dr. Brett Holfeld that will examine the impact of smartphone use on adults' face-to-face relationships with friends, family members, and romantic partners. I am interested in adapting some questions from your Japanese Version of the Smartphone Dependence Scale (J-SDS; Ezoe, Iida, Inoue, & Toda, 2016) in my online questionnaire and I would like your permission to do so.

Specifically, I am interested in using the following items from the scale:

Craving and withdrawal subscale

- I feel anxious when I forget to take my smartphone with me or when I am not able to use my smartphone

  I would like to separate this into the following questions:
  I feel anxious when I forget to take my smartphone with me
  I feel anxious when I am not able to use my smartphone

- I would not be able to tolerate not having a smartphone
- My smartphone is on my mind even when I am not using it

Overuse and tolerance subscale

- I have reduced my study, work, or hobby time due to smartphone use

  I would like to separate this into the following questions:
  I have reduced my study and/or work time due to smartphone use

I have reduced my study and/or work time due to smartphone use
I have reduced my hobby time due to smartphone use

- I involuntarily touch my smartphone
- I have tried to reduce my smartphone use but always fail
- Spending a lot of time on my smartphone has become a habit
- I use my smartphone for longer periods of time than I intended

Virtual life orientation subscale

- I feel that my communication with my smartphone is more enjoyable than conversations with my real-life people

  I would like to change the wording of the question to the following:
  I feel that smartphone conversations are more enjoyable than face-to-face conversations

- I prefer to use my smartphone over spending time with my family or friends

  I would like to separate this into the following questions:
  I prefer to use my smartphone over spending time with my friends
  I prefer to use my smartphone over spending time with my family
  I prefer to use my smartphone over spending time with my partner

- My cyber communications with my smartphone are more frequent than my relationships with my real-life people

  I would like to change the wording of the question to the following:
  Conversations using my smartphone are more frequent than face-to-face conversations

- I express my true feelings better via email or SNS (Line, Twitter, etc.) than by telephone or talking face-to-face

  I would like to change the wording of the question to the following:
  I express my feelings better via my smartphone than by talking face-to-face with people

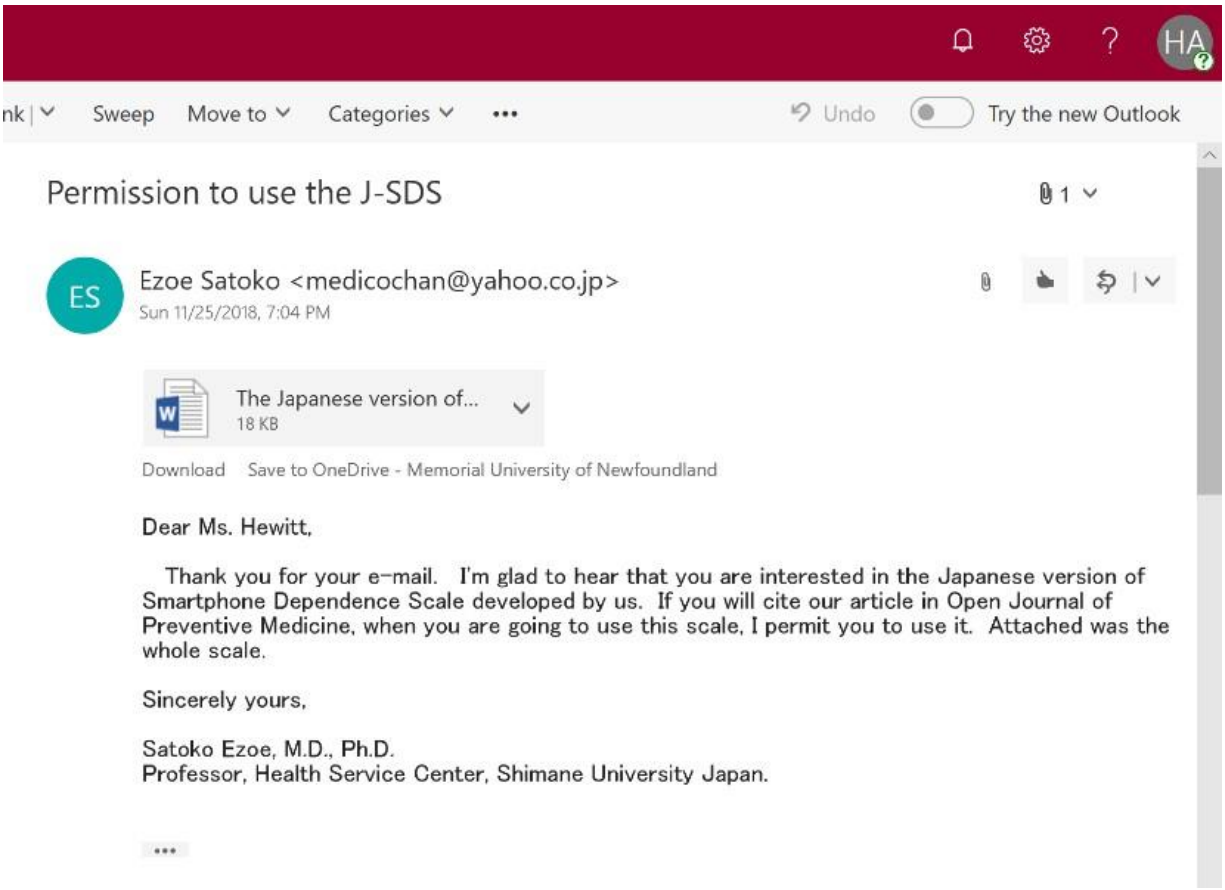
- I feel that my relationships with my smartphone friends are more intimate than my real-life friends

- It is difficult to communicate with other people without using a smartphone for that

  I would like to change the wording of the question to the following:
  It is difficult to communicate with other people without using my smartphone

Thank you for your time and consideration,

Sophia Hewitt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ES
Ezoe Satoko <medicochan@yahoo.co.jp>
Sun 11/25/2018, 7:04 PM
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Dear Ms. Hewitt,
Thank you for your e-mail. I'm glad to hear that you are interested in the Japanese version of Smartphone Dependence Scale developed by us. If you will cite our article in Open Journal of Preventive Medicine, when you are going to use this scale, I permit you to use it. Attached was the whole scale.
Sincerely yours,
Satoko Ezoe, M.D., Ph.D.
Professor, Health Service Center, Shimane University Japan.
•••