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Going online on behalf of someone else: Characteristics of internet users who act as proxy users

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Abstract
An important contribution of digital inequalities research has been the discussion of nuances in ways that people (dis-)engage with information and communication technologies (ICTs). One such practice is proxy internet use (PIU): indirect internet access by asking others to do things online for them or on their behalf. Whereas there is a good amount of research on those who are on the receiving end of PIU, users-by-proxy, little is known about "proxy users" who provide PIU. Analyses of nationally representative survey data from Slovenia (N = 1,047) collected in 2018 show that 51% of internet users reported to have acted as proxy users in the past 12 months. Multivariate analyses unveil that those internet users who report a wider array of personal, economic, social internet uses as well as those with higher levels of operational internet skills are more likely to act as proxy users.

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Introduction

Early research on the social implications of information and communication technologies (ICTs) focused on the gap between those who have access to computers and the internet and those who do not, i.e. the digital divide (Hargittai and Hsieh, 2013; Norris, 2001; Rogers, 2001). As internet penetration increased, scholarly inquiry moved to examine digital inequalities encompassing inequalities related to equipment, skills, support, and scope of use among those online (DiMaggio et al., 2004; Hargittai, 2002; Livingstone and Helsper, 2007; Robinson et al., 2015). An important contribution of digital inequalities research has been the discussion of significant nuances in ways people (dis)engage with ICTs, which underlined serious limitations of the dichotomous view of internet (non-)use and displayed great complexities in peoples' digital engagement.

One practice of digital engagement documented by previous research is proxy internet use (PIU), which encompasses indirect internet access whereby people obtain access to online services by asking internet users to do things online for them or on their behalf (Dutton et al., 2005). As such, PIU involves two parties: *proxy users*, i.e. those who "access services on another's behalf" (Newlands et al., 2018: 2), and *users-by-proxy*, i.e. those who receive such services through others. Although a recent study has reported that users-by-proxy are rarely "absolute non-users of the internet" (Selwyn et al., 2016: 1), PIU is predominantly being examined among internet non-users (Dolničar et al., 2018; Eynon and Geniets, 2012; Friemel, 2016; Grošelj et al., 2019; Reisdorf et al., 2012; van Deursen and Helsper, 2015), and many studies focus on various aspects of child-parent relationships (Correa et al., 2019; Galperin and Arcidiacono, 2019; Hänninen et al., 2018). While these studies provide important insight into demographic, social, and personal characteristics of those who seek, activate, and potentially benefit from PIU, little is known about those who *provide* PIU. Selwyn and colleagues (2016: 8) who provide qualitative insight into the nature of PIU, argue that PIU is, by and large, characterized by the extent of resourcing of “access to assets (devices and infrastructures), basic skills (low level know-how in operating technology); and complex capabilities (higher level digital literacy, proactive/interactive uses)” performed by proxy users. Therefore, a better understanding of proxy users’ personal characteristics, their internet skills and patterns of online engagement is needed also on a quantitative level since the findings of such studies could feed large-scale initiatives and interventions.

To the best of our knowledge, no large-scale study or general population study examining proxy users has been conducted to this date.[1] Studies that did use population data focus on users-by-proxy (e.g., Dolničar et al., 2018; Friemel, 2016; Grošelj et al., 2019; van Deursen and Helsper, 2015; van Deursen et al., 2014), a general overview of tasks performed by proxy users (Blank, 2013), or specific PIU relationships, such as between parents and children (Correa et al., 2019). In contrast, studies that focus on characteristics of proxy users applied qualitative methods (e.g., Selwyn et al., 2016, Taipale, 2019; Taipale et al., 2017). Building on previous work (Selwyn et al., 2016), the aim of this paper is to examine characteristics of internet users who act as proxy users in order to better understand what factors shape the provision of PIU. Proxy users may represent a backbone of (indirect) digital inclusion among internet non-users and those who only make limited use of the internet. In addition to socio-economic factors associated with digital engagement, we will examine proxy users’ internet skills as well as breadth of different types of internet use, as these dimensions have been shown to be core dimensions of the digital inclusion process (Correa et al., 2019; DiMaggio et al., 2004; Hargittai and Hinnant, 2008).

To examine these issues, first we review previous work on PIU and relate it to research on digital inequalities. Next, we discuss methods and employed analytical strategies.

[1] To identify studies of proxy users we searched Google Scholar, Web of Science, Scopus, and SSRN databases for “proxy internet use” and “proxy internet users”. The identified studies will be discussed in detail in the Literature Review section.

The description of results of our multivariate analyses is followed by a discussion, where we highlight the implications of our results for policy and future research.

Literature Review

Users-by-proxy

Most evidence related to PIU comes from studies examining the person who is on the *receiving* end of PIU, users-by-proxy. Various studies conducted in different countries have reported that PIU is fairly widespread among non-users (Blank, 2013; Friemel, 2016; Reisdorf, 2011; van Deursen and Helsper, 2015; van Deursen et al., 2014; Zickuhr, 2013). Notably, Zickuhr (2013) and Friemel (2016) estimated that 44% of offliners have gone online with the help of someone else in the US and in Switzerland, respectively. The most common types of PIU include “instrumental or functional activities, such as online banking or shopping, information seeking, and interacting with government services online” (Grošelj et al., 2019: 215). In line with the persistent age-related digital divide (Hunsaker and Hargittai, 2018; Seifert et al., 2018), previous research found that older non-users are less likely to activate PIU, while women and those who have positive attitudes about the internet are more likely to activate PIU (Dolničar et al., 2018; van Deursen and Helsper, 2015).

In their quantitative study of how non-users’ reasons for digital disengagement relate to their engagement in PIU, Grošelj and colleagues (2019) found that Slovenian non-users who mentioned lack of internet access as a reason for being offline were less likely to activate PIU. Since access barriers were measured with statements that reflect a general availability of internet access, this result indicates that non-users who live in technology-poor households or neighborhoods may have difficulties finding a proxy user. In contrast, non-users who indicated that a lack of skills kept them offline were more likely to activate PIU, which suggests that “non-users who are more aware of their deficiency in skills might be more aware of online opportunities” (Grošelj et al., 2019: 220).

Proxy users

However, whereas research has begun to yield more in-depth and sophisticated insights of users-by-proxy, little is known about those who *provide* PIU, proxy users. Research has shown that proxy users are often family members or those acting in a professional capacity, such as caregivers, social workers, or tutors, who themselves use the internet and computers frequently (Blank 2013; Selwyn et al., 2016). For example, families can act as mediators for older generations to remain part of the online society (Dolničar et al., 2018) as well as teachers to young children who are just beginning to use the Internet (Hänninen et al., 2018). This provision of functional intergenerational solidarity (Bengtson and Roberts, 1991) can be observed in more general day-to-day practices, such as support of older family members in housework or personal care (Daatland, 1990; Daatland and Lowenstein, 2005), support by older family members in caring for grandchildren (Igel and Szydlik, 2011) or providing financial support (Daatland and Lowenstein, 2005), as well as intergenerational support for learning uses of ICTs (Taipale, 2019; Taipale et al., 2017). Research across several European countries, for example, has found that children support parents and grandparents in learning how to use new technologies, and parents teach children about issues related to privacy and personal information online (Taipale, 2019; Taipale et al., 2017). However, Correa and colleagues (2019) found both learning *and* leaning effects of child-parent PIU, with parents being able to improve their own internet skills by learning from their children and at the same time relying on them to perform certain tasks. In line with these findings, Selwyn and colleagues (2016) found that proxy users predominantly evaluated their own internet skills as high.

Beyond that, it is not clear how exactly internet users' own skills, diversity, and breadth of use are related to providing PIU to others. For instance, it remains unclear whether any particular *types* of skills or internet uses, such as economic, personal, or social, are associated with being a proxy user. Skills levels and breadth and types of uses are important for several reasons. First, providing PIU often involves complex activities that might have serious consequences for users-by-proxy, such as online banking, governmental online services, and social media (Selwyn et al., 2016). Second, providing PIU is usually not a continuous activity, but mostly episodic and limited in time; it is activated only when needed (Richardson, 2018). This means that proxy users do not have time to learn how to help others, but instead they are expected to act promptly and efficiently (Selwyn et al., 2016). Therefore, as in the context of warm experts (Bakardjieva, 2005), breadth and types of skills as well as internet uses may play an important role in who is providing PIU and who is not. In addition to the role of skills and uses, it is not known whether particular socio-demographic factors affect whether someone provides PIU or not. For example, women are often identified as more caring and supportive in family context (Reevy and Maslach, 2001), which could potentially imply an overrepresentation of women as proxy users. On the other hand, research has shown that women tend to self-evaluate their internet skills as lower in comparison to men, even when they possess the same measured internet skills (Hargittai and Shafer, 2006), which could lead to men being more likely to act as proxy users. In addition, non-users or narrow users may be looking for individuals who can be considered “computer experts and whose know-how might stem from a special interest or earlier adoption of the technology” (van Deursen et al., 2014: 281). These early adopters tend to have higher educational qualifications as well as higher incomes, which is closely related to general digital inequalities.

Digital inequalities

Over the past two decades, a large body of work has explored who is using the internet and who is not, on what kinds of devices and through what kinds of access (Dutton and Blank, 2011), how broadly and how well (DiMaggio et al., 2004; van Deursen and van Dijk, 2015) and with what outcomes (van Deursen et al., 2016). In the following sections, we provide a brief summary of studies related to breadth of use (range of activities that internet users engage with once online), types of use (kinds of activities that internet users engage in), and internet skills. Both breadth of use and different types of internet uses as well as different levels of internet skills have been linked to differences in socio-economic status (Livingstone and Helsper, 2007) as well as different outcomes (Zillien and Hargittai, 2009) and may therefore affect who provides PIU to others and who does not.

Types and breadth of internet use

Conceptually, Helsper (2012) mapped online activities onto economic, social, personal and cultural domains or fields of digital engagement. Having a large number of indicators available, Blank and Grošelj (2014) empirically differentiated different types of internet uses. They used principal components analyses to differentiate 41 internet uses into ten types of use: email, information seeking, classic mass media, socializing, commerce, school and work, entertainment, blogging, production, and vice. Higher educational qualifications, employment, and being younger were associated with all types of use, whereas other indicators, such as gender, race, and occupational status were associated with different types of uses. For example, students were more likely to engage in information seeking and school and work uses, and women were less likely to engage in classic media, entertainment, email, and information seeking than men (Blank and Grošelj, 2014). Finally, not all use is created equal. Zillien and Hargittai's (2009) study of internet users in Germany showed that socio-economic status is related to what types of uses individuals engage in. High-status individuals engaged in more capital-enhancing uses than low-status individuals.

Various studies have looked at the number of different online activities that internet users engage in—breadth or variety of use—and how this is related to socio-economic background. For example, Livingstone and Helsper (2007) found that UK teens and young adults with higher socio-economic backgrounds engaged in a larger number of online activities than their less well-off peers. Differentiating between amount of use (time spent online) and variety of use (number of activities individuals engage in), Blank and Grošelj (2014) found that UK residents who are younger, male, have higher educational qualifications, and who are employed are most likely to spend more time online and to engage in a larger variety of online activities. Reisdorf and Grošelj (2017) found that both socio-economic factors and attitudes toward the internet had an effect on breadth of use. Whereas these three studies focused on UK residents, the same kinds of associations have been shown for internet users in a variety of European countries, including Germany, Norway, Sweden, Austria, and Spain (Brandtzæg, 2010; Brandtzæg et al., 2011; Zillien and Hargittai, 2009).

Internet skills

Breadth and types of use have also been linked to differences in internet skills. Early on, studies started including skills measures to account for differences in how well individuals could utilize the internet (DiMaggio et al., 2004; Hargittai, 2002; Helsper and Eynon, 2013; Litt, 2013). Those with higher socio-economic backgrounds often possess higher internet skills, which in turn affects how much and how well someone can utilize what the internet has to offer (Hargittai, 2010; Hargittai and Hinnant, 2008).

Over time, various typologies of skills measures have been developed, used, and reviewed across different country contexts (Hargittai, 2005, 2009; Hargittai and Hsieh, 2012; van Deursen and van Dijk, 2015; van Dijk and van Deursen, 2014). Regardless of the type of measurement, socio-economic status and internet skills remain closely linked, as do internet skills and the outcomes of internet uses (Helsper et al., 2015). For the purpose of this study, we utilized internet skills measures from the Internet Skills Scale (ISS) (van Deursen et al., 2016) differentiating operational, information navigation, social, and creative skills. From previous research, we assume that these different types of skills are associated with breadth of use as well as different types of potentially capital-enhancing uses that internet users engage in.

Research questions

Prior research has shown that proxy users evaluate their own internet skills as comparatively high and perform a number of often complex tasks for users-by-proxy (Selwyn et al., 2016). In addition, a comprehensive body of work in digital inequality research has shown that: those who are socio-economically better off usually 1) possess higher internet skills, 2) use the internet for a larger number of activities, and 3) engage in more capital enhancing types of uses. Therefore, our paper examines the following research questions:

RQ_1: What types of internet uses are associated with being a proxy user?

RQ_2: Controlling for types of internet uses, what types of internet skills are associated with being a proxy user?

RQ_3: Controlling for types of internet uses and internet skills, what socio-demographic factors are associated with being a proxy user?

Methods

Data

Data used in this study were collected in the 2018 wave of the Slovenian Public Opinion Survey conducted as part of the International Social Survey Programme (ISSP). The analyzed measurements were part of the internet access, use, and attitudes module. The fielding period was from March to June 2018. Standard survey fielding procedures for respondent solicitation and interviewing (e.g., mailing covering letters, multiple visits to a respondent in case of non-response) were carried out in order to maximize respondents' participation. No incentives were provided to participants.

Two-stage random sampling was used with stratification by type of settlement and the statistical region of residence. The survey was completed by 1,047 respondents, aged 18 years or older. No post-stratification techniques were applied since the socio-demographic characteristics of the sample were shown to closely mirror the characteristics of the general population when compared with data retrieved from the Central Population Register.

The full sample characteristics are presented in Table 1. In this article, we analyzed a subsample of respondents who have used the internet in the last three months (N=814). Among internet users, 51.1% were proxy users (N=410). The socio-demographic structure of internet users differs from the total sample with exception of gender (Table 1, columns 1 and 2). Likewise, the socio-demographic characteristics of proxy users were significantly different when compared to internet users (except for gender and type of settlement).

Table 1. Socio-demographic characteristics of the sample

Variable	Categories	Total sample[a] %	Internet users[b] %	Proxy users[c] %
Gender	Male	48.6	49.5	47.3
	Female	51.4	50.5	52.7
Age[d]	30 years or less	16.2	20.9	34.1
	31 – 45 years	24.9	31.7	35.6
	46 – 60 years	26.4	29.7	20.5
	61 years or more	32.5	17.7	9.8
Education[e]	Primary basic education or lower	17.0	8.0	5.1
	Vocational or technical secondary education	21.6	17.7	8.0
	General upper secondary education	30.8	36.5	41.0
	Academic higher education	30.5	37.8	45.9
Employment status	Working	54.2	67.2	71.2
	Not working	38.7	23.6	13.4
	In educational process	7.2	9.2	15.4
Type of settlement	Rural	53.9	52.1	51.3
	Urban	46.1	47.9	48.7
Children in the household	No	67.4	60.8	55.1
	Yes	32.6	39.2	44.9
Household type	Living with someone	69.6	73.6	67.3
	Living alone	30.4	26.4	32.7
Daily contact with parents	No	67.3	59.7	50.5
	Yes	32.7	40.3	49.5
Internet use	Users	77.9		

	Non-users	22.1	
Proxy use	No	60.8	48.9
	Yes	39.2	51.1

Notes. [a] N=1,047. [b] N=814. [c] N=410. [d] M = 50.8 years; SD = 18.36 years. [e] Educational level reported according to the ISCED 2011 classification (UNESCO, 2012). Total percentages may not add up to 100 owing to rounding errors.

Measures

Dependent variable

In order to determine whether internet users have acted as proxy users they were asked if they have done any of the eight activities shown in Table 2 on the internet for someone else for private purposes in the last 12 months. The list of eight activities has been adapted to the Slovenian context from the multiple-choice inventory proposed by Selwyn and colleagues (2016). Initially, the factorability of the seven close-ended dichotomously coded (0 = "No", 1 = "Yes") response categories was examined.[2] The communalities were all well above the advisable value of 0.2 (Child, 2006), confirming that each item shared some common variance with other items (see Table 2). Principal components analysis (PCA) was used to identify and compute a single value from the factors underlying the items measuring provision of PIU. The factor eigenvalues (λ = 3.107) and the scree plot indicated the one factor solution, which explained 44.4% of the variance. Since our objective was to identify factors that predict whether an internet user was a proxy user and the one factor solution was in line with the underlying theoretical assumptions and all items in the analysis had factor loadings over .5, the seven close-ended items and the open-ended response category were collapsed into a dichotomously coded variable *proxy use*.[3] An internet user who replied "Yes"

[2] The open-ended response category "Other" was omitted from PCA because its meaning was not predetermined.

[3] In an attempt to verify the binary codification strategy of the proxy use variable we also carried out an alternative approach consisting of computing a count variable (with a range of values from 0 to 8) which was entered into a Poisson regression analysis. The corresponding model predicted the number of different PIU activities an internet user engaged with. The results of the Poisson regression analysis (available from the authors upon reasonable request) did not differ substantially from the results of binary logistic regression.

to at least one of the listed activities was coded as “1 – proxy user” while a respondent who replied “No” to all eight items was coded as “0 – proxy nonuser.”

Table 2. Frequency distribution, factor loadings and communalities based on a principal components analysis (PCA) for activities provided by proxy users

Proxy uses	%	Factor loadings	Communalities
Searched for information about products or services.	82.4	.721	.519
Sent or received email.	55.4	.535	.286
Ordered or bought products or services.	54.4	.756	.572
Booked or bought airline tickets, transportation, accommodation, travel, etc.	28.5	.764	.583
Used online banking	21.5	.616	.379
Used online services of the public sector (e.g., e-Note, eTaxes, e-Government).	21.2	.653	.427
Used online social networks (e.g. Facebook, Twitter, Instagram).	20.2	.584	.341
Other activities.[a]	4.9	–	–

Notes. N = 410. [a] The open-ended response category was omitted from PCA.

Independent variables

For measuring *different types of internet use*, an adapted 16-item inventory of Blank and Grošelj (2014) was administered to internet users. The inventory is based on Helsper’s (2012) corresponding fields model and maps internet uses across the cultural, personal, economic and social domains. Four items each assessed cultural, social, and personal uses, while five items measured different forms of economic uses. All items were scored on a six-point frequency scale: 1 = “Never” and 6 = “Several times a day.” The items measuring the construct of internet uses were designed as formative measures in this study (Diamantopoulos et al., 2008). In such cases, there are no specific expectations about patterns or magnitude of intercorrelations between the indicators. Hence, factorization of formative indicators was not carried out (Diamantopoulos et al., 2008). Following Helsper and Eynon (2013), for each of the four types of uses, a composite score of breadth of use was created by summing the number of items that have a value higher than 1 = “Never” and dividing it by the number of items in the corresponding type. We obtained four composite scores with higher values indicating a higher percentage of activities in which internet users engaged across the four domains.

To assess internet skills, a short form of the Internet Skills Scale (ISS) (van Deursen et al., 2016) was used, containing 20 items measuring operational, information navigation, social, and creative skills. All items were measured on a five-point scale, ranging from 1 = "Not at all true of me" to 5 = "Very true of me." The results of exploratory and confirmatory factor analyses reported in the study of Petrovčič and colleagues (2019) showed that the ISS was characterized by high to adequate convergent and divergent validity. For instance, the composite reliability estimates for the scores on the four factors within the ISS had values ≥ .75, while Cronbach alpha scores (α) revealed acceptable to high internal consistency for all four factors, ranging from α = .74 for information navigation skills to α = .92 for operational skills. The four scale scores corresponding to four dimensions of internet skills were calculated by averaging across corresponding items, with items measuring information navigational skills being reversed before summing so that higher values of all four skills scores indicated a higher level of proficiency.

Informed by studies on digital inequalities that focused on internet uses and skills (e.g., van Deursen and van Dijk, 2015), as well as recent studies dealing with PIU (e.g., Correa et al., 2019; Grošelj et al., 2019), a set of questions in the standard ISSP socio-demographic module (ISSP Research Group, 2019) and an ISSP question about the respondent's involvement in inter-generational contacts in their personal network (Joye et al., 2019) were included in the analysis as covariates, namely: gender, age, education level, employment status, marital status, type of settlement, children living in the household, household size, and daily contacts with parents.

Analytical strategy

First, frequencies and descriptive statistics (means, standard deviations) were run to determine the univariate distributions for dependent and independent variables. Afterwards, a series of hierarchical multivariate logistic regression models was specified and estimated to answer the research questions. The provision of PIU was the dependent variable. Model 1 included the internet use variables, model 2 added a block of four variables measuring internet skills, while model 3 was used to control for socio-demographic characteristics. Cases with item non-response were dropped from analysis. The data were analyzed using SPSS 24.

Results

Descriptive analysis

Before answering our research questions, we examine the descriptive characteristics of variables used in the binary logistic regression model. Among proxy users, the largest percentage (82.4%) reported to search for information about products or services on behalf of someone else (Table 2), while the two least likely proxy uses were online social networking (20.2%) and other (4.9%). The distribution of the number of activities was right-skewed (M = 2.89, SD = 1.60) with the largest percentage (26.1%) of proxy users engaged in two proxy activities (Table 3).

Table 3: Frequency distribution of the number of different activities provided by proxy users

Number of proxy internet uses[a]	Proxy users (%)
1	21.7
2	26.1
3	21.0
4	15.4
5	9.0
6	3.9
7	1.7
8	1.2
Total	100

Notes. N = 410. [a] M = 2.89, SD = 1.60.

With reference to the four types of uses that internet users themselves engaged in, we found that they reported on average 62.1% activities related to cultural, 62.6% to economic, 63.0% to personal, and 67.3% to social uses (Table 4). The results of paired samples test (last row in

Table 4) revealed that the only statistically significant differences in means were between social uses and the other three types of uses. The largest percentage of respondents said they were looking for information about events (92.6% perform this activity at least less than once a month) and reading news (92.0%), whereas the smallest percentage said they publish opinions on social or political issues (20.7%).

Table 4. Four types of internet use

Internet uses[a]	CU[b]	EU	PU	SU
Read the news.	92.0			
Looked for information about events.	92.6			
Publicly, without restrictions, shared photos, videos, music, or texts you have created yourself.	44.7			
Published opinions on social or political issues.	20.7			
Ordered or bought products or services.		66.6		
Used online banking.		60.2		
Searched for information about products or services.		87.9		
Booked or bought airline tickets, transportation, accommodation, etc.		51.9		
Used online services of the public sector (e.g., e-Note, eTaxes, e-Government).		48.4		
Played games.			38.1	
Watched or downloaded TV programs or movies.			49.5	
Listened to music.			79.8	
Searched for information related to health.			86.2	
Sent or received e-mails.				89.7
Made calls or video calls (e.g., Skype, Viber, FaceTime).				58.0
Used online social networks (e.g., Facebook, Twitter, Instagram).				59.9
Sent messages (e.g., Facebook Messenger, Viber, WhatsApp).				63.4
Total - Mean[c]	62.1[*]	62.6[†]	63.0[§]	67.3[*†§]

Notes. N = 796. [a] CU = Cultural uses, EU = Economic uses PU = Personal uses, SU = Social uses. [b] All values shown in the table are percentages (%). [c] Means with matching superscripts are significantly different from one another at $p < .001$ level.

Table 5 shows the self-assessed levels of operational, information navigation, social, and creative internet skills. Respondents reported on average the highest agreement with items measuring social skills (M = 4.47; SD = 0.70), followed by operational (M = 4.42; SD = 1.01), information navigation (M = 4.05; SD = 0.86), and creative skills (M = 2.63; SD = 1.19). For all pairs of skills, the differences between means were statistically significant at $p < .001$ level with the exception of the mean comparison between social and operational skills.

Table 5. The Internet Skills Scale (ISS) with four types of skills

Items	N	OS M (SD)	INS M (SD)	SS M (SD)	CS M (SD)
I know how to open downloaded files.	792	4.29 (1.25)			
I know how to download/save a photo I found online.	792	4.30 (1.27)			
I know how to use shortcut keys (e.g., CTRL-C for copy, CTRL-S for save).	798	4.10 (1.43)			
I know how to open a new tab in my browser.	796	4.44 (1.17)			
I know how to bookmark a website.	793	4.23 (1.36)			
I find it hard to find a website I visited before. (R)	797		4.12 (1.26)		
I get tired when looking for information online. (R)	797		4.01 (1.23)		
Sometimes I end up on websites without knowing how I got there. (R)	795		3.91 (1.28)		
I find the way in which many websites are designed confusing. (R)	794		4.25 (1.04)		
I know which information I should and should not share online.	784			4.31 (0.97)	
I know when I should and should not share information online.	778			4.31 (0.95)	
I am careful to make my comments and behaviors appropriate to the situation I find myself in online.	747			4.57 (0.78)	
I know how to create something new from existing online images, music or video.	785				3.05 (1.65)
I know how to make changes to the content that others have produced.	782				2.31 (1.49)
I know how to design a website.	797				1.97 (1.45)
I know which different types of licenses apply to online content.	777				2.10 (1.38)
I would feel confident putting video content I have created online.	769				3.14 (1.72)
Total[b]	671	4.42[§] (1.01)	4.05 (0.86)	4.47[§] (0.70)	2.63 (1.19)

Notes. [a] OS = Operational skills, INS = Information navigation skills, SS = Social skills, CS = Creative skills. Items marked with "(R)" have reverse wording. [b] Means were calculated based on listwise deletion of cases with incomplete data. [§] Means not statistically significant at $p < .05$ level.

Logistic regression models

As shown in Table 6, the likelihood ratio χ^2 for the model 1 was significant (χ^2=191.243, $p < 0.01$). The addition of the second block (model 2) resulted in an improved model ($\Delta\chi^2$=39.250, $p < 0.01$), whereas the addition of the third block (model 3) only marginally improved the model ($\Delta\chi^2$=16.542, $p = 0.056$). All three models showed to be adequate, including a significant overall test of all parameters ($p < .01$), non-significant goodness-of-fit statistics ($p > .05$), and considerable predictive power of the model (Nagelkerke $R^2 > .35$), the overall prediction accuracy (OA > .74), sensitivity ($s_e > .81$) and specificity ($s_p > .64$) (Table 6).

In model 1 the likelihood of providing PIU was shown to be very strongly and positively associated with the breadth of economic, personal, and social uses (ORs > 4.5, $p < .01$). Once the internet skill variables were entered into the model (Model 2), the associations for the breadth of economic, personal, and social uses remained robust (ORs > 4.0, $p < .01$), which suggests that breadth of different internet uses was capturing unique variance in provision of PIU not otherwise accounted for by skills. It is also noteworthy that only operational (OR = 2.093, $p < .01$) and creative (OR = 1.219, $p < .01$) skills were significant predictors, indicating that skills have a positive, but smaller impact on provision of PIU when accounting for breadth of internet uses. When the full model with control variables was tested, the breadth of economic (OR = 4.961, $p < .01$), personal (OR = 4.104, $p < .01$), and social uses (OR = 2.521, $.01 < p < .05$) remained significant predictors. Among skills variables only operational skills remained significant, suggesting that higher self-reported operational skills increased the likelihood of providing PIU (OR = 1.656, $.01 < p < .05$). The socio-demographic characteristics of internet users contributed only marginally to the prediction of PIU provision – only education (OR = 1.088, $.01 < p < .05$) was a significant predictor. Each additional year of schooling increased the odds of being a proxy user by 8.8 percentage points.

Table 6. The summary of hierarchical binary logistic regression models for predicting PIU

Variables	Model 1				Model 2				Model 3			
	B	SE(B)	Wald	Exp(B)	B	SE(B)	Wald	Exp(B)	B	SE(B)	Wald	Exp(B)
Constant	-3.907	0.401	94.702	0.020***	-8.002	1.163	47.316	0.000***	-7.040	1.382	25.930	0.001***
Cultural uses	0.723	0.509	2.019	2.060	0.577	0.550	1.101	1.780	0.551	0.569	0.936	1.735
Economic uses	2.310	0.359	41.481	10.073***	1.643	0.385	18.240	5.172***	1.602	0.413	15.055	4.964***
Personal uses	1.517	0.417	13.230	4.560***	1.448	0.429	11.370	4.255***	1.412	0.459	9.448	4.104***
Social uses	1.568	0.368	18.114	4.798***	1.249	0.391	10.226	3.487***	0.925	0.419	4.865	2.521**
Operational skills					0.739	0.200	13.589	2.093***	0.504	0.205	6.042	1.656**
Information navigation skills					0.113	0.142	0.628	1.119	0.117	0.147	0.634	1.125
Social skills					0.115	0.189	0.370	1.122	0.084	0.194	0.188	1.088
Creative skills					0.198	0.100	3.892	1.219**	0.165	0.105	2.460	1.180
Gender (Female)									0.238	0.214	1.237	1.269
Age									-0.015	0.011	1.914	0.985
Education level									0.084	0.039	4.667	1.088**
Employment status (R = Working)											1.499	
(Not working)									0.148	0.324	0.210	1.160
(In education)									0.540	0.485	1.239	1.715
Type of settlement (Urban)									-0.152	0.211	0.516	0.859
Household type (Living with someone)									0.063	0.292	0.047	1.065
Children in household (Yes)									0.098	0.245	0.161	1.103
Daily contacts with parents (Yes)									0.207	0.225	0.848	1.230
-2LL	654.574				615.324				598.783			
χ^2	191.243***				230.493***				247.035***			
$\Delta\chi 2$					39.250***				16.542*			
Nagelkerke R^2	.356				.418				.442			
$\chi 2$ for Hosmer-Lemeshow test	14.300 (p = .074)				5.756 (p = .674)				8.663 (p = .371)			
Overall prediction accuracy (OA)	.746				.769				.764			
Sensitivity (s_e)	.817				.849				.840			
Specificity (s_p)	.653				.664				.664			

Notes. N = 618. ***p < .01, **.01 < p < .05, *.05 < p <.1.

Discussion

In this article, we shed light on what factors are associated with being a proxy user, i.e. using the internet on someone else's behalf. Based on previous research in digital inequalities, we asked whether breadth of different types of internet use (RQ_1) as well as the level of internet skills (RQ_2) and socio-demographic factors (RQ_3) are associated with being a proxy user.

Reflection on results

The results from our multivariate analyses show that different types of uses are indeed associated with being a proxy user (RQ_1). Internet users who engage more in economic and personal uses had 4.8 times and 4 times higher odds respectively to provide PIU in comparison to those who engage in few economic and personal uses. Those who engage in wide ranging social uses had 2.6 times higher odds to be proxy users than those who engage in very few social uses. The importance of economic uses for being a proxy user corroborate Selwyn and colleagues' (2016) qualitative findings that showed that most PIU is instrumental in nature and often pertains to important uses, such as banking, personal finances, and interacting with organizations and institutions. All of these types of uses were classified as economic uses in our study, and this was also the strongest indicator of being a proxy user. However, in contrast to Sewlyn et al.'s (2016) findings, our results showed that personal and social uses, which were not reported as common PIU activities, were still strong indicators of being a proxy user. Although this may not necessarily translate into doing those activities for others (see Table 2), it does indicate that those who engage in a larger number of various online activities themselves, including personal and social, are more likely to assist others with using the internet.

Our findings also suggest that those who reported high operational skills were also more likely to provide PIU (RQ_2). The importance of operational skills underscore Selwyn et al.'s (2016) results that proxy users often evaluate their own skills as fairly high. It also indicates that operational skills are more important for PIU than other types of skills, which goes in line with instrumental and on-and-off support (Selwyn et al., 2016). In addition, it corroborates van Deursen et al.’s (2014) findings, who noted that internet users with low levels of operational skills were turning to informal sources of support, such as friends and family, to address insufficiencies in internet proficiency. Yet, “… [internet] skills do not necessarily automatically improve through increased experience or with intense use” (van Deursen et al. 2014: 281). Such a conclusion seems to hold also in terms of PIU provision as the impact of the breadth of three different types of internet use is not reflected in the level of internet skills. Taking into account Correa et al.’s (2019) study, which showed that only skills, but not a wider variety of use, supported a learning effect for non-users and low users who were users-by-proxy, our findings may indicate that a leaning effect might be present, whereby proxy users are providing online services without a knowledge transfer. In practical terms, our findings thus raise questions about the quality and effectiveness of PIU as a source of help for internet non-users and low proficiency users, although without having access to PIU there might be even less opportunity to diminish gaps for digitally excluded groups.

The analyses unveiled that out of all socio-demographic factors, only education was positively associated with being a proxy user (RQ_3). This finding is not surprising, as previous research has shown a strong association of education and variety of use (Blank and Grošelj, 2014), different types of use (Zillien and Hargittai, 2009), as well as internet skills (Hargittai, 2002, 2010; van Deursen et al., 2014). Such relationships were also revealed in the context of adults relying on children as proxy users. Galperin and Arcidiacono (2019) showed that as children’s age, educational attainment, and complexity of internet skills and use increase, a stronger leaning effect of PIU for parents is present. Nevertheless, education seems to play a central role in PIU because, even when controlling for types of use and skills, each additional year of schooling increases the likelihood of someone being a proxy user. This is noteworthy for a number of reasons. First, taken together with previous work that found most PIU to be happening within families or close others (Dolničar et al., 2018; Selwyn et al., 2016), it indicates that those internet non-users and low proficiency internet users, who do not have someone in their close social circles who has extensive schooling, may have difficulties activating PIU. Second, in tandem with studies that have shown that those non-users who have higher educational qualifications themselves are also significantly more likely to activate PIU (Grošelj et al., 2019), the effect of education could be exacerbated by not only affecting who *activates* PIU but also who *provides* PIU. Third, previous studies have shown that those with higher educational qualifications engage in more capital-enhancing internet uses (Zillien and Hargittai, 2009) and self-reliant practices of mastering their internet proficiency (van Deursen et al., 2014), which could lead to an additional exacerbation of disadvantage for proxy users and users-by-proxy with lower educational qualifications—if PIU is even activated or provided in the first place.

Implications for policy and practice

Our findings have implications for policy makers who aim to address digital inequalities across the world. Given the uneven nature of activation (Grošelj et al., 2019) and provision of PIU (see this paper) across education, breadth of different types of uses, and levels of skills, current PIU practices may have a limited capability to decrease the digital divide among the most vulnerable groups. Thus, for those individuals who do not have access to PIU, a range of new initiatives could be designed to promote PIU in formal contexts such as community-based training centers (Damodaran and Sandhu, 2016) and/or at work (Selwyn et al., 2006). However, Richardson (2018) has shown that due to the aged and low-educated profile of non-users such interventions can have better and longer-lasting effects when flexible teaching strategies are implemented, which are based on tutor-learner relationships in peer-to-peer environments. In addition, for non-users or low-skilled internet users who have access to proxy users in family circles, the inclusive potential of PIU might be fostered by making proxy users more aware of users-by-proxy's learning and training requirements. In the case of older adults, this would mean engaging them in solving meaningful online problems, linking new knowledge to existing internet uses and skills, and using active demonstration based on examples from their everyday life (Fisk et al., 2009).

Such principles seem to be also relevant for potential "learning effects" of PIU in terms of internet skills (Galperin and Arcidiacono, 2019). In a previous study of Slovenian users-by-proxy, those who reported a lack of skills as one of the main reasons for being offline were more likely to activate PIU (Grošelj et al., 2019) and in our present study, internet users with higher operational skills were more likely to be proxy users. In addition, Correa et al. (2019) found that higher internet skills among proxy users were associated with higher learning effects among users-by-proxy. Given that other types of skills appear to be less important for PIU, policy efforts could focus on closing the operational skills gap before addressing higher-level skills that build on operational skills (van Deursen et al., 2014). For instance, Selwyn et al. (2016) suggested that group courses might be run specifically for low-skilled users together with their proxies. This would give novice users the opportunity to learn new skills, and also provide proxies with knowledge on how to support basic skills delivery when using the internet together with users-by-proxy.

Limitations and future research

Our results add important context to the area of PIU research, as they provide a large-scale overview of factors that make internet users more likely to act as proxy users and assist non-users and low-skilled users with making wider and more comprehensive use of the internet. However, there are some limitations to this study that can inform future research on PIU. First, our findings are based on survey data from one country only. Although internet use has increased to 78% in Slovenia during 2018, countries with higher or lower internet penetration rates may yield different results concerning PIU. For example, Galperin and Arcidiacono (2019) found that learning effects between children and parents outweighed leaning effects in countries with low levels of internet adoption. More international studies are needed to compare PIU across different nations and cultural backgrounds. Such cross-cultural perspectives could be used to develop theoretical frameworks of PIU and applicable models to addressing inequities in PIU activation and provision.

Our study highlights the need to take into account the perspectives of those who are providing PIU. Examining what characteristics differentiate proxy users from those who do not provide PIU emphasizes the skewed nature of PIU toward those who are already better off (Grošelj et al., 2019). It is notable that only half of internet users reported that they are also proxy users. More research on those who do not provide PIU may shed light on why they refrain from assisting others with using the internet. In this context, the focus could be placed on improving the existing self-reported measures of internet use as an important predictor of PIU provision. The ever-evolving nature of the internet demands application of cognitive and ethnographic methods for the future development of measurement models that would better capture the full breadth of what might constitute “internet use”. In addition, future investigations could explore the role of the ICT environment in which respondents live and work (e.g., access to broadband, types of internet-enabled equipment) in provision of PIU. Relatedly, prospective research could also concentrate on wider community-level factors (e.g., social capital or social cohesion) or individual-level factors (e.g., psychological factors and life-course conditions) that shape their utilization of and experience with the internet.

Further, research on proxy users could also be taken forward by focusing on formal contexts involving “professional” proxy users such as social care workers, personal assistants, medical staff, etc. On one hand, this topic is intriguing because it involves a different perspective on sharing internet skills and uses within the dyads of proxy users and users-by-proxy; in particular, the absence of informal normative commitments that place reciprocity over personal objectives of proxy users. On the other hand, PIU in formal contexts presents a set of implications related to legal and financial responsibility/liability of proxy users. Due to the prevalent economic nature of PIU activities (Newlands et al., 2018; Selwyn et al., 2016), investigating various aspects of internet proficiency among professional proxy users might not only lead to new conceptual insights into PIU but also to organizational interventions designed to limit the potential negative legal and economic consequences of PIU in public and private sector.

References

Bakardjieva M (2005) *Internet society: The Internet in everyday life*. London, UK: Sage.

Bengtson VL and Roberts RE (1991) Intergenerational solidarity in aging families: An example of formal theory construction, *Journal of Marriage and the Family* 53(4): 856–870.

Blank G (2013) Proxy users in the UK: An overview. *OxIS*. Available at: http://oxis.oii.ox.ac.uk/blog/proxy-users-uk-overview/.

Blank G and Grošelj D (2014) Dimensions of Internet use: Amount, variety, and types. *Information, Communication & Society* 17(4): 417–435.

Brandtzæg PB (2010) Towards a unified Media-User Typology (MUT): A meta-analysis and review of the research literature on media-user typologies. *Computers in Human Behavior* 26(5): 940–956.

Brandtzæg PB, Heim J and Karahasanović A (2011) Understanding the new digital divide - A typology of Internet users in Europe. *International Journal of Human Computer Studies* 69(3): 123–138.

Child D (2006) *The essentials of factor analysis*. 3rd Edition. New York: Continuum.

Correa T, Pavez I and Contreras J (2019) The complexities of the role of children in the process of technology transmission among disadvantaged families: A mixed-methods approach. *International Journal of Communication* 13: 1099–1119. Available at: https://ijoc.org/index.php/ijoc/article/view/9153/2586

Daatland SO (1990) 'What are families for?': on family solidarity and preference for help, *Ageing and Society* 10(1): 1–15.

Daatland SO, and Lowenstein A (2005) Intergenerational solidarity and the family–welfare state balance, *European Journal of Ageing* 2(3): 174–182.

Damodaran L and Sandhu J (2016) The role of a social context for ICT learning and support in reducing digital inequalities for older ICT users. *International Journal of Learning Technology* 11(2): 1–20.

Diamantopoulos A, Riefler P and Zeugner-Roth, K (2008) Advancing formative measurement models, *Journal of Business Research* 61(12): 1203–1218.

DiMaggio P, Hargittai E, Celeste C, et al. (2004) Digital Inequality: From Unequal Access to Differentiated Use. In: *Social Inequality*. Russell Sage Foundation, pp. 355–400. Available at: http://nukweb.nuk.uni-lj.si/login?url=http://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edselc&AN=edselc.2-52.0-84902901376&lang=sl&site=eds-live&scope=site&scope=cite.

Dolničar V, Grošelj D, Filipovič Hrast M, et al. (2018) The role of social support networks in proxy Internet use from the intergenerational solidarity perspective. *Telematics and Informatics* 35(2). Elsevier Ltd: 305–317.

Dutton WH and Blank G (2011) *Next generation users: the internet in Britain*. Oxford, UK: Oxford Internet Institute, University of Oxford. Available at: http://oxis.oii.ox.ac.uk/reports.

Dutton WH, Gennaro C and Hargrave A (2005) *Oxford Internet Survey 2005 Report: The Internet in Britain.* Available at: https://www.oii.ox.ac.uk/archive/downloads/research/oxis/oxis2005_report.pdf.

Eynon R and Geniets A (2012) *On the periphery? Understanding low and discontinued internet use amongst young people in Britain*. Available at: https://www.oii.ox.ac.uk/archive/downloads/publications/Lapsed_Internet_Users_Report_2012.pdf.

Fisk AD, Rogers WA, Charness N, Czaja SJ and Sharit J (2009) *Designing for older adults:*

principles and creative human factors approaches. 2nd Edition. Boca Raton: CRC Press.
Friemel TN (2016) The digital divide has grown old: Determinants of a digital divide among seniors. *New Media and Society* 18(2): 313–331.
Galperin H and Arcidiacono M (2019) Learning from or leaning on? The impact of children on Internet use by adults. *New Media and Society* 21(2): 483–506.
Grošelj D, Reisdorf BC and Petrovčič A (2019) Obtaining indirect internet access: An examination how reasons for internet non-use relate to proxy internet use. *Telecommunications Policy* 43(3). Elsevier Ltd: 213–224.
Hänninen R, Taipale S and Korhonen A (2018) Refamilisation in the broadband society–the effects of ICTs on family solidarity in Finland. *Journal of Family Studies*. DOI: 10.1080/13229400.2018.1515101.
Hargittai E (2002) Second-level digital divide: Differences in people's online skills. *First Monday* 7(4).
Hargittai E (2005) Survey Measures of Web-Oriented Digital Literacy. *Social Science Computer Review* 23(3): 371–379.
Hargittai E (2009) An update on survey measures of web-oriented digital literacy. *Social Science Computer Review* 27(1): 130–137.
Hargittai E (2010) Digital na(t)ives? Variation in Internet skills and uses among members of the 'Net Generation'. *Sociological Inquiry* 80(1): 92–113.
Hargittai E and Hinnant A (2008) Digital inequality: Differences in young adults' use of the Internet. *Communication Research* 35(5): 602–621.
Hargittai E and Hsieh YP (2012) Succinct Survey Measures of Web-Use Skills. *Social Science Computer Review* 30(1): 95–107.
Hargittai E and Hsieh YP (2013) Digital inequality. In: Dutton WH (ed.) *The Oxford Handbook of Internet Studies*. Oxford, UK: Oxford University Press, pp. 129–150.
Hargittai E and Shafer S (2006) Differences in actual and perceived online skills: The role of gender. *Social Science Quarterly* 87(2): 432–448.
Helsper EJ (2012) A corresponding fields model for the links between social and digital exclusion. *Communication Theory* 22(4): 403–426.
Helsper EJ and Eynon R (2013) Distinct skill pathways to digital engagement. *European Journal of Communication* 28(6): 696–713.
Helsper EJ, Van Deursen AJAM and Eynon R (2015) Tangible outcomes of Internet use: From digital skills to tangible outcomes project report. Oxford Internet Institute, University of Twente and London School of Economics and Political Science. Available at: http://eprints.lse.ac.uk/61807/
Hunsaker A and Hargittai E (2018) A review of Internet use among older adults. *New Media and Society* 20(10): 3937–3954.
Igel C and Szydlik M (2011) Grandchild care and welfare state arrangements in Europe, *Journal of European Social Policy* 21(3): 210–224.
ISSP Research Group (2019) ZA6980: International Social Survey Programme: Social Networks and Social Resources - ISSP 2017 – SI Questionnaire. Available at: https://dbk.gesis.org/DBKsearch/download.asp?db=E&id=65610.
Joye D, Sapin M and Wolf C (2019) Measuring Social Networks and Social Resources: An Exploratory ISSP Survey around the World. (GESIS-Schriftenreihe, 22). Köln: GESIS - Leibniz-Institut für Sozialwissenschaften. Available at: https://nbnresolving.org/urn:nbn:de:0168-ssoar-62256-9
Litt E (2013) Measuring users' internet skills: A review of past assessments and a look toward the future. *New Media and Society* 15(4): 612–630.
Livingstone S and Helsper EJ (2007) Gradations in digital inclusion: Children, young people and the digital divide. *New Media and Society* 9(4): 671–696.

Mendonça S, Crespo N and Simões N (2015) Inequality in the network society: An integrated approach to ICT access, basic skills, and complex capabilities. *Telecommunications Policy* 39(3–4): 192–207.
Newlands G, Lutz C and Hoffmann CP (2018) Sharing by proxy: Invisible users in the sharing economy. *First Monday* 23(11).
Norris P (2001) *Digital Divide: Civic Engagement, Information Poverty and the Internet Worldwide*. Cambridge, UK: Cambridge University Press.
Petrovčič A, Van Deursen AJAM, Dolničar V, Burnik T and Grošelj D (2019) Measurement invariance of the short internet skills scale: Testing the differences between younger and older internet users. In: *8th European Survey Research Association Biennial Conference*, Zagreb, Croatia, 15–19 July 2019. Zagreb: Faculty of Economics and Business. https://www.europeansurveyresearch.org/conferences/programme?sess=92#11
Reevy GM and Maslach C (2001) Use of social support: gender and personality differences. *Sex Roles*, 44: 437–459.
Reisdorf BC (2011) Non-adoption of the Internet in Great Britain and Sweden. *Information, Communication & Society* 14(3): 400–420.
Reisdorf BC, Axelsson A-S and Maurin Söderholm H (2012) *Living Offline: A Qualitative Study of Internet Non-Use in Great Britain and Sweden.* Manchaster, UK. Available at: https://social.umeahackerspace.se/file/3cf247e446ed0784f4b2eccc3c27db93ec1f7cc49b48eb7b724856433ee7ed48.pdf (accessed 26 September 2019).
Reisdorf BC and Grošelj D (2017) Internet (non-)use types and motivational access: Implications for digital inequalities research. *New Media & Society* 19(8): 1157–1176.
Richardson BJ (2018) *I am connected: New approaches to supporting people in later life online. The Centre for Ageing Better and Good Things Foundation*. Available at: https://www.goodthingsfoundation.org/sites/default/files/research-publications/cfab_report_v4.pdf.
Robinson L, Cotten SR, Ono H, et al. (2015) Digital inequalities and why they matter. *Information Communication and Society* 18(5): 569–582.
Rogers EM (2001) The digital Divide. *Convergence* 7(4): 96–111.
Seifert A, Hofer M and Rössel J (2018) Older adults' perceived sense of social exclusion from the digital world. *Educational Gerontology* 44(12): 775–785.
Selwyn N, Gorard S and Furlong J (2006) *Adult Learning in the Digital Age: Information Technology and the Learning Society*. New York, NY: Routledge.
Selwyn N, Johnson N, Nemorin S, et al. (2016) *Going Online on Behalf of Others: An Investigation of 'Proxy' Internet Consumers*. Clark N (ed.). Sydney, Australia: Australian Communications Consumer Action Network. Available at: http://eprints.lse.ac.uk/83436/.
Taipale S (2019) *Intergenerational connections in digital families.* Cham, Switzerland: Springer.
Taipale S, Petrovčič A and Dolničar V (2017). Intergenerational solidarity and ICT usage: Empirical insights from Finnish and Slovenian families. In: Taipale S, Wilska TA and Gilleard C (eds.) *Digital Technologies and Generational Identity*. New York, NY: Routledge, pp. 69-86.
UNESCO (2012) International standard classification of education ISCED 2011. Montreal, Canada. Available at: http://uis.unesco.org/sites/default/files/documents/international-standard-classification-of-education-isced-2011-en.pdf.
Van Deursen AJAM and Helsper EJ (2015) A nuanced understanding of Internet use and non-use among the elderly. *European Journal of Communication* 30(2): 171–187.
Van Deursen AJAM and Van Dijk JAGM (2015) Toward a multifaceted model of internet access for understanding digital divides: An empirical investigation. *Information Society*

31(5): 379–391.
Van Deursen AJAM, Courtois C and Van Dijk JAGM (2014) Internet skills, sources of support, and benefiting from Internet use. *International Journal of Human–Computer Interaction* 30(4): 278–290.
Van Deursen AJAM, Helsper EJ and Eynon R (2016) Development and validation of the Internet Skills Scale (ISS). *Information, Communication and Society* 19(6): 804–823.
Van Dijk JAGM (2006) Digital divide research, achievements and shortcomings. *Poetics* 34(4): 221–235.
Van Dijk JAGM and Van Deursen AJAM (2014) *Digital Skills: Unlocking the Information Society*. Palgrave Macmillan.
Zickuhr K (2013) Who's not online and why. Available at: http://www.pewinternet.org/files/old-media//Files/Reports/2013/PIP_Offline adults_092513_PDF.pdf.
Zillien N and Hargittai E (2009) Digital distinction: Status-specific types of internet usage. *Social Science Quarterly* 90(2): 274–291.