Information & Computer Security

Bridging the digital gap: security, privacy and challenges for older adults in governmental digital services

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Received 10 September 2025
Revised 16 December 2025
16 January 2026
Accepted 1 February 2026

Abstract

Purpose – There is an acknowledged and documented lag in the pick-up of governmental digital services, particularly among older adults. Existing research on the topic identifies practical and psychological factors creating that tentativeness among older adults to embrace moving to operating in a digital space. This paper aims to (i) highlight the digital gap between local governmental services and older adults, and (ii) identify key challenges faced by older adults while interacting with the technology.

Design/methodology/approach – A systematic literature review including ($n = 62$) academic publications was conducted to identify the challenges faced by older adults while interacting with online governmental services.

Findings – An analysis of the existing literature revealed key challenges faced by older adults when interacting with technology, including valuing technologies from the past, privacy and security concerns, anxiety, cognitive impairment, motivation, mode of participation and trust in government.

Originality/value – The study has implications for research, for instance, for developing effective cybersecurity awareness and training content, where success is measured by creating an environment of inclusivity for all.

Keywords Cybersecurity, Digitisation, Older adults, E-government, Awareness, Education

Paper type Literature review

1. Introduction

There is a consensus that, as a society, we are progressing towards fully operating within the online space (Hardill and O'Sullivan, 2018). This rapid digitisation offers opportunities but also poses a real threat (Schou and Pors, 2019). Consider as well that global populations are ageing, and it is projected that by 2050, one in four people could be over the age of 65 in North America and Europe (Elahi *et al.*, 2021). Therefore, attention must be afforded to the

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Information & Computer Security
Emerald Publishing Limited
2056-4961
DOI 10.1108/ICS-09-2025-0352

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older generations, across the globe, appreciating their continuing value to the developing society (Seo *et al.*, 2023). Another important factor to acknowledge, which has been identified in developed countries, is that one-person households are on the increase, and there are fears about their non-use of the Internet non-use considering the potential difficulties they may face in accessing good digital support (Ueno *et al.*, 2023).

In a recent study across the European Union (EU) examining communities from large cities, smaller towns and rural areas, Eurostat found that under two-thirds of people are interacting with their public authority, using the Internet as their primary mechanism (Ciesielska *et al.*, 2022). To further support this, data from the UK's Census 2021 showed a consistent pattern across a three-year timespan of how under half of all visitors to websites controlled by public authorities were actively engaging with the platform to perform common tasks, such as obtaining and submitting information and downloading needed forms (Serafino, 2019). With these trends, the use of digital tools can facilitate a better relationship between the state and citizens and ease any administrative pressures felt (Townley and Koop, 2024).

E-government is the term used to describe this evolutionary model of the redesign of administrative function to improve overall service provision to the public in the aid of progressing democracy (Kim and Kim, 2021). If E-government functions well through the improvement of process streams and the smooth delivery of online transactions, the public builds a positive perception of the mechanism of government, and trust is built from those constructs. However, if the government fails to deliver its e-services effectively, institutional-based trust is eroded, and the authority will struggle to earn a commitment from its citizens (Li and Shang, 2023). Ultimately, the success of E-government is not measured by a given rank, but rather by the acceptance and willingness of those using the digital services (Nookhao and Kiattisin, 2023). Bringing older generations into the sphere of E-government has clear benefits, including tackling social isolation, increasing their familiarity with operating in a digital environment, and gaining access to health management services more quickly (Ciesielska *et al.*, 2022). By facilitating the engagement of its older constituents, a local authority benefits by reducing its burden of public spending, too (Pantelaki *et al.*, 2023).

With the clear benefits of digitisation and E-governmental services, a critical challenge to address is security literacy, which enables citizens' access to these e-governmental services (Naqvi *et al.*, 2025). The European Network and Information Security Agency has also identified the need to improve people's knowledge and competence in the area of cybersecurity going forward (Szczepaniuk and Szczepaniuk, 2022). An education on cyber risks is key, as within the information management framework of people, process and technology, it is the individual who is most vulnerable to threats online (Chaudhary *et al.*, 2022). Older adults are seen as being particularly vulnerable to the risks of cybercrime. They are viewed as lacking confidence around technology use, there is a perception that they carry greater wealth than others, and they tend to refrain from reporting a crime when they have been the victim (Burton *et al.*, 2022). Certainly, an imbalance exists between the institutionalised effort to address the threats of a cyberattack and its people's preparedness to respond to such threats (Lee and Kim, 2020). There is a role for government at all levels in promoting cybersecurity awareness and building its constituents' digital skills (Szczepaniuk and Szczepaniuk, 2022).

Having highlighted the problem statement, a systematic literature review (SLR) is conducted to seek an appreciation of the digital gap between local governmental services and older adults. This SLR aims to investigate key challenges older adults face. The research is motivated by the fact majority of regions in the world, specifically the EU, have an ageing

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population, and the digital divide between the security literacy of the older adults and modern-day security mechanisms makes them vulnerable to various forms of cyberattacks. Furthermore, to determine whether there is real value in local government spearheading a training program for their older constituents on the particular focus area of cybersecurity, the essential aspects of cyber awareness were identified. The remainder of this review piece is organised as follows. Section 2 presents the method adopted for SLR. Section 3 presents the findings from the SLR gathered after analysis of ($n = 62$) academic publications. Section 4 presents the discussion, including the limitations of the study, and Section 5 concludes the paper while also highlighting avenues for further research.

2. Systematic literature review

This paper follows the guidelines set out in the Cochrane review standard to provide a grounded summary of findings in an unbiased manner (Korfitsen *et al.*, 2022). The methodology ensures that relevant studies are identified across a variety of sources and then measured against a given criterion. Selected articles were systematically collected and synthesised to present findings, in answer to the review's questions. The aim of following this standard is to provide an informed analysis, based on high-quality evidence (Wolfenden *et al.*, 2023).

The SLR was conducted in three phases as discussed in the subsequent sections.

2.1 Planning the systematic literature review

The main intention of this SLR is to take a multifaceted approach by analysing academic publications from diverse topics and bringing them all together to review and discuss this niche study's aim, as to how local governmental authorities can overcome the lack of barriers faced by older adults in adopting digital technologies. The following phases were considered while planning the SLR.

2.1.1 Formulating the research questions. The following research questions (RQs) were formulated in line with the objectives of this study:

RQ1. Prevalent is the digital gap between the local authorities and older adults?

With *RQ1*, it is intended to identify the scale of the problem of governmental digital services adoption, reviewing the factors causing the engagement gap, and determining whether it is indeed an issue that needs addressing. In addition to the *RQ1*, the following sub-research question was considered.

RQ1(a). What are the challenges faced by older adults in embracing technologies?

With *RQ1(a)*, it is intended to identify the key challenges that older adults face with technology and further build an appreciation of their confidence levels while operating online, revealing if indeed a lack of cyber-awareness is a core reason for their digital hesitancy. Understanding the relationship between older adults and technology will add vigour to a call for training provision for this demographic group.

RQ2. What does it mean to be cyber-aware?

With *RQ2*, it is intended to develop an understanding of what it entails to be cyber-aware, giving weight to the call for making this a priority learning area and creating tailored training and awareness activities to reduce the digital gap in societies.

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2.1.2 Defining the inclusion and exclusion criteria. In line with the SLR method, inclusion and exclusion criteria (see Table 1) were considered and agreed upon for the review of academic work. The criteria's construction was steered by the research questions mentioned above and by the overall objective of this study.

2.2 Conducting the systematic literature review

The main activity was conducted between May 2024 and November 2025. Articles satisfying the inclusion criteria and published from 2017 up to the commencement of this main search were included in the study. In line with the research questions, keywords were compiled together using Boolean operators to formulate search strings (see Table 2).

2.2.1 Executing the search. To limit the risks of reporting issues, this review closely followed the steps outlined in the preferred reporting items for systematic reviews and meta-analyses (PRISMA) method (see Figure 1). There are four distinct stages within this process flow, which are identification, screening, eligibility and synthesis. The *identification* stage requires identifying suitable academic articles from the targeted databases, and this yielded $n = 635$ results. The *screening* stage involved scanning for any duplicates and then conducting a first review on titles and abstracts alone, further determining suitability. At this stage, $n = 505$ results were removed, which included six duplicate hits, leaving 130 articles to be assessed further against the inclusion criteria. In the *eligibility* phase, $n = 68$ results were removed due to limited alignment with the research aim as specified by the inclusion and exclusion criteria. Finally, $n = 62$ publications were included in the study and further assessed to find answers to the research questions.

2.2.2 Bias. To demonstrate academic excellence, appropriate measures were taken to mitigate the risks of bias while executing the study. Multidisciplinary databases were targeted that are renowned for their specialist content in this study's topic areas to reduce the risk of irrelevant articles being considered for the review. This action alone reduces the possibility of a *selection bias* appearing in the study. To mitigate the possibility of a *reporting bias*, as mentioned above, this review followed the steps set out in the PRISMA flow

Table 1. Inclusion and exclusion criteria for SLR

Search feature	Inclusion criteria	Exclusion criteria
Content language	Published in English only	Non-English publications
Publication date	Published from 2017 onwards, to examine the contemporary nature of the study's problem statement	Published pre-2017
Article type	Peer-reviewed academic publications, governmental publications and industry reports	Non-peer-reviewed academic publications, news and blog sites from the internet
Applicability	(1) Studies that focus on the difficulties in governmental digital services adoption, (2) The experience of older adults with embracing digital transformation (3) Studies that provide a holistic look at cybersecurity awareness	Studies that do not provide value to the set research questions
Bias	Pass the check that the content reliability and validity are not affected	Identifies bias found in content

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Table 2. Search strings used in this SLR

Research question	Search strings
RQ1	(e-government or local government) AND (digital divide OR TAM theory OR RAT theory OR PMT theory) AND (older adults OR older people)
RQ1(a)	(older adults or older people) AND (cyber OR cybersecurity OR cybersecurity awareness) AND (digitisation OR ICT) AND (privacy OR security)
RQ2	(cyber or cybersecurity) AND (awareness OR training)

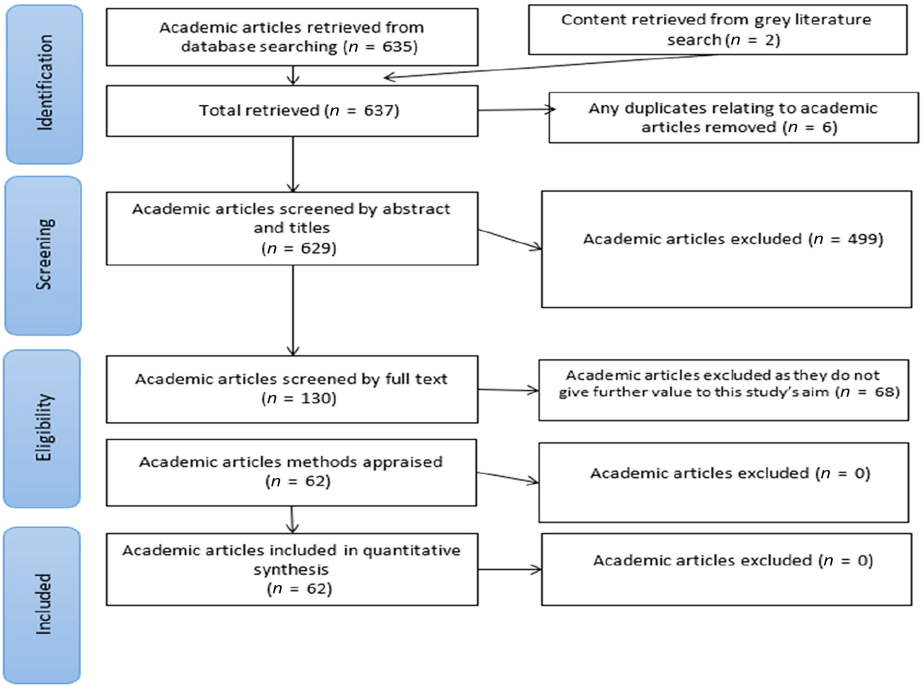

Figure 1. PRISMA flow diagram detailing the steps of the SLR

diagram. To address *competing bias*, the researchers involved in the study declare that there is no conflict of interest or alliance with a body, as this study is concerned.

3. Findings from systematic literature review

In alignment with the research questions, the synthesised articles' focus was on the areas of e-government, older adults and the challenges they face, and cybersecurity, with understandable variants of these terms, to gather a more holistic understanding. Following the synthesis of the included work, it is now important to present the findings and appraise the content for applicability to this study's aim.

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3.1 RQ1 how prevalent is the digital gap between the local authorities and older adults?

There is a generally held expectation that society should progressively move with the pace of evolving technology (Betts *et al.*, 2019). However, not all have kept up with this regarded policy of "Digital by Default" (Schou and Pors, 2019). Furthermore, Harvey and Brazier (2022) offered a viewpoint that people are indeed being forced to comply with digital transformation, with absolutely no consideration to their circumstances. Digitisation of services, by its design, leans towards the young and technologically savvy, leaving some demographic groups behind, towards the goal of functioning fully in the online space (Boland *et al.*, 2022). There is a clear opportunity for digitisation to bring society together in a more cohesive manner, but there must also be recognition of the threat it poses, in that new forms of social exclusion can germinate from its seed (Schou and Pors, 2019).

A recent study observed a negative trend between ageing and interaction with e-government services (Pérez-Morote *et al.*, 2020). This observation is supported further by evidence that found that for those over the age of 65, 37% are less likely to use governmental websites, and 58% of the sampled population are hesitant to download administrative forms (Harvey *et al.*, 2021). Senior citizens exhibit a preference for face-to-face contact with the government, rather than through electronic channels, as they value strongly human judgement on important matters (Ciesielska *et al.*, 2022). The government should consider the challenges the elderly face and look to simplify the process, which would allow better manoeuvrability around their website (Butt *et al.*, 2021). Older adults hold the idea that governmental digital services provision is more designed for the needs of the authority rather than for their own needs (Hardill and O'Sullivan, 2018), and it is this level of mistrust that can turn them away. Consider as well that the elderly crave a sense of security and so require it from their government, and when having to operate with digital technology. There is then a real opportunity for an authority to support this age group, through the hosting of their services platform (Ciesielska *et al.*, 2022).

Similarly, Butt *et al.* (2021), examined the fundamental lack of motivation from the older adults to use digital services, finding that those over the age of 65 showed hesitancy when new technology was introduced, and that those over the age of 85 had no desire to learn new IT skills at all.

Furthermore, Santofimia *et al.* (2021) investigate this from a perspective of quick access to health advice and improving overall well-being, through connectivity. A good predictor of how consistently older generations go online is their experience with computers pre-retirement (Hunsaker and Hargittai, 2018). However, a majority of the older adults have found themselves on the wrong side of a "Grey Digital Divide", which has become a focused area of concern for policymakers and academics alike (Mubarak and Suomi, 2022).

The embedding of e-government practice into society has encountered obstacles as people have struggled to get comfortable with the platform, overcoming trust issues and operability difficulties. This has undoubtedly stretched a digital gap between people and their governments. Recent studies have looked closely and found that older generations have been particularly struggling to adapt to this transformational move, and therefore, it is important to understand the experiences and difficulties faced by this group so that they can contribute fully to a burgeoning digital society.

3.2 RQ1(a) What are the challenges faced by older adults in embracing technologies?

The challenges faced by older adults in embracing technologies are multifaceted; however, they are interrelated. The challenges identified from the existing literature can be broadly categorised into the following categories:

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- Cognitive and Psychological: these include challenges such as anxiety while using digital technologies, issues related to cognitive impairment and motivation in adopting new technologies.
- Attitudinal and Experiential: these include issues such as valuing technologies from the past and developing attitudes shaped by prior experiences.
- Security, Privacy and Trust: these challenges relate to perceived security and privacy concerns, as well as institutional trust.
- Mode of participation: this refers to how older adults are expected to participate in, for instance, security awareness training.

Each of these categories is discussed in detail in the subsequent sub-sections.

3.2.1 Cognitive and psychological. In their study examining the growth of digital mental health interventions, Yin *et al.* (2024), found that older adults worried about negative perceptions of their age and mental health decline, which hampered full adoption of digital technologies. Sensitivities about mental well-being issues being shared with unknown individuals and the threat of anonymous intrusion were key factors in creating doubt in utilising these tools in the digital realm. They are conscious of age-related decline, viewing the wealth of information and services online as detrimental to keeping oneself physically and mentally healthy. Some prioritised to take that trip out for exercise, seek that social interaction and to find an answer for themselves (Money *et al.*, 2024). Online interactions have been found to offer less appeal to the older generations, due to sociopsychological barriers being built by heightened risk sensitivity and lack of human support. They are also less likely to put any value on online contact due to its inability to provide that meaningful co-presence, vital in the support of any ageing decline (Goodarzi *et al.*, 2023). Cognitive impairment does indeed become a more viable condition as we age, so factors such as screen size on a device, user interface design and managing many permissions for each downloaded app can cause feelings of frustration and confusion, leading to avoidance intention by the elderly (Elahi *et al.*, 2021). Furthermore, Suchowerska and McCosker (2022) identified that any public authority must find that balance in their digital services provision in the accessibility of both standardised resources and customised support functions.

Fake news has a propensity to cause damage through its transmission of misleading and false information. Older adults have displayed vulnerability to this deliberately biased content as they don't have the conscious mechanisms in place to be able to shield themselves from fake news, interpreting fact from fiction (Zhang and Ghorbani, 2020). Although Choudrie *et al.* (2021) offer a contrasting viewpoint, in discovering that the older generations do in fact seem more resistant to online misinformation than the younger and perceived as more digitally literate age groups.

Being competent with navigating digitally, using online services regularly, has been found to hamper age-related decline (Heponiemi *et al.*, 2022). Those who maintain a natural interest in technology were found to display greater self-efficacy in operating with digital tools, and being in better health, their cognitive abilities were sharper than those of their peers, who had shown an avoidance inclination to digitisation (Betts *et al.*, 2019). The digitisation of services has moved at such a rapid pace that questions need to be asked about whether older generations have had the appropriate time to gain familiarity with today's technologies. Abdalla (2024) found that if individuals understand the qualities and capabilities of technologies put in front of them, then this raises their perceptions of the usefulness of functioning in this more automated space.

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During their research, Money *et al.* (2024), found that older adults functioned in a very narrow way, while online. Standardised tasks such as online banking and shopping were routinely performed, but aspirations did not stretch outside those boundaries as older participants spoke of worries about losing track of their personal data and money in the digital space. Older adults do exhibit anxiety with new technology, citing helplessness and feelings of inferiority (Karagiannopoulos *et al.*, 2021). Multi-factor authentication adds an extra layer of protection to logging into online profiles, and older adults found this additional step monotonous; however, by continued practice, they felt safer and reassured by the safeguard (Braz *et al*, 2018). In the same study, older participants commented that they did not understand cookies, so they just accepted them onto their devices anyway (Ellefsen and Chen, 2022). Both these examples illustrate a complete lack of awareness shown by these older adults of the intricacies of the online space. When seeking help, the elderly can show a distinct lack of knowledge as to where to find appropriate guidance, with only Citizens Advice and Age UK being mentioned as sources of support (Karagiannopoulos *et al.*, 2021). The language of technology has proved to be a barrier, and the shame about not being able to articulate issues clearly, again, leads to avoidance intention (B. Morrison *et al.*, 2021). Therefore, older adults seek this technical assistance from their social peers and are strongly influenced by friends and family on matters (Seo *et al.*, 2023).

Within the literature, it can also be seen that older adults possess a vulnerability to cyber risk because of a lack of motivation to learn, adding credence to the call for a supportive training program in cybersecurity. However, the time of COVID highlighted that in periods of necessity, older adults can find the required motivation to engage with technology. (Ueno *et al.*, 2023), identifying that tailoring guidance and policy to encourage and engage people can deliver positive outcomes. Therefore, successful adoption of digitisation can only be achieved if the user maintains a trusted awareness of this evolutionary journey and reaches a level where they can competently use technology to its full benefit, for them as individuals (Weck and Afanassieva, 2023). Having the capability in the digital space gives individuals the appropriate tools to establish their role in the environment and go on to find their personal and professional opportunities (Pawlicka *et al.*, 2022). What can really be drawn from the review of literature is how detached older adults can find themselves from digital technology and online ways of operating, and this does lead to a lack of interest in finding out more.

3.2.2 Attitudinal and experiential. The older adults view technology's benefits to them, judge it on its affordability and accessibility, and consider how operating with these tools will make them look to others and whether this could be a threat to their independence (Weck and Afanassieva, 2023). Furthermore, it is quite common to find that this demographic group already holds a negative opinion of the usefulness and usability of this medium (Satake *et al.*, 2021). Taipale *et al.* (2021) add further to this by suggesting that the older adults still value the technologies from their time, finding comfort in their consistency, so there is no inclination to accept the digital transformation. For many in this group, navigating online is new, and this lack of familiarity causes mistrust and a sense of nervousness (Harvey *et al.*, 2021). It must also be noted that there is an unconscious bias about the older adults' skills with digital technology, and awareness of it leads older adults to just avoid the medium and the exposure that it brings (Morrison *et al.*, 2023).

3.2.3 Security, privacy and trust. Older adults assess the value of technology adoption through multiple lenses, although in our analysis of the literature, privacy concerns have been cited as a *common blocker* to full engagement. During this rapid rise of digitisation, privacy acts as that foundation enabling people to preserve an identity, a sovereignty and dignity in this constantly evolving society. A judgement on privacy is a key consideration for adoptive behaviour towards technology. This judgement is a complex construct of one's

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awareness, need for control and trust in the digital platform (Salah and Ayyash, 2024). Technology does now have its place in our daily lives, however, and this has led to heightened feelings of anxiety about one's personal privacy. The invasion of digital services and smart home tools has been found to threaten older adults' sense of privacy, and this has had a detrimental effect on how they perceive the usefulness of full technological adoption (Liu *et al.*, 2023).

Privacy and security are indeed sought by the older generations, so online platforms are consciously assessed against these measures, and if they are perceived to be lacking, this will negatively impact the older adults' attitudes to adopt these newer ways of operating. A third of people over the age of 50 cited privacy fears as a real barrier to adopting new technology (Ellefsen and Chen, 2022). The design purpose of the digital tool raises those privacy and security concerns for older generations, with commonplace user interfaces to support with health and financial matters, causing apprehension and thus affecting behavioural intention (Moxley *et al.*, 2022). Older adults have proved less likely to secure their devices, compared to younger demographics, however, it has been seen that they are more inclined to use stronger individual passwords and take software updates as regularly as possible, in contrast to young people (Branley-Bell *et al.*, 2022).

Lived experience has also been found to build a critical attitude towards digitisation as older generations steer more towards safeguarding their privacy and security because of past events, rather than actively picking up the technology. It was also cited that a feeling of losing decision-making control in the intrusive online space, sacrificing one's privacy, has proved to be a deterring factor to older adults (Kebede *et al.*, 2021).

Finally, trust in government is another influencing factor on an individual's intention to use, as effective e-services provision allows the authority to display its abilities with open integrity. If their digital platform were to fail due to a technical issue or an administrative blunder, citizen trust would quickly be eroded (Alzahrani *et al.*, 2017). Certainly, the rollout of e-government has been hindered by people's feelings of mistrust in government activities so far (Hashim, 2024).

3.2.4 Mode of participation. In addition, the mode of participation in training also impacts older adults' readiness to adopt technologies. Boland *et al.* (2022) found that virtual participation with authorities, however, can be a viable alternative to engaging with them face to face, and so then, the issue lies in bringing the people to the digital realm.

A summary of the challenges discussed earlier is presented in Table 3.

3.3 RQ 2 What does it mean to be cyber-aware?

Firstly, it was identified that the term cyber-aware is less prevalent in the academic literature and has been used mostly in public awareness campaigns referring to cybersecurity awareness. For instance, the Government of UK Government's "Cyber Aware [1]" initiative focuses on cybersecurity awareness. Based on this understanding, the discussion in line with *RQ2* seeks to provide what it entails to have cybersecurity awareness. Being online is increasingly more accessible due to the proliferation of devices, allowing people freedom to do and share as they wish. This environment has created serious risks, although, to individuals' information and status. It is a manipulative space, where many can find themselves susceptible to the use of subtle tools like targeted advertising and dark patterns (Mentis *et al.*, 2020). Humans are particularly exposed to cyber risks, and so having that awareness of the dangers out there can greatly improve their online safety (Mohammad *et al.*, 2022). There is a generalised misdirected viewpoint that cyberattacks only happen at the higher corporate level and don't touch individuals (Blackwood-Brown *et al.*, 2021).

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Table 3. Highlighted key challenges faced by older adults adopting technology

Category	Challenge	Summary
Cognitive and psychological	Cognitive impairment	Ageing can lead to a declining awareness of the threats online (Yin *et al.*, 2024; Money *et al.*, 2024; Elahi *et al.*, 2021; Zhang and Ghorbani, 2020)
	Anxiety	Operating in the space can lead to negative thoughts of helplessness and low self-esteem (Karagiannopoulos *et al.*, 2021; Money *et al.*, 2024)
	Motivation	A lack of desire to learn new IT skills (Ueno *et al.*, 2023)
Attitudinal and experiential	Value technologies from the past	This leads to a lack of general enthusiasm for digital transformation (Taipale *et al.*, 2021)
Security, privacy, and trust	Privacy and security	A large proportion of this demographic group cites privacy fears as a main cause of digital hesitancy (Salah and Ayyash, 2024; Liu *et al.*, 2023; Ellefsen and Chen, 2022; Moxley *et al.*, 2022; Kebede *et al.*, 2021)
	Trust in government	A sense of mistrust can cause challenges in using digital services (Alzahrani *et al.*, 2017; Hashim, 2024)
Mode of participation	Mode of participation	Older adults, particularly those having mobility issues, face challenges in participating in physical training, yet those with cognitive impairments find it hard to follow in virtual environments (Boland *et al.*, 2022)

To be cyber aware depends on the quality and suitability of any instruction received, and that information has to be absorbed and translated into proactive and safe online behaviour by the individual (Mohammad *et al.*, 2022). It requires a commitment from the individual to address any encountered issues with a richness of understanding (Lee and Kim, 2020). Being alert to online threats is necessary, but it is not sufficient to steer positive behavioural change, as there is still the possibility for individuals to go seek support from less reliable sources, such as friends and family (B. A. Morrison *et al.*, 2023). Those with commercial growth agendas will promote their security products by sensationalising online risks, and the internet and broadcast media can also be very pervasive in their roles of disseminating cybersecurity information (Nicholson *et al.*, 2019).

In their study, Szczepaniuk and Szczepaniuk (2022) sought insights into people's awareness levels of cyber threats across a range of age demographics. Discovering broadly that a noticeable proportion of each population had no awareness of online risks. A distinct pattern could also be observed from the findings in how the awareness levels drop through ageing, with only 17% of those aged over 65 claiming to be mindful of cyber risks. Indeed, it has been found that the older generations have very precise requirements when it comes to them seeking resources, covering cyber awareness (Karagiannopoulos *et al.*, 2021). A lower socioeconomic status can also impact the behavioural approach, as Mohammad *et al.* (2022), found that people deemed in this class can display dismissive attitudes to online safety practice.

Furthermore, it can also be said that an individual must have good "cyber hygiene" (Naqvi *et al.*, 2021). This acknowledgement relates to one's adoption of a set of rules and

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behaviours for operating in cyberspace that will improve the safety of the user as they navigate onwards (Szczepaniuk and Szczepaniuk, 2022). It requires a healthy degree of scepticism and a drive to act when running into cyber threats (Chaudhary *et al.*, 2022). Akter *et al.* (2022) conducted a recent study and found no consistency in areas of good cybersecurity behavioural practice. Nearly half of those in the workforce reuse their passwords, under half of their sampled population proactively secured their home networks, and a large proportion were not alert to the risks of using free Wi-Fi. Older adults have been shown to display reluctance to practice good cyber hygiene, citing low self-efficacy and a general lack of awareness of security issues (Branley-Bell *et al.*, 2022).

In addition, the advent of new technologies such as cloud and quantum will create new approaches to tackling cybersecurity issues, but they will also introduce new attack vectors. This means having and maintaining awareness of threats is a constantly evolving skill for people (Akter *et al.*, 2022).

Governments are incentivised to promote cybersecurity awareness, increasing their citizens' preparedness as they are scaled on national performance indexes, such as the Global Cybersecurity Index (Lee and Kim, 2020). Although these initiatives targeted at the masses have proven to help mitigate victimisation, the relentless versatility of the cyber-criminal to change their attack patterns, quite often, lowers the lasting impact of any mass educational program. Successfully reducing cybercrime is ever more becoming an increasingly difficult task (Sarkar and Shukla, 2023).

4. Discussion

4.1 Research agenda

This study considered an identified issue for local governments concerning the adoption of their digital service platforms. The review was then narrowed to a particular demographic group, older adults, as the principal users of governmental services. It was therefore important to then examine their experiences as users of digital technology to gain an appreciation of the challenges faced. From the reviewed literature, common barriers were identified. Practical and psychological factors intertwine as natural ageing, ferment a stronger sense of protecting one's privacy and security, yet also heighten feelings of anxiety, as technology advances around them. This review discovered, however, a willingness among older adults to learn, but consideration must be given to the mode of training.

After understanding how older adults view the technology, the study then looked at the niche area of cyber awareness to provide a contemporary review on people's perception of this and their approach mechanisms to it. Within the literature, it was agreed that the digital realm poses real risks to people's identities, and hence, having that awareness of real online threats and their mitigating measures can build a more resilient digital presence. This study did indeed find that the majority of older adults lack an awareness of cyber risks, and this could be due to their specific learning requirements. It is clear, however, from the reviewed literature that older adults having this lack of cybersecurity awareness was not the principal factor causing their digital hesitancy. Continuing with the agenda of this review, our study ultimately seeks to determine whether there is real value in local government fronting an educational initiative targeted at the older generations.

Suchowerska and McCosker (2022) noted that the current educational resources out there on cybersecurity assume an already informed level of understanding from the reader, which can disadvantage many. There are available apps for download that teach the user the online security fundamentals, but they have failed to have a sufficient impact and create that lasting change (Nicholson *et al.*, 2021). For example, content that has covered cybercrime awareness is not very useful for certain demographic groups to absorb (Karagiannopoulos *et al.*, 2021).

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The language of educational materials should be set at a level that doesn't cause the learner to feel incompetent or naïve about the topic area (Karagiannopoulos *et al.*, 2021). Delivery is important as well, as taking an approach to instil fear by compliance has proved less effective than focusing on the practical skills-building elements (Mohammad *et al.*, 2022). There is certainly an opportunity to take an approach to integrating older populations into a digital society by not only looking at their skills development, but also prioritising methods to change attitudes to online activity (Kang *et al.*, 2024). The goal must be to change mindsets so that people are willingly returning to learn more and develop their capabilities on said topic (Lazarov *et al.*, 2023). Current literature on this matter summarises that the most effective instructive approach proved to be person-to-person support, which allows a connection to be built between teacher and student (Branley-Bell *et al.*, 2022). This face-to-face method can boost learners' mental well-being as well, if they were to struggle with comprehending the topic being taught (Marinucci *et al.*, 2022). In addition, Rivinen (2020) identified that training specifically for older adults must be designed to meet their current needs and shaped for them as individuals. Betts *et al.* (2019) discovered that group learning can be perceived as an obstacle by the elderly to fully engage with online skills training. Learning must also be paced accordingly and must not rush older adults in their journeys, acknowledging the probable decline in cognitive abilities (Rivinen, 2020). In their study, Goodarzi *et al.* (2023) identify that policymakers must now recognise the value in educating older adults in digital literacy, as this will clearly bridge the social inequality faced and draw in the information gap. Privacy must also be regarded as generally, it is a general societal concern now, and attention must be given to implementing transparent privacy controls, understandable to all (Kebede *et al.*, 2021).

4.2 Relevance from a theoretical perspective

The research questions and findings have significance from a theoretical perspective. Social differences have been examined as a causal factor in this digital divide. Resources and Appropriation Theory put forward that inequality in society leads to an unfair distribution among people. This results in a lack of access to and use of the internet and a fundamental reduction in competency with digital skills (Ueno *et al.*, 2023). Education and one's income level have been recognised as two factors adding to the digital divide in society. Older adults with good education and solid income support are more enthusiastic about online activity and generally hold a positive view of the digital space (Kang *et al.*, 2024).

Digital inequality can also be understood using Protection Motivation Theory (PMT). This concept explores how we can mechanically have a protective response after perceiving a threat that has the potential to bring danger and cause harm to us. PMT extends to the triggering of a coping strategy to address any appraised risk (Hassan *et al.*, 2024). A part of PMT looks at the value of data from emotional and monetary viewpoints. Those with valued assets are likely to respond and take firmer action to a perceived risk to their security (Hassan *et al.*, 2024). This paper posits that older adults, who have shown clear concerns about threats to their accumulated wealth, can perceive the online space as a real security risk and therefore are likely to show avoidance tendencies.

In addition, the Technology Acceptance Model (TAM) theorises how people view and pick up various technologies. Two essential constructs of this model that lead to technology acceptance are perceived usefulness and judged ease of use. However, the model is permeable to other factors, such as a pre-existing awareness of the technology landscape (Abdalla, 2024). Schroeder *et al.* (2023) call for TAM to be developed further to account for the older generations, to acknowledge the nuances in their conditions for overall technology acceptance. Applying health and psychology constructs to the model with give deeper

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insights into older adults' behavioural intentions. Money *et al.* (2024) gave the view that TAM provides quantitative results about the adoption of technologies, rather than giving those personal insights into the why; digital hesitancy exists for older adults.

4.3 Limitations and directions for future research

As discussed earlier, steps were taken to limit the risk of bias; however, some relevant literature might not be included due to the subjective judgement of the researchers involved in the study. Going forward, there are many possibilities for further study. The review was able to identify a contemporary problem in society's adoption of governmental digital services and was able to identify a trend, in that this issue is more visible and prominent for older demographic groups.

As gathered from this study, older adults can have very narrow views about digital transformation before fully appreciating its value and benefits (Satake *et al.*, 2021). However, scholars have also identified a certain eagerness from this group to understand how to operate in the digital realm (Betts *et al.*, 2019). Therefore, it must be acknowledged that more research attention should be afforded to the elderly specifically, to fully appreciate their preconceived views about technology and look for solutions to their fears, so that their slumbering enthusiasm can be cultivated further. Furthermore, digitisation of services has pushed the accessibility of human support further away from the user, but this review was able to discover that the older generations still greatly value a personal approach to service interactions (Heponiemi *et al.*, 2022). This study found that there is indeed a space for formal training in society, particularly for the elderly. A question remains, although, as to who would be better to provide this, be it the local government or the private sector? Certainly, if a local authority struggles to provide this due to cost and resource issues, further research would be needed to address the elderly's perception of private enterprise, to ensure value is taken from any learning initiatives.

Finally, there is an opportunity to focus on the challenges surrounding how to publicise cybersecurity awareness, as this review has found that to be the real pain point. Current and available resources do not have the needed impact on society to protect individuals' online safety.

5. Conclusion

It is statistically recognised that digital services adoption from the governmental perspective has been below expectations. This SLR was structured to explore a much-researched societal group, in the digital transformation space, being older adults and examine their experiences with technology. Determining the benefit of a proposed cybersecurity training program hosted by a local authority. It is hoped that the discussions raised throughout this review piece will enthuse fellow researchers to use this work as a solid foundation, as was its intention, to really seek solutions to help the elderly become more familiarised with operating online and know how to protect themselves from cyber threats.

This study discovers the specific needs of older adults when it comes to their learning. That a personalised approach to cybersecurity learning would be beneficial to them. It is acknowledged that supporting the elderly with digital transformation is a contemporary issue, as our younger generations will age with that already embedded knowledge about operating confidently online. Ultimately, although, this study calls for proper attention to be given to the problem of cybersecurity resources and how they are not successfully being absorbed into the fabric of our societies. Thought must be given to the development of materials and the methods of dissemination, to properly allow people to fully understand and embed good cybersecurity behavioural practice.

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Note

[1.] www.ncsc.gov.uk/cyberaware/home

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