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SOCIAL AND SATISFIED? SOCIAL USES OF MOBILE PHONE AND SUBJECTIVE WELLBEING IN LATER LIFE

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Abstract: *The current study examined the associations between socio-demographic background and engagement in social uses of mobile phone, and between the engagement in these uses and life satisfaction and health satisfaction in later life through the lens of digital divide and uses and gratifications theories. The data, collected from the retired Internet users (62 and older) residing in seven countries (N = 5713), were analyzed using logistic and linear regression models. The results show that education and age predicted the engagement in social uses in the most consistent way. A number of social uses positively related to both life and health satisfaction. Of the particular uses, e-mailing and instant messaging were positively associated with life and health satisfaction. The results imply that socio-demographic background predicts the engagement in social uses of mobile phone in later life, that the engagement in such uses plays an overall significant role in wellbeing in later life, and that some particular uses play a greater role than others in this regard.*

Keywords: *digital divide, mobile phone, older adults, social use, subjective wellbeing, uses and gratifications.*

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INTRODUCTION

Information and communication technologies (ICTs) continue to affect people of all ages, though in an unequal manner (Berner et al., 2015; Quan-Haase et al., 2018). Older adults constitute a constantly growing segment of mobile technology users (Rosales & Fernandez-Ardèvol, 2016). Mobile technology offers older adults numerous opportunities to improve the quality of their lives, ranging from better self-monitoring of health to the facilitated maintaining of social relations and psychological wellbeing (Chiu et al., 2016). Although older adults hold generally positive attitudes towards mobile technologies (Neves & Amaro, 2012) and many of them have already incorporated these technologies into their lives (Fernandez-Ardèvol & Ivan, 2013), there is relatively little evidence regarding the relationship between mobile phone uses and wellbeing in later life.

The goal of this study was to explore two types of associations: (a) between socio-demographic background and social uses of mobile phone, and (b) between social uses of mobile phone and two subjective wellbeing measures (life satisfaction and health satisfaction) in later life. These associations were examined in the cross-sectional international sample of older Internet users. In this study, *social uses of mobile phone* are defined as uses of mobile phones "for social purposes, such as social networking, messaging, phone calls and maintaining social relationships." (Elhai et al., 2017, p.76). Two theoretical frameworks, the digital divide theory and the uses and gratifications (U&G) theory, were applied to guide the research and facilitate the interpretation of results.

The rationale behind investigating engagement in social uses of mobile phone and subjective wellbeing in later life is rooted in three issues. First, among all possible types of mobile phone usage, social uses are expected to be the most *beneficial* for older adults. Links with close family members become more significant as people age (Sims et al., 2017), while the number of their distant social ties tends to decrease over the years (Petrovčič et al., 2015). Older adults are therefore more likely to experience loneliness and social isolation than their younger counterparts (Xie et al., 2020), the fact that may lead to serious mental disorders, cognitive disparities, and even mortality (Courtlin & Knapp, 2017). Feelings of loneliness and social isolation may be even more strongly emphasized in the retired older adults, many of whom experience detachment from social circles developed and maintained during their participation in the labor market (Cotten et al., 2013). Social uses of mobile phone may therefore mitigate the impact of these consequences of aging, as well as improve wellbeing and satisfaction with various domains of life (Delello & McWhorter, 2017; Sims et al., 2017).

Second, prior research on ICT use and wellbeing in later life have yielded *inconsistent results*. Some of these studies found that ICT use positively relates to wellbeing, quality of life, and health (Heo et al., 2015; Kim et al., 2020; Sims et al., 2017), contributes to greater social connectivity, support, and inclusion (Chiu et al. 2016), and to greater life satisfaction (Kim & Shen, 2020). Other studies found little or no association between ICT use and life/wellbeing outcomes (e.g., Cotten et al., 2013; Francis et al., 2019).

Third, the *design* of the current study has several advantages compared with the previous studies on the alike topics (Chiu et al., 2016; Petersen et al., 2016; Seifert & Schelling, 2015; Vicente & Lopez, 2016). Despite their insightfulness, earlier qualitative study designs (e.g., Ivan & Fernandez-Ardèvol, 2017; Vicente & Lopez, 2016) did not allow establishing a systematic structure of predictors and outcomes of mobile phone use in later life. For the

most part, previous quantitative studies did not examine the association between each separate use and wellbeing outcomes (e.g., see Elhai et al., 2017; Seifert & Schelling, 2015), but rather focused on the relationship between the overall usage or mobile ownership and wellbeing measures. This approach disregards the notion that some ICT uses may relate to subjective wellbeing to a greater extent than others. Lastly, prior studies were based on relatively small samples, usually from a single country (Chiu et al., 2016; Petersen et al., 2016; Vicente & Lopez, 2016). In contrast, the current study applies quantitative methodology to a large data set collected from seven countries and examines overall social mobile phone usage as well as the engagement in particular social uses.

The results of the study have a potential to assist communities and public officials in their efforts to mitigate the undesired effects of aging through mobile technology. The COVID-19 pandemic, when older adults around the world are staying at home more than ever following governments' restrictions and safety measures (Nimrod, 2020b; Seifert et al., 2021), could have exacerbate these effects. The limited possibilities to maintain offline social relationships could have negatively impacted their subjective wellbeing.

As previously mentioned, the current study uses two theories to explain the studied associations. First, the association between socio-demographic background and engagement in social uses of mobile phone was examined through the lens of the digital divide perspective (Yu et al., 2016). Second, the association between social mobile phone uses and wellbeing outcomes was examined through the lens of the U&G theory (Han et al., 2015; Heravi et al., 2018). These two frameworks are used as neither can fully explain the studied associations. The role of socio-demographics in predicting ICT use can be better explained through the lens of the digital divide theory, which does not seek to understand users' needs in their ICT use. In contrast, in the U&G framework, needs or motivations are used to explain ICT use or its relation to various aspects of life, while the role of socio-demographic background is generally overlooked.

In sum, this study intends to respond to the following research questions. The first two questions will address the digital divide perspective:

RQ1: Which socio-demographic characteristics are associated with number of social uses of mobile phone in later life?

RQ2: Which socio-demographic characteristics are associated with the engagement in particular social uses of mobile phone in later life?

The two additional research questions will address the U&G theory:

RQ3: Does the number of social uses of mobile phone positively relate to subjective wellbeing in later life?

RQ4: Engagement in which particular social uses of mobile phone is associated with greater subjective wellbeing in later life?

In this cross-sectional study, we chose to examine how the social uses of mobile phone are associated with wellbeing measures. We acknowledge that the relationship can also be the opposite; greater subjective wellbeing can motivate people to use more social functionalities of their mobile phones. However, we follow the literature which examines more the former type of associations (Cotten et al., 2013; Elhai et al., 2017; Francis et al., 2019; Heo et al., 2015; Ihm & Hsieh, 2015; Kim et al., 2020; Petersen et al., 2016; Sims et al., 2017). In order to properly examine the opposite associations, more information about the motivations and

expected gratifications would be needed. The survey data used in the current study does not contain such information.

LITERATURE REVIEW

Digital divide theory and older adults' ICT use

The digital divide was one of the first theoretical concepts used in digital media and communication studies to refer to various types of inequalities in the ICT adoption/use domain. The literature in this domain distinguishes between first-level, second-level, and third-level digital divide. When the Internet was in its infancy, the (first level) digital divide referred to differences between having and not having access to computers and/or the Internet. As Internet penetration reached a saturation point in most countries of the world, meaning that the "use-nonuse" gap has substantially narrowed, research began attempting to understand the *second-level divide* (Mesch, 2016). It is defined as inequality in ICT uses (Chopik et al., 2017; Hargittai et al., 2019) or in digital skills (Quan-Haase et al., 2018). More recently, the concept of the *third-level digital divide*, which refers to inequalities in the beneficial outcomes (e.g., learning, productivity, wellbeing, and quality of life) of ICT use (Scheerder et al., 2017), has been introduced. It maintains that individuals do not benefit equally from ICT use even when they are equally likely to access and use it (Van Deursen & Helsper, 2015).

As older adults constitute a highly heterogeneous group in terms of ICT adoption and use (Hargittai et al., 2019; Hänninen et al., 2020), the digital divide appears to manifest itself in the older population in particular ways (Friemel, 2016). For example, older age was found associating with lower number of ICTs used (Chopik et al., 2017). With respect to gender, women value cooperation (Merchant, 2012) and are more motivated than men to maintain their social ties (Yu et al., 2016). A higher level of education reflects better ICT skills (Hargittai & Dobransky, 2017), and a higher income reflects greater ability to make financial expenditures (König et al., 2018). As to marital status, married people tend to be more motivated towards ICT use because their life partners are likely to encourage them to use the technology (Chang et al., 2015) and to provide an assistance with use-related problems when necessary (Berner et al., 2015). As to locality, urban localities have a more developed ICT infrastructure (König et al., 2018) and a larger supply of retail outlets (Dennis et al., 2016) where ICT services and products, including mobile phones, can be purchased.

Based on these findings from the previous research, it is expected that women and younger respondents will be more likely to engage in social uses of mobile phone than men and older respondents, respectively. Similarly, it is assumed that respondents with bachelor, master or doctoral degrees (hereinafter: tertiary education) and those with incomes higher than their country's average (hereinafter: high income) engage more in social uses of mobile phone than respondents with post-secondary or lower level of education (hereinafter: non-tertiary education) and those with an average or lower than average incomes (hereinafter: mean or lower income). Also, married individuals are assumed to engage more in social uses of mobile phone compared to unmarried (meaning single, divorced or widowed). Finally, respondents residing in large urban (i.e., big cities) and small urban (i.e., the suburbs of big

cities, towns or small cities) localities are expected to undertake social use of mobile phone more than those living in rural (i.e., country villages or farms/homes in the countryside) localities.

Uses and Gratifications theory and older ICT users

According to the U&G theory, individuals' selection of media is purposive and conscious (Han et al., 2015) since people are motivated to use media for gratification of the particular individual needs (Heravi et al., 2018). Since the choice of media is based on past gratifications (Bondad-Brown et al., 2012), the media selected for consumption are those perceived (and known) to be able to meet consumers' needs and desires (Vaterlaus, 2017). Despite a number of methodological criticisms (see Alhabash & Ma, 2017), U&G theory has been widely used to study the antecedents and outcomes of communication due to its high applicability (Chung & Kim, 2008). It focuses not only on motives for media use but also on the results of their use (Park & Goering, 2016), therefore being relevant for the current study.

Older adults' use of ICT is likely to be performed when technology does gratify or is expected to gratify their needs (Chang et al., 2015; Francis et al., 2018). This is also true for mobile phone usage, which is typically more utilitarian than hedonistic in older adulthood (Fernandez-Ardèvol & Ivan, 2013). One explanation to this can be found in the socio-emotional selectivity theory. According to it, because the older adults' future life perspective is shorter that of younger age cohorts, they tend to prioritize emotionally meaningful activities and gratify their short-term needs (Kim & Shen, 2020). Additional explanation to utilitarian approach in ICT use by older adults refers to the limitations of the later life. Geographical barriers (Francis et al., 2018), potential loss of social contacts (Cotten et al., 2013), and deteriorating health (Mesch, 2016) are major concerns in this life stage. Social uses of mobile phone are designed to help older adults to overcome these concerns and, consequently, improve their wellbeing. Therefore, it is expected that social uses of mobile phone will be associated with greater subjective wellbeing in later life.

Since numerous activities are included in ICT use, the contribution of each of them to wellbeing may differ (Nimrod, 2020a), as these activities may provide varying benefits and gratify different needs. For example, instant messaging can gratify health-related needs and therefore provide solutions for maintenance or improvement of health status. In contrast, social networking sites via mobile phone can be used to gratify needs for social entertainment and unwinding and therefore provide solutions for a more efficient spending of time. Therefore, the current study has adopted the toolkit approach (Smock et al., 2011), according to which each media outlet should not be seen as a single entity but rather as a combination of numerous features which may be differently used and provide varying gratifications. Hence, we will also examine whether and how each particular social use of mobile phone is associated with greater subjective wellbeing in later life.

METHODS

Data

The data used in the current study were attained from the 2018 wave of the Ageing, Communication, Technologies (ACT) cross-national longitudinal survey conducted among internet users aged 62 and over from Austria, Canada, Finland, Israel, the Netherlands, Romania, and Spain[i]. The overall aim of the survey was to study older audience in the digital media environment. Data were collected online in six of the countries, using commercial online respondent panels. Only in Romania they were collected by telephone due to the relatively low share of Internet users in the country's older population (Ivan & Schiau, 2018). The samples were representative of the older population of Internet users in each country as age and gender quotas were used in the sampling (Loos et al., 2019).

Sample

The population of the current study consisted of retired older Internet users for two reasons. First, differences in (social) uses of mobile phone can be attributed to the variations in amount of available free time, which is contingent upon the occupational status (Näsi et al., 2012). Second, affordances for purchasing, accessing and using technology may vary according to employment status (Hargittai & Dobransky, 2017) as people of various occupational statuses may have different financial abilities and digital skills.

In total, 7940 older Internet users provided their responses in the current wave of the survey. Filtering out the responses of those who reported their occupational status other than retired resulted in elimination of 1702 entries from the database. Of the remained 6238 responses, 447 had missing data for variables that referred to social uses of mobile phone. Another five respondents indicated they did not use mobile phone, so their answers were also discarded. Responses of another 62 participants, who reported their ages as 60 or 61, as well as 11 cases of missing data for age, were also excluded. Therefore, study's analytical sample included the responses of 5713 retired Internet users.

Measurement

The data were collected using a previously validated questionnaire (Jensen & Helles, 2015), with validated translations into Dutch, French, German, Hebrew, Romanian and Spanish available from the previous wave. As Finland joined the project on the current wave, first translation to Finnish language was performed by local research team. A back translation to English was carried out by an independent proofreader, and the process was reiterated until the Finnish version was consistent with the original questionnaire (Loos et al., 2019).

Measures

Subjective wellbeing

Life satisfaction is an ordinal variable measured with the question "Thinking about your own life and personal circumstances, how satisfied are you with your life as a whole?". The responses ranged from "1" (completely dissatisfied) to "10" (completely satisfied).

Health satisfaction is an ordinal variable measured with the question “Thinking about your physical health, how satisfied are you with your health as a whole?”. The responses here also ranged from “1” (completely dissatisfied) to “10” (completely satisfied).

Social uses of mobile phone

Number of social uses of mobile phone (*full scale*) was constructed based on the functions listed in the following item: “Which functions do you use on your mobile phone?”. The list of 19 functions was presented to respondents, and they had to check all that applied to them. Each function was then recoded into a binary variable ("1" – used, and "0" – not used). The calculated scale was therefore defined as the sum of responses regarding six functionalities which match to the abovementioned definition of social uses provided by Elhai et al. (2017). These items were: voice calling, using short message services (SMS), using multimedia message services (MMS), using social networking sites (SNS), e-mailing, and instant messaging. A higher score on the scale, ranging from zero to six, reflects a greater number of social uses of mobile phone. Since this variable represents variety/diversity and not intensity of these uses, no conclusions with respect to frequency of use should be made (this issue will be addressed in Limitations).

Number of social uses of mobile phone (*short scale*). The scale was computed for purposes of sensitivity analysis using as same scheme as in construction of the previous variable. Since voice calling and sending/receiving SMS are two basic functions on any phone, and actually are the two most frequently mentioned uses by older adults (Choudrie et al., 2017; Fernandez-Ardèvol & Ivan, 2013), they were not included in this scale. Therefore, the score on it ranged from zero to four. By comparing the results that are based on the full and those based on the short, scale, the relative importance of basic voice calling and using SMS for older Internet users’ satisfaction with life and with health is assessed.

Particular social uses of mobile phone. The six abovementioned social uses were also treated as separate binary variables. In each variable, respondents who did not engage in each particular use represented the reference category.

Socio-demographic variables

Gender was defined as a dichotomous variable, with female respondents as the reference category. *Age* was measured continuously in years. *Level of education* was measured as a dichotomous variable, with respondents having a non-tertiary education as the reference category. *Income level* was measured dichotomously, with respondents who reported having mean or lower income as the reference category. *Marital status* was defined a dichotomous variable, with unmarried respondents as the reference category. *Type of residential locality* was defined by two dummy variables—large urban and small urban localities. Residents of rural localities represented the reference category.

Statistical analysis

Data were analyzed using SPSS v.23 software. In terms of statistical methods, linear regression models were applied to explore the associations between socio-demographic background variables and number of social uses of mobile phone. Then, logistic regression analysis was employed to estimate the likelihood of engaging in each of the six social mobile

phone uses. Lastly, linear regression modelling was applied to examine the relationship between number of social uses of mobile phone, as well as between each use separately, and each subjective wellbeing outcome, while controlling for background variables. In every regression model, all variables were included in a single step (the enter model). Each model controlled for country of residence (Israel as the reference category).

RESULTS

Descriptive results

Descriptive statistics for each of the variable included in regression models are presented in Table 1.

Table 1. Sample characteristics**.**

Variable *Categories*	***n***	***% or M***	***SD***
Gender			
Male	3030	53.0	
Female	2683	47.0	
Age *(62-95)*	5713	69.95	5.7
Education			
Tertiary	1998	35.2	
Not-tertiary	3673	64.8	
Income			
Higher than mean	2202	44.7	
About the mean or lower	2720	55.3	
Marital status			
Married	3974	70.1	
Unmarried	1695	29.9	
Locality			
Large urban	1831	32.2	
Small urban	2733	48.0	
Rural	1124	19.8	
Life satisfaction *(1-10)*	5670	7.8	1.7
Health satisfaction *(1-10)*	5681	7.1	1.9
Number of social uses of mobile phone (full scale) *(0-6)*	5713	3.2	1.6
Number of social uses of mobile phone (short scale) *(0-4)*	5713	1.7	1.3

Note. M = Mean; n = Number of cases in each category; SD = Standard Deviation.

The participants' age ranged from 62 to 95 (*M* = 69.95; *SD* = 5.7). Of them, 53% were men and 70.1% were married. As to education and income, 35.2% reported having a tertiary education, and about 44.7% reported high income. As to locality of residence, 32.2% reported residing in large urban localities, 48% in small urban localities, and the rest 19.8% in rural localities. The respondents demonstrated a relatively high mean level of satisfaction with their lives (*M* = 7.8; *SD* = 1.7) and a moderately high mean level of satisfaction with their health (*M* = 7.1; *SD* = 1.9). On average, respondents reported performing about 3.2 social uses of mobile phone (*SD* = 1.6).

Figure 1 shows the distribution of respondents' mobile phone uses weighted by country. Frequencies of non-social uses are shown for comparison purposes only.

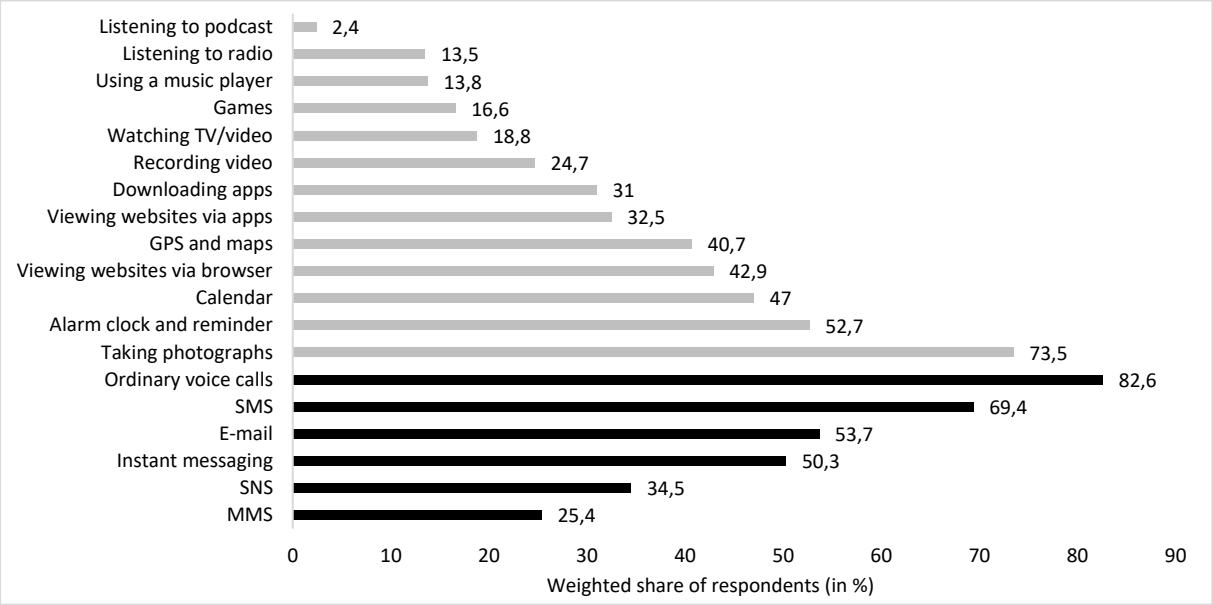

Figure 1. Distribution (in percentages) of social (in black) and other (in grey) mobile phone uses.
Note. Actual N = 5713; Weighted N = 3073.
GPS = Global Positioning System; MMS = Multimedia Message Service; SMS = Short Message Service; SNS = Social Networking Sites.

As expected, making voice calls (82.6%) and using SMS (69.4%) were the most frequent mobile social uses, corresponding to the similar finding by Choudrie et al. (2017), followed by e-mailing (53.7%), instant messaging (50.3%), and using SNS (34.5%). This sequence of uses corresponds to the sequence found by Barbosa Neves et al. (2018) regarding the internet use among the older population. The least common social use, sending MMS, was performed by about 25.4% of the respondents.

Predicting social uses of mobile phone

Table 2 shows the results of the analysis predicting the number of social uses of mobile phone by socio-demographic background.

The results suggest that male respondents engaged in fewer social uses than female respondents. Age was found to be negatively associated with number of social uses. Respondents with a tertiary education and a high income engaged in more social uses than respondents with non-tertiary levels of education and with mean or lower income, respectively. Married respondents engaged in more social uses than unmarried. Finally, respondents residing in large urban localities engaged in more social uses of mobile phone than respondents living in rural localities, while no difference appeared in this regard between the latter and respondents residing in small urban localities.

Table 2. OLS regression analyses - number of social uses of mobile phone by socio-demographic background (n = 4857).

	Number of social uses (full scale) b (SE)	***Number of social uses (short scale, without calls and SMS)*** b (SE)
Constant	7.08***	4.63***
Female (ref.)		
Male	-.12* (.05)	-.11** (.04)
Age (in years)	-.05*** (.004)	-.04*** (.003)
Non-tertiary education (ref.)		
Tertiary education	.22*** (.05)	.14*** (.04)
Mean or low income (ref.)		
High income	.29*** (.05)	.21*** (.04)
Unmarried (ref.)		
Married	.10* (.05)	.11* (.04)
Rural (ref.)		
Large urban	.15* (.06)	.14** (.05)
Small urban	.08 (.06)	.09 (.05)
Israel (ref.)		
Austria	-.55*** (.10)	-.59*** (.08)
Canada	-1.56*** (.10)	-1.20*** (.08)
Finland	-.30** (.10)	-.30*** (.08)
Netherlands	-.98*** (.12)	-.66*** (.10)
Romania	-2.07*** (.11)	-1.47*** (.09)
Spain	-.71*** (.10)	-.17* (.08)
F	83.35***	72.93***
R^2	.183	.164

Note. OLS = Ordinary Least Squares; SMS = Short Message Services; b = Unstandardized regression coefficient; F = Fisher's F ratio; R^2 = Coefficient of determination (non-adjusted); SE = Standard Error.
* $p < .05$ ** $p < .01$ *** $p < .001$.

Table 3 shows the results of the logistic regression analysis predicting engagement in each one of the six social uses of mobile phone investigated in the current study by socio-demographic background. Except for the model examining the use of SMS, which exhibited a poor fit to the data, each model was both significant at the 0.001 level and fitted the data well. Therefore, only their results are shown in the table.

As Table 3 shows, the most consistent predictors were age and education. Age was found to be negatively associated with engagement in each social use. Respondents with a tertiary education were found to be more likely than respondents with non-tertiary education to engage in each of the social uses except for the use of SNS.

Other variables exhibited less consistent associations. As to gender, men were found to be less likely than women to engage in instant messaging, use of SNS and of MMS. Respondents with high income were more likely than respondents with lower income levels to use e-mail, MMS, and engage in instant messaging. Married respondents were more likely than unmarried to use e-mail and engage in instant messaging. Finally, residents of large urban localities were more likely to use e-mail and MMS via mobile phone than residents of rural localities. No difference whatsoever emerged between the latter and residents of small urban localities.

Table 3. Binary logistic analyses - likelihood of engagement in the particular social uses of mobile phone by socio-demographic background (n = 4857).

Predictors	*Voice calls*		*E-mail*		*Instant messaging*		*SNS*		*MMS*	
	OR	p	OR	p	OR	p	OR	p	OR	p
Constant	50.09	.000	31.33	.000	92.23	.000	34.04	.000	5.44	.000
Female (ref)										
Male	1.09	.340	1.02	.806	**.82**	**.006**	**.83**	**.006**	**.84**	**.019**
Age (in years)	**.99**	**.045**	**.96**	**.000**	**.94**	**.000**	**.95**	**.000**	**.96**	**.000**
Non-tertiary (ref.)										
Tertiary education	**1.26**	**.008**	**1.27**	**.001**	**1.33**	**.000**	1.03	.682	**1.19**	**.020**
Mean or lower income (ref.)										
High income	1.14	.131	**1.46**	**.000**	**1.41**	**.000**	1.07	.322	**1.31**	**.000**
Unmarried (ref.)										
Married	.91	.275	**1.18**	**.016**	**1.18**	**.028**	1.10	.172	1.10	.247
Rural (ref.)										
Small urban	.95	.658	1.09	.292	1.12	.183	1.08	.381	1.17	.091
Large urban	.98	.882	**1.32**	**.002**	1.19	.073	1.03	.750	**1.27**	**.017**
Israel (ref.)										
Austria	.62	.112	**.63**	**.001**	**.52**	**.000**	**.28**	**.000**	.80	.112
Canada	**.16**	**.000**	**.34**	**.000**	**.09**	**.000**	**.33**	**.000**	**.42**	**.000**
Finland	**.27**	**.000**	**.63**	**.001**	**.48**	**.000**	**.43**	**.000**	**2.09**	**.000**
Netherlands	.59	.122	**.69**	**.030**	**.65**	**.011**	**.44**	**.000**	**.13**	**.000**
Romania	**.08**	**.000**	**.12**	**.000**	**.14**	**.000**	**.29**	**.000**	**.19**	**.000**
Spain	**.18**	**.000**	.93	.625	**2.05**	**.000**	**.74**	**.030**	**.34**	**.000**
Model chi-square	288.31	.000	518.53	.000	1191.30	.000	254.10	.000	649.40	.000
-2 log likelihood	4169.57		6170.11		5537.61		5941.40		5116.29	
R^2	.096		.135		.290		.071		.180	

Note. MMS = Multimedia Message Service, SNS = Social Networking Sites; OR = Odds Ratio; P = Significance level; R^2 = Coefficient of determination (Nagelkerke).

Predicting life satisfaction

Table 4 shows the results of the linear regression analyses of life satisfaction by number of social uses of mobile phone.

As expected, the results show that the number of social uses of mobile phone was positively associated with life satisfaction. This association was more pronounced in the model with the short scale than in the model with the full one.

Regarding the associations of the other variables, men and residents of large urban and of small urban localities were found to be less satisfied with life than women and residents of rural localities, respectively. In contrast, respondents who reported being married, having a tertiary education, and a high income were found to be more satisfied with life than respondents who were unmarried, had non-tertiary education, and a mean or lower income, respectively. Finally, age was found to be positively associated with life satisfaction.

Table 4. OLS analysis of life satisfaction by number of social uses of mobile phone (n = 4833).

Predictors	***Model 1*** b (SE)	***Model 2*** b (SE)
Constant	5.28***	5.41***
Number of social uses (full scale)	**.08*** (.02)**	----------
Number of social uses (short scale)	----------	**.10*** (.02)**
Female (ref.)		
Male	-.15** (.05)	-.15** (.05)
Age (in years)	.03*** (.004)	.03*** (.004)
Non-tertiary education (ref.)		
Tertiary education	.11* (.05)	.12* (.05)
Mean or lower income (ref.)		
High income	.45*** (.05)	.46*** (.05)
Unmarried (ref.)		
Married	.44*** (.06)	.44*** (.06)
Rural (ref.)		
Small urban	-.13* (.07)	-.13* (.07)
Large urban	-.20** (.07)	-.20** (.07)
Israel (ref.)		
Austria	.27* (.11)	.28* (.11)
Canada	.10 (.11)	.09 (.11)
Finland	.22* (.11)	.23* (.11)
Netherlands	.25 (.13)	.23 (.13)
Romania	.05 (.13)	.02 (.13)
Spain	.04 (.12)	-.004 (.12)
F	18.19***	18.06***
R^2	.050	.050

Note. OLS = Ordinary Least Squares; b = Unstandardized regression coefficient; F = Fisher's F ratio; R^2 = Coefficient of determination (non-adjusted); SE = Standard Error
* $p < .05$ ** $p < .01$ *** $p < .001$.

Table 5 shows the results of linear regression analyses predicting life satisfaction by engagement in each social use of mobile phone while controlling for the socio-demographic background.

Table 5. OLS analyses of life satisfaction by engagement in particular social uses of mobile phone – each one (Models 1-6) and altogether (Models 7-8) (n = 4833).

	Model 1 b (SE)	***Model 2*** b (SE)	***Model 3*** b (SE)	***Model 4*** b (SE)	***Model 5*** b (SE)	***Model 6*** b (SE)	***Model 7*** b (SE)	***Model 8*** b (SE)
Constant	5.84***	5.58***	5.61***	5.50***	5.71***	5.75***	5.26***	5.38***
Phone calls	.02 (.07)	---------	---------	---------	---------	---------	-.03 (.07)	---------
SMS	---------	**.20** (.06)**	---------	---------	---------	---------	**.14* (.06)**	---------
E-mails	---------	---------	**.19*** (.05)**	---------	---------	---------	.10 (.06)	**.12* (.06)**
Instant messaging	---------	---------	---------	**.26*** (.06)**	---------	---------	**.20** (.06)**	**.20** (.06)**
SNS	---------	---------	---------	---------	**.12* (.05)**	---------	-.01 (.06)	-.004 (.06)
MMS	---------	---------	---------	---------	---------	**.15* (.06)**	.05 (.06)	.07 (.06)
Female (ref.)								
Male	-.16** (.05)	-.16** (.05)	-.16** (.05)	-.15** (.05)	-.16** (.05)	-.16** (.05)	-.15** (.05)	-.15** (.05)
Age	.02*** (.004)	.02*** (.004)	.02*** (.004)	.02*** (.004)	.02*** (.004)	.02*** (.004)	.03*** (.004)	.03*** (.004)
Non-tertiary education (ref.)								
Tertiary education	.13* (.05)	.12* (.05)	.12* (.05)	.12* (.05)	.13* (.05)	.13* (.05)	11* (.05)	.11* (.05)
Mean or lower income (ref.)								
High income	.48*** (.05)	.47*** (.05)	.46*** (.05)	.46*** (.05)	.48*** (.05)	.47*** (.05)	.45*** (.05)	.45*** (.05)
Unmarried (ref.)								
Married	.45*** (.06)	.44*** (.06)	.44*** (.06)	.44*** (.06)	.44*** (.06)	.45*** (.06)	.43*** (.06)	.44*** (.06)
Rural (ref.)								
Small urban	-.12 (.07)	-.13 (.07)	-.13 (.07)	-.13* (.07)	-.13 (.07)	-.13 (.07)	-.13* (.07)	-.13* (.07)
Large urban	-.19** (.07)	-.19** (.07)	-.20** (.07)	-.20** (.07)	-.19** (.07)	-.20** (.07)	-.21** (.07)	-.21** (.07)
Israel (ref.)								
Austria	.22 (.11)	.21 (.11)	.24* (.11)	.26* (.11)	.26* (.11)	.23* (.11)	.25* (.11)	.27* (.11)
Canada	-.02 (.11)	.01 (.11)	.02 (.11)	.11 (.11)	.003 (.11)	-.002 (.11)	.13 (.11)	.12 (.11)
Finland	.20 (.11)	.18 (.11)	.22* (.11)	.24* (.11)	.22* (.11)	.17 (.11)	.21 (.11)	.23* (.11)
Netherlands	.17 (.13)	.23 (.14)	.18 (.13)	.20 (.13)	.19 (.13)	.21 (.14)	.25 (.14)	.22 (.14)
Romania	-.12 (.13)	-.07 (.13)	-.03 (.13)	-.01 (.13)	-.09 (.13)	-.08 (.13)	.06 (.13)	.04 (.13)
Spain	-.02 (.12)	.06 (.12)	-.02 (.12)	-.05 (.12)	-.01 (.12)	.01 (.12)	.02 (.12)	-.03 (.12)
F	16.27***	17.16***	17.31***	17.94***	16.66***	16.77***	13.88***	15.19***
R^2	.045	.047	.048	.050	.046	.046	.052	.051

Note. MMS = Multimedia Message Services, OLS = Ordinary Least Squares, SMS = Short Message Services, SNS = Social Networking Sites; b = Unstandardized regression coefficient; F = Fisher's F ratio; R^2 = Coefficient of determination (non-adjusted); SE = Standard Error
* $p < .05$ ** $p < .01$ *** $p < .001$.

Except for making phone calls, engagement in each social use was positively associated with life satisfaction. Nevertheless, when the use variables were inserted into one model, the situation somewhat changed. Only use of SMS (in Model 7), e-mailing (in Model 8), and instant messaging (in Model 7 and Model 8) were associated with the increased levels of life satisfaction.

Predicting health satisfaction

Table 6 shows the results of the linear regression analysis predicting health satisfaction by number of social mobile phone uses.

Table 6. OLS analysis of health satisfaction by number of social uses of mobile phone (n = 4839).

	Model 1 b (SE)	***Model 2*** b (SE)
Constant	5.96***	5.97***
Number of social uses (full scale)	**.07*** (.02)**	**---------**
Number of social uses (short scale)	**---------**	**.11*** (.02)**
Female (ref.)		
Male	-.20** (.06)	-.20** (.06)
Age (in years)	.01 (.01)	.01 (.01)
Non-tertiary education (ref.)		
Tertiary education	.11 (.06)	.11 (.06)
Mean or lower income (ref.)		
High income	.44*** (.06)	.43*** (.06)
Unmarried (ref.)		
Married	.32*** (.06)	.32*** (.06)
Rural (ref.)		
Small urban	-.13 (.07)	-.13 (.07)
Large urban	-.18* (.08)	-.18* (.08)
Israel (ref.)		
Austria	.44*** (.13)	.47*** (.13)
Canada	.17 (.13)	.19 (.13)
Finland	.30* (.13)	.31* (.13)
Netherlands	.32* (.15)	.33* (.15)
Romania	.35* (.15)	.36* (.15)
Spain	.30* (.13)	.27* (.13)
F	9.48***	10.06***
R^2	.027	.028

Note. OLS = Ordinary Least Squares; b = Unstandardized regression coefficient; F = Fisher's F ratio; R^2 = Coefficient of determination (non-adjusted); SE = Standard Error.
* $p < .05$ ** $p < .01$ *** $p < .001$.

Similar to the findings for life satisfaction, the number of social uses was associated with health satisfaction. As in case of predicting life satisfaction, this association was more pronounced in the model with the short social uses scale than in the model with the full one.

With respect to other associations, men and residents of large urban localities were found to be less satisfied with their health than women and residents of rural localities, respectively. Respondents who reported being married and having high income were found to be more satisfied with their health than respondents who reported being unmarried and having mean or lower income, respectively.

Table 7 shows the results of the linear regression analyses predicting health satisfaction by each social use of mobile phone while controlling for the socio-demographic background.

Table 7. OLS analysis of health satisfaction by engagement in particular social uses of mobile phone – each one (Models 1-6) and altogether (Models 7-8) (n = 4839).

	Model 1 b (SE)	***Model 2*** b (SE)	***Model 3*** b (SE)	***Model 4*** b (SE)	***Model 5*** b (SE)	***Model 6*** b (SE)	***Model 7*** b (SE)	***Model 8*** b (SE)
Constant	6.58***	6.37***	6.12***	6.07***	6.37***	6.32***	6.10***	5.94***
Phone calls	-.12 (.08)	---------	---------	---------	---------	---------	**-.15* (.08)**	---------
SMS	---------	.06 (.07)	---------	---------	---------	---------	-.02 (.07)	---------
E-mails	---------	---------	**.26*** (.06)**	---------	---------	---------	**.22** (.07)**	**.22** (.07)**
Instant messaging	---------	---------	---------	**.28*** (.06)**	---------	---------	**.22** (.07)**	**.22** (.07)**
SNS	---------	---------	---------	---------	.07 (.06)	---------	-.11 (.07)	-.11 (.07)
MMS	---------	---------	---------	---------	---------	**.18** (.07)**	.11 (.07)	.10 (.07)
Female (ref.)								
Male	-.21*** (.06)	-.21*** (.06)	-.21*** (.06)	-.20** (.06)	-.21** (.06)	-.21** (.06)	-.20** (.06)	-.21** (.06)
Age	.002 (.01)	.003 (.01)	.01 (.01)	.01 (.01)	.003 (.01)	.004 (.01)	.01 (.01)	.01 (.01)
Non-tertiary education (ref.)								
Tertiary education	.13* (.06)	.12 (.06)	.11 (.06)	.11 (.06)	.12* (.06)	.12 (.06)	.10 (.06)	.10 (.06)
Mean or lower income (ref.)								
High income	.46*** (.06)	.45*** (.06)	.43*** (.06)	.44*** (.06)	.45*** (.06)	.45*** (.06)	.42*** (.06)	.42*** (.06)
Non-married (ref.)								
Married	.33*** (.06)	.33*** (.06)	.32*** (.06)	.32*** (.06)	.33*** (.06)	.33*** (.06)	.31*** (.06)	.31*** (.06)
Rural (ref.)								
Small urban	-.12 (.07)	-.12 (.07)	-.13 (.07)	-.13 (.07)	-.12 (.07)	-.13 (.07)	-.13 (.07)	-.13 (.07)
Large urban	-.17* (.08)	-.17* (.08)	-.18* (.08)	-.18* (.08)	-.17* (.08)	-.18* (.08)	-.19* (.08)	-.19* (.08)
Israel (ref.)								
Austria	.40** (.13)	.40** (.13)	.43** (.13)	.45** (.13)	.43** (.13)	.42** (.13)	.43** (.13)	.43** (.13)
Canada	.04 (.13)	.08 (.13)	.13 (.13)	.21 (.13)	.08 (.13)	.09 (.13)	.19 (.13)	.22 (.13)
Finland	.26* (.13)	.27* (.13)	.30* (.13)	.32* (.13)	.29* (.13)	.25 (.13)	.28* (.13)	.29* (.13)
Netherlands	.25 (.15)	.28 (.16)	.28 (.15)	.28 (.15)	.27 (.15)	.31* (.15)	.29 (.16)	.30 (.15)
Romania	.17 (.15)	.23 (.15)	.33* (.15)	.33* (.15)	.23 (.15)	.26 (.15)	.36* (.15)	.40** (.15)
Spain	.23 (.13)	.27* (.13)	.25 (.13)	.22 (.13)	.25 (.13)	.29* (.13)	.21 (.14)	.24 (.13)
F	8.64***	8.52***	9.92***	9.92***	8.55***	9.01***	8.31***	9.04***
R^2	.024	.024	.028	.028	.024	.025	.032	.031

Note. MMS = Multimedia Message Services, OLS = Ordinary Least Squares, SMS = Short Message Services, SNS = Social Networking Sites.; b = Unstandardized regression coefficient; F = Fisher's F ratio; R^2 = Coefficient of determination (non-adjusted); SE = Standard Error

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

In contrast to life satisfaction, only three uses—namely e-mailing, using MMS, and instant messaging—were found to be positively associated with health satisfaction. Yet when the use variables were included in one model (Model 7 and Model 8), only e-mailing and instant messaging were associated with greater health satisfaction. In contrast, voice calling appeared to exhibit a negative, though marginally significant, association with health satisfaction (Model 7).

DISCUSSION

This study investigated the associations between socio-demographic background and social uses of mobile phone, as well as between these uses and two subjective wellbeing measures—life satisfaction and health satisfaction—among retired Internet users. As to the former associations, the results supported and complemented earlier findings reporting digital divides in the adoption and use of ICT in general (Chopik et al., 2017) and mobile communication technology in particular (Cheng et al., 2015; Petersen et al., 2016). As to the latter associations, the results revealed not only the relationship between overall social uses and subjective wellbeing, but also the associations that are specific to certain social uses, generally supporting the uses and gratifications approach.

Regarding the RQ1 and the RQ2, the analysis confirmed that social uses of mobile phone are affected by digital divides. As a response to RQ1, being male, of younger age, having a

tertiary education and a high income, being married and residing in large urban localities were associated with greater numbers of social uses performed (Table 2). As to RQ2, age was related to all studied social uses, whereas education, income, gender, marital status, and residential locality appeared to be the less consistently associated variables (Table 3). The results considering the age are consistent with other studies on ICT use (Berner et al., 2015; Chang et al, 2015; Chopik et al., 2017). Health tends to deteriorate with age (Mesch, 2016). In addition, offline social networks of older adults tend to dwindle for various reasons, including retirement (Cotten et al., 2013). All this may hamper the use of ICT use in general and in social uses of mobile phone in particular, as the elder people may have less ability, need, interest and/or motivation for engaging in these uses. The results on education are also in line with previous findings (Chang et al., 2015; Chopik et al., 2017; Friemel, 2016). Education reflects greater interest in ICT use (Berner et al., 2015), and lower perceived barriers in ICT use (Chopik et al., 2017) that, in turn, enable a broader scope of mobile phone uses, including those performed for sociability purposes. In addition, similar to other studies on ICT use (Friemel, 2016; Hargittai & Dobransky, 2017), income level was found positively associating with social uses of mobile phone. Higher income reflects better financial abilities (König et al., 2018), which allow purchasing more advanced mobile phones with up-to-date social functionalities. Regarding gender, older women were more likely to use instant messaging and particularly SNS than older men (also, e.g., Ihm & Hsieh, 2015). This result is in line with the gender socialization perspective, according to which women value and engage in communication, cooperation and social bonding to a greater extent than men (Merchant, 2012; Yu et al., 2016). Finally, residing in large localities may provide more reasons for increased social usage of mobile phone than residing in rural localities. Compared to their rural counterparts, older Internet users residing in large cities may have better digital skills which allow greater variety and sophistication of social uses of mobile phone.

As for RQ3, in line with earlier studies (Nimrod, 2020a) and with U&G theory (Han et al., 2015; Heravi et al., 2018), it was found that the number of social uses were positively associated with life (Table 4) and health (Table 6) satisfaction. These results imply that older adults use mobile phone also to gratify their sociability needs. Greater gratification of sociability needs via the mobile phone seems to result in greater subjective wellbeing.

Regarding RQ4, the results of the study show that instant messaging, using SMS, and e-mailing were positively associated with life satisfaction – both as separate predictors and when incorporated in the same model with the other uses (Table 5). In addition, only three social uses of mobile phone were found to be associated with health satisfaction (Table 7): e-mailing (positively), instant messaging (positively), and voice calling (negatively). These findings can be also interpreted through the U&G theory. The gratification of sociability needs using text-based mobile communication channels (e-mailing, using SMS and instant messaging) calls for good health in terms of dexterity and vision. In addition, they enable not only one-to-one but also one-to-many communication, thus allowing gratification from multiple social encounters at one point of time. Voice calls, in turn, are typically performed in a one-to-one mode, and are perhaps considered a more gratifying and suitable medium of communication when one's health status is poorer. All in all, the finding suggest that some social uses of mobile phone are more relevant than others for increasing the wellbeing of older adults, therefore justifying the use of the toolkit approach (Smock et al., 2011). More research is necessary to address these issues.

LIMITATIONS AND FUTURE RESEARCH

This study has some limitations that must be considered when interpreting the results and designing the future studies. First, the study is based on a cross-sectional design. Therefore, it cannot be concluded that the study participants report greater subjective wellbeing *because* of the larger number of their mobile phone uses or because of the engagement in particular mobile phone uses. As we have previously discussed, greater wellbeing may also expand the scope of social uses of mobile phone. Second, even though the samples from each country were representative of older Internet users by gender and age, the respondents included in the sample are likely to be in good health and to have good digital skills compared to other people in their age. This may be the reason why many of them engaged in social uses of mobile phone and why they were able to participate in the online survey which was relatively long and required retrieving of detailed information about ICT and media behavior (for example, number of hours and minutes of watching television via a TV set) instead of mere reporting about attitudes toward ICT. Third, the sample was skewed towards male, less educated, younger age and lower income users – characteristics that may restrict the generalization towards all older Internet users as well as influence the results of the study. Fourth, the measures of individual mobile uses are only indicative of whether or not respondents use mobile devices in general, which narrowed down the number of applicable statistical methods. Hence, future studies should also examine the frequency of mobile phone uses for social purposes and its bearings on wellbeing. Moreover, our data did not contain information about the reasons, goals and motivations behind the each of social uses of mobile phone. Instant messaging via mobile phone can be used for totally similar or completely dissimilar reasons as voice calling. In addition, use of SNS via mobile phone can gratify one need for one group of older Internet users but multiple needs for another group of them. Future studies should also address the role of the underlying factors, as they may correspond to the wellbeing outcomes in different ways. Fifth, because the wellbeing variables are based on self-reports, they may be subject to incorrect estimation due to social desirability. Finally, although significant associations were found between the studied variables, the explained variance was modest, especially in models predicting the subjective wellbeing. Other variables such as attitudes may provide a better explanation of the outcomes (Nikoloudakis et al., 2018).

CONCLUSION

To conclude, two main issues arise from the findings. First, a wide range of socio-demographic factors still differentiate between older adults who use and who do not use social functionalities of mobile phone. Consequently, this implied that the second level digital divide is still a considerable issue even in the sample consisting of people who were all Internet users and therefore probably more technology savvy on average than their agemates who do not use the Internet. Therefore, public decision makers and broader community should still stay alerted and be more involved in mitigating this divide, with special emphasis placed on elder people, those with lower levels of education and lower income. Second, social uses of mobile phone were positively associated with subjective wellbeing measures.

This implies that the use of mobile phones for social purposes seems to aid older adults to gratify their daily needs. The results also imply that e-mailing and instant messaging seem to gratify these needs to a greater extent than other uses. This said, the potential of mobile phones to alleviate the social isolation and loneliness, which tend to increase with age (especially with the transition from work to retirement) and have become accentuated with shelter-in-place policy as well as now with the COVID-19 pandemic, is evident. Therefore, older adults, especially those retired, should be further encouraged to use their mobile phone for social purposes. What needs to be carefully followed in the future is various life course trajectories shape the use of mobile communication for social purpose and its impact on personal wellbeing.

Statement of ethical approval

Principal investigators in Canada, Israel, Romania and Spain obtained ethics approval from their Institutional Review Boards (IRBs). In Austria and the Netherlands, there were no IRBs at the institutions involved. In the Netherlands, the head of department gave his ethic approval. In Finland, ethical review was not required according to the standards of the Finnish National Board on Research Integrity.

Statement of conflict of interest

The authors declare that there is no conflict of interest.

Declaration of contribution of authors

DR performed the statistical analyses and wrote all chapters of the manuscript except for Discussion. ST planned the study, coordinated the data collection, wrote the Discussion chapter, revised the manuscript and made necessary corrections.

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Consent to participate

Informed consent was not obtained from study participants since they were surveyed anonymously.

Data availability statement

The database of this project is not yet available to the public.

Short bio

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[i] More information about the ACT project is available at https://actproject.ca/act/longitudinal-study/