

Older adults' digital competency, digital risk perceptions and frequency of everyday digital engagement

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97

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Abstract

Purpose – This study explores digital risk perceptions – the perception of risk related to digital environments – among older adults. Specifically, it investigates how these risk perceptions influence older adults' frequency of digital engagement in everyday activities.

Design/methodology/approach – The research methodology involved conducting 22 interviews and administering 708 surveys among older adults living at home. The researchers examined how digital risk perceptions influenced older adults' frequency of engagement in everyday digital activities. The study also explored the mediating role of digital risk perceptions in the relationship between older adults' digital competencies and the frequency of everyday digital engagement.

Findings – The study identified six distinct categories of digital risk perceptions among older adults. Furthermore, it found that older adults' digital competencies significantly impacted the frequency of everyday digital engagement. However, certain digital risk perceptions, particularly those related to privacy and security concerns and concerns about financial impact, mediated the relationship between digital competencies and the frequency of everyday digital engagement. Older adults' frequency of participating in digital activities was influenced by perceptions of risk, highlighting the complex interplay between digital competencies and digital risk perception in shaping older adults' engagement with everyday digital activities.

Originality/value – This study contributes to understanding older adults' engagement in everyday digital activities by delineating six specific categories of digital risk perceptions. By identifying the mediating role of digital risk perceptions, particularly regarding privacy, security and financial concerns, the study sheds light on the nuanced factors influencing older adults' willingness to participate digitally, which adds nuance and extends knowledge on digital and social inclusion among older adults.

Keywords Older adult consumers, Perceived risk, Digital inclusion

Paper type Research paper

1. Introduction

Social exclusion is a significant threat to the well-being of older adults. In older adults, a lack of engagement in digital society may produce a new form of social exclusion (Seifert *et al.*, 2018). Moreover, the likelihood of internet engagement – critical to processes of digital

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engagement –rapidly decreases with age, leaving older adults further at risk of social exclusion. Although the older population is diverse when it comes to proficiency in technology use, they are overall less likely to integrate technology into everyday activities (Quan-Haase *et al.*, 2018). Integrating technology into everyday activities has become more necessary than ever after the arrival of the COVID-19 pandemic, as it has changed the techno-social environments with more everyday activities moving online (Finkelstein *et al.*, 2023), and many governments are embracing “digital-first service delivery” (Das Chowdhury and Renaud, 2024). Thus, there is a heightened need for older adults to engage with technology for everyday activities.

Technology acceptance can be hindered by an individual’s perceptions of risk (Im *et al.*, 2008). The specific perceptions of risk related to digital environments are here defined as digital risk perception. Recent research involving older adults highlights that diverse digital risk perceptions result in resistance to technology for many older adults (Figueiredo *et al.*, 2021, 2022). One’s advanced age can play a pivotal role in determining the extent of digital inclusion, and a considerable number of older adults may feel ill-equipped to cope with the dynamic technological landscape. It is important to acknowledge the rights of everyone, regardless of capability and power, to participate in an increasingly digital-first society (Das Chowdhury and Renaud, 2024). Thus, there is a need to better understand what older adults value and what they can and would like to do to develop inclusive policies and digital solutions.

Achieving the goal of increasing online activities among older people necessitates addressing trust, confidence, and risk issues. Perceived risks reflect older adults’ genuine concerns about the potential harm or the possibility of loss that technology can often pose (Sheahan *et al.*, 2022). Extensive consumer research has consistently shown that perceived risk can impede the adoption and utilisation of various products and services (e.g. Rehman *et al.*, 2020; Ross, 1975). Previous discussions on perceived risk have delineated its manifestations across several dimensions – including financial, psychological, social, performance, physical, privacy, and time-related aspects (Featherman and Pavlou, 2003; Stone and Grønhaug, 1993). While research has investigated different risk dimensions based on various consumer characteristics, the risk dimensions of central concern for older adults’ engagement with everyday digital activities are unclear. The enhancement of digital competency and a reduction in risk perception is a critical imperative for enabling older adults to expand online activities. This study explores older adults’ digital risk perceptions – specifically, how these perceptions influence the frequency of everyday digital engagement.

Through a mixed-methods approach, this study contributes by discovering six unique categories of digital risk perceptions in older adults. We also discover five categories of everyday digital engagement and show how frequently older adults engage with each category. Through a mediation analysis, we discover the complex relationship between digital risk perceptions, frequency of everyday digital engagement and older consumers’ level of digital competencies.

The remainder of this paper proceeds as follows: Section 2 presents a scoping review from a computer science, software engineering, and cybersecurity perspective to better inform the development of secure and inclusive digital environments in digital-first societies. This review grounds this research in a wider body of work on at-risk users by synthesising the literature examining how digital experiences, competencies and risk perceptions among older adults are considered—or often overlooked—in designing digital products and solutions. The review highlights the need for more user-centred development practices, which justifies the empirical investigation in this study.

Section 3 outlines this study’s theoretical background and main concepts and develops the research questions and hypothesis. Section 4 describes the methodology, particularly the mixed-methods approach, and how the survey was developed to measure the concepts described in Section 3. The analysis and results are presented in Section 5, discussed in Section 6 and concluded in Section 7.

2. Scoping review

Given the growing necessity for older adults to engage with digital technologies in digital-first societies, it is crucial to address factors influencing their engagement and disengagement. Computer science research highlights that security concerns, self-blame for fraud incidents, and opaque privacy policies contribute to older adults' reluctance to fully integrate technology into their daily lives (Das Chowdhury and Renaud, 2023; Sharevski, 2024). Existing cybersecurity solutions often assume a one-size-fits-all approach, disregarding the diverse capabilities, preferences and risk perceptions among many "at-risk users", such as older adults (Ramokapane *et al.*, 2024). Older adults report a discernible degree of concern about the security of their personal information (Pacheco, 2024), which supports Sim *et al.*'s (2023) emphasis on the importance of designing security measures that are inclusive and user-friendly to encourage engagement from marginalised and vulnerable populations.

At-risk users, including older adults, often face amplified digital safety risks that can lead to disengagement from online services, particularly when they experience concerns about security threats such as data breaches and financial fraud (Warford *et al.*, 2022). Addressing these concerns requires security and privacy solutions tailored to older users, such as inclusive Internet of Things (IoT) privacy labels, which aim to reduce information asymmetry and improve accessibility to security measures (Ramokapane *et al.*, 2024). Foundational cybersecurity skills, such as recognising phishing scams and managing passwords, can also significantly reduce vulnerability, while structured digital literacy programs and inclusive gamification in cybersecurity training have demonstrated the potential to improve both competence and confidence (Zhong *et al.*, 2024).

Addressing these challenges requires integrating inclusive and adaptive security measures into digital services (Das Chowdhury and Renaud, 2023). Inclusive cybersecurity research highlights the need for participatory security design, where older adults actively shape privacy and security solutions that align with their digital confidence levels and risk perceptions (Sharevski, 2024). By incorporating participatory security design, older adults can be empowered to engage confidently with digital services, making security solutions more transparent, accessible, and tailored to their needs and behaviours (Slesinger *et al.*, 2022). However, a deeper understanding of older adults' everyday user needs and preferences is needed to create meaningful interventions and opportunities for participatory design processes.

Beyond security concerns, a broader theoretical perspective can help explain how older adults interact with technology in their daily lives. From a computer science and software engineering perspective, focusing on the everyday digital engagement of older adults means moving away from the traditional utilitarian perspective of designing digital tools based on evaluating surface features to maximise adoption (Das Chowdhury *et al.*, 2022). As an alternative, a "Capability Approach" has been proposed based on Sen's framework (Robeyns, 2005; Sen, 1980), which looks at both the opportunities a person has (capabilities) as well as the actions they actually carry out in their lives (functioning). This perspective acknowledges that digital engagement is not just about having access to technology but also about whether individuals can navigate usability barriers, security concerns, and personal motivations to participate meaningfully (Das Chowdhury and Renaud, 2024). When developing technology solutions for the everyday use of older adults, accessibility and user empowerment should be prioritised, ensuring they can confidently engage with digital services without security concerns, usability challenges, or confidence barriers limiting their participation (Das Chowdhury *et al.*, 2024). To achieve this, a better understanding of older adults' everyday digital engagement is needed.

3. Theoretical background, research questions, and hypotheses

The concept of everyday life (Lefebvre, 1991) highlights the often-overlooked aspects of consumers' mundane and familiar routines. In recent discussions, digital technology and the internet, in particular, have become integral parts of these routines, blending seamlessly into

daily practices (Wellman and Haythornthwaite, 2008). The everyday perspective shifts the focus towards how older adults integrate ICTs into their existing activities, information needs, and habits rather than dwelling on their limitations (Quan-Haase *et al.*, 2016). Therefore, we adopt the everyday life context in researching older adults' digital engagement, as it provides insights into how they utilise technology to maintain autonomy and independence. Digital engagement refers to older adults' use of contemporary technology to perform tasks they enjoy and do routinely.

As individuals age, the desire for autonomy and independent living remains paramount (Matsumoto *et al.*, 2016). Independent living signifies more than self-sufficiency; it embodies the freedom for older adults to shape lifestyles according to preferences, even if some aspects are not managed independently (Brisenden, 1986). Realising this ideal of independent living hinges on one's ability to perform essential everyday routine tasks like shopping and staying informed, as well as engage in other enjoyable activities and pastimes such as social networking. However, the pervasive influence of the internet and internet-enabled digital technologies fundamentally transforms our socio-economic interactions. This transformation also encompasses older consumers, necessitating increased everyday digital engagement to sustain independent living, encompassing activities such as online shopping, obtaining and distributing information, social networking, and entertainment (Blank and Groselj, 2014; McKenna *et al.*, 2023; Vulpe and Crăciun, 2020).

Research supports the importance of ICT use for older adults to maintain autonomy and independence. However, different approaches and definitions of concepts are used such as "technology communication usage", "internet use", "ICT use" or "digital engagement". This can be confusing, as terminology is often used interchangeably. For example, Vulpe and Crăciun (2020) refer to older adults "internet users" and "ICT users" without distinction. The nuances may be small, but some conceptual clarity is prudent for the purpose of the context of this paper.

3.1 Older adults' frequency of everyday digital engagement (FEDE)

In this study, we are interested in older adults' maintenance of autonomy and the everyday activities performed through contemporary technology needed to maintain independent living. ICT is a too broad concept because analogue telephones, TVs, and cameras are examples of ICT that are still in use but not contemporary. For example, older adults may be unable to rely on analogue landline phones to maintain autonomy soon as more services move online. However, focusing on "internet engagement" may still be too narrow because several functions of modern devices do not always need an internet connection. For example, digital TVs, digital cameras, digital games, music (PM3) players, or e-readers do not always require an internet connection. Such devices could be standalone or embedded in a modern smartphone. Moreover, anxiety and frustration with the actual devices such as smartphones are common characteristics in older adults (Mohlman *et al.*, 2022) – suggesting the focus needs to incorporate device usage, not just internet or online engagement.

Consequently, we prefer the term "digital engagement" because contemporary technology is digital rather than analogue. Digital engagement encompasses operating devices as well as using them for online engagement. Moreover, since the focus here is on older adults' autonomy and independent living, engagement should relate to everyday activities. Therefore, we call our central concept older adults "frequency of everyday digital engagement" (FEDE), defined as older adults' use of contemporary technology in the context of their everyday life, the aspects of their life that they enjoy and do routinely.

Numerous factors drive older adults to engage in digital activities, including evolving service delivery methods (Siren and Knudsen, 2017), the transformative impact of the COVID-19 pandemic (Osborne *et al.*, 2022), a strong desire for heightened social interaction and inclusion (Reuter *et al.*, 2021), as well as the aspiration to derive pleasure and benefits from various online activities (Kaufman *et al.*, 2016). Qualitative research on "digital seniors"

(older adults who use digital technology) suggests that older adults utilise digital technology to enhance or replace traditional (non-digital) everyday practices (Quan-Haase *et al.*, 2016). That is, older adults adapt and modify their everyday practices to emerging digitalisation, improving old solutions and finding new ones. Quan-Haase *et al.* (2016) suggest that older adults engage in everyday digital activities related to communication and information needs, but other everyday activities remain unexplored.

Although patterns of digital disengagement are most pronounced among older people (Hill *et al.*, 2008), previous research has yet to adequately map the type of everyday engagement older adults have with digital technology, as well as the extent of use. To foster increased online participation of older adults, it is essential to look beyond a binary approach and investigate all possible everyday activities older adults engage with digitally and how frequently they engage with such activities. In general, it has long been established that media usage tends to change as individuals age (Dimmick *et al.*, 1979), and more recent research shows generational differences regarding digital engagement as well (Bondad-Brown *et al.*, 2012). As such, older adults' everyday digital engagement may differ from younger generations and be unique to their needs and what they enjoy and do routinely. Since prior research has suggested that there may be unique dimensions of internet use related to older adults (Blank and Groselj, 2014), we propose the following research question:

RQ1. What aspects of everyday activities do older adults engage with digitally, and how often do they engage with each activity?

3.2 Older adults' digital risk perceptions (DRP)

To engage in everyday activities digitally, aligning with personal aspirations, many older adults grapple with perceptions of risk and uncertainties associated with online engagement (Wong *et al.*, 2022). Fear and perceived risk are among the most widely recognised barriers inhibiting engaging and participating in online activities (Marriott and Williams, 2018). Perceived risk is defined as consumers' expectation of losses associated with purchasing and acts as an inhibitor of purchase behaviour (Peter and Ryan, 1976). The specific perceptions of risk related to digital environments are here defined as Digital Risk Perception (DRP). Many factors are noted as inhibitors of both ICT adoption and involvement with the internet and online activities (e.g. Nimrod, 2018). Perceived risk (beliefs about potential harm or the possibility of a loss) is a critical inhibitor for older adults, as "fear" is the main barrier to online participation (O'Connell *et al.*, 2022). Moreover, perceived risks negatively influence consumers' intentions across digital retail contexts (Chang and Chen, 2008; Marriott and Williams, 2018; Pappas, 2016).

In consumer information systems research, perceptions of risk have been defined as uncertainty about a purchase situation (Im *et al.*, 2008). Typically, these judgements refer to cost/benefit, performance, and other uncertainties – known to impact intentions to use (Im *et al.*, 2008). Although cost/benefit and performance have been popular dimensions of risk perceptions, it has long been recognised that other dimensions, such as psychological, social, and time-related, are also important to consumers (Cunningham, 1967). According to Chang and Chen (2008), perceived risk is an individual's biased perception of a risk situation. It is highly dependent on the individual's psychological and situational characteristics, which suggests that risk perceptions depend on the characteristics of the consumers (Lian and Yen, 2014; Marriott and Williams, 2018). For older adults, technophobia (fear of technology) is also a central barrier to use (O'Connell *et al.*, 2022). That is, older consumers may also have perceptions of risk associated with being able to use the products – beyond the previous risk dimension of product performance, which assumes the user knows how to use a product. While technophobia is a fear of the ICT product in itself, product performance is a risk dimension related to whether the product will perform as the user intended or hoped for.

Market characteristics could also impact how consumers perceive risk. Featherman and Pavlou (2003) examine market characteristics and argue that since e-services do not threaten

human life, measures of physical safety risk should be replaced by “privacy concerns” in this market. More recently, [Kamalul Ariffin et al. \(2018\)](#) used different risk categories and found that “security risk” (potential loss due to online fraud or hacking) was the main contributor deterring consumers from purchasing online. As such, categories of digital risk perceptions experienced by older adults will likely include technophobia (as discussed in the previous paragraph) and concerns with privacy/security. Given these factors, understanding the categories of digital risk perceptions among older adults is essential for designing inclusive solutions and fostering greater digital participation. We propose the following research question:

RQ2. What are the different ways in which older adults perceive digital risks, and how do these perceptions influence their everyday digital engagement?

Considering the overall level of older adults digital perceived risk ([O’Connell et al., 2022](#)), previous research strongly suggests that higher perceptions of digital risk would have a negative relationship with the frequency of everyday digital engagement ([Featherman and Pavlou, 2003](#); [Kamalul Ariffin et al., 2018](#); [Pappas, 2016](#)). As such, we propose this hypothesis:

H1. Higher Digital Risk Perceptions (DRP) are negatively related to the Frequency of Everyday Digital Engagement (FEDE).

3.3 Older adults’ digital competency (DC)

Digital competencies are fundamental in today’s knowledge economy and information society ([van Dijk and van Deursen, 2014](#)). [Ochoa Pacheco and Coello-Montecel \(2023\)](#) defined digital competencies as “the set of knowledge, abilities, skills, attitudes, and other characteristics regarding digital technologies that are fostered by an individual’s personal, cognitive, social, and global competencies for communicating, collaborating, creating, and sharing content, managing and sharing information, solving problems, and adopting and spreading the digital culture, taking into account ethical and sustainable practices” (p. 3). Digital competencies facilitate constructing new knowledge, creating media expressions, and communicating with others in the context of specific life situations to enable constructive social action and to reflect upon this process ([Martin and Grudziecki, 2006](#)).

Improving the inclusion and engagement of older adults in digital technology is becoming increasingly important ([Oh et al., 2021](#); [Scheerder et al., 2017](#)). While numerous studies have assessed the digital competencies of younger generations, few have examined the inclusion of older adults in the research and design of digital technologies ([Olsson et al., 2019](#); [van Deursen et al., 2016](#)). Research also suggests that people with higher digital competencies have less anxiety associated with using technology in their daily lives ([Di Giacomo et al., 2019](#)). Digital competencies and associated internet-related skills are also likely to significantly influence attitudes towards digital technology, self-efficacy level, facilitating conditions for engaging digitally, and the degree to which others pressure the individual to use digital technology ([de Boer et al., 2019](#)). Importantly, digital competencies are also associated with technology’s perceived ease of use and usefulness ([de Boer et al., 2019](#)).

Previous research has suggested a close relationship between adopting digital technology and digital competencies ([Nunan and Di Domenico, 2019](#); [Figueiredo et al., 2021](#)). Further, digital risk perceptions are higher in individuals who lack exposure and experience with practices regarding engaging with everyday activities digitally ([Aranda et al., 2019](#)). Thus, digital competency is crucial for digital inclusion. [Van Deursen et al. \(2016\)](#) examined digital competency within a broad framework and linked individuals’ skills, types of engagement with online services and activities, and the tangible outcomes of this engagement. Although digital competency may impact the frequency of everyday digital engagement, perceptions of digital risk may mediate this relationship. For example, perceived digital risk mediates the relationship between online store environments and purchase intentions ([Chang and Chen, 2008](#)). We propose the following three hypotheses:

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- H2. Higher Digital Competency (DC) is positively related to lower levels of Digital Risk Perceptions (DRP).
- H3. Higher Digital Competency (DC) is positively related to the Frequency of Everyday Digital Engagement (FEDE).
- H4. Digital Risk Perceptions (DRP) mediate the relationship between Digital Competency (DC) and the Frequency of Everyday Digital Engagement (FEDE).
-

4. Methodology

We employed a mixed-methods approach to address the complexity of the research questions and hypotheses. We used prior research supplemented with interview data to inform survey development. This allowed us to generate a large pool of survey items for the frequency of everyday digital engagement (FEDE) and digital risk perceptions (DRP) among older adults constructs. We used a pre-existing, well-established scale to measure digital competencies (DC).

4.1 Qualitative stage

This research is part of a larger program investigating how technology supports and enhances older adults' connectedness, social inclusion, and participation. An initial phase of 22 exploratory interviews was conducted among Australian older adults from November 2020 to January 2021. These interviews were recorded, transcribed, and analysed. In addition, several video vignettes were created to help understand how older adults engage with ICT. In total, thirteen interviewees were women, and eight were men – four respondents self-reported as culturally and linguistically diverse (CALD) persons. The cohort was between 59 and 85 years, with a mean age of 71.8 and a median of 71 years. These interviews were used to help derive additional survey items for the FEDE and DRP constructs we measured in our survey.

4.2 Survey development and pre-test

The survey was carefully designed to be applied to older adults after a review of the literature and our interviews. Before the survey was finalised, ten academics and PhD-qualified researchers reviewed the questionnaire to ensure its content validity. To eliminate possible ambiguities and, following established recommendations (Hunt *et al.*, 1982), the survey was pretested with administrators of the University of the Third Age (U3A) Network Victoria in Australia (www.u3avictoria.org.au) and 25 older adults enrolled in U3A courses. U3A Network is the peak body for the U3A movement in the state of Victoria. U3A is an international movement which provides lifelong learning opportunities to retired or semi-retired people over 50 through courses and activities. Pre-test participants were encouraged to comment on the questions, survey design, and other survey elements that would influence the completion of the survey. Their responses were not included in the final sample used for analysis.

4.3 Survey Measures: Older adults' Frequency of Everyday Digital Engagement (FEDE), Digital Risk Perceptions (DRP), and Digital Competency (DC)

Our Frequency of Everyday Digital Engagement (FEDE) measure (Appendix 1) was based on previous grey and published research (e.g. Aranda *et al.*, 2019; Figueiredo *et al.*, 2021; Twohig, 2021) and further informed by our interviews. At the survey stage, respondents were asked to indicate the frequency of engaging in 17 different digital everyday activities. Items included were based on our discussions, interviews with older adults, a previous survey, and several papers investigating older adult's internet use, digital/online activities (Blank and

Groselj, 2014; Nimrod, 2018; Schehl *et al.*, 2019). Respondents were also asked to rate how frequently they engaged with each type of everyday digital activity on a seven-point scale: 1 “never”, 2 “once every few months”, 3 “about once per month”, 4 “several times per month”, 5 “about once per week”, 6 “several times per week”, or 7 “daily”. Hence, higher scores indicate a higher frequency of engagement. All FEDE items can be found in [Appendix 1](#).

Digital Risk Perceptions (DRP) were measured using a combination of items drawn from consumer behaviour and information systems research (Cocosila and Archer, 2010; Featherman and Pavlou, 2003; Stone and Barry Mason, 1995; Stone and Grønhaug, 1993). The measures for risk were further developed and adapted to older adults’ experiences through qualitative analysis of our interview data and subsequent quantitative analysis using confirmatory factor analysis (Figueiredo *et al.*, 2021, 2022). 41 survey items were developed based on the previous literature and our interviews for the DRP measure. Twenty items focused on individuals’ thoughts, feelings, and expectations when using digital technology. Fifteen items addressed issues to do with risks associated with online transactions and the cost of digital technology, and 14 items broadly addressed perceived personal and social risks. Each item was measured on a 7-point Likert scale ranging from strongly disagree (1) to strongly agree (7). All risk perception items can be found in [Appendix 2](#).

Following Ochoa Pacheco and Coello-Montecel’s (2023) approach, we employed Van Deursen *et al.*’s (2016) scale to measure digital competencies (DC). This scale encompasses technical ability (8 items: e.g. download a photo, open a downloaded file, adjust privacy settings); information navigation ability (6 items: e.g. use of search keywords, finding websites, ease of using a search engine); Mobile ability (4 items: e.g. downloading apps, tracking usage cost, syncing mobile devices with other ICT); Social ability (7 items: e.g. what to share and not share online and with whom, block people); and finally, creative ability (5 items: e.g. design a website, manipulate images, music, or video, create content) (van Deursen *et al.*, 2016). Each item was measured on a 7-point Likert scale ranging from strongly disagree (1) to strongly agree (7). The scale is treated as a second-order factor in the analysis (Rehman *et al.*, 2020).

4.4 Procedure

The study used a non-probability sampling method. Participants were recruited through U3A Network Victoria. The Network represents 104 Member U3As and their 33,000 members. U3A members were contacted via email, newsletter, and nominated course enrolments to complete the online survey. Participants were informed that by completing the survey, they were providing informed consent and assured that answers were anonymous, confidential and would be used for research purposes only. The university ethics committee approved the collection of data from human subjects. The survey was hosted on a Qualtrics platform. Three recruitment bulletin emails were sent to the Network’s 104 member U3As, and a bulk email was sent to a broader member base. In addition, notifications were placed in U3A Network Victoria publications (Network News, Facebook, Network Council papers). The “Social Seniors Programs” promoted the survey, and ten U3A peer ICT tutors asked members to complete the survey in their classes. Incomplete responses lacking completion of the demographics section were not included in the final analysis.

Trusted U3A representatives were asked to distribute the survey instrument to their members, which reduced older adults’ perceived risk and anxiety regarding participation in the study. The instrument included a brief introduction to the project and research goals, and both U3A and the research university were identified in the survey. These measures helped limit participation resistance and mitigate concerns about scams, cyberbullying, general security threats, and other risk perceptions (Figueiredo *et al.*, 2021, 2022).

Following Macedo’s (2017) recommendations, common method bias was addressed using the following steps: (1) respondents were assured anonymity; (2) attention was paid to avoid statements relating to the dependent variable not being located close to the independent variables of the questionnaire (Podsakoff *et al.*, 2003).

4.5 Participants

The data is based on survey responses from 706 older adults. The largest age category of participants was 70–74 (37.8%). There were significantly more female participants (69.2%) than male participants (30.7%). Education varied among the participants, with 13.4% having achieved lower than year 11 or below and 7.6% completing secondary school (year 12). A significant proportion had a graduate diploma (17.7%), with a considerable number of respondents being highly educated with a bachelor's degree (21.5%) and postgraduate qualifications (17.9%). As expected for this age group, most participants were retired or no longer working (87.3%). The income of most participants (53.2%) was less than \$51,999. However, 10.5% had an income of over \$91,000 per year. Most participants were currently in couple relationships (57.1%) compared to single (35.4%). A greater percentage of participants lived in urban areas (67.5%) than in rural or regional locations (31.6%).

Regarding ICT ownership and usage, almost all survey respondents had personal access to the internet (92.5%) and a smartphone (91.4%). A laptop followed this (71.5%), and an iPad or tablet (69.3%) was the most owned technology. Just over half owned an internet-enabled TV or a desktop computer. Wearable devices and the iPod Touch (digital music player) were less commonly owned items (24.7 and 10.7%, respectively). Finally, most participants completed the survey online (86.9%), while 13.1% completed a paper version.

5. Analysis and results

Descriptive statistics were calculated using IBM SPSS Statistics (Version 28), while structural equation modelling was undertaken using SmartPLS 3.3.3 for analysis purposes (Ringle *et al.*, 2022). The first stage of the analysis requires establishing the validity and reliability of the model, including assessing indicator loadings, internal consistency, and construct reliability (Hair *et al.*, 2019). The first stage addressed RQ1 and RQ2 and included discovering the components of older adults' FEDE and DRP through confirmatory factor analysis, discriminant validity assessment, and scale reliability analyses to test how the survey items related to underlying constructs (see appendix for details). The second analysis stage tested the relationships hypothesised in H1-4.

RQ1. The Nature and Frequency of Everyday Digital Engagement (FEDE)

RQ1 related to everyday activities older adults engage with digitally and how frequently they engage with each activity. Confirmatory factor analysis was used to discover the underlying factors associated with FEDE from the 17 items in the survey. Each factor was then assessed for its scale reliability and discriminant validity (Appendix 1). In this case, factor analysis revealed five underlying factors (Table 1) – revealing the nature of older adults' everyday digital engagement. Table 1 shows the factor name, the number of survey items used to measure each factor, a detailed description of what each factor measures, and the mean frequency of engagement (1–7 scale: 1 = never, 7 = daily).

Participants most frequently engaged with communication and information exchange activities (mean = 5.83). These activities include googling, emailing, instant messaging, and sharing information with friends and family. Consuming content (mean = 4.41), followed, which includes reading, watching, or downloading online content. These everyday activities are similar to what Quan-Haase *et al.* (2016) mentioned in their interviews with “digital seniors”: news consumption, library use, information seeking, and reading. In contrast, gaming (mean = 2.99), creating content (mean = 2.98) and financial transactions (mean = 2.88) were the least frequent activity engaged with. A higher standard deviation for Content Consumption (Std. Dev. = 1.54), Gaming (Std. Dev. = 1.92) and Content Creation (Std. Dev. = 1.48) also indicates more variation in how engaged older adults are with these activities.

RQ2. Categories of Digital Risk Perception (DRP) and impact on Frequency of Everyday Digital Engagement (FEDE)

Table 1. Frequency of everyday digital engagement (FEDE) mean factor scores

Factor	Items	Description	Mean/Std. Dev.*
Communication and Information Exchange	4	Sharing information with friends and family, emailing, google searching.	5.82/1.04
Content Consumption	4	Reading news, downloading content, watching TV/ movies/sports online.	4.41/1.54
Gaming	2	Playing standalone or connected/networked games online.	2.99/1.92
Content Creation	3	Uploading content for others to see, blogging, vlogging, commentary, chatting	2.98/1.48
Transactions and Commerce	4	Various forms of online shopping, transactions, and online banking	2.88/1.06

Note(s): *Measured on a 7-point scale: 1 = Never, 2 = Once every few months, 3 = Once per month, 4 = Several times a month, 5 = About once a week, 6 = Several times a week, 7 = Daily
Source(s): Authors' own work

[RQ2](#) was related to categorising digital risk perception (DRP). Results for confirmatory factor analysis, including reliability and discriminant validity, are reported in [Appendix 2](#). Our analysis of the 41 [DRP](#) items in the survey revealed six factors ([Table 2](#)). [Table 2](#) shows the factor name, the number of survey items used to measure each factor, a detailed description of what each factor measures, and the mean level of perceived risk (1–7 scale: 1 = strongly disagree, 7 = strongly agree).

Older adults' Digital Risk Perceptions (DRP) were relatively low compared with the frequency of everyday digital engagement (see means in [Table 1](#) compared with means in [Table 2](#)). Respondents overall had low risk perception scores. This may reflect respondents' higher levels of education and involvement in ICT-related learning through U3A classes. However, when we examine the average factor scores, the lowest scores (less perceived risk) were for the "Health Fears" (mean = 2.81), "Social and Emotional Apprehensions" (mean = 3.02) and "Financial Impact" (mean = 3.18) risk factors. The highest average scores were for the "Device Dread" (mean = 3.45), "Privacy and Security" (mean = 3.42), and

Table 2. Digital risk perception (DRP) mean factor scores

Factor	Items	Description	Mean/Std. Dev.*
Device Dread	12	Fear of ability to use, forgetting instructions/passwords, keeping up when ageing	3.45/1.43
Privacy and Security	7	Security of online transactions, identity theft, losing privacy.	3.42/1.32
Transaction Worry	5	Making transaction mistakes, not receiving goods, processing errors.	3.34/1.25
Financial Impact	4	Excessive online shopping, overspending, rising software/device upgrade costs.	3.18/1.23
Social and Emotional Apprehensions	10	Being made fun of, feeling incompetent, frustrated, or overwhelmed.	3.02/1.39
Health Fears	3	Physical inactivity, addiction to ICT, eyesight, or strain injury.	2.81/1.35

Note(s): *Measured on a 7-point scale: 1 = Strongly disagree, 2 = Disagree, 3 = Somewhat disagree, 4 = Neither agree nor disagree, 5 = Somewhat agree, 6 = Agree, 7 = Strongly agree
Source(s): Authors' own work

“Transaction Worry” (mean = 3.34) risk factors. These findings corroborate previous research suggesting a fear of technology (device dread) is a central barrier to use in older adults (O’Connell *et al.*, 2022) and Kamalul Ariffin *et al.*’s (2018) finding that “security risk” (potential loss due to online fraud or hacking) was the main contributor deterring consumers from purchasing online. However, the standard deviation for all factors ranges between 1.23 and 1.43, indicating moderate variability in responses and suggesting that while some older adults perceive certain digital risks as minimal, others experience significantly higher levels of concern.

H1. Digital Risk Perceptions (DRP) and Frequency of Everyday Digital Engagement (FEDE)

We moved to the second analysis stage to test H1 (whether higher digital risk perceptions negatively influence the frequency of everyday digital engagement). Here, we utilised partial least squares structural equation modelling (PLS-SEM) using SmartPLS (Version 3.3.3) (Ringle *et al.*, 2022). PLS-SEM is a distribution-free method of determining the predictive power of complex models (Hair *et al.*, 2019). Therefore, PLS-SEM was appropriate for analysing a predictive model utilising multiple constructs and indicators. Furthermore, PLS-SEM was also deemed suitable, given the sample size ($N = 706$). For the analysis of H1, we ran a non-mediated model, including the direct relationship between DRP and FEDE (top-end of Table 3 – non-mediated model).

The results show that risk perceptions are real and have a significant negative influence on the Frequency of Everyday Digital Engagement (FEDE) for three of our risk categories (H1): Device Dread ($\beta = -0.242$, $t = 4.472$), Privacy and Security ($\beta = 0.261$, $t = 4.716$), and Social and Emotional Apprehensions ($\beta = 0.284$, $t = 4.490$). However, risk perceptions associated with Financial Impact ($\beta = 0.220$, $t = 4.500$) and Health Fears ($\beta = 0.088$, $t = 2.086$) are not barriers to FEDE. On the contrary, those who perceive these types of risk are also more engaged online.

H2. Digital Competencies (DC) and Digital Risk Perceptions (DRP).

Notably, most participants’ digital competency level was sufficient to utilise email and complete an online survey. The mean level of DC in the sample was 4.89 (7-point scale, Std. Dev. 1.13). For the analysis of H2, we followed the same procedure as for H1. Results show that digital competencies (DC) form a significant factor influencing older adults’ ICT use (lower-end of Table 3, non-mediated model). The level of DC directly reduces all categories of

Table 3. DC → DRP → FEDE mediation analysis

Relationship	Non-mediated model			Mediated model		
	Beta	t	p	Beta	t	p
DC → FEDE	–	–	–	0.561	12.123	0.000
Device Dread → FEDE	–0.242	4.472	0.000	–0.007	0.144	0.885
Privacy and Security → FEDE	–0.261	4.716	0.000	–0.172	3.384	0.001
Transaction Worry → FEDE	0.049	0.712	0.477	–0.014	0.272	0.786
Financial Impact → FEDE	0.220	4.500	0.000	0.200	4.468	0.000
Social and Emotional App. → FEDE	–0.284	4.490	0.000	–0.036	0.527	0.598
Health Fears → FEDE	0.088	2.086	0.037	0.026	0.671	0.502
DC → Device Dread	–0.714	39.598	0.000	–0.701	36.262	0.000
DC → Privacy and Security	–0.620	25.372	0.000	–0.553	19.943	0.000
DC → Transaction Worry	–0.529	19.338	0.000	–0.506	17.741	0.000
DC → Financial Impact	–0.456	15.195	0.000	–0.418	14.318	0.000
DC → Social and Emotional App.	–0.692	31.251	0.000	–0.688	32.070	0.000
DC → Health Fears	–0.354	10.583	0.000	–0.333	9.614	0.000

Source(s): Authors’ own work

risk perception. These relationships also remain strong when considering FEDE in the model (lower-end of Table 3, non-mediated model). The more digitally competent the user is, the less likely they are to perceive any type of digital risk. Although the H1 analysis suggests that some types of digital risk perceptions represent a significant barrier to FEDE, the H2 analysis confirms that all types of digital risk perception can be reduced through improved digital competency.

H3-4. Digital Competencies (DC), Frequency of Everyday Digital Engagement (FEDE) and Digital Risk Perceptions (DRP).

To test the relationships in H3 and H4, we ran a mediation analysis in SmartPLS with DC as the independent variable, FEDE as the dependent and DRP as the mediator (top-end of Table 3, mediated model). DC directly affects FEDE ($\beta = 0.561$, $t = 12.123$), showing strong support for H3; digital competencies impact the level of engagement with the digital economy.

Regarding H4, we see that different types of DRP mediate FEDE in different directions (top-end of Table 3 – mediated model). DRP about Privacy and Security reduces FEDE ($\beta = -0.172$, $t = 3.384$), while DRP about Financial Impact increases FEDE ($\beta = 0.200$, $t = 4.468$). The strong direct effect between DC and FEDE shifts the relationships between Device Dread, Social and Emotional Apprehensions, and Health Fear risk perceptions from significant to insignificant between the non-mediated and the mediated model. That is, improved digital competency can reduce everyday digital engagement barriers associated with general fear of digital devices (Device Dread), concerns about being made fun of or getting frustrated or overwhelmed by technology, and fears of negative health impacts. DRP about Transaction Worry was insignificant regarding FEDE in both the mediate and the non-mediated model.

6. Discussion

This paper explores the multifaceted aspects of everyday digital engagement among older adults, shedding light on both the prevalence and nature of their online activities, as well as the nuanced spectrum of risks they perceive in the digital landscape. The discussion highlights the intricate relationship between digital competencies, digital risk perceptions, and everyday digital engagement, underscoring the importance of targeted training to enhance digital skills and reduce perceived risks. It also addresses the complex interplay between increased digital competencies and heightened awareness of certain risks, particularly in the realms of privacy, security, and financial impact, offering valuable insights into the challenges and opportunities in fostering digital inclusion for older adults.

First, this research demonstrates that older consumers engage in a range of everyday activities digitally and that one's frequency of engagement varies depending on the activity. The most common activities are communication and information exchange. These activities reflect the central benefits of digital technology and the internet, as they relate to quick and effective searching and finding and sharing information. Such activities are central to continued independent living as individuals age, enabling older adults to communicate and exchange information in an increasingly digital society. However, our results also revealed that the digital activity older adults least frequently engage with is transaction and commerce. As societies extend digital-first delivery and shift further towards digital payment and cashless transactions, it is imperative that training for those interested and alternative payment methods be developed.

This finding aligns with Das Chowdhury *et al.* needs (2024), who argue that digital-first policies must account for the varying technical proficiencies of older users, emphasising intuitive design and cybersecurity measures tailored to their needs. This may be addressed using a strength-based approach (Raciti *et al.*, 2022; Russell-Bennett *et al.*, 2023) that focuses on empowering users (Figueiredo *et al.*, 2023). For example, training may focus on older

adults' proficiency in digital communication and information exchange and consider how these skills can be transferred to digital transactions and commerce.

The investigation of perceived risks in this research showed that older adults' digital risk perception can be divided into six distinct categories. These categories deviate from previous research on perceived risk (Chang and Chen, 2008; Kamalul Ariffin *et al.*, 2018) and strongly suggest that perceived risk is not a general concept but depends on the market and consumer characteristics. Older adults' highest perceived digital risk is the fear of computing products, which we labelled Device Dread. This dimension of risk differs from more conventional risk dimensions such as time risk (i.e. fear of wasting time learning to use (cf. Stone and Grønhaug (1993))), as it includes a fear of being unable to use digital devices. The relatively high level of device dread confirms O'Connell *et al.* (2022) research, suggesting fear of technology is a central barrier to use. Also, our perceived risk of Device Dread dimension encompasses a fear of ageing and an inability to keep up with ICT in the future. This suggests that this type of risk perception particularly relates to older adults.

This device dread may come from internalised stereotypes of incompetence where older adults believe that the products are not made for them (Ivan and Cutler, 2021; Westberg *et al.*, 2021). One way to overcome this barrier could be through gamification strategies designed specifically for older adults, which could enhance digital competencies and security awareness, transforming learning into an engaging and confidence-building process (Zhong *et al.*, 2024).

Another prominent dimension of perceived risk for older adults relates to Privacy and Security. Like Device Dread, this perceived risk also relates to a general fear of digital technology. However, Privacy and Security relate to fears of being taken advantage of outside of one's control – which is different from beliefs about abilities to use (Device Dread). Our Privacy and Security dimension confirms Kamalul Ariffin *et al.*'s (2018) study that this is a central risk perception dimension regarding online purchases. However, we discovered that Privacy and Security are also distinct from transaction worry, which relates to the risk of making mistakes when buying goods online. That is, older adults perceive two distinct types of risk regarding online transactions; one relates to how secure the environment is, and the other relates to their abilities to navigate this environment and what may happen if they make a mistake. It is important to note here that the fear of the online environment appears to be more pronounced. This is perhaps not surprising since organisations demonstrate very little care or concern for victims when security breaches happen, responsabilising instead of supporting them (Das Chowdhury *et al.*, 2024). As such, it is important to further understand older adults "healthy scepticism" towards the online environment.

We further discovered a risk dimension associated with Financial Impact, which differs from the conventional financial risk dimension (Stone and Grønhaug, 1993). Here, the concern is not so much about getting value for money but instead a concern about future costs and the long-term financial impact of everyday digital engagement. Further, while previous research suggests social and psychological risks as different dimensions (e.g. Featherman and Pavlou, 2003; Stone and Grønhaug, 1993), we find that these dimensions merge as they relate to apprehension with ICT, which could be social or emotional. Finally, we found that there may be a Health Fear dimension to digital risk perceptions, which encompasses concerns about becoming addicted and inactivity due to prolonged use. This contrasts Featherman and Pavlou's (2003) argument that e-services do not threaten human life. Although health fears were the least pronounced dimension of risk, some older adults are nevertheless concerned with health fears such as becoming addicted to their devices or the physical inactivity associated with prolonged device usage.

Our H1 analysis revealed that many dimensions of digital risk perceptions negatively impact the frequency of everyday digital engagement. Older adults who perceive risk associated with Device Dread, Privacy and Security, and Social and Emotional Apprehensions are less frequently engaged digitally. That is, a general fear of digital devices, concerns about being taken advantage of, and personal distress or being made fun of by others are barriers for older adults to engage in everyday activities digitally. Interestingly, risk perceptions associated with financial impact and health fears are higher for older adults who are more frequently

engaged with everyday activities digitally. That is, increased frequency of engagement is associated with more concerns for future financial impact and declining health.

These insights suggest that although some dimensions of perceived digital risk may be a barrier to engagement, other risk dimensions may be heightened due to more frequent engagement. Centres such as the University of Bristol's "REsearch centre on Privacy, Harm Reduction and Adversarial INfluence online (REPHRAIN)" (<https://www.rephrain.ac.uk>) may, therefore, consider whether there is a limit to what "full participation" in digital life looks like. A digital-first society that increasingly pushes its citizens towards more screen-based interactions could have unintended negative consequences. Overuse of technology can indeed cause both physical (Davies *et al.*, 2012) and mental (Zhang *et al.*, 2022) harm in adults.

The analysis of H2 and H3 provides strong evidence that the level of digital competencies will reduce all types of perceived digital risk and increase the frequency of engagement with everyday activities digitally. As such, the provision of training for older adults who want to improve their digital abilities is central in order to reduce the perception of risk and increase the frequency of everyday digital engagement. Van Deursen *et al.*'s (2016) 5-dimension scale (technical, information navigation, mobile, social, and creative abilities) offers an excellent overview of competencies that can be included in ICT training programs for older adults to reduce perceived digital risk.

Finally, the analysis of H4 shows a partial mediation of the relationship between digital competencies and the frequency of everyday digital engagement by digital risk perception. Although the H3 analysis provides strong confirmation that the higher the digital competency, the higher the frequency of everyday digital engagement, the fear of being taken advantage of outside one's control (Privacy and Security) mediates this relationship. This may suggest that higher digital competency leads to greater awareness of scams and nefarious digital activities. Consequently, this particular perception of digital risk will continue to be a barrier to everyday digital engagement, despite heightened digital competencies. Finally, risk perceptions about financial impact further elevate the frequency of everyday digital engagement. That is, high competency leads to frequent engagement despite an increased concern for how much one will spend. This may be related to highly competent consumers being locked into plans/subscriptions they feel they need to stay connected while worrying about the current and future costs of maintaining the same level of engagement.

These results highlight the complexities in the relationships between digital competencies, perceptions of risk and everyday engagement. Basic digital competency training will help eliminate risk perceptions as a barrier to engagement. However, privacy and security concerns are separate issues that cannot be solved with training and education of consumers alone. Organisations dedicated to promoting cyber security and preventing digital harms need to focus on facilitating broader debates and participatory programs. Since service providers are likely to deflect responsibility and consumers tend to self-blame (e.g. "I should have changed my password") when breaches happen (Das Chowdhury *et al.*, 2024), it is important to focus on empowering end-users through purposeful policies (Das Chowdhury and Renaud, 2024).

7. Conclusion

This research contributes to the literature by elucidating older adults' specific categories of digital risk perception. We find that older adults perceive different dimensions of digital risk than what has been captured in previous conceptualisations of risk perceptions as a general concept. Older adult's perception of digital risk impacts the frequency of everyday digital engagement, and improved digital competencies are needed to reduce the perception of digital risk. However, the perceived risk associated with privacy and security and financial impact mediates the relationship between digital competencies and the frequency of everyday digital engagement.

This research shows that digital competency training for older adults should be mindful of particular perceptions of digital risk. Breaking down risk barriers may allow for more efficient

building of central digital competencies. Those involved with ICT training for older adults should pay particular attention to how they perceive the risk associated with privacy and security. Discussions of such concerns and offering resources for scam alerts and specific training about protecting privacy and being secure online may help reduce this perception of risk – consequently increasing the frequency of engaging with everyday activities digitally. Finally, many older adults are concerned with the future cost of staying connected/engaged. Service providers should offer older adults financial incentives as well as specific training and information about how to reduce subscription/running costs as well as the cost of hardware.

This research contributes to the literature with the classification and labelling of specific dimensions of older adults' engagement with everyday activities digitally as well as the specific dimensions of digital risk perceptions. Future research could further investigate these dimensions in a different online/digital context or among a different population. For example, including older adults with lower levels of engagement and competencies may provide further insights. An experimental design that includes surveying older adults before and after digital competency training may also provide deeper insights into how digital risk perceptions are reduced and how more frequent use of digital means for everyday activities may be achieved.

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(The Appendix follows overleaf)

Table A1. CFA, Frequency of Everyday Digital Engagement (FEDE)

Construct	Items	Beta	t-value	p-value
<i>Communication and Information Exchange</i> Mean: 5.52 SD: 1.04, CA: 0.66, CR: 0.79, AVE: 0.50.	Emailing friends and family	0.609	12.013	0.000
	Sharing information with friends and family	0.728	22.485	0.000
	Searching and checking information using a search engine, e.g. google searching	0.802	36.083	0.000
<i>Content Consumption</i> Mean: 4.41 SD: 1.54, CA: 0.66, CR: 0.80, AVE: 0.50.	Instant messaging, e.g. texting	0.645	13.970	0.000
	Reading online or downloaded books and magazines	0.750	35.515	0.000
	Reading news online, e.g. online newspapers, ABC news online	0.720	26.662	0.000
<i>Content Creation</i> Mean: 2.98, SD: 1.48, CA: 0.64, CR: 0.79, AVE: 0.59.	Making calls, e.g. skype, facetime, zoom	0.659	20.952	0.000
	Watching entertainment, e.g. movies, catch-up TV, or sports	0.678	21.462	0.000
	Social networking, e.g. chatting on Messenger or another app	0.837	41.292	0.000
	Uploading content for family and friends to see, e.g. using Facebook, Instagram, YouTube	0.834	43.835	0.000
	Blogging, vlogging, and other general online commentary	0.596	14.672	0.000
<i>Gaming</i> Mean: 2.99, SD: 1.92, CA: 0.39, CR: 0.74, AVE: 0.60.	Playing connected games online, i.e.	0.546	4.144	0.000
	Competing with other people			
	Playing standalone games on the device, i.e. competing with self or the device	0.930	17.898	0.000
<i>Transactions and Commerce</i> Mean: 2.88, SD: 1.06, CA: 0.73, CR: 0.83, AVE: 0.55.	Online shopping for basics, e.g. food and groceries or items of clothing, etc	0.726	26.003	0.000
	Online shopping for more advanced products and services, e.g. new technology	0.805	48.488	0.000
	Online shopping for service products, e.g. insurance, travel	0.720	22.336	0.000
	Online banking and bill payments	0.706	30.277	0.000
Source(s): Authors' own work				

Appendix 2

Table A2. CFA for digital risk perception (DRP)

Construct	Items	Beta	t-value	p- values
<i>Device Dread</i> Mean: 3.45, SD: 1.43, CA: 0.95, CR: 0.96, AVE: 0.65.	I fear wasting my time	0.493	14.08	0.000
	I fear I'll lock myself out of my device	0.843	70.96	0.000
	I fear I won't understand the language of new technology, e.g. Bluetooth, 5G	0.861	81.089	0.000
	I fear a malfunction will wipe out my data	0.792	42.992	0.000
	I fear I won't be able to keep up with it	0.831	60.587	0.000
	I fear I won't know how to operate the device	0.861	77.536	0.000
	I fear my content (files, photo's, programs, etc.) won't work across my different devices	0.795	43.363	0.000
	I fear using ICT will get too difficult as I get older	0.849	65.302	0.000
	I fear my device will crash	0.789	41.921	0.000
	I fear I will forget my passwords	0.742	33.161	0.000
	I fear I'll forget instructions before I can use the device	0.881	88.956	0.000
	I fear I won't be able to find things I need on my device	0.893	109.21	0.000
	I feel there is a high level of risk doing transactions online (e.g. banking, shopping)	0.758	37.114	0.000
<i>Privacy and Security</i> Mean: 3.42, SD: 1.32, CA: 0.89, CR: 0.90, AVE: 0.60.	I fear buying ICT related products online without really understanding what I paid for	0.782	48.464	0.000
	I'm worried that people might be able to access my account or credit card information if I were to shop online	0.857	75.063	0.000
	I worry that I don't know how to cancel my online subscriptions (e.g. magazine, antivirus service)	0.791	48.772	0.000
	I worry that people can see my personal details when I go online to transact	0.855	72.458	0.000
	I fear losing my privacy	0.754	36.145	0.000
	I feel safe doing my transactions online (e.g. banking, shopping) *(reverse coded)*	0.591	14.452	0.000
	I worry that the cost of upgrading my ICT devices will become too expensive for me	0.914	70.091	0.000
<i>Financial Impact</i> Mean: 3.18, SD: 1.23, CA: 0.78, CR: 0.89, AVE: 0.60.	I worry about the increasing cost of using ICT devices (software, subscriptions, internet connection)	0.919	73.317	0.000
	I worry about spending too much when I'm shopping online	0.646	15.999	0.000
	Overspending is easier online than in a regular store	0.546	11.162	0.000
	I worry that friends and family would think less of me if something went wrong in any transaction I made	0.717	31.013	0.000
<i>Transaction Worry</i> Mean: 3.34, SD: 1.25, CA: 0.87, CR: 0.87, AVE: 0.66.	I worry that if transaction errors occur, I cannot get compensation from the company or person I paid	0.823	54.259	0.000
	I worry my transactions and payments will be processed incorrectly	0.891	89.26	0.000
	I am often afraid I will make mistakes when transferring money online	0.832	48.196	0.000
	I worry the goods I purchased online will not show up	0.77	35.693	0.000

(continued)

Table A2. Continued

Construct	Items	Beta	t-value	p- values
<i>Social and Emotional Apprehension.</i> Mean: 3.02, SD: 1.39, CA:0.95, CR: 0.96, AVE: 0.69.	I fear feeling incompetent	0.873	76.669	0.000
	I fear making a fool of myself	0.87	74.88	0.000
	If I were scammed, my friends and family would think less of me	0.673	25.249	0.000
	I fear being overwhelmed	0.891	87.936	0.000
	I fear I'm not going to be able to accomplish what I set out to do	0.873	75.742	0.000
	I fear confrontations on social media	0.691	26.841	0.000
	I fear it will increase my stress and anxiety	0.835	55.68	0.000
	I fear I'll get frustrated	0.84	65.792	0.000
	I fear bothering others with my questions	0.874	76.957	0.000
	I fear being made fun of for my level of ability	0.873	69.841	0.000
<i>Health Fears</i> Mean:2.81, SD: 1.35, CA: 0.78, CR: 0.85, AVE: 0.68.	I fear that it will do me physical harm, e.g.e.g. impact my eyesight or increase repetitive strain injury	0.87	46.41	0.000
	I fear being too physically inactive	0.793	29.363	0.000
	I fear that I might become addicted to it	0.809	29.19	0.000

Source(s): Authors' own work

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