

Older and Ethnic Minority Population's Access to Online Financial Services in the UK: Human, Technological and Societal Issues

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DECLARATION

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PUBLICATIONS

Papers that have been published throughout the PhD study:

1. THOMAS, D., CHOWDHURY, G. & RUTHVEN, I. Exploring older people's challenges on online banking/finance systems: Early findings. Proceedings of the 2023 Conference on Human Information Interaction and Retrieval, 2023. 333-337.
2. THOMAS, D., CHOWDHURY, G. & RUTHVEN, I. Are older people battling with digital financial services? iConference 2024: Wisdom, Well-being, Win-win, 2024.
3. THOMAS, D., CHOWDHURY, G. & RUTHVEN, I. A framework to facilitate older people in leveraging online financial services. International Conference on Asian Digital Libraries, 2025a. Springer, 305-319.
4. THOMAS, D., CHOWDHURY, G. & RUTHVEN, I. 2025b. Grey digital divide: factors associated with older people's use of the Internet for financial transactions in the UK. *Journal of Documentation*.

ABSTRACT

This thesis investigates the diverse challenges encountered by older and ethnic minority population's access to online financial services. Digital services which incorporate financial transactions are considered as online financial services. Obstacles faced by older people who are aged 65 and over, whose first language is not English and those from ethnic minority groups, have not been addressed in previous research. Therefore, in order to bridge these gaps, this study conducted semi-structured interviews to identify older people's impediments to using digital financial services. Through the interviews with older people and intermediaries, several key challenges that could deter older people from adopting and using such services were established, for example, fear, cultural traits and linguistic challenges.

The qualitative data led to the development of personas which assisted in developing a theoretical tool. This could be utilised by finance service providers and other stakeholders to quantify the broad factors that could contribute to the challenges faced by older people in accessing online financial services. This tool could also be used to identify unique and prevalent challenges faced by multiple ethnic minority groups.

This study also created a categorised representation of the factors identified through a review of the literature that could be deployed to determine the various factors in relation to older people's access to digital financial services. Subsequently, the qualitative data was mapped onto this diagram to identify novel factors, to explore factors not disclosed through this study, and to recognise the factors corroborated through interviews. As a result, an updated version of the visual representation of the factors was created.

Not only does this study enhance our knowledge but also the contributions of this study would assist service providers to develop interventions which would address the obstacles faced by older people, especially those from ethnic minority groups.

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CHAPTER 1

Introduction

The proliferation of technology is resulting in the creation of diverse digital products and services for individuals to lead a convenient day-to-day life and have an efficient lifestyle. However, in this process of evolution of technologies, certain people in society, especially older people are being digitally excluded due to a range of challenges and they are not leading an optimised way of living due to not leveraging the internet. In the UK, around 2.3 million older people who are aged 65 and over are non-internet users and 37% of older people lack the required digital skills to access online (Age UK, 2024b).

This research focuses on the key challenges experienced by older people (those who are aged 65 and over) in the adoption and use of online financial services. Online financial services refer to any websites which have a financial component of transaction, for example, online banking, online shopping and online insurance policies. Utilising such services could prevent older people from travelling to physical branches. Data from the House of Commons Library showed that, “3.5% of the UK population lived further than 2km from a bank, building society, Post Office branch or ATM” (Booth, 2023). This could indicate that older people who live far away may not be able to easily access the branches or shops to carry out basic activities, especially if they have disabilities. Hence, they have to utilise online services. However, this is not feasible if they lack digital skills.

This is a study based on the largest city in Scotland, and the study population covers different areas of the city and the surrounding suburbs. This research acknowledges several challenges faced by older people (those aged 65 and over) from ethnic groups through a review of the literature and selected research methods. Specific ethnic groups were chosen to carry out this study: a) White (Scottish) and b) Asian, Asian Scottish or Asian British. The latter included ‘Pakistani, Pakistani Scottish or Pakistani British’, ‘Chinese, Chinese Scottish or Chinese British’ and ‘Indian Scottish or Indian British’ groups. Organisations in urban areas assisted in recruiting older people and intermediaries for interviews. This led to the identification of several novel challenges experienced by older people from different ethnic backgrounds.

The study process and findings are highlighted in the upcoming chapters. This chapter discusses the research context, research objectives, research questions, thesis structure and publications.

1.1 Research Context

Although internet users in older people's age groups have been soaring over the years in the UK, ONS (Office for National Statistics) data depicted that 65-74 and 75+ age groups had the highest proportion of internet non-users (11.4% and 38.8% in that order) when compared with other age groups (ONS, 2020b). This clearly demonstrates that older people who are aged 65 and over barely use the internet which, in turn, indicates their low usage of online financial services. Also, ONS data shows that 28.9% of older people who were retired never used the internet or they utilised the internet over three months ago (ONS, 2020b). Hence, this study investigates the challenges faced by older people who are aged 65 and over. In terms of financial services, the House of Commons Library reported that, "around 6300 bank and building society branches have closed since January 2015. This is equivalent to 64% of branches in January 2015" (Abbas Panjwani, 2025). Other financial services and digital services that involve financial activities, e.g. renewal of driving licenses, paying online for various government and council services, have also moved online and expect people to use their services digitally. Thus, digital financial services were chosen as the focus of this study.

Around 13 million people aged 65 or over will be residing in the UK in ten years (Age UK, 2022). Older people will be digitally excluded to a great extent if digital financial services are not utilised. Therefore, this research is significant as the contributions of this study would lead to assisting marginalised people, especially older people to leverage online financial services more competently. Even though older people would benefit from this project, other stakeholders would be interested in this study such as volunteers/employees, digital carers (i.e., family, friends or relatives) (Thomas et al., 2024), government and organisations such as NGOs (non-governmental organisations), financial service providers (e.g., RBS (Royal Bank of Scotland), M&S (Marks and Spencer)) and regulatory bodies (e.g., Financial Conduct Authority). Employees, digital carers and organisations aid older people with digital financial services (see Chapter 4 for more details). Contributions produced from this study could promote stakeholders, especially financial service providers to accelerate digital inclusion

through new interventions or by amending existing services/products. Engagement with many of the stakeholders was carried out through the interviews which resulted in various key findings regarding older people's challenges with online financial services. Since this study occurred following the Covid-19 lockdown, there were major difficulties in recruiting the relevant participants. This is discussed further in chapter 3.

1.2 Research Objectives

- This study aims to concentrate on older people's interactions with digital financial services and explore the diverse barriers encountered by them in the use of these services.
- This study intends to provide a key theoretical contribution to knowledge by enhancing our understanding of the key challenges encountered by older people aged 65 and over, especially those whose first language is not English and those from ethnic minority groups.
- This research aspires to generate a positive impact through the contributions of this research. Inclusive interventions that could be produced from the contributions would facilitate digital inclusion. As a result, older people and intermediaries could save time and utilise it for other activities, thus enhancing social sustainability. Organisations could utilise the data in this study to amend or produce new policies/products which could facilitate vulnerable people including older people to leverage online financial services in their day-to-day lives which results in reinforcing digital inclusion.

1.3 Research Questions

An in-depth understanding of the topic was grasped through a review of the literature which led to the identification of research gaps and formation of four research questions:

- 1) What are the key challenges encountered by older people aged 65 or over whose first language is not English on online financial services?
- 2) What issues related to online financial services do older people (those aged 65 or over) from ethnic minority groups experience?
- 3) How to assess the factors that contribute to the challenges encountered by older people?

4) How do the contributions of this study lead to new interventions that could address the challenges faced by these older people?

The first two research questions intend to address the challenges confronted by older people whose first language is not English and those from ethnic minority groups. There are limited studies on these specific groups particularly in the context of online financial services. Thus, their difficulties with digital financial services have not been established. These are major research gaps which were discovered after conducting a review of the literature on the research topic. Individuals from ethnic minority groups and those whose first language is not English are considered as two different cohorts since there are individuals whose first language is English but their ethnicity is different. The third question focuses on the development of a novel tool which could assist in gauging the factors that could contribute to the challenges experienced by older people. Again, this is another research gap in the context of digital financial services. Lastly, the fourth question aspires to demonstrate how the contributions of this research could result in aiding older people to utilise online financial services and how other stakeholders could develop potential solutions to decrease digital exclusion to some extent.

1.4 Thesis Structure

This thesis consists of six chapters (including this introduction chapter); a chapter outlining the 'literature review' which led to the formation of a categorised representation of the identified factors, a chapter on 'methodology' which discusses the research methods employed to conduct the study, a chapter on 'interview findings', a chapter on the development of a 'theoretical tool' and a 'conclusion' chapter which summarises the whole study along with limitations and recommendations for future work. A diagram which would assist in identifying the chapters where answers to the research questions can be determined is shown below in Figure 1.2. Also, the key contributions are displayed in the diagram: a categorised representation of the identified factors, key findings identified through interviews, theoretical tool and an updated version of the visual representation of the factors.

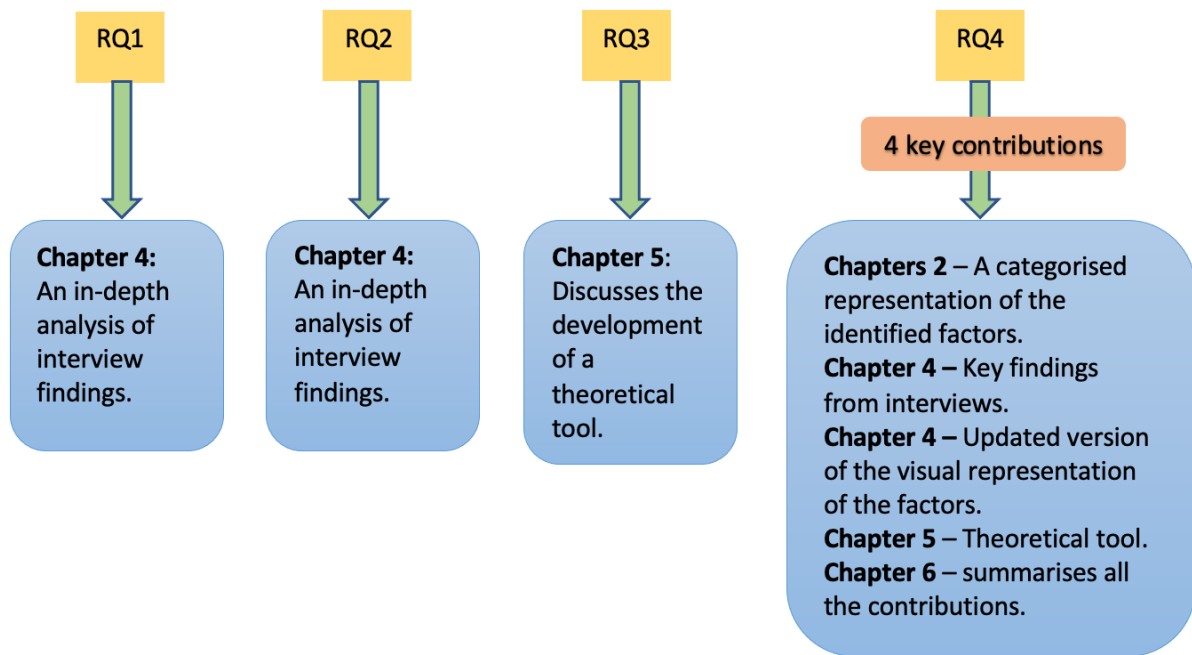


Figure 1.2: Identification of key chapters

1.5 Publications

Four peer-reviewed publications were utilised to write the chapters in this thesis:

- Chapter 4 includes the preliminary findings extracted from the following papers:
 - THOMAS, D., CHOWDHURY, G. & RUTHVEN, I. Exploring older people's challenges on online banking/finance systems: Early findings. Proceedings of the 2023 Conference on Human Information Interaction and Retrieval, 2023. 333-337.
 - THOMAS, D., CHOWDHURY, G. & RUTHVEN, I. Are older people battling with digital financial services? iConference 2024: Wisdom, Well-being, Win-win, 2024.
- Chapters 2 and 4 include the content extracted from the following paper:
 - THOMAS, D., CHOWDHURY, G. & RUTHVEN, I. 2025b. Grey digital divide: factors associated with older people's use of the Internet for financial transactions in the UK. *Journal of Documentation*.
- Chapter 5 expounds on the theoretical tool mentioned in the following paper:
 - THOMAS, D., CHOWDHURY, G. & RUTHVEN, I. A framework to facilitate older people in leveraging online financial services. International Conference on Asian Digital Libraries, 2025a. Springer, 305-319.

Also, the 'Literature review' sections in all the aforementioned papers were employed to write Chapter 2 and the 'methodology' sections were utilised and elaborated in Chapter 3.

CHAPTER 2

Literature Review

This chapter has four main sections. The first section explains the techniques utilised to search the literature. The second section describes the literature review that was undertaken to comprehend the basic background of this research. The third section details the factors that were identified through a review of the literature and how this resulted in the formation of a visual diagram consisting of four main areas which is considered as one of the contributions of this study (section 2.4). The fourth section summarises the whole chapter, highlighting that there are not many studies on older people aged 65+ in relation to online financial services, especially those who are from ethnic minority groups and those whose first language is not English.

2.1 Search Techniques

In order to understand the research topic and to determine the research gaps, searches were carried out on scholarly databases: University of Strathclyde SUPrimo, Web of Science, Scopus and Google Scholar. Different terms were used in multiple searches to gather more papers related to the topic, for example, 'older people's use of online financial services' and 'older people's interactions on digital financial services.' Keywords that were included, but not limited to, were 'challenges', 'online banking', 'e-commerce', 'interactions', 'digital divide', 'barriers', 'digital skills', 'internet', 'issues' and 'digital exclusion'. The searches began by only concentrating on online banking; however, this approach was changed to incorporate various areas associated with online financial services. Initially, the researcher focused on urban/rural areas, language, ethnic minorities and socio-economic factors as there were limited studies on these areas with older people aged 65 and over. However, to keep the volume of literature to a manageable limit, two attributes were chosen: older people whose first language is not English and those from ethnic minority groups. These research gaps led to the creation of two research questions.

Not only the UK studies, but research related to financial services that were conducted in other countries, were also taken into account as this provided knowledge on the area being

investigated. Google Scholar was the most commonly used database in the study since it was uncomplicated to retrieve many relevant papers in a few searches including peer-reviewed papers, papers related to HCI (Human-Computer Interaction) and reports produced by organisations. Although Web of Science and Scopus had 'advanced search' features, not all the pertinent papers were displayed. In addition to these databases, Google was also leveraged to seek reports produced by banks and government bodies which assisted in gathering statistics to strengthen this research. Through Google, charity organisations and other sources of support that aid older people with digital services and information regarding institutions that provide online financial services were discovered.

A systematic retrieval process assisted in gathering many papers. As part of the selection process, papers which were related to digital services and online financial services were taken into consideration and other papers were eliminated. Also, the age category mentioned in the papers were examined as this study focuses on older people. While reading the papers, citations guided in identifying studies related to this research which saved a significant amount of time by allowing the researcher to focus on other research activities instead of spending it with the database searches. After locating a relevant citation, Google Scholar was utilised to identify the paper; this technique helped to discover more information regarding specific aspects of the study. After reviewing each retrieved paper, brief notes were created on a Word document under specific topic headings which helped in writing and publishing papers and creating a diagram showing the factors related to online financial services under four categories.

Since this research focuses on older people who are aged 65 and over, there were limited studies on this cohort; therefore, the operator AND was utilised in the 'advanced search' function to determine studies that were conducted with the age group being investigated. However, this did not assist in identifying relevant papers; therefore, abstracts were analysed before reading the paper to ensure studies were conducted on those who are aged 65 and over. Due to the lack of papers on older people aged 65+, papers which focused on older people aged 55+ were also taken into consideration as this included the age category that was being investigated in this study. Additionally, papers/reports related to older people in general without considering the age category were also examined to understand their

challenges as this could be applied to those who are over 65. Most of the referenced papers were from the year 2000 and onwards; several older papers were used to define certain terms or aspects of the study. A broad number of papers were examined to magnify the understanding of this research which resulted in recognising the gaps and the studies that have been conducted in diverse countries.

2.2 Background

There are approximately 12 million people who are aged 65 and over in the UK (Age UK, 2019) and around 32% of them are internet non-users (UK Finance, 2018). This indicates that a proportion of the population are not utilising online financial services. A diverse range of factors could hinder these older people from the adoption of digital financial services. Even though these factors were explored through a review of the literature, it was noted that various online financial services have not been investigated in one study. Researchers tend to focus on one specific online financial service in their studies, for example, online banking or online shopping and investigate the barriers faced by older people in using such services. Since digital financial services have not been explored collectively with older people aged 65 and over, this research focuses on a number of common online financial services used by older people aged 65 and over and apprehend their challenges through selected research methods.

Academic literature does not explicitly mention the typical or common tasks that older people in the UK undertake with regard to their finances. However, ONS data established the online financial tasks that some older people (those aged 65+) carry out, for example, internet banking, selling goods or services over the internet, buying or renewing existing insurance policies, taking a loan or arranging credit from banks or other financial providers, buying or selling shares, bonds, funds or other investment services (ONS, 2020a). Older people who live on a small pension prefer using cash as they feel more in control of their own finances; it helps them to budget their daily spending. Older people who are not used to online payments rely heavily on cash and may depend on their family or friends to carry out tasks such as shopping and paying bills on their behalf and they'll repay using cash. Many older individuals withdraw cash from post offices or bank branches for their daily expenses (Age UK, 2021a). Older people could check their account balance through this method as well. The UK Department for Work

and Pensions (DWP) released a report saying that individuals handle their finances for later life in diverse ways, for instance, taking a private pension and saving for retirement. People aged 55 to 59 and 60 to 64 have high financial literacy as they know how to maintain their personal finances (Department for Work and Pensions, 2025). This indicates that older people aged 65 and over require support through training or other interventions on how to plan and maintain their finances in later years.

With regard to age, OECD (The Organisation for Economic Co-operation and Development) data indicated that anyone aged 65 and over are part of the elderly population (OECD, 2021) and as mentioned in the previous chapter, this age group scarcely utilises the internet which, in turn, reduces the adoption of online financial services such as online banking. In 2020, only 49% of those aged 65 and over exploited the internet banking compared to other age groups where over 65% of people in each cohort used online banking (ONS, 2020a). In the UK, four in ten older people who are aged 65 and over with a bank account do not use internet banking (Age UK, 2023a). This demonstrates that older people who do not utilise online financial services would be carrying out the activities in-person and some may require additional support to conduct the online tasks. Even though the use of online financial services can encourage an efficient lifestyle, some older people prefer interpersonal services such as face-to-face conversations for financial information; therefore, they visit local bank branch (Maguire, 2024). This indicates that older people use less technology than others, especially younger people, which further stimulates digital exclusion. Digital exclusion is “where a section of the population has continuing unequal access and capacity to use information and communication technologies (ICT) that are essential to fully participate in society” (Casselden, 2023). Three elements are interconnected to this term: internet access, digital skills and financial ability to access the internet (Ueno et al., 2023). These attributes could prevent people from utilising the technology. Also, other factors could play a role, for example, a study showed that older people are at higher risk of digital exclusion due to factors such as low income, geographical area, lack of education and household size (Wilson-Menzfeld et al., 2025). Hence, this study is necessary to address vulnerable people’s diverse challenges that contribute to digital exclusion, particularly older people from ethnic groups.

Even though the target population of this study is older people aged 65+, it is necessary to acknowledge the diversity within the older population, for example, older people aged 70-89 could have varying levels of challenges compared to those who are aged 90-99. Older individuals aged 60-70 could be actively working in society, and therefore, they may have more digital literacy skills compared to those who are aged 80+. They are more likely to utilise technology than those who are in their late 80s. Also, health is an issue for those in later stages of life. Thus, the findings of this study may not be applicable to everyone aged 65+ collectively as each age group has varying levels of factors in relation to the use of online financial services.

Although older people face many barriers in accessing digital financial services, the wider population also experiences issues with such services, for example, accessibility issues (e.g. no internet connection to access the technology) and security concerns. Individuals are always concerned about the security of transactions; they fear that their accounts could be hacked and they worry that the money they transfer may not reach the right individual. Security measures such as OTP authentication may not securely protect accounts as hackers could obtain this password through various hacking attacks (Chaimaa et al., 2021). In addition to this, people encounter diverse usability issues on specific tasks, for example, people's satisfaction level decreases due to duration and the number of steps required for two-factor authentication (Marky et al., 2022). Complex tasks or poorly designed interfaces could prevent people from utilising the technology efficiently, for instance, incorporating large buttons on interfaces improves user experience, and this design is adopted by Amazon, where a large sign-in button is placed on the main interface. However, on the eBay website, the login button is not well-designed (Cheng, 2019). This suggests that user-friendly designs could lead to fewer clicks as there is less confusion when carrying out a specific task.

Even though older people encounter similar challenges mentioned above (this is further discussed in section 2.3), they face additional barriers due to age-related issues, indicating differences in the challenges between younger people and older individuals, for instance, younger people have faster hand movements compared to older people (Kim et al., 2025); therefore, motor issues could influence older people's intention to use online services. Furthermore, memory or cognitive problems affect technology use in older people (Gitlow,

2014). Technology use can improve memory in older people with and without cognitive impairment (Wilson et al., 2022). This could indicate that using online financial services could enhance cognitive function as these services require individuals to remember passwords and other relevant details to carry out specific tasks. Hence, such services would be useful to overcome cognitive issues.

In terms of technology acceptance, older people may accept or reject technology due to several reasons and researchers utilise models such as Technology Acceptance Model (TAM), Unified Theory of Acceptance and Use of Technology (UTAUT/UTAUT2) to explore older people's issues. TAM was proposed by Davis (1989), which shows how two key variables: perceived ease of use and perceived usefulness influence an individual's intention to adopt technology. Later, this model was updated to UTAUT, which was comprised of four determinants (performance expectancy ("the degree to which an individual believes that using the system will help him or her to attain gains in job performance", effort expectancy ("the degree of ease associated with the use of the system", social influence, facilitating conditions "the degree to which an individual believes that an organisational and technical infrastructure exists to support use of the system") and four moderators (gender, age, experience, voluntariness of use) (Venkatesh et al., 2003). Subsequently, this model was expanded to formulate UTAUT2 to explore consumers' technology acceptance by incorporating three new constructs (hedonic motivation (fun or pleasure obtained from the use of technology), price value (monetary aspect) and habit (automaticity)) (Venkatesh et al., 2012).

The UTAUT2 model has been widely used to investigate older people's acceptance and adoption of technology (Macedo, 2017, Huang, 2023, Johannes, 2025), including online financial services, for example, a study showed that older people's intention to accept online banking was influenced by habit, performance expectancy, price value and effort expectancy (Arenas Gaitán et al., 2015). A UK-based study modified the UTAUT model to incorporate three variables: perceived cyber security risk, perceived cyber security trust and perceived overall cyber security (Hanif and Lallie, 2021). The results showed that performance expectancy and perceived cyber security risk are the key factors that influence older people's intention to use mobile banking applications. Researchers can amend the models by adding

new variables to suit specific contexts, thereby exploring various factors that could contribute to the digital exclusion of older people.

Previous studies show that various constructs play a role in older people's intention to adopt digital financial services. Technology acceptance models assist in revealing correlations between the constructs that influence older people's intention to adopt and access digital financial services. This study did not utilise such models and focused predominantly on obtaining rich qualitative data which would facilitate exploring diverse challenges that could hinder older people, especially those from ethnic groups, from leveraging online financial services.

This research is closely related to HCI due to the investigation of users' interactions with online financial services. Also, this study involves the creation and use of personas which is a HCI design method. The concept of personas in HCI originated from the work of Cooper (2004). Specific fictitious user profiles are demonstrated through personas. These personas aim to understand the challenges, needs and goals of users. It helps designers to comprehend the needs of users throughout the design process. In terms of validity, personas cannot be adequately verified due to the use of unreal data (Chapman and Milham, 2006). First-hand data are not utilised to create personas. However, data-driven personas (McGinn and Kotamraju, 2008) can be used instead of traditional methods to produce effective design decisions when forging products for target groups. Empirical data is involved in the creation of data-driven personas; this could be collated through surveys and interviews (McGinn and Kotamraju, 2008). A similar approach was adopted in this study; data gathered from semi-structured interviews were leveraged to create several personas, containing real information gathered from interviewees (more information regarding the development of personas is mentioned in chapter 3, section 3.5.1)

This study also contributes to the information science field, especially ELIS (Everyday life Information Seeking). Savolainen (1995) describes ELIS as "the acquisition of various informational (both cognitive and expressive) elements which people employ to orient themselves in daily life or to solve problems not directly connected with the performance of occupational tasks." In other words, people collate and use information to manage everyday

life to solve non-work problems. People seek information from online sources on a day-to-day basis, for example, online banking and online shopping (Savolainen and Thomson, 2022). Information practices focus on the societal factor, for example, people seeking information through engagement with communities and information behaviour focuses on the cognitive aspect (Savolainen, 2007). Older people could face human-related challenges or societal-related barriers in the use of online financial services. Hence, this study sits within the context of older people's information practices and information behaviour.

2.2.1 Research Methods in Related Studies

While reviewing the literature, papers were also analysed to comprehend the research methods used by the researchers to explore older people's difficulties with online financial services. One of the studies utilised usability testing with 12 older participants to analyse their challenges on online banking (Gatsou et al., 2017). Their interactions on simulated websites were captured using a digital camera and screen capture software. Participants were given a number of tasks to complete and the time taken to complete these tasks was recorded. Then a post-task questionnaire was given to understand their experiences with the two banking websites. Results obtained from the questionnaire were presented using graphs and the time took to complete the tasks was shown on a table. The research concluded that several older people have an interest in using online banking as they were aware of its benefits but they were not having adequate user experience due to design issues such as small font size, colour issues and small icons. Gatsou et al. (2017) also state that there is a lack of research that focuses on older people's user experience with banking websites. This study indicates that older people are facing several obstacles in accessing online financial services, but their problems are not being addressed due to limited studies.

Another research examined users' insights and knowledge of online banking (Mukhtar, 2015). Primary data was elicited through surveys. Data was shown through pie charts which were colour-coded to distinguish the figures and demographic information of users. The survey was the chosen research method as it could be used to evaluate research aims. The researcher recruited participants through convenience sampling – a technique used to select participants depending on the convenience of the researcher. It was noted through this research that some older people perceived online banking as less favourable.

Jin et al. (2021) also adopted the survey method to understand older people's banking practices. This method was chosen as the most appropriate one as they can easily reach a wider group of older people. The survey incorporated close-ended (Likert-scale and multiple-choice) and open-ended questions. There were two sections; first section was for those who did not have banking experience and the second one for those who did (e.g. app, virtual bank and digital payment). The survey was tested in three stages: 1) reviewed by colleagues to determine errors 2) interviewed with older people to assess motivational quality and 3) pilot study to uncover any remaining problems. Survey details were distributed in organisations and social media. Snowball sampling was also used by asking the participants to share study details among their networks. Older people also had the option to carry out the survey orally at a public place. Survey data from this study showed that 94.9% of older adults used physical banks, with lower statistics reported for other banking platforms such as apps, virtual banks and ATMs. They preferred physical banks due to usability and security concerns.

Furthermore, a study conducted in the UK explored older people's use of web-based services, including online banking and online shopping (Money et al., 2024). In this study, researchers conducted semi-structured interviews with older people and community support workers. Participants were recruited through purposive and convenience sampling. Data was analysed through thematic analysis on NVivo (data analysis software), resulting in identifying five themes. Discussions were held to resolve any ambiguities in the coding process. Key themes derived from the analysis facilitated the understanding of the barriers to and facilitators of older people's engagement with web-based services. Data from this research showed that some older people had limited use of online services, for example, checking account balance and not transferring money through online banking. They have a fear of financial scams and concerns about making mistakes using the wrong button.

Another study leveraged interviews and focus groups to recognise older people's shopping practices and their perceptions of online shopping (Gorkovenko et al., 2017). Data derived from interviews and focus groups were presented in a written format. Cards were utilised to stimulate thought-provoking conversations in focus groups. These methods established some obstacles that older people were experiencing on online shopping such as lack of trust and

interface issues. Some older adults believed that adding items to an online shopping basket meant that they purchased the items. Also, some of them do not prefer online shopping as they have to provide their bank details. These responses and other data were deployed to develop a technological intervention which was evaluated in focus groups. All the aforementioned studies have highlighted the various formats used by researchers to present their results and they also described the type of research methods they utilised to procure data from individuals including vulnerable people to understand the barriers they face with online financial services.

2.3 Factors Related to Digital Financial Services

As previously mentioned, diverse factors associated with digital financial services that could impede older people from accessing online financial services were retrieved through a review of the literature. This included, but was not limited to, challenges, facilitators and different types of online financial activities (e.g., transport tickets, payment of car tax and passport renewal), leading to the categorisation of the factors into four sections: technology, human, society and institutions that provide such services. After reviewing each relevant paper, concise notes were taken on a Word document under specific sections, for example, ethnic minorities, financial scams, socio-economic and usability. These divisions provided the concept of developing a classified representation of the factors related to digital financial services. Using the Word document, identified factors that could be facilitators or impediments were clustered under four main sections. This coding process formed a visual representation of the factors (this is discussed in section 2.4).

These identified factors are described in the subsequent four sections: 'Human', 'Technology', 'Institutions that provide online financial services' and 'Society'.

2.3.1 Human

Prior studies have explored a plethora of human-related factors in relation to older people's lack of technology use, including online financial services. These factors are explained in the forthcoming sub-sections.

2.3.1.1 Self-efficacy

Bandura (1977) defines self-efficacy as a person's belief in their ability to execute various actions to produce successful outcomes. Self-efficacy positively influences older people's intention to access internet banking (Peral-Peral et al., 2020). Other studies have also identified that self-efficacy could influence people's intention to adopt internet banking services (Alalwan et al., 2015). Self-efficacy can also be seen as a negative factor. Low self-efficacy is a challenge which prevents older people from acquiring the required technological skills (Bhattacharjee et al., 2020). This indicates that higher levels of self-efficacy lead to higher adoption of technology.

2.3.1.2 Anxiety

Anxiety is also another factor which could play a vital role in deterring older people from accessing online financial services. Technological anxiety is more evident in older people than younger adults (Guo et al., 2013). Being introduced to innovation and novel technological developments such as digital financial services lead to anxiety in older people, resulting in the elimination of the use of modern-day technology (Chaouali and Souiden, 2019). This demonstrates that older people are being influenced by psychological factors which has an impact on their intention to use online financial services.

2.3.1.3 Perceived Ease of Use and Perceived Usefulness

Factors such as perceived ease of use and perceived usefulness could influence older people's intention to use technology. Davis (1989) defines perceived ease of use as the extent to which an individual perceives that using a specific technology would require less effort whereas perceived usefulness is the extent to which a person perceives that using a specific technology would elevate their job performance. Perceived ease of use is an essential determinant in older people's adoption of technology; therefore, technology has to be user-friendly and easy to comprehend in order to enable older people to become more inclined to utilise technology (Basri and Gani, 2023). Perceived ease of use and perceived usefulness can influence adults' acceptance of online shopping, particularly online airline ticket purchases (Guritno and Siringoringo, 2013). Also, both of these factors can influence older people's adoption of internet banking (Asmi and Ishaya, 2012). This clearly depicts that these factors have a major

impact on older people's adoption of online financial services and have to be taken into consideration when developing technological products.

2.3.1.4 Attitude

Older people's attitude towards technology could influence them to some extent. Older people aged 65 and over who have a negative attitude towards technology are less likely to adopt it; this attitude would commence to decline in older people once they become more familiar with technology (Gitlow, 2014). A higher use of technology is more evident in older people who have a positive attitude towards technology; they are more independent and have an optimistic outlook (Vroman et al., 2015). The top three reasons for older people aged 65 and over having a positive attitude towards technology were convenience, useful features and the support they receive from technology for activities such as communication (e.g., emailing, calls), research (e.g., seeking information) and leisure. On the other hand, some perceive technology negatively due to the inconveniences produced by technology, features and concerns regarding security and reliability (Mitzner et al., 2010). This explicitly demonstrates that older people's perspectives on technology would have a direct impact on their adoption of online financial services.

2.3.1.5 Trust

Transitioning to technology, specifically online financial services has increased in society; many individuals are shifting to the new technological realm while some are digitally excluded. Digital banking services (mobile and online) are being underused by older people mainly due to their lack of trust (Maguire, 2024). Social dimensions could influence trust for older people aged 65 and over; interactions with others such as banking staff when using services like mobile banking, can elevate their trust in the financial institution (Rajaobelina et al., 2021). In order to increase their trust with online financial services, they may require support from close others such as family members, friends, neighbours or paid assistants (Latulipe et al., 2022). However, older people who rely on and trust their family members are at an increased risk of financial exploitation. Victims of elder family financial exploitation could lose more money when compared with those victimized by strangers (Hall et al., 2023). Financial scams could prevent older people from utilising online financial services. Additional

support is required to assist older people to reinforce their financial literacy skills as this could prevent financial exploitation perpetrated by family members.

Due to trust issues, older people evade digital services when asked to type their personal information and older people aged 65 and over do not trust information retrieved from online; the trustworthiness of online sources is a concern for these individuals due to the existence of fallacious information (Gatto and Tak, 2008). This, in turn, indicates that trust is a determinant of older people's use of digital financial services. Trust gradually increases when older people increase their self-efficacy and the output of this is that they will trust in their capability more when using services such as internet banking services (Peral-Peral et al., 2020). If older people do not enhance their trust on online financial services, then they are being further excluded from the digital world, thereby fostering digital exclusion.

Although trust is a factor which could influence older people in accessing services such as online banking, older people may deploy 'distrust' to "express their discomfort with certain aspects of digital society as a whole, and to object to certain aspects of a given technology that clashed directly with their values". Some older people may choose not to use technology due to their lack of trust and some may utilise technology even if they do not trust it (Knowles and Hanson, 2018).

2.3.1.6 Fear

Fear also plays a major role in older people's use of digital financial services. Older people have a fear of becoming a victim of identity theft; this is one of the reasons why they are concerned about providing personal information on online services (Gatto and Tak, 2008). A Ghana-based study showed that younger people adopt online banking more quickly than older people; older people have a fear of technology and are not aware of the benefits of digital tools; hence, they perceive that it is irrelevant to them (Ameme, 2015). Fear is a key factor that could hinder older people from accessing technological services, especially digital financial services. Older people have a fear of cybercrime, they are worried about online fraud on online banking, they are aware that the risk is likely to increase through high exposure. As well as this, older people may avoid using online banking and online shopping if they know someone who has been a fraud victim (Kemp et al., 2025). This increases older people's fear

or worry about online fraud. Additionally, they have a fear of repercussion; they have a fear of reporting scams to others as it could lead to a negative impact on their well-being. As well as this, they feel ashamed to discuss their victimisation with others as they are concerned about how they might be perceived (Havers et al., 2024). Older people could be scammed in various ways, for example, obtaining their personal banking information through phishing emails, fake shopping websites etc (Button et al., 2025). This denotes that older people are being targeted through diverse methods to procure their personal information or money, and this increases older people's fear of fraud which could hinder them from utilising digital financial services, thereby exacerbating digital exclusion. Older people also have a fear of monetary loss; they are afraid to bank online due to prior negative experiences and they may not purchase anything online due to their fear of losing their account details to fraud (Button et al., 2025).

If older people fear technology, they will have to rely on traditional methods. Older people usually prefer traditional methods where they could have a face-to-face communication with individuals to carry out their tasks (Asmi and Ishaya, 2012). However, everyone is shifting to the digital world to conduct financial transactions such as banking activities, e-commerce, holiday bookings, etc., and fear is preventing older people from adopting such services. As well as this, older people have a fear of making mistakes (Lam and Lee, 2006) and they fear technology due to their lack of confidence and knowledge (Vaportzis et al., 2017a).

Information shown above shows that fear in the context of online financial services refers to older people's fear of scams, fear of repercussion and fear of losing money through online fraudulent incidents. Also, older people's technophobia (i.e. their fear of technology) is a major barrier which prevents older people from adopting technology (Pérez-Rugosa et al., 2025). Older people's fear has to be reduced through interventions as this could positively influence them to adopt online financial services.

2.3.1.7 Confidence

Confidence is a factor that could influence older people in the use of online financial services. The lower the confidence level in older people, the more worried they are about using the internet (Lam and Lee, 2006). For older people, confidence is often associated with their

knowledge of technology and is commonly described as self-efficacy. Confidence can be linked to various emotions and it's a dynamic concept which is connected to user experiences; positive experiences enhance their confidence in technology use while negative experiences decrease their confidence (An et al., 2022). Older people have concerns about the safety of their data and they scarcely use online services such as banking; these problems are further intensified due to their lack of confidence and digital skills (Money et al., 2024). Also, older people lack confidence to use technological devices like tablets; they are more likely to utilise such devices if they are more confident (Vaportzis et al., 2017b). Older people's confidence has to be enhanced through various forms of support (e.g. group activities and tasks involving personal interests etc) to help them continue using technological devices in everyday contexts (An et al., 2022). If older people utilise technology on a day-to-day basis, they may eventually gain the confidence to use digital financial services. Interventions (e.g., developing well-designed interfaces and providing individualised assistance) have to be developed that would improve older people's confidence levels as this could encourage them to utilise digital financial services (Anwar et al., 2024).

2.3.1.8 Knowledge

In terms of knowledge, older people could have insufficient expertise in online and internet banking (Mukhtar, 2015). Older people are considered as digital immigrants since they were not born into the digital world; they have to evolve into the new technological era by learning about digital services (Yong and Gates, 2014). This implies that older people require knowledge and insights into technology before conducting financial activities on digital financial services.

2.3.1.9 Age

Age can also be a reason for older people's lower usage of digital financial services. Age UK report showed that age is one of the several factors which lead older people to the risk of digital exclusion (Davidson, 2018). Age has an impact on older people's outlook towards internet; as their age increases, usage of internet commences to decline (Ivankina et al., 2017). This is a result of the declining cognitive functions in older people due to mature stage of life (Kim and Han, 2021). However, using the internet or any digital tool in our daily lives

can vastly alleviate this cognitive decline in later life (Xavier et al., 2014). This clearly underlines the significance of fostering digital literacy in older people. Digital literacy is defined as one's ability to comprehend and utilise information in various formats from multiple computerised sources (Gilster, 1997). Not only does leveraging the internet or online financial services assist older people increase their digital literacy skills and gain benefits in everyday lives but it also helps them in their later years through improved cognitive abilities. Older people's use of technology and cognitive function can be enhanced through digital literacy education programs; such initiatives can facilitate in preventing dementia and promoting happiness (Lee et al., 2022). This denotes that using technology, including digital financial services is beneficial for older people in maintaining mental functioning. Additionally, digital literacy training programs involving intergenerational contact can increase older people's digital skills and confidence in using technology and they could have a positive attitude towards aging, preventing them from having diseases such as dementia (Miller et al., 2024). Although cognitive abilities decrease with age, they can be improved through the use of technology, especially via online financial services as such activities enable older people to think effectively before making any decisions on their finances.

2.3.1.10 Disabilities

Disabilities and other health-related issues are some of the results of cognitive decline in later stages of life (Xavier et al., 2014). This means that disabilities can also be considered as a factor of older people's low usage of internet. Disability can pose challenges which impede older people from the use of online financial services. A report produced by the Disability Rights UK declared that many banks have failed to assist people with disabilities due to bank closures, including assistance with digital banking (Disability Rights UK, 2021). Visually impaired older people have already stated that they are not taken into consideration as inclusive designs are not utilised on interfaces (Okonji et al., 2015). Furthermore, individuals with visual impairment asserted that they are experiencing challenges on many digital services, including internet banking; some of these issues include, but are not limited to, accessibility problems, usability issues and technical difficulties (Fuglerud, 2011). Visually impaired older people prefer technologies which reduce cognitive and physical workload; they prefer adopting technologies which provided safety-related, accessibility-related and usability-related advantages (Kim, 2021). They adopt technologies where they can

successfully complete specific tasks, for example, using larger screens to improve readability (Kim, 2021). This denotes that older people may not adopt and use digital financial services if they determine that the features or interfaces on a website are unsatisfactory for their needs and desires.

Intellectually disabled people are also facing difficulties in using the internet (Zhang et al., 2016). Older people with neurodiverse needs (e.g. cognitive disabilities - dementia, intellectual disabilities, development disabilities and mental health) have difficulties in using digital banking due to complex interfaces (e.g. issues with long sentences and finding specific buttons) and they may require extensive support from others to carry out the payments which increases the risk of financial exploitation (Dai et al., 2023). Diversified cues on simple interfaces are required to support people with cognitive disabilities such as images representing money amounts, short sentences and non-numeric text input (Dai et al., 2023).

Furthermore, motor decline in older people can influence their use of technology. Younger adults can perform hand movements quickly when compared with older people, indicating age-related motor decline differences (Kim et al., 2025). This suggests that older people's reduced dexterity with technological devices could be an issue when using online banking as older people would require additional time for text/number input such as passwords and OTP (one-time password) and the webpage could automatically logout due to prolonged inactive sessions. Older people, particularly disabled people confront many problems while using online websites and could discourage them from using the internet further. This, in turn, decreases their interest in adopting digital financial services and facilitates digital exclusion.

Assistive technologies are required to support each type of user, for example, Braille displays for individuals with visual impairments and Voice-Activated Controls for those with motor impairments; this would enable them to navigate interfaces without physical input (Naik, 2024). Although such features are useful for older people, digital skills are required to utilise online financial services on a technological device.

2.3.1.11 Place of Residence

Place of residence can also affect older people's intention to adopt online financial services. Individuals who live in urban areas are more inclined to utilise digital banking compared to those residing in suburban and rural areas (Onyia and Tagg, 2011). Some older people living in rural areas would generally not prefer to conduct online payments; they would go to a nearby post office to conduct financial transactions as they give higher priority to social elements which involve interactions with other people in-person (Hodge et al., 2017). Not only would conducting online transactions mean that the social element would be replaced but also the feeling of being independent would be tarnished (Hodge et al., 2017). Awareness of e-banking services (e.g. mobile banking, credit cards, internet banking, mobile apps, debit cards) is more evident in educated senior citizens in urban areas than the older people in rural areas; rural citizens scarcely utilise these services and their insight into these digital services is limited compared to urban people (Lakshman and Sulaiman, 2019).

Additionally, a higher proportion of older people reside in rural areas than in urban areas (Age UK, 2019). This could depict that older people in urban areas are taking full advantage of digital financial services due to their education and experience in using technology at home and workplace. Although digital inclusion is increasing in urban areas, older people in rural areas are on the verge of extreme digital exclusion due to socio-economic factors.

2.3.1.12 Income, Job and Education

A study has shown that socio-economic factors such as income and occupation could influence older people in accessing the internet. Those with low income could end up becoming an 'offliner' if their income is low and those whose occupational status is unemployed, including home caretaker and retirement has an impact on older people's internet usage – recent use of internet is less likely for those who became unemployed or retired (König and Seifert, 2020). König and Seifert (2020) also highlight that older people could become 'onliners' or 'offliners' depending on various elements, which encompass education; those with higher education would continue to be an 'onliner'. Unemployment and lower education in older people imply that they are less disposed to engage with the internet (Siren and Knudsen, 2017). Not utilising the internet due to these factors indicates that this could have an impact on older people's adoption of online financial services.

Individuals with a low educational background, low income and an occupational status of unemployment are likely to be non-users of internet banking services (Tekin and GULERYUZ, 2020). This denotes the importance of socio-economic factors in the context of digital financial services; older people who lack a higher level of socio-economic factors barely use online services to conduct financial transactions which, in turn, contributes to digital isolation.

2.3.1.13 Financial literacy

Digital exclusion among older people could be reinforced through a lack of financial literacy skills and consequently, their use of such services would be greatly limited. Financial literacy is defined as one's ability to use skills and knowledge to manage personal finances for lifetime financial security (Stolper and Walter, 2017). Financial literacy skills are a prerequisite for obtaining a basic understanding of pensions (Dick and Harvey, 2025). Older people have to make wise decisions regarding their retirement savings and they also have to handle the risks and costs of aging; various new financial products can be easily accessed to make effective choices (Lusardi and Mitchell, 2023). To use financial technology (FinTech) products, a high degree of digital financial literacy is essential (Morgan et al., 2019). Therefore, an older person who extensively uses online financial services in the context of everyday life could indicate that they possess an adequate level of financial literacy skills. However, in older adults, financial literacy declines every year; older people with lower levels of financial literacy skills have complexities in making effective financial decisions (Boyle et al., 2025). This is a barrier for older people when making decisions on choosing the appropriate financial products/services, for example, which bank is adequate for savings, which airline provides cheaper flight tickets etc.

2.3.1.14 Language

Language is another factor that could impede older people from leveraging online financial services. People with second language as English may face more complexities on digital services (Harvey and Brazier, 2022). Also, people who have linguistic challenges may lack the digital skills to use the technology and this means that there are additional barriers to teaching digital skills to these individuals (Hecker and Loprest, 2019). This could imply that older people who have language difficulties and those who possess a lower degree of digital

skills require additional support in order to adopt and use online financial services in the context of everyday lives.

2.3.1.15 Experience

Lack of experience is a barrier that could deter older people from the use of digital financial services (Kaijane and Stenberg, 2018). Around 18% of older people aged 65 and over do not utilise the internet (Age UK, 2024b). This could indicate that non-internet users among older people may not have prior technological experience; therefore, they are not aware of its benefits and also they may have a lack of digital skills. Technological experience could be gained through the workplace, self-learning or through other people. Since lack of experience is a challenge faced by older people, they may require additional support from organisations or digital carers to learn about technology before utilising online financial services.

2.3.1.16 Gender

Gender is another influencing factor that could have an impact on older people's use of digital financial services. Older women scarcely utilise online banking services when compared with men (Ramón Jerónimo et al., 2014). This could suggest that older men have more control over household finances; therefore, women may not take the initiative to access digital financial services. This could be associated with gender norms in society and therefore, inequalities between men and women have to be addressed through inclusive solutions that would encourage both men and women to adopt and use online financial services.

2.3.1.17 Satisfaction

If people are not satisfied with the online portals then this could have an impact on their use of online financial services. Customer satisfaction could be influenced by the design of interfaces and the content within online financial websites (Ling et al., 2016). In other words, well-designed websites would enhance people's satisfaction; thereby, returning to the portals to carry out online financial activities in day-to-day lives. As well as this, security and company (i.e. product/service providers) could influence customer satisfaction (Parvaneh and Amirnima, 2011). General public, including older people may not utilise online financial services if there are security concerns; therefore, people may prefer leveraging online portals of well-known financial service providers.

2.3.1.18 Ethnic minorities

Older people who are aged 65 and over from White ethnic groups are more likely to use the internet when compared to older people from Asian ethnic groups (GOV, 2019). This indicates that older people from ethnic minority groups are facing several challenges that could hinder them from accessing online services, including digital financial services. One of the barriers encountered by these individuals is language issues (Moore, 2000). In addition to this, older widowed women from ethnic minority groups may face major financial disruptions (Angel et al., 2007) and therefore, they may not have the income to purchase the required equipment to utilise online financial services. Some widowed women may try to manage their finances by themselves, but this is a complex task for those who have linguistic challenges (Grewal et al., 2004). Due to the limited studies on older people (those aged 65 and over) from ethnic minority groups, their challenges with online financial services are not addressed. In order to develop potential solutions, more research is required on this cohort.

2.3.2 Technology

This section elucidates the diverse technological factors related to online financial services which were identified through a review of the literature and reports.

2.3.2.1 Open Banking Standard

Online financial services became more advantageous to the citizens and financial service providers due to the creation of the Open Banking Standard – these are rules outlining the ways of securely sharing customers’ data. The introduction of Open Banking Standard in 2015 enables financial service providers (e.g. banks) to share customers’ data to develop useful financial products and services (e.g. investment and budgeting apps). The sharing of data is carried out with customer’s consent (Open Banking, 2021). Open APIs are utilised to share users’ bank data with FinTech companies to create apps that are beneficial for the public, for instance, comparisons can be made on investments and overdrafts through the newly developed apps and the client can select the products/services that suit them better (Plaid, 2017). Leveraging such financial products and services would permit people to use online financial services more efficiently. However, due to older people’s low usage of online

services, they are digitally excluded from accessing new financial products that could be used in everyday contexts.

2.3.2.2 Accessibility

Accessibility is defined as one's capability to access online financial services and this is considered as a factor that could influence people's intention to adopt and use online banking (Gerrard and Cunningham, 2003). Although a 24% rise in web accessibility has been identified among older people (ONS, 2020b), some older people may face complexities in accessing the websites since portals are developed by targeting young people (Milne et al., 2005). In general, web developers are anticipated to enhance inclusivity by following the web guidelines, for instance, adding text alternatives and providing ways to facilitate people to navigate the webpages (W3C, 2024). However, accessibility errors are still shown on the majority of banking websites (Akgül, 2018). This would create major issues for older people with disabilities. Blind and partially sighted people (BPSP) are already experiencing challenges in navigating the online financial portals; therefore, potential interventions have to be developed to promote equity (Goundar and Sathye, 2023). Web platforms with significant accessibility errors have to consider marginalised people, especially those with auditory, visual and cognitive disabilities (Akgül, 2018). Older people with disabilities are already facing major challenges in using the internet (Curran et al., 2007). On top of this, accessibility issues would result in older people at risk of further digital exclusion (Milne et al., 2005).

2.3.2.3 Security

Security concerns prevent older people from utilising online financial services; they would only use such services if security were guaranteed (Omotayo and Akinyode, 2020). If banking webpages or transactions are not sufficiently protected, then online banking users have to encounter major issues such as scams, and this is one of the reasons why people are concerned about security (Jun and Cai, 2001). Also, some individuals will only utilise digital financial services if they know how their data is collected and used (Yoon and Steege, 2013). Such security concerns could hinder older people from leveraging financial services as they do not want to experience monetary loss.

2.3.2.4 Usability

Usability issues related to navigation, layout and other design barriers are faced by older people (Kurniawan and Zaphiris, 2005). Due to usability problems, older people do not find online banking websites easy (Gatsou et al., 2017). Hence, usability is a factor that could influence older people's acceptance of online financial services. If the designs of online services are user-friendly, vulnerable individuals including older people would encounter fewer impediments. Subsequently, a high proportion of the population would be able to carry out online financial activities such as payment of utility bills and payment of goods and services (Finance Foundation, 2016).

2.3.2.5 Advertisements

Older people are unsure of what technology can offer (Ameme, 2015). Online banking services are not used by some older people as they are not aware of it (Omotayo and Akinyode, 2020). Also, older people who reside in rural areas are less likely to know about these services as compared to those living in urban areas (Lakshman and Sulaiman, 2019). Since the benefits of online financial activities are not reaching many older people through endorsements, they are not becoming aware of the different ways that could be utilised to lead an efficient lifestyle.

2.3.2.6 Digital Divide

Digital divide is commonly referred to as the gap between those who have access to technology and those who don't (Hayes and Martin, 2007). Several factors could contribute to digital divide such as low income, low educational background and area of residence – rural areas (Hargittai, 2003).

In order to address older people's low usage of internet, a more specific concept was developed, the 'grey digital divide' which has the "same levels as the broader digital divide concept, referring to the obstacles they encounter in terms of access (first-level divide), skills (second-level divide) and opportunities (third-level divide)" (Alexopoulou et al., 2022). The first-level divide refers to the equipment required to use the internet (more details in section 2.3.2.8); the second-level divide refers to the basic digital skills required to utilise the

technology (more details regarding this in section 2.3.2.7) and the third-level divide is about the deployment of the online tools to attain outcomes and opportunities (Alexopoulou et al., 2022). This could indicate that older people may not utilise digital financial services due to the barriers related to the varying levels of the digital divide.

2.3.2.7 Digital Skills

Non-internet users among older people do not utilise the technology as they lack basic digital skills (Olphert et al., 2005). In the UK, around 76% of older people aged 65 and over do not possess the essential skills required to use the internet (Lloyds Bank, 2018). Some of the basic digital skills are - seeking information through search engines, online communication, online transactions and seeking online help to solve problems (ONS, 2019). Due to older people's lack of digital skills, they face challenges in accessing online financial services (Thomas et al., 2023). Not enhancing older people's digital skills would lead to further stimulation of the grey digital divide.

2.3.2.8 Lack of Access

Lack of access is another issue that contributes to the digital divide. In the UK, around 34% of older people's (those aged 65 and over) houses do not have internet access; therefore, they may approach other people for support in carrying out online activities (Ofcom, 2022). Older people may feel that they lack the skills to access online financial services if they do not have the required equipment (Gerrard and Cunningham, 2003). Also, the cost of technological devices is a barrier for some people. People with lower incomes cannot purchase the equipment (Compaine, 2001). Furthermore, those who reside in rural areas may not have broadband access (Polasik and Wisniewski, 2009) and they may not be able to afford the devices/internet connection (Onyia and Tagg, 2011). Older people cannot adopt and use digital financial services if the essential tools are not available. Hence, the only option for them is to seek support from others.

2.3.3 Institutions that provide Online Financial Services

Various online financial services provide a financial component of transaction:

- Banks (e.g. RBS, HSBC)
- Credit unions

- Online Shopping (e.g. Amazon, FinTech products – e.g. PayPal, ApplePay)
- Holiday bookings (e.g. booking.com)
- Online transport service tickets (e.g., SkyScanner)
- Tickets for cultural events/other events (e.g., cinema)
- Passport renewal (gov.uk)
- Parking fines (council)
- Payment of car tax (gov.uk)
- Online insurance policies (e.g. comparethemarket.com)
- International money transfer services (e.g. Western union)

Digital financial services such as online banking are provided by community organisations (e.g. credit unions) and banks (e.g. Santander). There are many benefits of using such online financial services, for example, online banking was created with the intention of providing convenience for people to access information regarding their bank account (Aldas-Manzano et al., 2009). Also, there would be a reduction in paper usage for bank statements and the journey to a bank can be eliminated – this would reinforce eco-friendliness (Koskosas, 2011). Leveraging any online financial service would promote environmental sustainability. Furthermore, such services would be financially beneficial for vulnerable people, especially older people. Online products or services provide various discounts (for example, flight ticket and online insurance policy offers) and individuals can save time through such digital services – people can save at least 30 minutes per online transaction (Centre for Economics and Business Research, 2022). Transactions could be easily carried out through FinTech products, for example, ApplePay and PayPal. This indicates that time savings would enable older people to focus on other activities and obtaining monetary savings is useful for people with lower income.

Additionally, some financial service providers aid vulnerable people with digital services, for example, Barclays developed an app with accessibility features which would be useful for disabled people (Barclays, 2021a). Also, free digital training sessions are provided to build people's confidence and digital skills (Lloyds, 2023). This indicates that some service providers

are willing to provide support to vulnerable people through diverse initiatives in order to enhance digital inclusion.

In terms of international money transfer, people from ethnic minority groups send money to their home country (Moore, 2000). However, some may approach the branch, organisations or other individuals to carry out the online transactions due to language issues.

Although various digital financial services are available, older people face various challenges which could prevent them from accessing such services and this perpetuates digital exclusion.

2.3.4 Society

The upcoming sub-sections provide explications of the factors associated with society, including brief descriptions of how each factor could influence older people's use of online financial services.

2.3.4.1 Charity Organisations

Charity organisations such as Age UK offer immense support for older people in the UK (Age UK, 2016a). For example, they provide computer classes for older people to access the technology (Age UK, 2021b). One of their aims is to decrease the scams and provide older people with the skills required to stay digitally active. They are achieving this goal through the Digital Champion Programme (Age UK, 2024a). This is a programme where Digital Champions (volunteers) provide one-to-one assistance or training sessions to those who want to increase their digital skills. Also, devices and tools are offered on loan for those without access. As well as this, programmes such as Connecting Scotland (an initiative by the Scottish Government) assist people with the equipment required to use the internet and provide training and digital support through Digital Champions (e.g. sending emails, online shopping, setting up Wi-Fi etc) (ConnectingScotland, 2022). Their vision is to ensure that no one is left behind; therefore, they work along with the public, private and voluntary sectors to enhance digital inclusion. Such organisations and programmes would encourage older people to obtain the relevant skills to access digital financial services.

2.3.4.2 Churches, Temples

Older people from ethnic minority groups who participate in their own communities are highly active and may adopt technology if it produces tangible benefits (Choudrie et al., 2022). This indicates that communities formed for specific ethnic groups (e.g. churches and mandir (Hindu Mandir Glasgow, 2024)) could facilitate older people to become more active in accessing digital financial services through the support they receive from others in the community. People who approach such communities can overcome social isolation (Choudrie et al., 2022). Consequently, they'll become more involved to learn and adopt technology. As well as this, older people who are in the same age group may benefit from peer tutoring due to the sense of belonging; side-by-side learning creates a reciprocal relationship which helps them to learn technology together (Korpela et al., 2023).

2.3.4.3 EDI (Equality, Diversity and Inclusion)

EDI policy was created to eradicate discrimination by incorporating everyone in any environment irrespective of their gender, race, background etc., thereby, promoting inclusivity (University of Edinburgh, 2021). Although EDI complies with the Equality Act 2010 (GOV, 2018) and is being followed by many institutions and businesses, digital discrimination can be seen on digital financial services i.e. older people are facing digital divide and digital exclusion. Literature review has already shown that many factors contribute to the challenges that older people face which exacerbates the grey digital divide. Financial service providers could follow the EDI policy by including vulnerable people, particularly older people in the design and development process of online financial services/products.

2.3.4.4 Post Offices

Post offices are generally used by many individuals to conduct basic banking activities, for example, viewing account balances, depositing and withdrawing cash (PostOffice, 2021). Staff provide face-to-face assistance with such activities, and the individual only needs to use their card and pin (Barclays, 2021b). Older people are a key customer group of post offices, especially those who reside in rural areas (Hamilton, 2016). 27% of older people who are aged 65 and over handle their accounts via bank branches or post offices (Age UK, 2023b). This

depicts that some older people prefer in-person interactions; therefore, they approach physical locations where digital support is provided.

2.3.4.5 Libraries

Glasgow Life (a charity that enables people to become active and engaged through various activities) arranges drop-in sessions at various libraries for people who require digital support with online activities (Glasgow Life, 2023). Digital skills workshops are also held at libraries through Glasgow Life - topics that are included, but not limited to, are social media, eBay and online job search (Glasgow Life, 2025). Older people could easily utilise such opportunities to learn the technology and enhance their digital skills in order to adopt and use digital financial services. Although they provide assistance with basic digital skills, they may not aid people with online financial services due to sensitive information such as bank card details and digital banking login details.

Public libraries support vulnerable people, including older people with access to equipment and Wi-Fi and provide digital skills training to reduce digital exclusion. Older people can become digitally active through appropriate training, thereby enhancing their digital literacy skills (Casselden, 2023). In addition to Information Technology (IT) training activities, libraries provide 1-2-1 taster sessions on various activities such as online shopping, email, downloading etc (Ruiu and Ragnedda, 2016). Such sessions are useful for older people, especially for those who do not have the required equipment to use the internet. Older people could learn and receive support through diverse library activities to increase their basic digital skills.

2.3.4.6 Banks (third party mandate)

Banks allow individuals to have a representative who would have control over an individual's account. Different types of access are available, for example, third party mandate and power of attorney (Lloyds, 2021). A third party mandate would enable a person to carry out basic banking activities while a power of attorney permits an individual to make decisions on behalf of the account holder (NatWest, 2021) (Barclays, 2025). Although this is useful in certain circumstances, this could hinder older people from accessing digital financial services as they

are always receiving support from another trusted individual to manage their account through digital banking.

2.3.4.7 Digital Carers

Vulnerable people may receive digital support from digital carers such as family, friends or relatives (Harvey et al., 2021). 86% of youngsters aged 16-24 act as digital carers i.e. they assist others to carry out online activities and 46% of them provided weekly support (Ofcom, 2022). These statistics indicate that digital carers spend a significant amount of time aiding people who lack the skills to access digital services. Even though receiving support is a starting point for digital inclusion, some older people may not learn and utilise digital financial services due to digital carers who carry out the online financial activities on behalf of them.

2.3.4.8 Financial Scams

In the initial months of the year 2023, around £580 million was lost through fraud (UK Finance, 2023). Older people are often targeted for scams (Age UK, 2016b). Frauds utilise various techniques to gather sensitive information from people, for example, fake messages, websites and phone calls (UK Finance, 2021). Some older people lose their entire savings and experiencing fraudulent incidents affects them mentally and emotionally (Age UK, 2016b). This indicates that financial scams could prevent older people from accessing digital financial services due to fear of monetary loss.

2.3.4.9 Social Pressure

Social influence (e.g. views of family and friends) could have an impact on older people's access to digital financial services (Martins et al., 2014). Older people may encounter positive or negative social persuasions from family and friends and as a result they may begin to use the internet (Lin et al., 2013). Having negative social influence from others could affect older people's mental health. However, social pressure could encourage them to access digital financial services to some extent.

2.4 A Categorical Representation of the Factors

The review of the literature on digital financial services led to the identification of numerous factors that could be grouped into four sections: Human, Technology, Society and Institutions that provide online financial services. These four sections have already been discussed in this chapter in previous sections, explaining the factors interrelated with each section. The four main groups and the corresponding factors led to the creation of a visual representation of the identified factors (see Figure 2.1). Figure 2.1 indicates that pertinent factors recognised through a review of the literature can be divided into sections which can be easily deployed to provide insights into the topic of online financial services. A journal article detailing the factors procured through literature and the categorised sections, including Figure 2.1 has been published (Thomas et al., 2025b).

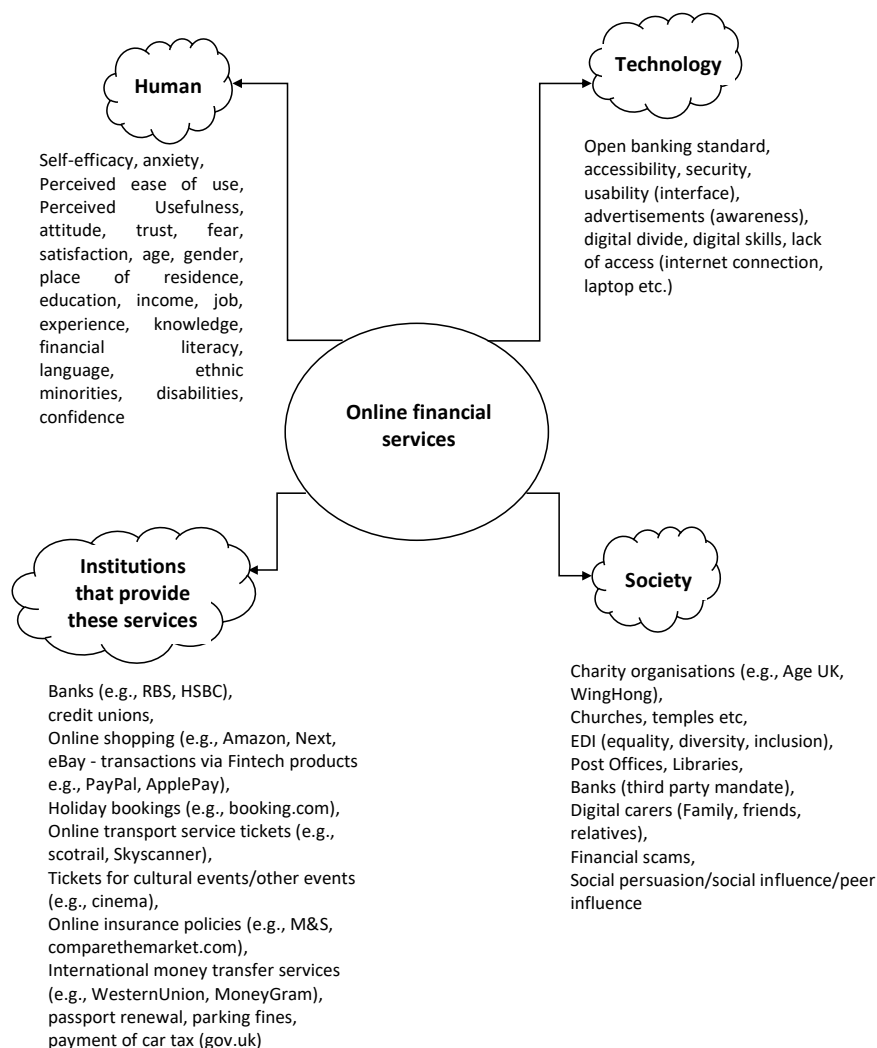


Figure 2.1: A categorised representation of the factors in relation to older people's access to online financial services

Interconnections between the factors shown in Figure 2.1 have been revealed through the literature review. For instance, links can be established between income, job and education. Socioeconomic factors play a vital role in older people's access to the internet; older people who remain 'onliners' are those with higher socioeconomic backgrounds (König and Seifert, 2020). This denotes that people from higher socio-economic strata would generally utilise the internet, including online financial services. In addition to this, the adoption of online banking services is interconnected with educational attainment, age and place of residence; people with low qualifications, people aged 65 or over and those under the age of 18 and people residing in rural areas were less likely to adopt internet banking (Polasik and Wisniewski, 2009). Moreover, there is a link between the digital divide and socio-economic factors; existence of digital divide is found among older people with low socio-economic status. Also, a higher degree of digital skills can be found among older people with high socio-economic status (Hargittai and Dobransky, 2017).

Additionally, a paper written by Peral-Peral et al. (2020) outlined various connections between the factors that could influence older people's adoption of internet banking services. Firstly, higher self-efficacy positively influences perceived usefulness; self-efficacy improves, and anxiety decreases through social influence (e.g. support from family and friends). Also, there are gender-based differences due to the degree of self-efficacy and anxiety; older women have higher anxiety even if their level of self-efficacy has improved whereas older men reflect lower levels of anxiety when they increase their self-efficacy with technology.

Furthermore, a study conducted by Choudrie et al. (2022) on older people's use of technology showed the interplay between ethnic minority groups, self-efficacy, confidence, education, disabilities and organisations; educated older people from ethnic minority groups can build their self-efficacy and confidence levels with the encouragement and support obtained from organisations, irrespective of any health-related issues they have. Despite being educated, older people from ethnic minority groups face complexities while using technology which exacerbates digital divide (Choudrie et al., 2022). Also, language can be an issue for older people from ethnic minority groups. Those whose first language is not English encounter more difficulties with online services (Harvey and Brazier, 2022).

Since there are various interconnections between the factors, the concept of intersectionality is relevant in this study. Crenshaw (2013) introduced the term 'intersectionality', which refers to a person's experiences and challenges formed from the intersections between individual identities such as gender, race and sexuality. Crenshaw (2013) points out the fact that obstacles cannot be formed from only one factor; intersection of various elements could result in unique experiences. Patterns of intersectionality can assist in exploring how different social identities influence each individual (Tsatsou, 2022). In this research, literature review showed that older people face challenges due to the interplay of diverse factors (see previous paragraphs). This study does not explore gender disparities in detail; for example, older women from ethnic minority groups with disabilities and low incomes could face unique challenges (e.g. motor issues, cultural norms etc) which prevent them from accessing online financial services. Such intersections of social identities could be explored and confirmed through a large sample size of interviews with diverse ethnic groups. Intersectionality is necessary to acknowledge the various factors that contribute to the lower levels of digital literacy skills in older people from specific cohorts and identify the key barriers that promote the digital exclusion of older people.

Although diverse interconnections can be determined through the factors shown in Figure 2.1, some of the variables can be treated as barriers or facilitators. For instance, digital carer is a facilitator for older people as they receive significant support from them on online financial services. Simultaneously, this factor could also act as a barrier as older people could always rely on them and may gradually become reluctant to learn online services due to having external support. Also, a low-level educational background could imply that older people are less likely to adopt online financial services. Conversely, those with higher educational attainment could have the intention to utilise online financial services more frequently as they are aware of the benefits of such services. This could also be applied to the factors such as income and job. Those with a higher income could easily access technological devices to utilise digital financial services in their everyday lives whereas those with a lower income could have a major issue in accessing digital services. Besides that, older people who currently work with technology or have had technological experience at their workplace could conduct online financial services with ease as compared to those who did not have this type of technological experience.

Another example is 'charity organisations'; even though organisations facilitate older people with online services, this could be an issue for older people residing in rural areas as most organisations are situated in urban areas. Also, those whose first language is not English could experience challenges on digital financial services whereas native speakers may not face many difficulties in learning and accessing such services.

Many factors could negatively or positively influence older people's access to online financial services. Even though Figure 2.1 encapsulates barriers and facilitators with regard to online financial services, the diagram was modified following the interviews with older people and intermediaries. Findings were mapped onto Figure 2.1 to identify novel factors and also those corroborated through interviews which resulted in the creation of an updated version of Figure 2.1. More information regarding this is discussed in chapter 4.

2.5 Summary

In conclusion, this chapter provided great insights into older people's access to online financial services. A review of the literature assisted in exploring the various factors that could hinder older people from adopting and using digital financial services, for example, fear, lack of confidence, lack of digital skills and lack of financial literacy skills. Older people's fear of scams prevents them from learning and adopting the skills required to utilise the technology for their own benefit; this further escalates the grey digital divide. Older people with limited digital skills rely heavily on digital carers or organisations to carry out online services and this could significantly hinder them from learning the steps required to carry out online financial activities. Also, older people's financial literacy skills decline over time and they have difficulties in choosing appropriate financial services/products, which could even hinder them from leveraging online financial services. Furthermore, older people are concerned about their data and negative experiences can decrease older people's confidence to use technology, which leads to reduced engagement with digital financial services. Diverse factors that act as facilitators or barriers were identified through literature review and these were categorised into four groups: human, technology, institutions that provide online financial services and society (see section 2.4). In this chapter, the four groups with the associated factors were explained in four sections (sections 2.3.1, 2.3.2, 2.3.3 and 2.3.4). Most of the

challenges that older people face were clustered under 'Human' when compared with other groups. This implies that human/behavioural factors have to be addressed and taken into account, as this could be considered the main element which exacerbates digital exclusion.

As previously highlighted, research gaps were established through a literature review in which ethnic minorities and language aspects were noted as the major gaps with regard to older people's use of digital financial services. This aided in developing the first two research questions mentioned in section 1.3:

- 1) What are the key challenges encountered by older people aged 65 or over whose first language is not English on online financial services?
- 2) What issues related to online financial services do older people (those aged 65 or over) from ethnic minority groups experience?

There is limited UK-based research work on older people aged 65 and over in the context of online financial services, especially on those whose first language is not English and those from ethnic groups. Older people from these two groups may experience different types of challenges; therefore, it is necessary to examine their issues. This study addresses their problems through chosen research methods (see chapter 3) and the findings (see chapter 4) obtained from this research assisted in exploring some of the multifaceted challenges that older people from these two cohorts experience. Older people's issues could not be attributed to one key challenge as it could be interconnected with other factors which negatively influence their intention to adopt online financial services.

Although older people's challenges were investigated in previous studies, a novel tool has not been produced to gauge the factors that could impede older people from leveraging online financial services. Furthermore, studies have not extensively declared how meaningful interventions could be developed for older people from the contributions of a study. These gaps led to the formation of the remaining two research questions:

- 3) How to assess the factors that contribute to the challenges encountered by older people?
- 4) How do the contributions of this study lead to new interventions that could address the challenges faced by these older people?

Assessing the factors that could contribute to the challenges faced by older people would enable financial service providers and other stakeholders to comprehend the key areas where additional interventions are required to reduce digital exclusion. This study developed a theoretical tool (see chapter 5) which could be leveraged to identify an individual's or a specific cohort's barriers on online financial services. Data procured from this tool could be utilised in various ways to formulate interventions for vulnerable people. Also, prior studies do not explicitly state how the contributions of a study related to digital financial services could develop a pathway to assist in producing inclusive context-specific interventions. Hence, this research produced four key contributions (chapter 2: a categorised representation of the factors, chapter 4: key findings from interviews, chapter 4: updated version of the visual representation of the factors, chapter 5: theoretical tool, chapter 6: summarisation of contributions) which could help in developing the interventions required to mitigate the obstacles faced by older people, for instance, fear, lack of digital literacy skills and lack of confidence. Sections 6.3 and 6.5 describe in detail how the contributions could be taken forward to create a tangible impact in the society.

Additionally, it was noted that online financial services have not been explored collectively i.e. previous researchers focused on one specific online financial service. Thus, this study delves into the most common online financial services utilised by older people aged 65 and over. Although this study aims to bridge the aforementioned gaps, this study intends to produce several key contributions in which one contribution has been discussed in this chapter. A visual representation of the identified factors (Figure 2.1) could be fruitfully utilised to comprehend the barriers and facilitators associated with older people's access to digital financial services. This diagram could be updated to include further factors and can be leveraged by stakeholders prior to developing useful interventions for older people to ensure that various factors related to online financial services have been acknowledged.

CHAPTER 3

Methodology

This chapter discusses the main phases of the study, elucidates how the research evolved through the selected research methods and justifies the decisions taken to structure and design the research methodology. Several amendments have been made to the research due to various reasons and these are explained in this section. The three main parts of the study were literature review, interviews and experimental design. Within these parts, there are different areas of work that were carried out during the study and this led to the production of several key contributions.

3.1 Methodological Construct

Before the process of collecting the data, a methodological approach had to be chosen which would assist in selecting the most suitable research methods. Saunders et al. (2023) produced a Research Onion model (see Figure 3.1) to assist researchers in designing their research methodology. This framework was followed to ensure that relevant research methods were selected for this study through various steps. These steps are considered as six layers in the Onion model:

1. Philosophy (our knowledge of the research being conducted)
2. Approach to theory development – (deductive or inductive)
3. Methodological choice – (quantitative, qualitative or mixed methods)
4. Strategy – (survey, experiment, case study, action research, grounded theory etc)
5. Time horizon – (cross-sectional (short-term) or longitudinal (long-term))
6. Techniques and procedures - (core layer - data collection and data analysis)

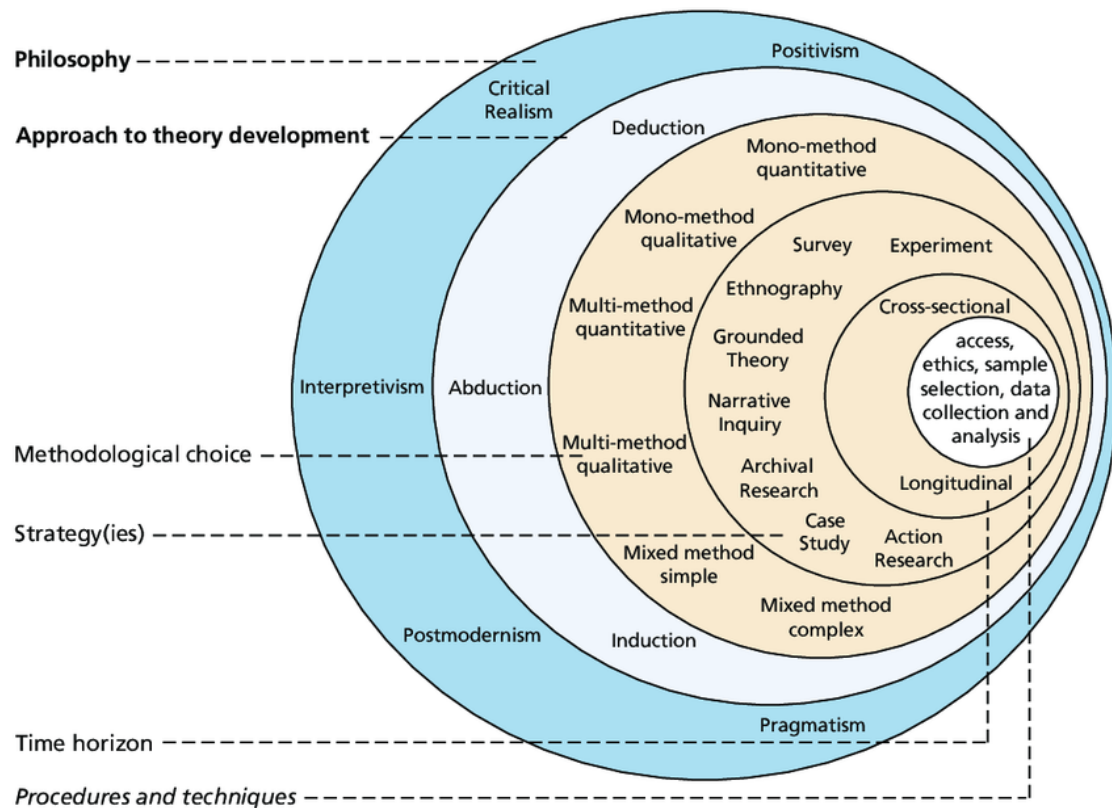


Figure 3.1: Research Onion model (Saunders et al., 2023)

The researcher’s knowledge of older people’s use of online financial services was enhanced through a literature review which assisted in determining the research gaps. Moreover, studies gave an overall understanding of the various research approaches that could be deployed for theory development and the two main approaches are inductive or deductive. Inductive approach produces a generalised conclusion from specific observations, while deductive approach, conversely, begins with broad facts to elicit certain information (Hyde, 2000). Due to limited research on older people aged 65+ on digital financial services, a deductive approach could not be followed to generate hypotheses; therefore, an inductive approach was considered to be more apt for this study.

A quantitative study employs a deductive approach where hypotheses are produced through theories/facts which are ratified through acquired data whereas an inductive study obtains data which would be analysed to form a theory (Newman, 2000). Qualitative studies generally adopt an inductive approach as data could be utilised to produce themes (Thomas, 2006).

In an inductive study, different research methods could be deployed to collate qualitative data, for instance, interviews, focus groups and observations. Semi-structured interviews were considered more adequate compared to structured interviews as structured interviews do not encourage conversational communication. Since semi-structured interviews do not follow an exact structured interview style, participants could have more control over the conversations which would allow the researcher to ask more relevant questions in the context of online financial services.

Moreover, an advantage of semi-structured interviews is that these interviews enable the researcher to explore new ideas that could arise during the conversations (Adeoye-Olatunde and Olenik, 2021). Since semi-structured interviews take a conversational approach, the researcher could ask for more details regarding the conversations that each interviewee shares on the experiences they face with online financial services; this might not be possible in a focus group study due to group discussions. In a focus group, confident participants take control of the conversations (Gorkovenko et al., 2017). This is a major disadvantage for those who are introverted. Furthermore, some interviewees may not share certain experiences that they are reluctant to communicate while in a focus group. Hence, focus groups were not considered as an appropriate method for this study.

Semi-structured interviews were also deemed as a suitable method when compared with questionnaire surveys (deductive approach). This study involves older people from ethnic minority groups; therefore, language could be a barrier for them which could deter them from not properly filling out the surveys. As previously stated in chapter 2, older people could have a lack of digital skills due to their seldom use of technology. Hence, they may not have the digital skills to provide pertinent responses on their use of digital financial services and they may require additional support to use a technological device to carry out the survey.

Due to the adoption of semi-structured interviews as a research method, this study follows an inductive approach. The interview data was utilised to generate patterns and themes, with the aim of creating novel theories or facts which would bridge the research gaps.

In terms of time horizon, this study did not require an extended period to gather data from older people aged 65+. Therefore, this is a cross-sectional study. Additional time was only required for the recruitment process. Data was not being gathered repeatedly to determine changes and developments which would be required in a longitudinal study, for example, observing an app where users record and manage their finances over 3 years.

After following the first five layers of the model, it was less complicated to choose the data collection methods for the final stage. Literature review and interviews were chosen as data collection instruments. Data collected through a review of the literature resulted in developing a visual representation of the factors associated with digital financial services (Figure 2.1) and semi-structured interviews was chosen as another method due to the reasons mentioned previously. In terms of data analysis, thematic analysis is the common method used to analyse qualitative data. Therefore, this was chosen as a method for this study. Thematic analysis would show the interconnections and patterns between the themes and codes related to digital financial services.

The brief explanations mentioned earlier indicate how the Research Onion model assisted in guiding the researcher to reach the core layer through several stages of the decision-making process. This methodological approach created a foundation for the study which facilitated in utilising the collected data to produce key contributions.

3.2 Workflow

A diagram summarising all the work carried out in the PhD study can be seen in Figure 3.2. Arrows are used to show the transition from one activity to another.

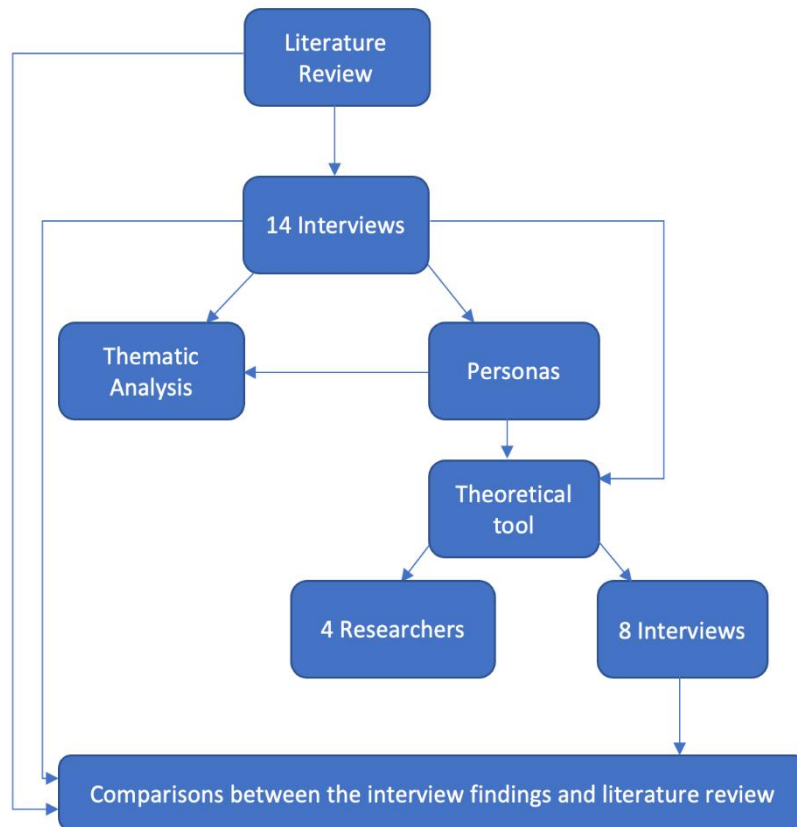


Figure 3.2: A workflow showing the methodological approach

As shown in Figure 3.2, this study commenced with a literature review followed by 14 interviews with older people and intermediaries. Thereafter, the procured data was thematically analysed using NVivo (version 1.7.1) – a data analysis software (NVivo, 2024). The idea of developing a persona emerged when interviewees described older people they are familiar with who are struggling with online financial services. This data was utilised to create seven personas. Creating personas was necessity to leverage all the information acquired through interviews and this technique assisted in understanding the challenges encountered by other older people in the society. During the process of thematic analysis, this additional information regarding older people was also analysed on NVivo. Following the development of one persona, a number of broad factors that could contribute to the challenges encountered by older people were noted that could be utilised to form a theoretical tool (see section 3.5.2) with a scale ranging from 0 to 5. Several factors were included using the information obtained from the literature review. This tool was tested on all the developed personas and older people’s interview transcripts from the initial set of interviews. Also, data from another 8 interviewees were deployed to test this theoretical tool. Furthermore, to address subjectivity issues, the tool was tested with four researchers and the

procured data were used to determine inter-rater agreement using Krippendorff's Alpha. Finally, the findings obtained from the interviews and the literature review led to an updated version of Figure 2.1.

3.3 Part 1 – Literature Review

A review of the literature was carried out to comprehend the topic, establish the gaps, create research questions and develop a categorised representation of the identified factors as shown in Figure 2.1 in Chapter 2. As highlighted in chapter 2 section 2.1, the researcher began by only concentrating on online banking. Subsequently, the topic was widened by considering a broad range of areas related to online financial services which was narrowed at a later stage to focus on the aspects of language and ethnicity.

3.4 Part 2 – Interviews

Following the literature review phase and after the creation of research questions, appropriate research methods had to be chosen for the study to gather meaningful data from older participants aged 65 and over. Semi- structured interviews were regarded as the best choice since older people can discuss their experiences in using digital financial services more. Although questions were created for semi-structured interviews, participants had the advantage of expressing themselves by discussing any matters related to online financial services.

In addition to semi-structured interviews, observations were considered as another research method in the study to understand older people's challenges with simulated online financial websites, e.g., online banking, insurance policy websites and online shopping websites, and observe their interactions with the given tasks on each website using HCI techniques which could aid in identifying issues linked to digital skills, accessibility and usability etc. However, this method was eliminated from the study after the first-year annual review meeting due to the difficulties that could arise from this method, for instance, older people may not have the digital skills to carry out the tasks and the developed simulated websites may not resemble the real websites. Thus, the decision was to spend more time on the theoretical aspect by conducting interviews with older people and intermediaries.

Despite all the benefits of semi-structured interviews, there are some drawbacks to this method, for example, not being able to easily control the time with older participants who prefer having conversations for a prolonged period. Also, some people may not participate in the interviews due to their fear of being asked sensitive questions such as bank details, card details etc. As well as this, research time could be lost if desirable participants are not recruited to gather data. Nevertheless, this method was sufficient for the initial stage of the study to collect primary data from older people aged 65 and over as meaningful data could be gathered through semi-structured interviews when compared with other research methods.

3.4.1 Recruitment

In order to answer the research questions 1 and 2, participants were recruited from two main ethnic groups:

- White
 - o Scottish
- Asian, Asian Scottish or Asian British
 - o Pakistani, Pakistani Scottish or Pakistani British
 - o Chinese, Chinese Scottish or Chinese British
 - o Indian, Indian Scottish or Indian British

These cohorts assisted in identifying the barriers associated with the aspects of language and ethnicity. The common attribute in these two groups is that the older people are aged 65 and over. Scotland's Census established that White: Scottish was the largest White ethnic group (National Records of Scotland, 2011). Therefore, this group was chosen for this study. Asian, Asian Scottish or Asian British was another group selected for this research to comprehend older people's language complexities. Within this group, 50,000 people were identified as 'Pakistani', 34,000 people were 'Chinese' followed by 33,000 'Indians' – these subgroups had the highest proportion of individuals residing in Scotland (National Records of Scotland, 2011). Hence, these subgroups were selected, and they were recruited through Glasgow-based organisations.

Initially, the intention was to recruit at least 4 men and 4 women for each sub-cohort to explore gender issues. However, one of the main problems which was faced during the study was recruiting older people aged 65 and over and those from ethnic minority groups. Therefore, an exact number of participants could not be recruited for each group. Several organisations such as *AgeScotland*, *GlasgowLife*, *Glasgow Women's Library*, *Anyiso* and *Almeezan* and individuals were contacted through phone calls and emails but did not receive positive responses from most of them as everyone was occupied with assembling everything back to normal phase following Covid lockdown. Also, organisations such as *GlasgowLife* do not help with digital financial services, they only provide learning sessions on digital skills that are carried out in various Glasgow libraries. Due to the involvement of sensitive information, organisations are generally not allowed to aid people with such services. This, in turn, produced more complexities in identifying organisations that assist older people with online financial services.

Even though there were challenges in the recruitment stage, a number of organisations aided in recruiting participants for the interviews such as *Glasgow's Golden Generation*, *Hindu temple*, *Wing Hong* and the *Dixon community*. Snowball sampling technique (Parker et al., 2019) was also employed to recruit participants by requesting various individuals to spread research information with their families and friends. Initially, the main plan was to include older participants. However, intermediaries were included due to the complexities in recruiting older people after the Covid lockdown. Later on, it was recognised through the interviews that older people had difficulties in articulating their own challenges whereas intermediaries clearly knew the challenges that older people experienced with online financial services. Data from these two groups of participants (intermediaries and end users) were used in this research to comprehend and categorise the different challenges.

Study information was circulated among students through emails with invitations for volunteers to participate who assist(ed) older people with digital financial services. An interpreter who was an acquaintance also accompanied the researcher to conduct the interviews with the Chinese older people at *Wing Hong* – an organisation for Chinese elderly people (Wing Hong, 2024).

3.4.2 Interview Questions

While recruitment emails were being circulated, interview questions were derived from research questions. Semi-structured interview questions can be seen in Appendix A. One of the main intentions of this study was to bridge the identified research gaps; therefore, specific questions were developed for targeted participants. Due to the lack of previous studies on older people whose first language is not English and those from ethnic groups, their challenges had to be explored through the interviews. There are many areas where older people could face challenges in using online financial services (e.g. fear, lack of digital skills, lack of education etc) and these were identified through a review of the literature (see chapter 2). Due to time constraints, it was not possible to ask each specific factor in an interview; therefore, each participant was given a few examples of the identified challenges which would assist them to think and answer the questions.

Questions for older people include demographic information (gender, education, occupation, income etc). These details were collected to understand if these factors had a role in facilitating or hindering older people from adopting online financial services. 'Literature Review' (Chapter 2) also aided in creating these questions since relevant factors were identified through previous research. Gender inequalities were briefly discussed previously (see section 2.3.1.16); therefore, in order to determine gender issues, participants were kindly posed to state their gender as part of the first interview question. Also, prior studies already showed that (see section 2.3.1.12) unemployment, lack of education and lack of income could influence older people in accessing the internet. Hence, questions regarding these factors were included. As part of the income question, Scottish tax bands (GOV, 2022) were used to create the five income options (over £12,570 - £14,732, over £14,732 - £25,688, over £25,688 - £43,662 etc). As well as this, questions regarding participant's marital status, first/second generation and household (e.g. living alone/with a partner/in a multigenerational household) were asked with the intention of gathering novel factors as these were not explored through previous studies.

Older people whose first language is not English and those from ethnic minority groups had similar questions. Those from ethnic minority groups were asked about their ethnicity and they were asked about language issues with online financial services. Language and ethnic

minority groups were the two main research gaps which were being addressed through this study; therefore, it was vital to determine the challenges faced by ethnic minority groups and explore their issues surrounding linguistic challenges. 'Older people whose first language is English' section in Appendix A shows that language and ethnicity were not incorporated as specific areas unless the participant shared any relevant information in relation to these two aspects.

In order to gather meaningful data regarding older people's challenges, ONS data was utilised. Five popular online financial services used by older people aged 65 and over were identified through ONS data; these were online banking, online shopping, buying or renewing existing insurance policies, tickets to cultural or other events (e.g., cinema, theatre etc) and buying transport service tickets (e.g., flight ticket, train ticket etc). ONS data showed that only 49% of over 65s were online banking users; only 65% of those aged 65 and over did online shopping; only 13% of older people bought online transport service tickets; only 14% bought tickets for cultural or other events and only 25% of older people bought or renewed existing insurance policies (ONS, 2020a). Although there were other activities carried out by older people, these five services were the most common online financial services conducted by older people aged 65 and over in 2020.

Older people were asked about the frequency with which they carried out these activities, the help acquired from others, the challenges they faced and the reasons (if any) for not carrying out these services. Such questions were required to identify the obstacles that older people experienced in accessing each online financial activity. Due to the digitalisation of many services, it was necessary to comprehend how older people utilised online services. Thus, these questions were required to let the participant share relevant information in relation to each activity. Although the interview focussed on five main online financial services, a question regarding other financially related tasks was included to discover how older people accessed other services as this could aid in identifying diverse challenges.

Additionally, a question regarding the implications of not using online financial services was included as section 2.3.1.6 briefly mentioned how older people are unaware of the benefits of technology due to fear. This also led to the creation of another question: 'do you think

online financial services are useful?’ This question was extended for those who had language issues: ‘do you think it would be easier to use online services if you received it in your own language? Explain your answer.’ This was added to enable those with language problems to suggest ideas or solutions (if any) that could be useful for future work.

Furthermore, literature review has shown that older people aged 65 and over seldom use online banking and this could depict that some older people may prefer in-person interactions. Also, some may prefer in-person monetary payments instead of digital transactions (see section 2.3.1.11). Hence, in order to identify older people’s preference regarding payments, a question was created: ‘do you prefer in-person payments or online transactions?’ Lastly, a final question was created to enable older participants to include any comments related to the research topic.

Intermediaries such as digital carers and employees were mainly asked questions regarding the help provided to older people and the issues they noticed while assisting older people with online financial services. Also, they were asked to suggest some solutions which could support vulnerable people in accessing digital financial services. All these questions were only created to enable the researcher to guide the conversations. The researcher who conducted this study is a digital carer who facilitates older family members with online services; therefore, this assisted in creating the questions for intermediaries as shown in Appendix A.

The opening question formulated for intermediaries was: ‘what kind of difficulties do you find in older people’s use of online financial activities?’ Examples of challenges (e.g. fear, language issues, interface issues, lack of confidence etc) that were identified from the literature review (chapter 2) were included to assist them in answering this question. As well as this, a question was developed for volunteers/employees to discover gender disparities among older people at organisations as this has not been investigated before. In addition to this, a question was created to determine the online financial services where older people seek help for. This question was required to examine whether the activities mentioned by the intermediaries matched the responses gained from the interviews with older people.

Along with these questions, another question was included to identify intermediaries' challenges while assisting older people. As a digital carer, a lack of patience and frustration are challenges that could arise while repeating the same instructions to older people. Hence, a question related to frustration and other personal challenges was incorporated into the interview schedule.

Although literature review shows that help is provided through charity organisations (see section 2.3.4.1), post offices (section 2.3.4.4), community groups (e.g. churches and temples (see section 2.3.4.2), older people encounter various complexities in using and adopting online financial services; therefore, in order to identify the type of assistance that intermediaries provide to older people, a question related to assistance was created to comprehend their digital support techniques and understand if these are helpful for older people.

Also, a question regarding the time that digital carers and volunteers/employees spend with older people was created. Digital carers devote considerable time to helping older people with digital services and this was discussed in section 2.3.4.7. Hence, it was essential to determine how digital carers utilise their time to carry out personal activities (e.g. studying, hobbies, work etc) and assist older people.

Another question was formulated to enable intermediaries to recommend solutions (if any) that could be utilised to overcome human/behavioural, technological and/or societal issues. Also, a further question was designed to let them share any comments regarding the research topic.

In the initial stages of developing these interview questions, the length of the questions was short and this may not assist in gathering enough information from the participant. Thus, sub-questions were included with examples or options to obtain detailed answers regarding their challenges with online financial services. The interview questions were repeatedly refined until the wording of the questions was deemed accurate.

3.4.3 Interview Process

Before commencing the interviews, ethics approval was obtained from the department. As part of the ethics approval process, three documents were created (Participant Information Sheet/Consent Form and Instructions – See Appendix B, C). Before commencing each interview, these documents including a Privacy Notice were given to each participant.

Prior to the actual interviews, alpha testing was carried out in which the researcher conducted self-interviews, imitating the individuals who would fit the criteria of this study. The researcher recorded the interview and made minor changes to the wording of the questions. Following this process, a pilot study was conducted with two individuals (an actual participant and a friend) to test the phone voice recorder, duration of interviews and to ensure that the questions were appropriate. Slight changes were made to the questions following the pilot testing. Pilot study with the older participant revealed that they had difficulties in understanding the semantics of the questions. Hence, more examples of the challenges were included in some of the questions to assist and encourage older people to think and provide pertinent responses.

Preceding the interviews with participants, consent forms and other relevant sheets were given. Participants were not obliged to take part in the study; therefore, those who did not sign the consent forms were not interviewed. Although face-to-face interviews and Zoom interviews were conducted, those who did not know how to utilise Zoom and those who preferred phone calls had their interviews through phone calls.

During the interviews, participants were asked semi-structured questions and their responses were utilised to ask new questions and create conversations which would provide a clearer idea of the challenges that older people encounter on online financial services.

Older people's fear of financial scams could impede them from participating in interviews associated with online financial services and this had an impact on this study. Two individuals did mention that they were not interested in going ahead with the interview due to fear. The researcher did assure them that their personal details are not being collected and participant information sheet and other relevant information were provided. Yet, individuals were not

fully satisfied due to fear. However, this type of scenario was expected due to the involvement of older people in the research.

The following table (see Table 3.1) displays the total number of participants and the different groups of participants interviewed from various organisations. One digital carer was recruited through snowball sampling.

Table 3.1: Participants involved in the study

Participants (those aged 65+, digital carers and employees)	Organisations	Total
White: Scottish	Glasgow's Golden Generation	3
Chinese, Chinese Scottish or Chinese British	Wing Hong	5
Pakistani, Pakistani Scottish or Pakistani British	Dixon	3
Indian, Indian Scottish or Indian British	Hindu temple	4
Digital carers	Glasgow Women's Aid, Snowball sampling, colleague	3
Employees	Glasgow's Golden Generation, colleague, the Well Multi-Cultural Resource Centre	4
		Total = 22

Interviews were carried out in two phases. Initially, the plan was to conduct as many interviews with the different cohorts as possible. However, once the theoretical tool (see section 3.5.2) was developed, more interview participants from different ethnic minority

groups volunteered to participate in the study; therefore, this data was also utilised to test the developed tool. Out of the 22 interviews, 14 interviews were conducted before the tool was created and eight interviews ('Pakistani, Pakistani Scottish or Pakistani British', 'Chinese, Chinese Scottish or Chinese British') were carried out after the development of the tool in which the data was used to test it. The duration of each interview was approximately 30-40 minutes. This means that 11-14 hours' worth of data was collected through interviews.

3.4.4 Data Analysis

Although Otter – version 3.70.0 (Otter, 2025) was employed to generate transcribed files, the researcher had to examine each transcribed file to ensure that the generated words and sentences were accurate; amendments to these sentences were made after listening to the voice recordings numerous times.

Verbatim transcription method was followed to include all the words shared by the participant. Some forms of analysis methods like thematic analysis and grounded theory, focus on what was said instead of how it was said (Braun and Clarke, 2013). Verbatim transcription only records the words spoken, showing as much detail as possible (Oliver et al., 2005). Verbatim transcription style often misses nuances due to idioms, especially when engaging with people whose first language is not English. Also, there's a loss of various cues highlighting hesitation, frustration, lack of patience, lack of concentration etc. However, this transcription style was deemed to be ideal for this study as other methods such as discourse transcription is a time-consuming process due to the coding involved in the method to analyse emotions and interactions (Gee, 2014). Also, verbatim transcription provides rich, reliable data due to the use of participants' original language that could be utilised to produce credible themes and codes.

Transcribed data obtained from Otter were transferred to NVivo to conduct thematic analysis. Thematic analysis consists of various stages which would enable the researcher to carry out the analysis in a precise manner. Moreover, this method primarily focuses on themes and codes that aim to answer the research questions in a study (Braun and Clarke, 2006). Each transcribed file was reviewed many times to ensure that the coding process was executed adequately.

Six phases of thematic analysis were widely utilised to analyse each interview transcript (Braun and Clarke, 2006, Braun and Clarke, 2019):

1. Familiarise yourself with the data
2. Generate codes
3. Search for themes
4. Review themes
5. Define and name themes
6. Produce the report

Firstly, each transcribed file was read multiple times to become familiarised with the content. Secondly, meaningful codes were generated by dragging and dropping the sentences to each relevant code. Each code could be expanded to view all the interview excerpts. Thirdly, codes were collated into themes; each theme would be able to contribute some information in relation to a research question under focus. 'Challenges' was one of the main themes consisting of many codes which could be deployed to answer research questions 1 and 2. A set of themes and codes were formed for participants from various ethnic groups, digital carers and employees. Furthermore, interconnections between the codes were identified; NVivo has a feature to view the intersecting codes. In other words, we can view if a code has excerpts that are linked to other codes.

Next, the generated themes and theme names were reviewed to ensure that they fit well with the coded extracts. Preliminary findings consisting of themes and codes derived from five interview transcripts were published in a conference paper (Thomas et al., 2023). Later on, some of the thematically analysed data procured from 14 interviews were published (Thomas et al., 2024). Interviews were conducted over 2+ years due to the difficulty in recruiting the participants during the Covid-19 pandemic and immediately afterward. Therefore, thematic analysis of the obtained interview data was not carried out simultaneously; each transcript was analysed following each interview. Findings from 22 interviews, including interconnections are discussed in chapter 4 and the development and testing of the theoretical tool using qualitative data is discussed in chapter 5. In order to

anonymise the interview participants, the data was coded as shown in Table 3.2. Chapter 4 utilises these codes to discuss the findings obtained from the 22 interview transcripts.

Table 3.2: Codes for interview participants

Participants	Codes
White: Scottish	S1, S2, S3
Chinese, Chinese Scottish or Chinese British	C1, C2, C3, C4, C5
Pakistani, Pakistani Scottish or Pakistani British	P1, P2, P3
Indian, Indian Scottish or Indian British	I1, I2, I3, I4
Digital carers	DC1, DC2, DC3
Employees	E1, E2, E3, E4

3.4.5. Comparisons between Interview Findings and Literature Review

Once the eight interviews were conducted after developing the theoretical tool (see section 3.5.2), 22 interviews were carried out in this study, 14 and 8 in phases 1 and 2 of interviews, respectively. All the interview findings were mapped onto the categorised representation of the four main areas related to online financial services (Figure 2.1). This merging process led to the development of an updated version of Figure 2.1 which displays the novel and common factors associated with digital financial services. More information regarding the updated version of the visual representation of the factors is highlighted in chapter 4.

3.5 Part 3 – Experimental Design

The third part of the study involves desk-based research instead of system-based. Personas were created through interview data; therefore, this is an experimental design. A theoretical tool (see section 3.5.2) was developed following the creation of the personas. An experimental design approach was taken to identify whether the factors in the tool that originated from the personas can be leveraged to gauge the barriers experienced by older people in the use of online financial services.

3.5.1. Personas

The data acquired from the first phase of the interviews were utilised to create several personas. Personas were created using the interview data obtained from intermediaries who described older individuals who are experiencing challenges with digital financial services (see Figure 3.3 for an example of a persona). See Appendix D to view the remaining six personas. The developed personas incorporate real information except participants' names; accurate qualitative data is required for the theoretical tool (see section 3.5.2) to gauge the factors. A persona contains the user's goals, demographic details and other pertinent information (Blomkvist, 2002). Personas are generally regarded as a HCI tool and they provide a clearer image of the final user (Nunes et al., 2010). Although personas could contain invented information to mimic potential human-like characters (Blomkvist, 2002), the personas created in this study incorporate real information.

Name: Aamina Muhammed
Age: 70+
Gender: Female
Ethnicity: Pakistani
Occupation: No job; never worked
Marital status: Married

Aamina is part of first generation who migrated to UK with her husband from Pakistan at a young age. She lived majority of her life in UK and she's not educated (i.e., no school/university education). She encountered some domestic violence and she lives by herself. She always needs someone to aid her with online activities. Aamina has children who are in their 40s now.

Aamina is adequate with English language but she is autistic and she has severe anxiety. Therefore, she had difficulties in communicating with people around her. Due to her health condition, staff from mental health organisation provided long explanations to teach her digital financial services. Yet, she had difficulties to comprehend everything in general.

Staff goes to her house three times a week for two hours. If she wanted help with bank-related tasks then she would have to go to the bank to deal with it which consumes a lot of her time. Then she wouldn't have assistance with anything else. Someone told her about online banking and she receives help from staff on digital banking services. Since she doesn't have any digital skills, she faced many issues. For example, she paid for an expensive TV package. Staff told her about how she could receive basic packages on online. But she doesn't trust it; she's happy with what she knows. She doesn't want to phone them up as this could lead to other problems. Aamina wouldn't leave the house without the staff; she always stayed in the house.

She relied on state benefits as she never worked in the UK before. Aamina was being looked after by the state as her children were all grown up. She had a daughter who was in her 30s. She went to university and she also had mental health issues like her mother. She helped her with all the online tasks. Unfortunately, she passed away in 2020 and Aamina lost all the support from the one person who used to help her with everything.

Even though Aamina receives assistance from organisation, she still hasn't been able to grasp the digital skills due to her mental health; she has a routine that she follows. If anything changes, she won't be able to cope really well.

Goals:

- Become more independent by learning some useful services, for example, online TV packages, online banking which could facilitate day to day life.
- Increase trust on online services.

Figure 3.3: Example of a Persona

All the developed personas consist of real information. This information was thematically analysed while assessing the interview transcripts on NVivo. Personas were created to

visualise these individuals and acknowledge the complexities they face with digital financial services; this technique would facilitate the design (Chang et al., 2008) and development process of diverse interventions such as digital tools for older people with limited digital literacy and financial literacy skills.

3.5.2 Theoretical Tool

Personas and literature review facilitated in identifying various broad factors that could negatively or positively influence older people's use of online financial services. These factors were utilised to create a tool consisting of 10 factors with a scale ranging from 0 to 5, this tool was tested on all the developed personas and older people's interview transcripts and a subset of the interview data (eight interviews) were leveraged to test the tool. Also, four researchers tested this tool using the personas and Krippendorff's Alpha was used to assess inter-rater agreement. This tool permits individuals to quantify the factors which may contribute to the barriers confronted by older people. More details regarding this tool can be seen in chapter 5.

3.6. Summary

Research commenced by conducting a review of the literature, semi-structured interviews and data analysis followed by the experimental design which consisted of personas and the theoretical tool. This study took an inductive approach by collating qualitative data through interviews. Following a methodological approach assisted in choosing the most appropriate research methods for this research. As mentioned at the beginning of this chapter, there are three main parts to this study which transitioned from one to another using the information/data from the previous phase. Even though there were difficulties in the chosen research methods, data was exploited in various ways which could assist in answering the research questions.

In terms of research questions, the data acquired from the first phase of interviews i.e. 14 interviews gathered from intermediaries, 'White: Scottish' and 'Indian, Indian Scottish or Indian British' was insufficient to identify the challenges surrounding different ethnic minority groups. During the waiting period, expecting that individuals would volunteer to participate

in the interviews, personas and theoretical tool were created as part of the experimental design. Later, another 8 older people from different ethnic minority groups took part in the interviews and this data was used to test the theoretical tool. Also, four researchers tested this tool using the personas. All the findings from 22 interviews were thematically analysed and leveraged to update Figure 2.1 (Chapter 4). Findings from the first phase and the second phase of the interviews (14 + 8 interviews) are discussed in the next chapter.

CHAPTER 4

Study Findings

Data for this study was collected in two phases of semi-structured interviews. This chapter examines the data collected from these interviews and discusses the key themes and codes identified through thematic analysis. The first section of this chapter explores the data obtained from three interviews of 'White: Scottish' participants, four interviews of 'Indian, Indian Scottish or Indian British' participants and seven interviews of intermediaries comprising three digital carers and four employees. The second section of the chapter focuses on the data derived from the second phase of the interviews in which eight older people's responses are analysed. The third section discusses how these findings assisted in answering the two research questions and highlights how this guided bridging the gaps. This chapter concludes by examining the data obtained from the 22 interviews and how this led to an updated version of the categorised representation of the factors shown in Figure 2.1.

4.1. Phase 1 of Interviews

First phase of the data collection consisted of 14 interviews. The following sub-sections concentrate on the responses received from seven older people followed by seven digital carers/employees. The final sub-sections address the themes and codes derived from three participant groups during the thematic analysis process which helped in understanding the challenges older people face in undertaking online financial services.

4.1.1 Demographics of Older People

Around seven or eight sets of questions were asked to each participant (See Appendix A). One of the limitations of this study is that some older participants were not capable of articulating their answers and some participants were confused after repeating the question which resulted in not obtaining proper responses. However, this was considered when reviewing the transcripts on NVivo by eliminating unclear answers using square brackets and question marks. Additional questions were asked to older people whose first language is not English, for example, do you face language-related issues when using digital financial services or is this the main reason you do not utilise such services? etc.

The first set of questions focused on demographics. Older people were asked about their gender, education level, occupation, income, household, marital status and first/second generation. A set of options was given for some of these factors to help them to answer the questions quickly, for example, Scotland’s tax bands were used to seek information regarding participant’s income (GOV, 2022). Older people’s demographic information can be seen in Table 4.1. The participant code column in this table consists of the codes mentioned in Table 3.2 – S1, S2, S3 refer to ‘White: Scottish’ participants, and I1, I2, I3, I4 refer to ‘Indian, Indian Scottish or Indian British’ participants. 1st generation in the last column means anyone who migrated to the UK and 2nd generation is the offspring of the 1st generation immigrant parents.

Table 4.1: Phase 1 interview participants’ demographics

Participant code	Gender	Education level	Occupation	Income	Household	Marital status	1 st /2 nd generation
S1	Female	Postgraduate degree	Retired Manager	25k-43k (before retirement)	Lives alone	Unmarried	NIL
S2	Female	High School	Retired Social Worker	25k-43k (before retirement)	Resides with husband	Married	NIL
S3	Female	High School	Retired Nursing assistant	25k-43k (before retirement)	Lives alone	Married	NIL
I1	Female	Bachelor’s degree	Retired Post Office Worker (Owner)	NIL	Multigenerational household	Married	1 st generation
I2	Male	Postgraduate degree	Retired Multicultural officer	60k (business)	Resides with wife	Married	1 st generation
I3	Female	Bachelor’s degree (not completed)	Wages Clerk (before marriage)	£7 per week	Resides with husband	Married	NIL
I4	Male	Postgraduate degree	Retired Doctor	60k	Lives alone	Widower	1 st generation

4.1.2. Online Financial Activities

As mentioned in Chapter 3, after collecting demographics, older people were asked questions regarding five common online financial activities – ONS data was utilised to obtain this

information. They were also asked about other financially related activities, the implications of not utilising online financial services and the advantages of such services.

4.1.2.1 Online Shopping

With regard to online shopping, 'White: Scottish' participants occasionally utilise online websites such as Amazon, eBay, Etsy and M&S but some may receive digital support to purchase online products on such portals. Also, some prefer traditional methods to carry out shopping. One participant stated, "I am wary about ordering because I'm not really sure if the size would be correct or what kind of material it would be or things like that. So I am not really all that interested" [S2]. This is a disadvantage of online shopping; therefore, some older people prefer shopping physically. Also, participant S2 does not conduct transactions on e-commerce websites as she receives support from her husband: "If I saw something, then he would order it for me, he would do the transaction.... he's quite happy to do it. But I feel that if I had to something like that, and if somebody showed me how to do it, then I probably would. But I don't do it that often. So, I don't feel the need to learn how to do it." This clearly suggests that receiving informal support could prevent older people from learning online financial activities. Also, this would cause more complexities when they reach a point in life where they have to live alone or support is no longer available because of illness or some other conditions of the supporting partner. Furthermore, not using online shopping websites due to the transaction part suggests a hint of fear.

Similar responses were obtained from 'Indian, Indian Scottish or Indian British' participants regarding online shopping. Fear and lack of confidence deter older people from carrying out the final stages of an online financial activity:

"I learned how to do shopping online. But I just start doing it on the phone...put the things in the basket then after that I stopped" [I1].

Older people may enhance their fear due to the negative experiences shared by others: "My friend told me she ordered something...instead of one item she ordered 10 items" [I1]. This also indicates that older people experience complexities while undertaking specific tasks in e-commerce, especially the payment section: "I can do it. But when I go up to payment, then

um, I'm a bit... you know...scared" [I3]. As well as this, previous experiences influence older people in the use of shopping websites: "I had a bad experience on online shopping. I don't have that much confidence" [I2]. Negative experiences have an impact on older people's level of confidence and have a direct effect on their use of online shopping. Additional support is often provided to those who have difficulties with shopping websites: "So I just look at the thing and I tell him (husband). This is the slippers I want. I want this" [I3]. Participant I3 prefers shopping in person but has to rely on her husband due to health issues: "My arthritis is really...and I had both my knees operated.... I like to see the thing before I buy it" [I3]. This indicates that older people use online services by depending on others due to reasons such as health conditions. Despite this, such extensive support from others could hinder them from learning digital financial services.

4.1.2.2 Online Banking

In terms of online banking, two out of the three 'White: Scottish' participants regularly use online banking to conduct tasks such as checking statements, transferring money and setting up new payees. However, participant S3 never utilised online banking even through additional support: "I would receive help from Glasgow's Golden Generation class if I go to. I would also receive help from my family. And I know that the bank would set it up all for me, if I went to my bank. I know that it can be done" [S3]. Participant S3 utilises a nearby post office to carry out banking activities: "I seldom go to the bank; there's a post office near me and I use a post office to withdraw money. I seldom go to the bank.... only if I have to cancel a standing order or a direct debit" [S3]. Even though post offices and banks offer support on basic banking services, there are hidden costs associated with formal support, for example, indirect costs associated with the time and effort required to travel to a post office or a bank could be utilised on other activities. Also, travel expenses are a direct cost; older people can save money by not travelling to banks and post offices. Reducing these hidden costs could improve their everyday lifestyle (Thomas et al., 2024). Moreover, these hidden costs are also experienced by the family members or friends who aid older people to carry out an online banking activity: "I have grandchildren in Ireland and grandchildren in Spain. And I just need to send them money....if somebody's going to Ireland, I give them the euros to take over...somebody's going to Spain, I would give somebody euros to take over" [S3]. This is clearly inconvenient as international money transactions could be conducted through digital

banking or other relevant apps/websites. Family and friends have to spend their time, effort and money to carry out such activities in person to help their older family members.

Older people may not access online banking services due to fear of transactions: “if it is a big amount I go to the bank, they’ll do it” [I2]. Participant I2 has an online banking app but goes to a bank for large transactions: “takes you a couple of minutes. But gives you a peace of mind” [I2]. Participant I2’s wife also has this fear and she doesn’t use online banking services; she relies on the support provided by banks. This indicates that hidden costs are also evident in ethnic minority groups. There were two out of four ‘Indian, Indian Scottish or Indian British’ participants who utilised online banking while the other two participants do not use it due to fear or the support received from their partners: “It’s just because he does it.... I am busy cooking and he’s doing all these things” [I3]. Although these participants have varying qualifications, fear and extensive support from others prevent older people from leveraging digital banking.

4.1.2.3 Buying or Renewing Existing Insurance Policies

Regarding online insurance policies, one participant knew how to compare the prices online to select the best insurance policy while other ‘White: Scottish’ participants did not carry out this online financial activity as they received support from family members. Participant S2’s husband dealt with buying or renewing insurance policies: “he would look online to get the best deal” [S2] and participant S3’s son provided support in comparing the prices online: “My son looked at that, I didn’t” [S3]. Again, this indicates that older people receive significant support through digital carers to buy or renew existing insurance policies. However, they are not learning this digital service as they are aware of the fact that they would always receive digital support from family members.

Participant S1 carried out this activity without any additional support and used various websites to compare the policies such as comparethemarket.com. However, the complexities regarding this activity were discussed briefly: “Sometimes, it can just be overwhelming. There’s just too much” [S1]. This highlights that digital literates, i.e. those who utilise digital services, encounter difficulties with online financial services. Comparing insurance prices online is a time-consuming process due to the substantial number of questions and patience

is required to provide the answers to seek the best offers. This could be a difficult task for older people aged 65 and over due to the complex question-answer process.

Pertaining to 'Indian, Indian Scottish or Indian British' participants, 1 out of 4 participants buy or renew existing insurance policy through online: "Sometimes I use go.compare [website] [14]. One participant renews car insurance every year through phone calls due to online safety concerns: "If I see the amount is heavy then I try to inquire from other people...phone them and see how much they charge" [12]. Participant I2 does not fully trust online financial services. On the other hand, participants I1 and I3 do not buy or renew existing insurance policies as their husband or son carries out this activity. As previously stated, additional support from family members prevents older people from learning and accessing digital financial services which, in turn, reinforces digital exclusion.

4.1.2.4 Tickets to Cultural or Other Events (e.g. cinema, theatre etc)

Concerning tickets to cultural or other events, two out of three 'White: Scottish' participants buy tickets for cinema or theatre programmes via online. However, one of these participants relies on their partner to ensure that they have conducted the activity accurately: "I will go through the booking process. But I would always maybe ask my husband, just to check that I've done it properly before I would make the payment" [S2]. This depicts that some older people prefer having the final reassurance prior to making the transaction to ensure that they are booking the tickets for the right events and to confirm that they are using the right websites to book these tickets.

In relation to 'Indian, Indian Scottish or Indian British' participants, buying online tickets for events is not a common activity that they carry out on a regular basis. However, if they do want to buy a ticket, they either receive support from their partner: "He does it....so any online thing.... He does it" [13] or phone them: "I just phone them and give them my credit card number. Because credit cards are less risk than debit cards" [12]. Participant I2 feels secure by providing credit card details over the phone as there are fewer chances of encountering a financial scam.

4.1.2.5 Buying Transport Services Tickets (e.g. flight ticket, train ticket etc)

In terms of transport service tickets, only one 'White: Scottish' participant buys online transport tickets: "I've bought lots of flight tickets" [S1]. Participant S2 does not carry out this activity: "Generally, any flights, my husband would book them. I would look up the trains. I would use local trains. But I would look up online to see what time the trains are" [S2]. This suggests that older people may use apps to seek general information regarding transport services, but the transaction part is mainly carried out by the digital carers. Participant S3 also received support from family members to book flight tickets in the past and is no longer interested in travelling: "But I don't go anywhere now" [S3]. Older people aged 65 and over do not require tickets for buses as they utilise a free bus pass to travel; interviewed participants utilise this pass without conducting any online financial transactions. Regarding taxis, 'White: Scottish' participants would call up a taxi instead of using apps such as Uber: "I just call the taxi from my phone. I don't have anything. Nothing. None of the fancy stuff that my kids have. I don't do it, I just do it the conventional way" [S3]. This implies that older people prefer traditional methods as they are not used to accessing digital services to buy tickets for transport services.

With regard to 'Indian, Indian Scottish or Indian British' interviewees, participant I2 always used a credit card to pay for tickets by travelling to the railway station in person and usually received support from I2's son to book flight tickets: "So I ask my son to book my ticket... If not, I said I'll go to a local travel agent" [I2]. Participant I3 also obtained digital support from digital carers: "Yeah, he [husband] does it. He does it online" [I3]. Older people who lack digital skills or those who have a fear of losing money always depend on people that they can trust with their finances and in most cases, this would be immediate family members. From another perspective, some people prefer following the traditional methods even if they know about online services: "I know certain companies, I phone them and book the flight" [I4]. Participant I4 always utilises online financial services but prefers calling travel agencies for flight tickets. Also, health conditions prevent participant I4 from travelling excessively. This means that buying transport service tickets is not a common activity for those with extreme health conditions. It was evident from the interviews with 'Indian, Indian Scottish or Indian British' participants that they rarely utilise online transport services and the majority of them received support from their family members.

4.1.2.6 Other Financially Related Activities

Participants were also asked questions regarding other financially related tasks, e.g. payment of car tax and renewal of passport, that they carry out through online to acknowledge the challenges they confront while using these services or the reasons for not conducting such services. Participant S1 generally utilised the internet for any activities by themselves: “I’ve paid a few parking fines online” and “I pay my car tax online” [S1]. However, participant S2’s husband carried out all the financially related activities: “My husband could do that online” [S2]. This means that participant S2 is fully dependent on her husband regarding such online financial services. Additionally, participant S3 sought support from family members to renew the passport: “That was done online with the help of one of my sons” [S3]. Those who received support on the five main online financial activities received assistance with other online financially related activities through digital carers. This was also evident during the interviews with ‘Indian, Indian Scottish or Indian British’ participants. Participants I1 and I3 received help from family members to conduct online financial activities. Participant I4 carried out such activities by themselves. Participant I2 visited a post office to pay car tax and travelled to a passport office to renew the passport: “I pay extra money because they give you immediately on the same day. Just wait a couple of hours. They give your passport” [I2]. Hidden costs can be clearly identified through this interview excerpt. Older people spend their time, effort and money to travel to a passport office and they incur additional costs to obtain the document on the same day. Older people could easily complete these types of activities using the internet, but some prefer to follow the traditional ways as they might feel more independent while carrying out the activities without support.

4.1.2.7 Implications of not using Online Financial Services

Participants were asked questions regarding the consequences of not leveraging online financial services. In general, participants were not aware of the ramifications of not utilising online financial services: “I am very old. I’m still old fashioned. I just think to myself, why do I need online banking? I just keep saying this, why do I need it when the bank already does everything?” [S3]. This indicates that older people could have an interest in digital financial services if they are aware of the implications of not using digital financial services, for example, they spend money to travel to a bank or a shop that could be utilised for other purposes.

Although not all the participants were aware of the implications of not utilising online financial services, participant S1 understood the convenience of using digital financial services: “If somebody comes into my garden...I pay her, you know, just by transferring money. So, you got all the previous information, you just update it. Also, there’s quite a lot of young people in my family...birthday money, it’s more the norm just to put it into a bank” [S1]. Participant S1 clearly knew that we are living in a digital world; therefore, we have to adapt to this new paradigm.

4.1.2.8 Usefulness of Online Financial Services

In order to acknowledge older people’s awareness of the advantages of online financial services, participants were asked to share their opinions on the usefulness of such services. Participants S1 and S2 knew that online financial services assist people in having a convenient life: “It’s so much easier to do things online...because you could be on the phone waiting in a queue for someone to speak to you and things like that” [S2]. Moreover, participant S2 was aware of the hidden costs: “If I have to transfer money, I can do it just more or less instantly without having to physically go somewhere and do it” [S2]. However, participant S3 had a lack of experience or knowledge regarding digital financial services: “I don’t know what online banking would do for me” [S3]. This implies that some older people are unaware of the benefits of leveraging online financial services such as discounts obtained through online shopping, saving travel expenses and the minimal time and effort required to conduct online activities. Lack of experience or knowledge prevents older people from adopting digital financial services which results in exacerbating the existence of hidden costs.

In terms of ‘Indian, Indian Scottish or Indian British’ participants, only participant I4 confidently mentioned that online financial services are useful. Other participants did not fully perceive that such services were useful due to fear or previous negative experiences. For example, one participant stated, “They are useful but.... again, I don’t want to take a risk. Don’t know if it’s a gamble or not. But it’s a risk.... that’s why I don’t want to get involved in it” [I2]. This indicates that fear is a major factor that could restrict older people from taking the initiative to learn about the importance of online financial services in the context of everyday life. Additionally, negative experiences act as a barrier to using such services: “But sometimes you can be in a problem. Because it happened to my brother’s son once. He

travelled to America, and he paid for everything. And then something happened. I can't remember now. And he couldn't even get the money back from them" [I3]. Even though participant I3 has utilised online financial services through digital carers, several negative experiences led to the perception that online financial services are not significantly beneficial. Barriers such as fear or negative experiences halt older people from learning and comprehending the advantages of online financial services. These challenges could result in not utilising or adopting such services. Consequently, this further promotes the grey digital divide that is prevalent in society.

4.1.3. Digital Carers/Employees

Seven intermediaries -- three digital carers and four employees -- were interviewed to apprehend the challenges that older people encounter with digital financial services. As stated in chapter 3, intermediaries were included due to the difficulties in recruiting older people following the Covid lockdown. Moreover, the notion of involving intermediaries arose when older people had complexities in articulating their own challenges. During the interviews with intermediaries, it was noted that employees and digital carers had a greater knowledge regarding older people's challenges with digital financial services.

4.1.3.1 Older People's Challenges

The first question asked to the intermediaries was the challenges they identified in older people's use of online financial activities. One of the main challenges identified by the employees was fear: "Most older adults are really nervous and scared of being scammed, worried about their information being stolen. And in general, they're just very nervous about using technology. They're worried that they can break it, things are going to go wrong, they're going to forget things, they're going to lose information" [E2]. This demonstrates that older people's fear of financial scams impedes them from conducting online financial activities. Moreover, these scams are "aimed at older adults" [E3]. Frauds generally target vulnerable people to obtain sensitive information such as name, card details and account information. Older people also have a fear of making mistakes: "I've paid for it, the money's come out of my account now, if this is the wrong item or if, I paid for it and I didn't get something, how can this be fixed?" [E3]. A digital carer stated, "I think they're intimidated by these things"

[DC2]. Older people may feel that technology is convoluted, and this would increase their fear of using online financial services.

One of the main challenges recognised by digital carers was a lack of experience/knowledge. One digital carer mentioned that older people have confusion in understanding the security measures in digital banking, they have complexities in understanding biometrics and two-factor authentication. Also, “they have some difficulties with the meanings of words” [DC2]. Older people have issues comprehending the difference between memorable information and passwords. Most importantly, they could be unaware of the scams in digital financial services if they have not used these services before: “She didn’t know this. She didn’t know about scam at all. She didn’t know these scam things” [DC1]. This indicates that older people’s lack of experience or knowledge could create major issues when accessing online financial services. As a result, they approach digital carers or organisations for assistance with such services.

In addition to the interviews with digital carers and employees, findings were obtained through emails from *Age Scotland* during the recruitment phase of intermediaries. An employee at *Age Scotland* stated that many of the older women from ethnic minority groups depend on their husbands for their banking services but there are also some situations where it is considered as a sign of control of their partner. This suggests that many older men from ethnic minority groups traditionally undertake certain financial activities and therefore women are always relying on their partners to conduct financial tasks. This highlights the existence of gender disparity among older people.

Furthermore, The *Age Scotland* employee also mentioned that “most of the older people don’t do online banking and would rather go into the bank or use postal services to pay for their bills – this is for both men and women. Using a computer would be quite daunting for them as they are not technologically inclined. There are a few of them that have joint accounts with their children and their children will do their online banking for them”. This indicates that the majority of older people are dependent on additional support to conduct banking activities.

4.1.3.2 Assistance Rendered By Intermediaries

Intermediaries aid older people in various ways to help them learn the processes: “So I first demonstrate it to him and then that.... for the first one he writes it down. And then tries it himself with the instructions that he’s written down” [DC2]. Instructions are often provided to older people to help them navigate the processes of digital banking and international money transfer apps. Although instructions are written down, they have various doubts regarding the processes. Also, they quickly forget what they learn due to age and memory retention issues: “She will learn but easily forget it, it’s not just her, I noticed even my auntie uncle they’re very keen to learn something, for example, I teach them something...maybe just after half an hour, they forget it” [DC1].

Employees teach older people about online services through group sessions and step-by-step instructions. They try to increase older people’s awareness of financial scams through training: “I’ve tried to do training with our service users, just going over things like phishing emails and scam texts, scam phone calls” [E1]. Even though they receive training regarding security, basic digital skills are required to utilise online services: “A lot of them don’t really know or understand the potential of technology. And they’re just kind of really uncertain, like, what is the internet? What does that mean? What is a website?” [E2]. Interviews with employees showed that older people who approach organisations require extensive support: “So they literally come to us for absolutely everything” [E4].

4.1.3.3 Intermediaries’ Challenges

Although digital carers and employees identified the challenges faced by older people with online financial services, intermediaries also experienced several challenges while assisting older people with such services, for example, digital carers become frustrated when they have to repeat the instructions: “I do sometimes lose patience with my mother. Just because she’s kind of, you know, like repeating things” [DC3]. Some employees also become frustrated when they have to teach older people: “It was very frustrating to kind of teach them how to identify what was safe and what wasn’t on online” [E3]. Older people are interested in engaging with other people. However, this is seen as a challenge for employees as older people continue to talk while they are assisting them with online financial services:

“Sometimes I’ll actually stop and I’ll say, okay, when you finish.... then I’ll do this because I can’t really do both” [E4].

Compared to employees, digital carers aid older people without remuneration; therefore, money is a hidden cost. They spent “45 minutes or an hour” [DC2] or “two or more hours per week” [DC3]. This denotes that digital carers could utilise the time (hidden cost) they spend with older people on work-related or personal activities, for example, entertainment and hobbies. However, they perceive that they do not have any other options: “You know I need to do it. I don’t have any choice in it” [DC3]. This indicates that effort is another hidden cost; they significantly dedicate themselves to aiding older people. Employees also exert extensive effort in training older people; they have to ensure that they teach older people about online scams to prevent them from experiencing unexpected fraudulent incidents. If not, employees could face consequences at the workplace.

4.1.4. Themes and Codes

As highlighted in chapter 3, thematic analysis was carried out on the interview transcripts using NVivo. Some screenshots of NVivo coding can be seen in Appendix E. Themes and codes were generated for three participant groups: ‘Indian, Indian Scottish or Indian British’, ‘White: Scottish’ and intermediaries. The main theme in each group was ‘Challenges’ as many codes were added under this theme to reflect the issues faced by older people.

4.1.4.1 Indian, Indian Scottish or Indian British

Themes and codes generated from 4 ‘Indian, Indian Scottish or Indian British’ participants are displayed in Figure 4.1. Standalone themes were also established through thematic analysis such as hidden costs and previous financial scams. Interconnections between the themes and codes are illustrated through double arrow lines.

Indian, Indian Scottish or Indian British

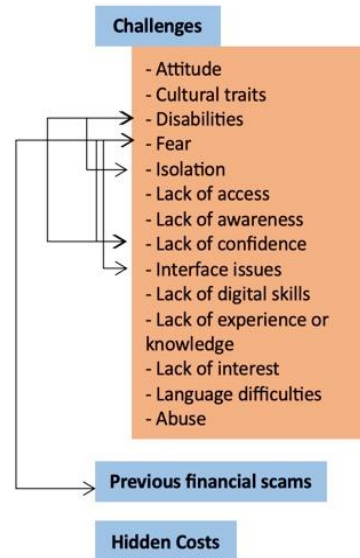


Figure 4.1: Themes and codes for 'Indian, Indian Scottish or Indian British' older people

As illustrated in Figure 4.1, various challenges experienced by 'Indian, Indian Scottish or Indian British' older people were determined through themes and codes. Negative attitude was not seen as a major problem among the interviewed participants. However, an Indian digital carer stated that "you don't learn something if somebody else is doing it for you" [DC3]. This implies that older people may feel that there is always someone, for example, family or friends, to assist them with digital activities and therefore, this attitude could negatively influence their adoption of online financial services. Also, this digital carer mentioned that cultural traits were a problem. DC3's Indian mother came to Scotland at a young age but never decided to complete her education while her two brothers received an education. Women stayed in the house to look after their families and communicated with other Asian women in the community which meant that they hardly learned the language. English was not her first language so there were complexities in understanding digital terms. Although English is not the ethnic minority population's first language, 4 interviewed older participants were fluent in the English language and had no issues in communicating their challenges with digital financial services. The 4 interviewed participants attained higher educational qualifications, and this could be considered as a reason for not having language complexities.

Furthermore, Figure 4.1 depicts an interconnection between disabilities and isolation. Older people may feel isolated to some extent due to their disabilities: “My father... because of ill health...stopped working. So, I think if people are quite isolated then they’re kind of further isolated by kinda not having access to these technologies” [DC3]. This clearly indicates that health conditions prevent older people from being included in the technological world. Also, a lack of confidence is shown in older people with disabilities: “She uses that commode and everything now because she’s got mobility issues. After she broke her hip, she lost a lot of confidence” [DC3]. In terms of online financial services, a lack of confidence could hinder older people from learning and adopting technology in their everyday lives. Those with major disabilities always rely on others for technological support.

One of the major challenges experienced by Indian participants was fear. An interrelation between fear and other factors was determined through thematic analysis. Participant I1 had a lack of confidence to conduct the transaction after adding the items to the online shopping basket. She didn’t have enough confidence to carry out the transaction due to her fear of losing money. This implies that older people’s lack of confidence increases their fear of potential monetary loss. They perceive that younger people have more confidence to recognise frauds whereas older people have more fear and less confidence: “There’s a lot of members of the Indian community who are older but young people...I think they have the confidence, they’re doing well. And they can recognise if it’s valid or not” [I2]. Additionally, negative experiences shared by others elevate older people’s fear. Interface issues could also be the reason for negative experiences which, in turn, increases older people’s fear. Her friend told her that she accidentally added 10 items to the online shopping basket instead of one and she didn’t know how to delete it. This means that older people become confused when they experience unexpected scenarios and they have to familiarise themselves with common interface designs, for example, icons without text, small icons and text etc. Moreover, there’s a direct link between fear and previous financial scams. Participant I2 encountered a fraudulent incident in which he provided personal details including credit card details over an email, expecting to renew his driving license through the provided details. Subsequently, he had some doubts and understood that it was a fraud and informed the bank regarding the scam. This increased his fear drastically and became more conscious of online fraud. However, this prevented him from actively utilising online financial services: “I don’t

want to have a shock, or I don't want to lose money. So, safety is not to get involved in it" [I2]. This suggests that previous financial scams increase older people's fear which deters them from accessing online financial services.

Another issue faced by older people was the lack of access to equipment to use online financial services: "haven't got Wi-Fi there.... they won't use a mobile phone either. My mother is a bit reluctant, and I didn't want to give her one because she might phone me all the time – that sounds terrible. But she kept phoning on the landline all the time" [DC3]. Although older people have difficulties accessing the internet, not receiving support from family members to purchase and set up the required equipment escalates this problem. Some older people are also unaware of the benefits of utilising digital financial services: "Saves time, that's all. Apart from that are there any other advantages?" [I2]. They are unaware of the discounts that they could easily obtain through online financial services, for example, cheaper flight tickets and offers on online items. This could also imply that they have a lack of awareness of the hidden costs such as effort, time and money lost through in-person activities. This was briefly mentioned in section 4.1.2.6. Two Indian participants received support from digital carers on digital financial services, meaning that the digital carers have to spend their time and effort to aid older family members and this is completely free of charge. They could easily utilise this time on other activities.

Another challenge faced by the older people from the 'Indian, Indian Scottish or Indian British' ethnicity minority group was a lack of digital skills. Digital carer DC3 stated, "Well, with my parents, I just find that they don't really have a clue about anything online, you know, they don't really know how to use any technology. I mean, you know, they don't know how to access PC, they don't know how to get onto social media, they don't know how to, you know, like send an email, they don't know anything about that at all" [DC3]. Along with this challenge, some older people have a lack of experience or knowledge. The code 'lack of experience or knowledge' involves interview excerpts related to experience or knowledge as people who had prior technological experience may have technological knowledge which may help them to utilise technology more efficiently. Digital carer DC3 confirmed that her parents do not have prior technological experience which is one of the reasons why they have complexities in using online services. Older people were not born into the digital world and

most of those who experienced the transition from the non-technological era to the digital realm did not receive support to acquire the digital skills.

Lack of interest was another issue: “I do feel that I should be more...you know. I can do it. I think I’m a bit lazy as well. I’m a bit religious as well. I would rather read bhajan (book) or something” [I2]. This suggests that participant I2’s lack of interest prevents her from using online financial services and this could be one of the reasons why older people depend on others for digital support. Additionally, minor abuse could influence older people’s intention to adopt online financial services: “He suffered a lot of racism then people treat you badly, you don’t have the same amount of money, you know it’s a lot of different things” [DC3]. Digital carer DC3’s dad came from a wealthy family in India. However, his social status changed from upper class to middle class when he moved to the UK and people were not treating him well as he was an immigrant. This type of scenario hinders older people from feeling included in the community which, in turn, affects their mindset to learn and carry out activities on a day-to-day basis.

4.1.4.2 White: Scottish

Figure 4.2 displays the themes and codes discovered through thematic analysis from ‘White: Scottish’ participants’ interview transcripts. Also, three standalone themes were discovered: previous financial scams, pressure and hidden costs.

One of the main barriers encountered by ‘White: Scottish’ older people was fear: “I would always be wary of doing anything. I wouldn’t really do anything on my own, I would get the reassurance of my husband, or my son to make sure that it’s not a scam” [S2]. As stated in earlier sections, older people have a great fear of financial scams, they do not want to lose their hard-earned money. Furthermore, there is an interconnection between fear and confidence. Older people’s fear increases due to a lower degree of confidence, and this was determined through the codes for Indian ethnic minority group as well: “I think they’re intimidated by these things” [DC2]. Previous financial scams also have a direct link with the fear factor: “I would be much more wary if I was getting into that kind of service again and somebody here was collecting an item, I would take a photograph of their car registration” [S1]. Here, participant S1 describes a fraudulent incident where she tried to return an online

item by handing the product to a person who confirmed that they would deliver the item to the seller in England. This resulted in a scam as the item was not delivered and delivery fees were taken. Previous financial scams may prevent older people from utilising online financial services, and this was proven through Indian participants as well.

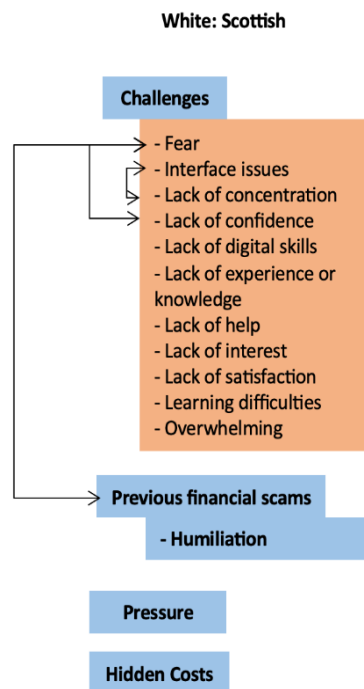


Figure 4.2: Themes and codes for ‘White: Scottish’ older people

‘Humiliation’ is a code under the theme ‘previous financial scams’ as this is a subsequent consequence of financial scams: “But to be honest, I probably would go for a more official company, a more recognised company, because I did feel pretty humiliated. I just feel pretty stupid” [S1]. Due to the experience of financial fraud, older people become more conscious of online financial services, and this can largely increase their fear.

Additionally, interface issues especially online shopping baskets are a common problem among older people: “Sometimes I find that I have ordered two of something. And I have a panic about how to get rid one of them. Sometimes I get a bit wary about it” [S3]. This denotes that older people are confused about using the online shopping basket which impedes them from purchasing the online items. Some older people may not finish this task due to a lack of concentration: “I think it’s just maybe I don’t take enough time to read it properly. I don’t take enough time to read everything, only what comes up properly. But now I know that I can

get rid of it [shopping item]. I'm a bit more careful" [S3]. This means that there is an interrelation between interface issues and concentration; those who lack concentration to carry out an online financial activity may perceive that interface issues are one of the reasons for not being able to navigate the webpages. Also, those who assist older people may not recognise older people's lack of concentration and they may believe that design issues are preventing them from carrying out the activities.

'White: Scottish' participants also mentioned their lack of digital skills: "I think maybe lack of digital skills. Maybe not so much now as before, because I'm using them more often than before. And I'm becoming more familiar with some. So, I'm now becoming more confident doing it than I would have been maybe a year ago, two years ago" [S2]. They are aware of the complexities they have to face due to their age: "I think a lot of people like of my age and older, they can't grasp how it is quite easy to do once you learn the skills" [S2]. This indicates that older people require support to learn digital skills to acknowledge the benefits and the ease of using online financial services. Also, their lack of experience or knowledge hinders them from learning the technology: "But I can understand why a lot of people think, oh no, I don't want all my information on my phone. Because if my phone gets stolen, somebody can steal all my money, which isn't true, if you do things properly" [S2]. This depicts that older people who have not utilised online financial services before are more unaware of the technology and they have a lack of knowledge on how the websites and phones work; they create and believe their narratives which prevent them from carrying out online financial activities.

Although older people receive digital support from digital carers and organisations, the quality of help they receive is questionable. Younger people are faster at explaining everything, this may cause confusion for older people as they require additional time to understand the digital terminologies: "If you are with a young person, and sometimes if they are saying, oh you just do that there...let me think wait a minute wait a minute...what does that even mean? What does an app mean" [S2]. Some older people have constraints in understanding the various concepts of technology and not receiving proper support stimulates digital exclusion. Those who receive support from others have a lack of interest in technology; they always have the thought that there is always someone to support them. On

the other hand, some older people are not interested in online financial services as they have difficulties in accepting this new technological world: “So what is interesting to a younger person, they can do this, and they can do that, older people sometimes not because they don’t really want that, they’re not interested in a lot of these other things. You know, because most of us have a landline, most of us still do...this is part of our world” [S1].

Another barrier is lack of satisfaction; some people prefer the conventional way: “I’m not really that satisfied with online shopping. Because anything I’ve bought, and then it’s been delivered. I’m not really happy with it. So, I’d rather just buy things from a shop where I can see them or try them on or something like that” [S2]. Some older people perceive that traditional methods are more convenient as they have been accustomed to this practice for many years. This was mentioned in section 4.1.2.5.

Furthermore, some older people may have learning difficulties which hinder them from understanding the technological jargon being used: “Maybe the first time I wouldn’t really know, because I wouldn’t know what different things were. But with guidance and advice, you become more familiar and competent” [S2]. Older people prefer learning digital services with the basic language before delving into the technological words, for example, interfaces, apps and websites. They can only learn through repeated instructions and explanations as technology can be overwhelming for them. Due to bank closures, everything is transitioning to online, and everyone is expected to utilise the internet; this external pressure may cause stress in older people: “If you don’t know how to do online, you’re going to be kind of stuck, trying to kind of basically go to sort your money out or transfer money or pay bills, because those places will no longer exist in a time that you can physically go in and do something. Because the world is growing. So, it’s about trying to kind of keep up with all” [S2]. Not keeping up to date with the technological world means that the hidden costs associated with online financial services would increase for ‘White: Scottish’ older people. These hidden costs were discussed in section 4.1.2.2.

4.1.4.3 Digital Carers

Digital carers were asked to describe the challenges they noticed irrespective of older people's ethnicity. Through themes and codes, older people's challenges recognised by the digital carers were discovered and these are demonstrated in Figure 4.3.

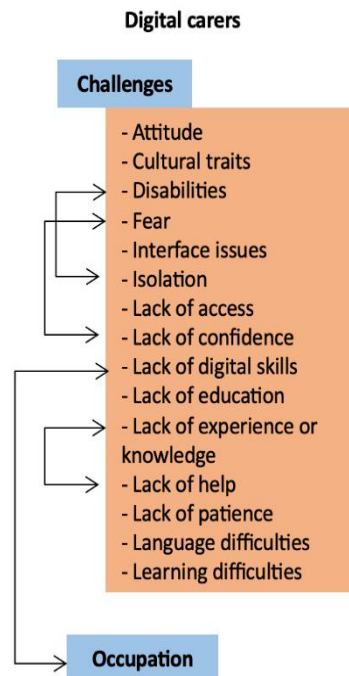


Figure 4.3: Themes and codes derived from Digital Carers' interview transcripts

Digital carer DC3 addressed that attitude, cultural traits, lack of access, interconnection between disabilities and isolation can influence older people's intention to adopt and use online financial services and these were mentioned in sections 4.1.4.1. Digital carer DC3's interview data was partially discussed in section 4.1.4.1 as DC3 acted as a carer for her Indian parents.

DC1 stated that older people are very lonely and they want to interact with others. In order to decrease the isolation, they have to engage with people of the same age group, then they would have more interest to learn online financial services. As well as this, fear of monetary loss prevents them from using such services: "Like she was like, if I add the money, what like where does the money go? Does it send?" [DC2]. DC2 discussed how fear stopped older people from learning international money transfer apps; they lacked clarity regarding money transactions. They were uncertain about sending and receiving money through the app as they were unfamiliar with the digital world. Moreover, there is an interrelation between fear

and lack of confidence; this was pointed out in section 4.1.4.2. The pandemic prevented older people from socialising with others: “You know, some older people have lost confidence, because they were told to stay in, and they’ve lost kind of confidence about going out and things like that” [DC3]. Before that, her parents “used to be out and about everyday...it gave them a routine to get out of the house and it gave them physical exercise and gave them mental stimulation” [DC3]. This lack of confidence in older people could have an impact on the process of learning digital technologies.

Additionally, interface issues were one of the major barriers noticed by the digital carers: “He had to increase his phone font size” [DC1]. This caused more problems for the user; he had to scroll up/down or horizontally/vertically to view the text. But “he still manages to get around with it anyway” [DC2]. Also, they have complexities in comprehending the security measures and the language of the apps. This was indicated in section 4.1.3. Lack of digital skills was another barrier highlighted by a digital carer. DC2 stated that all the older people that he assisted did not possess any digital skills. This was also a challenge faced by the Indian and White: Scottish interview participants. Another digital carer’s conversation demonstrated a subtle connection between digital skills and occupation: “If you’re not in a job where you have to learn different things.... where you have to do different things like then maybe you just don’t do it, you know?” [DC3]. This denotes that older people may not learn technology if they never had technological experience at the workplace. Not only technology but any skill could be enhanced if there is prior experience. Digital carer DC3 also stated that lack of education could also play a role in accessing the technology as this affected DC3’s mother in various ways, for example, lacking English language skills.

Lack of experience or knowledge was another code identified through thematic analysis. DC1 stated that her mother is too old and lacks knowledge of technology. Her mother only knew how to open links and never knew what scams meant. DC1 does not teach her about online financial services as her priority is to protect her from fraudulent incidents. This indicates that there is a link between lack of help and lack of experience/knowledge. Older people may not receive technological experience or gain knowledge if they are not obtaining help from family members. Nowadays, family members are engaged with their hectic work schedules and

therefore, older people have fewer opportunities to learn online financial services. Older people approach friends or relatives as “they don’t have anyone else to help them out” [DC2].

Due to a lack of experience or knowledge, older people face difficulties in the signing up process: “So you need to enter like the basic information, your name, first name, surname, date of birth.... enter a password” [DC2]. This password may require special characters, and older people may face issues in creating the password as they have not previously encountered this. Also, they could face obstacles regarding the verification stage: “I think he needed an ID card. But he didn’t understand what kind of ID card they needed. I think he just thought you can just use any ID” [DC2]. It is clearly evident from these interview excerpts that a lack of experience or knowledge impedes older people from grasping the processes incorporated in an online financial service.

Furthermore, some older people have a lack of patience. Digital carer DC3 tried to teach her parent how to use the phone, for example, WeChat but she doesn’t have the patience to learn it; she’s always too tired. Older people may not exhibit an interest to learn online services due to complicated processes and as a result, they lack the patience to learn the technology. Digital carer DC3 also highlighted that the language gap is an issue. For ethnic minority groups, English is not their first language. It “would be difficult if they used the computer...they don’t use anything. So basically, I would need to do things for them” [DC3]. Teaching online financial services to those who have difficulties grasping the English language could cause major complexities in understanding the technological terms. With regard to learning difficulties, older people may have issues remembering the taught items; they cannot recall what they learned after half an hour. This point was also raised in section 4.1.3.

4.1.4.4 Employees

In addition to the themes and codes derived from the transcripts of digital carers, several themes and codes were obtained from the transcripts of four employees. This is illustrated in Figure 4.4 below.

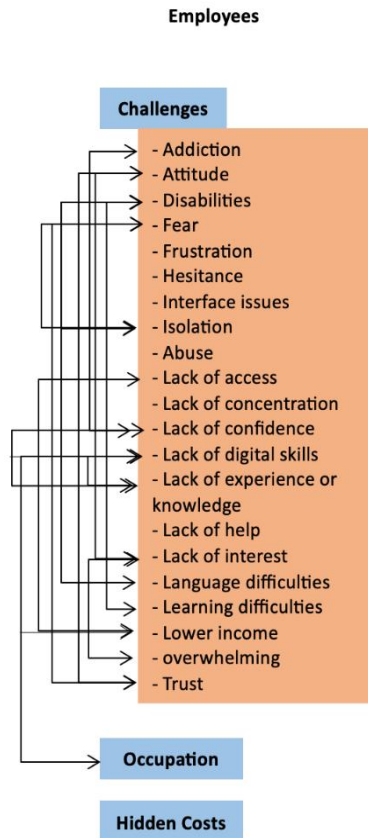


Figure 4.4: Themes and codes derived from Employees' interview transcripts

Figure 4.4 clearly illustrates that employees had deeper insights regarding the challenges experienced by older people in accessing online financial services as compared to other participant groups. Also, there are various intersecting codes which were determined through the analysis – see Figure 4.5:

- Lower income ↔ Lack of access
- Occupation ↔ Lack of digital skills ↔ Lower income
- Learning difficulties ↔ Disabilities
- Addiction ↔ Lack of confidence
- Isolation ↔ Fear ↔ Disabilities
- Lack of interest ↔ Overwhelming
- Lack of interest ↔ Attitude
- Trust ↔ Fear
- Trust ↔ Attitude
- Language difficulties ↔ Disabilities
- Lack of confidence ↔ Lack of experience or knowledge ↔ Lack of digital skills
- Fear ↔ Isolation
- Lack of experience or knowledge ↔ Lack of digital skills

Figure 4.5: Employees' intersecting codes

The first challenge shown in Figure 4.4 is Addiction. Addiction such as gambling or drugs could be an issue for some older people: “There are a few older British folks who tend to have other issues like some of them would have addiction issues and things” [E4]. Employee E4 stated that those with addiction issues lack the confidence to use online financial services. This indicates that there is a relationship between addiction and confidence; addiction issues prevent older people from increasing their confidence and consequently, this could hinder them from adopting and using online financial services. In terms of confidence, older people require repeated explanations and demonstrations to confidently use online financial services. Employee E1 mentioned how older people do not feel confident after using Amazon or eBay once.

Additionally, negative attitude prevents older people from accepting online financial services: “They worry so much.... sometimes they would just give up...just do it from your phone then, I can’t do it” [E3]. Also, a lack of trust could increase older people’s negative attitudes towards online financial services. Employee E3 mentioned how an older individual did not trust online financial services due to the complexities of phoning them if an unexpected scenario occurs: “She didn’t trust. She said she’s happier with what I know” [E3]. Older people have difficulties in trusting the websites: “How do you know how to trust a website? How can you tell if the card details are being put into somewhere, that’s a legit mistake?” [E1].

Moreover, a lack of interest in learning how to use and adopt online financial services could lead to a negative attitude: “Not even one of them wants to learn, like try to learn and do it by themselves. I don’t know what could be done to remove barriers when the biggest barrier of all is, I really don’t want to know” [E4].

Furthermore, one of the major barriers discussed by the employees was disabilities: “Some of our service users, you know, they have dementia, or they have like physical impairments or maybe they are suffering from ill health” [E2]. Older people with disabilities could have a higher chance of having learning difficulties. An employee described a woman who had issues in learning the technology due to her disability: “I’ll put it down to the autism, she was very set in her routine” [E3]. Also, language difficulties could be seen in older people with disabilities: “Her language difficulties were more cognitive because obviously, it was mental

health organisation. So, she had kind of.... autism” [E3]. In the context of language difficulties, some older people are “illiterate in their own language” [E3]. This could produce more complexities for older people if they had to use the technology to access websites/apps for online financial services.

In addition to this, an interconnection was established between disabilities, fear and isolation: “A lot of them are lonely, they’re depressed, they’re isolated. They’re struggling, you know, it’s difficult time periods. A lot of them are ill or they’re losing family friends” [E2]. Due to disabilities, older people are often isolated and disconnected from others, and this could elevate their fear of making an effort in learning new knowledge and skills. In relation to isolation, employee E1 stated that older people without family support are often isolated compared to those who received digital assistance from family and friends. Older people who are isolated due to a lack of family support have a fear of using technology: “And if I see them once a week or every second week, I would say, oh, so what have you been using your iPad or tablet for? And they might say, oh, I’ve not touched it since I was scared to turn it on” [E1].

According to the employees, fear was the major barrier faced by older people: “Most older adults are really nervous and scared of being scammed, worried about their information being stolen. And in general, they’re just very nervous about using technology. They’re worried that they can break it.... Things are going to go wrong” [E2]. Older people are uncertain about what they have to do if they make a mistake: “I think the main fear was that if anything goes wrong, if I’ve done this online, who can I go to for help to fix it? That was the main problem, that’s why they didn’t really use it in the first place” [E3]. Older people used to follow the traditional methods to determine a solution for financially related issues, for example, a physical receipt was provided by the banks and shops and there was CCTV: “If something goes wrong, you can kind of work your way around it” [E3]. Some older people experience a heightened fear of leveraging online financial services due to their lack of trust. Even if older people’s existing online financial services such as TV packages are expensive, they prefer to continue with the current package as “it kind of opens up a new door of, you know, more issues” [E3]. This denotes that older people’s fear and lack of trust deter them from obtaining various benefits of online financial services, for example, selecting inexpensive insurance policies every year to retain money.

Lack of access can also prohibit older people from utilising online financial services: “Some people were maybe living in, like extreme poverty” [E3]. This suggests that those who face extreme monetary constraints depend on organisations to access technological equipment. Organisations such as *Glasgow’s Golden Generation* provide tablets and iPads to those “who might not have the funds to purchase them themselves” [E1]. There is an interrelation between lower income and lack of access: “Those who are maybe living on less income, maybe if they’re sort of just getting a little bit of help from the state, or they’re on a sort of lowest level of the state pension and stuff, if they’re, especially these days as well, with energy bills.... costs are going up. They’re less likely to have disposable income to spend on technology” [E1]. Lower income means lower chances of spending money on the equipment required to utilise online financial services.

Along with these challenges, older people lack digital skills which could hinder them from using online financial services in their everyday lives: “I think they just don’t even know how to switch a computer on” [E4]. Employees have to explain each technological step of an online financial activity: “I would show them, and I would explain to them, okay, it’s been ordered, we’ve put in our payment. And this is the confirmation email. That was another thing, a lot of them didn’t have emails either. So, we’d have to set up emails and explain emails” [E3]. In addition to this challenge, there is an interrelation between digital skills, income and occupation. Those with lower paid jobs lack digital skills as they are less prone to interact with technology: “Maybe you’re in.... lower paid jobs, such as maybe working in a supermarket.... then maybe you’re less likely to come into contact with.... computers and technology” [E1]. Lack of experience or knowledge could also be one of the reasons for a lower degree of digital skills in older people: “Most of them didn’t grow up with technology. They’re not used to using technology” [E2]. Employee E2 also stated that confidence, knowledge and digital skills affect older people’s intention to use technology. This implies that a lower confidence level, a lack of experience or knowledge and a lower degree of digital skills could prevent older people from accessing digital financial services.

Moreover, older people may have a disinterest in learning the technology as they feel it is overwhelming; therefore, employees teach older people by providing basic information: “I wouldn’t start venturing down lines of like, you know, files and what files are and the

technicalities of words and stuff like that” [E2]. Additionally, employee E2 stated that older people feel frustrated when they cannot grasp the technology quickly, when they cannot recall the learned materials or when it becomes too technical for them. On the other hand, some older people become hesitant to ask for help as they do not want to disturb others: “I’ve got this problem, but I didn’t want to bother you” [E1]. Hesitance results in older people not obtaining the required skills to learn digital financial services.

Abuse is another challenge encountered by older people. Employee E3 mentioned that some older people who approach the organisation have experienced abuse, for example, domestic violence. They require additional help with online activities. This indicates that abuse could negatively affect older people’s use of online financial services. As well as this, some family members do not have the patience to share their digital knowledge with older members of the family: “Some family members can’t be bothered to help each other and sit with them using their phones for ages. And as it’s my job, obviously, I am not going to get impatient with them. But it’s easier to get impatient with a family member” [E2]. Lack of help from family, friends and society intensifies digital exclusion to a greater degree.

Lack of concentration could also hinder older people from utilising online financial services. They lose attention when they receive assistance from employees for a prolonged period: “I think anything more than an hour, then people start to lose concentration” [E1]. Older people prefer learning in concise training sessions.

Moreover, interface issues experienced by older people in accessing online services were highlighted by the employees. Employee E1 stated that drop down menus for choosing different text sizes are not always very clear i.e. it’s not easy to determine if there is an option to decrease the size. Also, icons without additional text confuse older people as they have not previously used such icons, for example, love heart on online shopping websites means to favourite an item or the picture of the basket means the items you’ve chosen to purchase. Older people who are not familiar with such interfaces and icons would face various challenges that could prevent them from carrying out the transaction. As well as this, the websites are quite complicated to use on the phone, “there’s a lot of scrolling that’s involved. And maybe some of our service users might not realise that you can use your finger to scroll

down and see many other products. Amazon isn't particularly easy, especially with a number of different drop-down menus, all the different departments that you can search in all the different filters, quite often, there's just a lot of different words and text on the screen." [E1]. Also, the various links shown up on a search engine confuse older people and they become indecisive. The interface issues outlined above illustrate that interface designs have to be improved for older people to utilise online financial services.

Figure 4.4 also incorporates another theme - hidden costs. The hidden costs linked to older people were identified by the employees. Firstly, most of the older people travel to a local bank to carry out basic banking activities. Employee E1 stated, "She has to travel into the city centre if she ever wants to go into a physical bank" [E1]. This indicates that they spend money, time and effort on activities that could be easily carried out through online banking.

To sum up, employees had a clear understanding and comprehensive knowledge of the constraints older people face in the use of digital financial services and these were portrayed through themes and codes in Figure 4.4. Employees spend an extensive amount of time with older people and provide training sessions to increase their digital skills. Thus, they can easily recognise the challenges they confront in accessing online financial services.

4.2. Phase 2 of Interviews

As mentioned in chapter 3, data obtained from phase 2 of the interviews were utilised to test the developed theoretical tool. Concurrently, a deficient amount of data was procured from phase 1 of the interviews due to a lack of interview participants from different ethnic minority groups. This data was not sufficient to answer the research questions. Therefore, phase 2 data was also leveraged to comprehend the challenges encountered by various ethnic minority cohorts in accessing digital financial services. Also, the findings were mapped onto Figure 2.1 to create an updated version. This is discussed later in this chapter.

Eight interviews were conducted in phase 2. The upcoming sub-sections of section 4.2 focuses on the responses received from eight older people followed by the themes and codes derived from two participant groups: 'Chinese, Chinese Scottish or Chinese British' and 'Pakistani, Pakistani Scottish or Pakistani British'.

4.2.1. Demographics of Older People

Phase 2 of the interviews was conducted by following the same format as phase 1 and the same questions were utilised (see Appendix A). Older people’s demographic information can be seen in Table 4.2. The participant code column in this table consists of the codes mentioned in Table 3.2 – C1, C2, C3, C4, C5 refers to ‘Chinese, Chinese Scottish or Chinese British’ participants and P1, P2, P3 refers to ‘Pakistani, Pakistani Scottish or Pakistani British’ participants. 1st generation in the last column means anyone who migrated to the UK and the 2nd generation is the offspring of the 1st generation parents.

Table 4.2: Phase 2 interview participants’ demographics

Participant code	Gender	Education level	Occupation	Income	Household	Marital status	1 st /2 nd generation
C1	Female	Bachelor’s degree	Retired Interpreter	(freelancer)	Resides with husband	Married	1 st generation
C2	Female	Primary School	Retired Kitchen Worker	5k-6k (before retirement)	Lives alone	Divorcee	1 st generation
C3	Female	University degree	Retired Interpreter	(freelancer)	Resides with husband	Married	1 st generation
C4	Female	Middle school	Housewife	NIL	Lives alone	Married	1 st generation
C5	Female	(Undisclosed)	Retired Interpreter	(freelancer)	Resides with husband	Married	1 st generation
P1	Male	No education	Retired shopkeeper	(own business)	Multigenerational household	Married	1 st generation
P2	Male	High School	Retired television engineer	20k-25k (before retirement)	Resides with wife	Married	1 st generation
P3	Female	High School	Retired from a sewing factory	(stopped working after having kids)	Resides with husband	Married	1 st generation

4.2.2. Online Financial Activities

Questions regarding five common online financial activities were asked to each participant to understand the challenges they experienced with each online financial service. These activities were online shopping, online banking, insurance policies, tickets to cultural/events and transport service tickets. They were also asked questions regarding other digital financial

services they carried out, the implications of not utilising these services and the advantages of such services.

4.2.2.1 Online Shopping

In terms of online shopping, four out of five 'Chinese, Chinese Scottish or Chinese British' participants haven't carried out online shopping due to various reasons such as fear, lack of digital skills, lack of experience or knowledge, language difficulties, overwhelming and attitude. One participant did not "like watching a screen to shop" [C1]. Also, participant C1 had a negative experience which prevented her from utilising online shopping websites: "She didn't actually click checkout so she never purchased anything but her husband was saying that she ordered everything completely wrong. So that was like the first time and the last time" [C1]. This indicates that older people's lack of digital skills could result in negative experiences which increases their fear of using the websites in the future. Language barrier was not the issue experienced by participant C1: "She doesn't like online shopping; I don't think it's a language barrier issue" [C1]. She wants to interact with people and feel the material before purchasing the items. She perceives that the process of returning an online item is cumbersome.

Conversely, some older people such as participant C2 face language difficulties and have a lower degree of digital skills which impedes them from utilising online shopping websites. Language difficulties were encountered by participant C4, and she became overwhelmed by the returning process: "She's seen how much of a hassle it is to return stuff. And also, just her generation, she's like, oh, just the older generation, we just don't like the hassle" [C4]. She often received help from her daughter to buy online items. This means that her daughter acts as a digital carer and hidden costs are associated with the assistance provided by her daughter. Moreover, extensive family support could prevent participant C4 from learning online financial services. Also, fear of scams could prevent older people from utilising online shopping; Participant C5 never conducted online shopping due to her fear; she heard many negative anecdotes regarding online shopping which hindered her from utilising the service.

With regard to 'Pakistani, Pakistani Scottish or Pakistani British' participants, none of the participants conducted online shopping. Participant P1 had a lack of digital skills as he

received extensive support from family members: “He doesn’t really bother because his kids does it” [P1]. Participant P2 also had a lack of digital skills which prevented him from using the service.

Participant P3 had a fear of making mistakes and a lack of interest due to the involvement of the returning process. Therefore, she prefers in-person shopping and purchasing the items that fit her well. If participant P3 intended to acquire an online item, she would send the photo of the item through WhatsApp and her daughter would order it for her. Although she had the digital skills to utilise Amazon and WhatsApp, her fear prevented her from conducting the transaction. As reiterated, this data proves that family support could hinder older people from leveraging online financial services to a great extent.

4.2.2.2 Online Banking

In relation to online banking, only one ‘Chinese, Chinese Scottish or Chinese British’ participant utilised online banking to carry out basic banking activities. Participant C1 prefers having social interaction with bank staff and participant C2 goes to a bank due to language difficulties. Participant C2 also received support from her sons or daughters on banking activities: “When she has to open an account in a bank, she’ll get her daughters or sons to go to the bank” and received help from *Wing Hong* organisation to send emails. Participants who had language issues travelled to the *Bank of China* for help: “There’s a Bank of China in Sauchiehall street, she’ll just go in there...speak Chinese to them and they’ll understand it completely fine” [C3]. Language difficulties were one of the main issues for Chinese participants; therefore, they received formal or informal support. Participant C3 also had a lack of confidence to utilise online banking: “She’s not confident in using online banking. She thinks that it’s a lot safer for her to go in person.... for like banking transactions and stuff” [C3]. Furthermore, some older people such as participant C5 have a fear of using online banking; they do not trust such services. They feel that any banking issues can be solved through in-person interactions. *Bank of China* is a common bank utilised by Chinese older people as they could engage with staff using their first language. Again, hidden costs are associated with such physical interactions.

Regarding ‘Pakistani, Pakistani Scottish or Pakistani British’ participants, two out of three participants do not use online banking. Participant C1’s family dealt with banking activities. If

he wanted to know his account balance, he would ask his children. Support from family members could be one of the reasons that hinder him from leveraging online financial services. Participant C3 also do not utilise online banking as her husband managed the finances and they used a joint account. Participant C2 (husband of C1) used online banking for basic activities, for example, checking account balances.

4.2.2.3 Buying or Renewing Existing Insurance Policies

Pertaining to buying or renewing existing insurance policies, none among the 'Chinese, Chinese Scottish or Chinese British' participants carry out transactions on online insurance policies. Family members or *Wing Hong* organisation assisted participants C2, C3, C4 and C5 with insurance policies. Participant C2 usually receives support from *Wing Hong*: "She will ask people from here at *Wing Hong* to buy insurance for her and she'll just give them the money. And then sometimes she will also ask her son to do it" [C2]. Participant C4 also received support from her son: "When it comes to house insurance, her son will deal with everything" [C4]. For participants C3 and C5, their husbands dealt with insurance: "My husband, he deals with that sort of things. I just concentrate on living" [C5]. This data clearly illustrates that these participants depend on formal or informal support to buy or renew insurance policies. Due to the support rendered by the digital carers, they have to encounter the hidden costs.

In relation to 'Pakistani, Pakistani Scottish or Pakistani British' participants, none of the participants utilised the internet to buy or renew insurance policies. Participants P1 and P2 followed the conventional methods. Participant P1 bought insurance over the phone and participant P2 stayed with the same insurance provider for the past five years. This could indicate that P2 did not compare the providers to receive inexpensive insurances as this could help him in accumulating financial savings during retirement. Since participant P3's husband (P2) dealt with insurances, she did not take the initiative to learn about online insurance policies. Also, she perceives that her lack of education is one of the reasons for not conducting such services.

4.2.2.4 Tickets to Cultural or Other Events (e.g. cinema, theatre etc)

Buying tickets to cultural or other events is not a common activity carried out by the 'Chinese, Chinese Scottish or Chinese British' participants. Only one participant stated that they pay for tickets when going out with friends: "I just attend and pay my share" [C5]. She relies on her friends to buy the tickets; she does not have any experience buying tickets online.

Regarding 'Pakistani, Pakistani Scottish or Pakistani British' participants, two participants visit the cinema occasionally and their daughters book the online cinema tickets for them. Although informal support is being provided, participant P3 is aware of the advantages of online cinema tickets; she does not have to wait in a long queue to buy the ticket: "Then obviously the technology came...it's very, very, easy you know, we got money, get a ticket, sit there and enjoy yourself" [P3].

4.2.2.5 Buying Transport Services Tickets (e.g. flight ticket, train ticket etc)

Concerning transport service tickets, four out of five 'Chinese, Chinese Scottish or Chinese British' participants do not utilise the internet to buy the tickets. They received support from digital carers or agencies. Participants C1 and C2 purchased flight tickets from an agency: "It's almost like a travel agency. But it's like specifically for Chinese people. So, she used to go to those shops to purchase plane tickets" [C2]. As well as this, sometimes "her friends will get tickets for her, and she will just pay them the money" [C2]. Also, participant C2 would travel to a station to purchase a train or bus ticket. Participant C4 received support from her children to purchase the tickets and she has a free bus pass: "Her friend helped with the application" [C4]. Participant C5 also obtained support from children to buy flight/taxi/bus/train tickets. This demonstrates that Chinese participants significantly rely on digital carers to purchase transport service tickets. This could hinder them from learning the advantages and acquiring the skills required to access online websites to purchase tickets without support.

All three 'Pakistani, Pakistani Scottish or Pakistani British' participants depended on travel agents to book flight tickets, and participants P2 and P3 used a free bus to travel on the bus. Similar to Chinese participants, they do not utilise the internet to purchase transport service tickets.

4.2.2.6 Other Financially Related Activities

All the 'Chinese, Chinese Scottish or Chinese British' participants do not conduct financially related activities such as payment of council tax and passport renewal. Participant C2 travelled to a post office to pay the tax. This denotes that she has to spend her money, time and effort (hidden costs) through this activity. Participant C3 has the skills to use the technology for financial-related tasks. However, in this case, she is dependent on her husband: "That's my husband's job" [C3]. Also, family members aid older people with such activities; participants C4 and C5 received help from their children: "When it comes to passport renewal, her children will take care of that for her" [C4].

Regarding 'Pakistani, Pakistani Scottish or Pakistani British' participants, all the participants were fully dependent on their family members. Participant P1 lives in a multigenerational household (see Figure 4.2); therefore, he received support from his children to conduct online financial services. Participants P2 and P3 acquired assistance from their daughters regarding passport renewal: "My kids are doing that.... My two daughters, they are very helpful" [P2]. This data shows that older people in the 'Pakistani, Pakistani Scottish or Pakistani British' ethnic minority group require substantial help from family members; this is preventing them from learning and accessing online financial services.

4.2.2.7 Implications of not using Online Financial Services

'Chinese, Chinese Scottish or Chinese British' participants were not aware of the implications (e.g. hidden costs) of not using online financial services except participant C3. She was aware of the ramifications as she already has the digital skills to use technology: "If I don't do online banking, I have to go to the bank" [C3]. Although she utilises online banking, she prefers physical banks. This suggests that older people prefer the traditional methods as they could easily determine a solution by communicating with bank staff.

Also, 'Pakistani, Pakistani Scottish or Pakistani British' participants were not aware of the implications except for participant P3. She knew about online discounts that may not be found in physical shops. In this way, older people can save money through online financial services. Participants P1 and P2 were not aware of the implications and were comfortable in following the conventional methods.

4.2.2.8 Usefulness of Online Financial Services

'Chinese, Chinese Scottish or Chinese British' participants did not discuss the benefits of online financial services; they were unaware of the advantages. Participant C3 stated that the usefulness is limited. Due to participant C3's lack of technology use, she did not experience the benefits she could obtain from utilising online financial services. Also, participant C4 was unaware of the advantages: "She's not aware of any online discounts" [C4].

In terms of 'Pakistani, Pakistani Scottish or Pakistani British' participants, one participant had a brief insight regarding the benefits: "You don't have to go outside to do anything, you can see everything" [P3]. Participant P1 never utilised online financial services; therefore, his lack of experience or knowledge impeded him from understanding the advantages of digital financial services. Some older people are unwilling to learn the benefits due to their dislike of technology: "I personally don't like them. I don't know why" [P2]. This data demonstrates that both participant groups scarcely apprehend the pros of using digital financial services due to their lack of technology use.

4.2.3. Themes and Codes

In addition to the themes and codes derived from phase 1 of the interviews, thematic analysis was also carried out on phase 2 of the interviews. The following sub-sections focus on the themes and codes generated for 'Chinese, Chinese Scottish or Chinese British' and 'Pakistani, Pakistani Scottish or Pakistani British' ethnic minority groups.

4.2.3.1 Chinese, Chinese Scottish or Chinese British

Figure 4.6 portrays the themes and codes generated from five 'Chinese, Chinese Scottish or Chinese British' participants through thematic analysis. Two standalone themes were also discovered: previous financial scams and hidden costs.

Chinese, Chinese Scottish or Chinese British

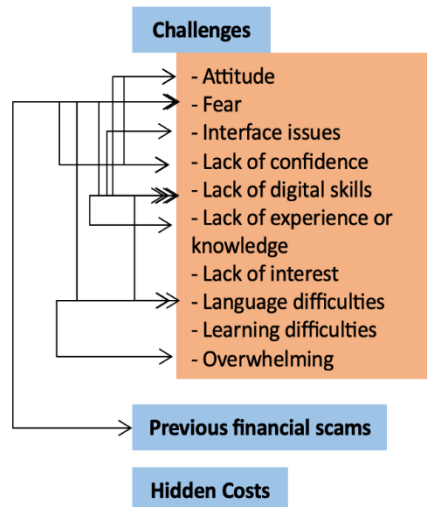


Figure 4.6: Themes and codes for ‘Chinese, Chinese Scottish or Chinese British’ older people

Figure 4.6 illustrates various interconnections that could contribute to the challenges experienced by ‘Chinese, Chinese Scottish or Chinese British’ older people – see Figure 4.7:

- Attitude ↔ Lack of confidence
- Attitude ↔ Lack of digital skills
- Fear ↔ Lack of digital skills
- Fear ↔ Language difficulties
- Fear ↔ Previous financial scams
- Fear ↔ Lack of confidence
- Interface issues ↔ Lack of digital skills
- Lack of digital skills ↔ Lack of experience or knowledge
- Lack of digital skills ↔ Language difficulties
- Language difficulties ↔ Overwhelming

Figure 4.7: Intersecting codes for ‘Chinese, Chinese Scottish or Chinese British’ older people

The first challenge displayed in Figure 4.6 is attitude. Even if support is provided, some older people may not utilise online financial services due to a negative attitude: “Okay, so even if it’s a website in her language, she still wouldn’t use it” [C2]. Lack of confidence could also lead to a negative attitude: “So when she has to use it, she’s maybe not the most confident but she will probably do it, but she doesn’t feel the need to use it” [C1]. This could imply that lower confidence levels could influence older people to develop a negative attitude towards

online financial services. Thus, there is an interconnection between attitude and lack of confidence. Moreover, a lack of digital skills in older people could lead to developing a negative attitude towards such services: “Yeah, plus the fact that I’ve never learned to use these things. I don’t feel the need” [C5]. Although we reside in a technological world, some older people from Chinese ethnic minority group develop a negative attitude as they do not have prior technological experience.

Due to a lack of digital skills, older people may face challenges in conducting online activities by themselves: “If her husband was on holiday and doesn’t come back for a long time, she would just call for everything” [C1]. In addition to this, lack of digital skills may result in older people making mistakes, resulting in a higher degree of fear which could lead to the prevention of accessing online financial services. This was discussed in section 4.2.2.1.

Additionally, older people who lack digital skills may experience interface issues: “So when you click on a button it takes you to a page and you have no idea why you are in that page and it’s really hard to kind of go back to a page, go back to where she kind of started” [C1]. Younger generations are familiar with interfaces; therefore, they can easily navigate the pages. However, older people may encounter interface issues due to a lack of technological experience. All the Chinese participants used to have a non-technological job: “She was working in a kitchen” [C2]. Lack of experience or knowledge means that there is a lack of digital skills. Participant C4 was unfamiliar with the process of conducting an online transaction which implies that she has a lower degree of digital skills. A lack of digital skills is also evident in older people who have language difficulties. This was mentioned in section 4.2.2.1. Language was one of the main barriers encountered by the participants. Language difficulties could make older people feel overwhelmed due to task-related complexities: “She also finds out the returning process is way too complicated” [C4]. Moreover, limited language competency could enhance older people’s fear of accessing digital financial services especially when they have a fear of scams: “Scared of being scammed, scared of buying....and her language barrier as well” [C2].

Furthermore, older people’s experience of previous financial scams could amplify their fear of utilising digital financial services. Participant C2 experienced an online scam; she received

a call from an individual saying that someone's been using her broadband, and they want to refund her the money. She trusted them and disclosed her bank details to them. Later on, "she realised that it was probably a scam" [C2] and she immediately visited *Wing Hong* to receive help. Also, a lack of confidence in older people increases their fear of accessing online financial services: "She's not very confident, she's quite scared of getting scammed" [C2].

Another barrier was learning difficulties; older people may face complexities in recalling the learned materials: "So she finds it really quite difficult so even if she learns English or she learns technology, she will.... forget a lot of stuff" [C2]. This implies that instructions have to be repeated multiple times until they become familiar with online financial services. Lack of interest was also another issue faced by the participants. Participant C1 never had an interest to learn the technology and always waited for her husband to carry out the online tasks. This indicates that most older people from Chinese ethnic minority group rely extensively on digital carers with digital financial services; this was discussed in section 4.2.2. Again, providing support to older people could prevent them from learning online services and hidden costs are associated with this. Section 4.2.2.2 mentioned older people travelling to the *Bank of China* for assistance with banking activities. Older people could save on travel expenses through the use of online banking. Leveraging online financial services would also hinder digital carers from being faced with the hidden costs.

4.2.3.2 Pakistani, Pakistani Scottish or Pakistani British

Figure 4.8 portrays the themes and codes identified through thematic analysis which primarily reflects the complexities confronted by the 'Pakistani, Pakistani Scottish or Pakistani British' participants.

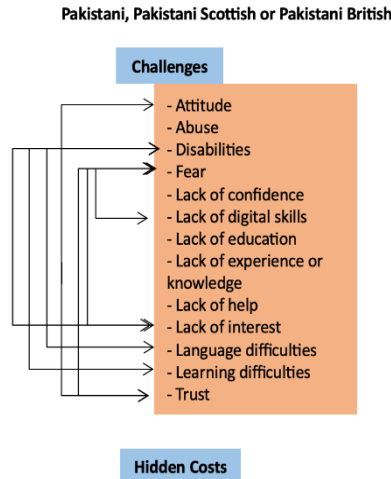


Figure 4.8: Themes and codes for 'Pakistani, Pakistani Scottish or Pakistani British' older people

Several intersecting codes were also determined through analysis – these are shown in Figures 4.8 and Figure 4.9:

- Learning difficulties ↔ Disabilities
- Language difficulties ↔ Disabilities
- Trust ↔ Fear
- Trust ↔ Attitude
- Lack of digital skills ↔ Fear
- Lack of interest ↔ Disabilities
- Lack of interest ↔ Fear

Figure 4.9: Intersecting codes for 'Pakistani, Pakistani Scottish or Pakistani British' older people

In terms of the interconnection between learning difficulties and disabilities, a higher degree of learning difficulty could be seen in older people with disabilities. Also, older people with disabilities could face linguistic challenges. These were discussed in section 4.1.4.4.

With regard to fear, older people have a fear of utilising online financial services due to “a lot of fraud nowadays” [P3]. Participant P3 also stated that he requires additional digital support to access online financial services. This depicts that older people who lack digital skills have a fear of financial scams and therefore, they can receive support from digital carers or organisations. Moreover, a lack of interest in carrying out online transactions due to fear of monetary loss through scams increases their fear to utilise online financial services efficiently;

participant P3 uses online shopping websites by herself until the point of transaction in which her daughter orders the items by providing the card details. Additionally, older people with disabilities may exhibit signs of low interest in technology; participant P1 was not interested in technology as he had dementia. He reached a point in his life where he perceived that he could not learn and utilise technology.

Along with these challenges, older people may have a lack of confidence which could hinder them from utilising online financial services; participant P2 stated that he was only moderately confident. Also, older people who have lower education levels may perceive that this is one of the reasons for not having the ability to utilise online financial services – this was mentioned in section 4.2.2.3. Another challenge shown under the theme ‘challenges’ on Figure 4.8 is lack of experience or knowledge. Participants P1, P2 and P3 never had prior technological experience; technological world was formed at a later stage of their lives. Therefore, they require support from others to carry out online activities, especially online financial services. However, support is not always readily available for those who live without informal support: “She had no friends or family. She always needs help from someone to do any task basically on online” [E3]. This indicates that lack of help could deter older people from accessing online financial services. However, digital carers who assist older people with such services have to face hidden costs (a theme in Figure 4.8). Participants P1, P2 and P3 frequently received informal support from their children.

Abuse is another challenge experienced by ‘Pakistani, Pakistani Scottish or Pakistani British’ older people. Older people may experience domestic violence which could hinder them from learning and adopting online financial services and therefore, they have to seek informal or formal support.

Figure 4.8 also illustrates that there is a relation between fear and lack of trust – this was discussed in section 4.1.4.4. As well as this, older people’s negative attitude could be heightened through their lack of trust which was also mentioned in section 4.1.4.4.

4.3. Bridging the Gaps

This section intends to demonstrate how the semi-structured interview findings assisted in answering the first two research questions in Chapter 1:

- 1) What are the key challenges encountered by older people aged 65 or over whose first language is not English on online financial services?
- 2) What issues related to online financial services do older people (those aged 65 or over) from ethnic minority groups experience?

The interviews that were conducted with the participants resulted in several key themes and codes which contribute to the challenges experienced by the older people. The themes and codes of all the older and ethnic minority groups can be seen in Figure 4.10. This figure effectively addresses both research questions, and the themes/codes of each participant group were elaborated in previous sections of this chapter.

Figure 4.10 illustrates that 'Indian, Indian Scottish or Indian British' and 'Pakistani, Pakistani Scottish or Pakistani British' older people experienced more challenges with online financial services compared to other groups. Each cohort experienced different types of challenges in accessing digital financial services. Human-related, technology-related and societal challenges were discovered through thematic analysis, for example, fear, interface issues and pressure, respectively.

Figure 4.10 also shows the common challenges across all the groups, the unique challenges facing each group and the factors that appear in more than one group through a specific colour code.

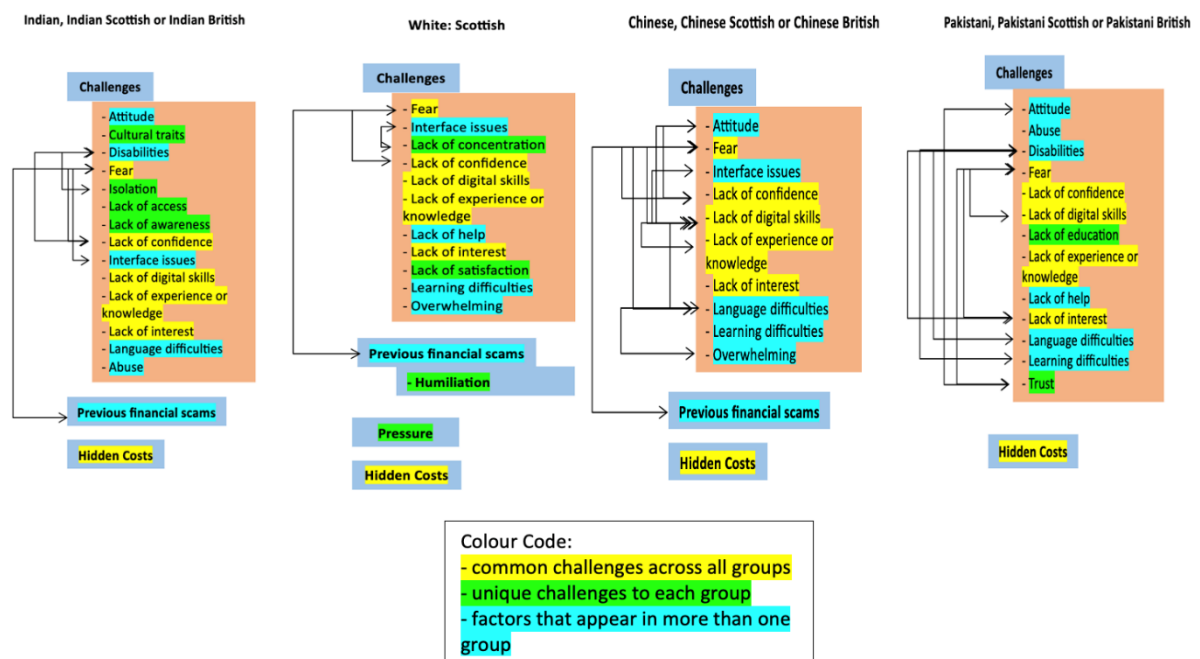


Figure 4.10: Themes and codes of all older and ethnic minority participant groups

In terms of the first research question, ‘Indian, Indian Scottish or Indian British’, ‘Chinese, Chinese Scottish or Chinese British’ and ‘Pakistani, Pakistani Scottish or Pakistani British’ participants in this study acquired English as a second language. Following the interviews with ‘Chinese, Chinese Scottish or Chinese British’ participants, it was noted that they had higher language-related obstacles compared to other groups. Their linguistic issues were interconnected with other challenges. These were discussed in detail in section 4.2.3.1. Moreover, in conjunction with language difficulties, fear was one of the key challenges they confronted in accessing digital financial services. Limited language proficiency and fear deter older people of the Chinese community from taking the initiative to acquire the digital skills to learn online financial services. Consequently, they heavily rely on digital carers or organisations such as *Wing Hong*.

For ‘Pakistani, Pakistani Scottish or Pakistani British’ older people, language was not the primary cause which prevented them from accessing digital financial services; they faced minor language-related obstacles. Similar to older people of Chinese origin, fear of scams was the predominant reason for them to not utilise such services. As mentioned in section 4.1.4.1, ‘Indian, Indian Scottish or Indian British’ women may not have the opportunities to learn the English language due to cultural traits, for example, not gaining education due to the care they have to provide for their families. Interviewed Indian women in this study did not work

for a prolonged period due to family responsibilities and they did not have the experience of working at a technology-related job. However, the interview participants from the Indian community were well-educated and this could be the reason why they did not face language-related obstacles. Also, women from the Indian subcontinent often do not manage the finances; this would be handled by their husbands. This was observed during the interviews with a husband and wife in the study. This was also noted during the interviews with two 'Pakistani, Pakistani Scottish or Pakistani British' participants. Similar to other ethnic minority groups, fear was one of the key challenges faced by the 'Indian, Indian Scottish or Indian British' participants when accessing online financial services and this challenge was described in section 4.1.4.1.

Language difficulties could prevent older people from grasping the skills required to access online financial services. Simultaneously, digital carers and employees would have difficulties in teaching digital terms and providing training sessions unless they interact using the service user's first language, for example, *Wing Hong* and the *Bank of China* provide language support to carry out online financial services for older people. Also, the majority of the interviewed participants preferred in-person interactions as staff could easily solve their problems without older people having to engage with complicated online processes. An employee stated that from her experience with ethnic minorities, they're not as open to learning as English white people; "they don't trust at all, especially when it comes to money" [E3]. This indicates that older people from ethnic minority groups are cautious regarding financial scams, and they could have a higher degree of fear if their first language is not English; this was confirmed through the interviews with 'Chinese, Chinese Scottish or Chinese British' participants.

To sum up, the research questions were addressed through the interview findings obtained through thematic analysis and Figure 4.10 displays all the key challenges specific to each participant group. This data is novel as older people's challenges with online financial services, especially those aged 65 and over, from ethnic minority groups and those whose first language is not English, has not been explored in previous studies, and this research has bridged this gap through the findings. Moreover, the interconnections between the codes shown in Figure 4.10 add new knowledge regarding the challenges faced by older people from each participant group i.e. different ethnic minority groups.

4.4. Updated Version of the Visual Representation of the Factors

Phase 1 and phase 2 of the interviews resulted in 22 semi-structured interviews with 15 older people and seven intermediaries - three digital carers and four employees. All the discovered interview findings were mapped onto Figure 2.1 (section 2.4) to identify the findings that corroborate with other research, to determine the novel factors and to explore the factors not recognised through this study. An updated version of the categorised representation of the factors is shown in Figure 4.11.

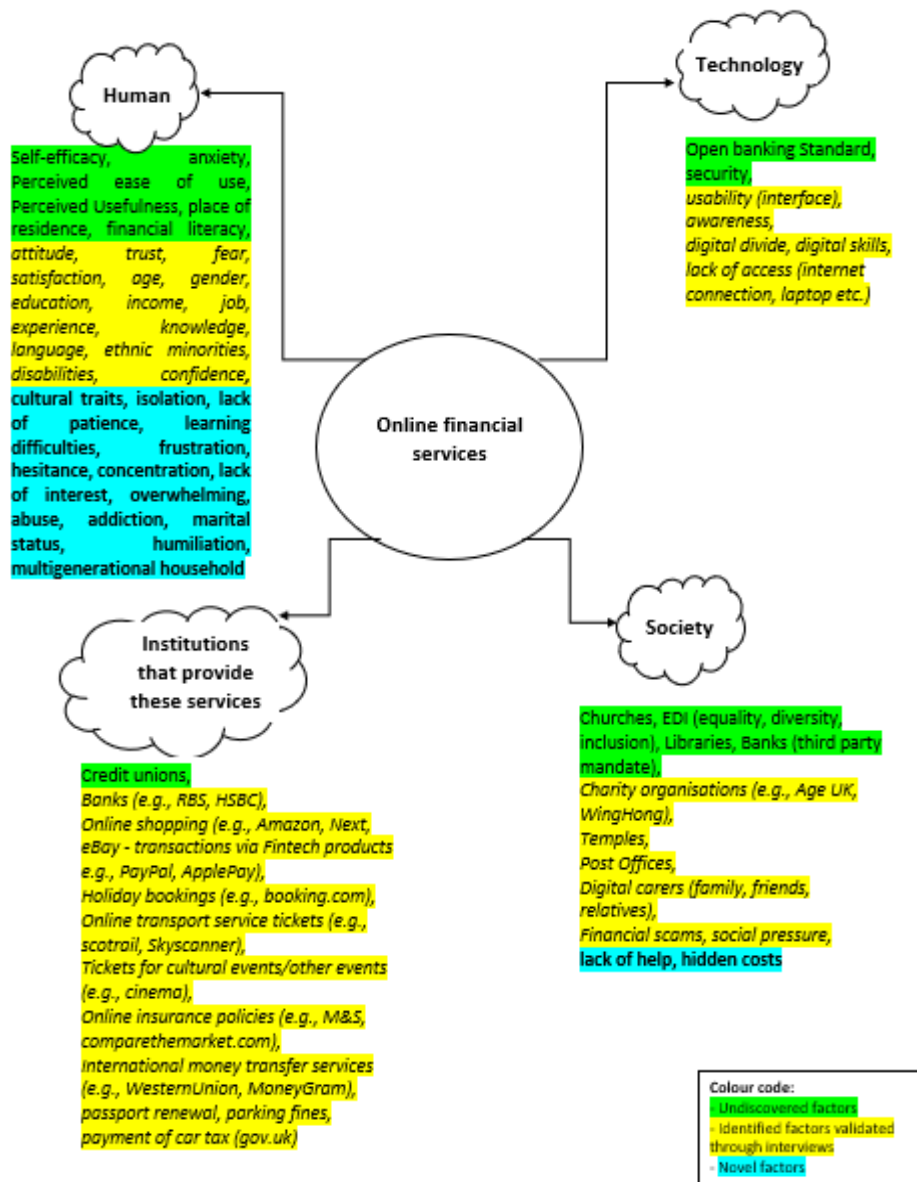


Figure 4.11: Updated version of the visual representation of the factors

Colour code for Figure 4.11:

Green = undiscovered factors i.e. factors that were identified in previous research but not collected through the data in this study.

Yellow = identified factors which were validated through the interviews.

Blue = novel factors.

The six green colour-coded factors under the section 'Human' in Figure 4.11 were the factors not identified through thematic analysis but were discovered through other studies in literature review (chapter 2). Yellow colour-coded factors are the factors which were validated through the interviews, for example, interview findings have shown that older people may not utilise online financial services due to their negative attitude. In terms of demographic information - age, gender, education, income and job have also been identified in other studies:

- Age – it was evident from the interviews that older people aged 65 and over face many challenges in the context of online financial services. They encounter more issues compared to other age groups. As older people advance in age, they perceive that they cannot utilise the internet; thus, they begin to lose interest - this was observed through participant P2. This has been corroborated in a previous study (Ivankina et al., 2017).
- Gender – an equal number of male and female participants were not recruited for interviews to discuss the issues regarding gender inequalities. However, gender disparity was mentioned by the employees. Employee E3 stated, "I think women maybe find it a wee bit harder" [E3] as they had less control of their finances. This supports the findings in previous research (Ramón Jerónimo et al., 2014). "There is a higher percentage of females" [E3] who attend organisations to learn and carry out online financial transactions. Moreover, older men from ethnic minority groups controlled financially related activities in their households. This was highlighted in sections 4.3 and 4.1.3.1. Gender norms in society could be one of the reasons for the existence of gender issues (Thomas et al., 2025b).
- Education – Section 2.3.1 has already outlined the studies which confirm that people with higher educational backgrounds are more likely to adopt and use online financial services. This study partially validates this finding. Participants S1, and I4 possess

higher educational qualifications and utilised online financial services by themselves. Nevertheless, participants of Indian origin also have a higher educational attainment but they do not leverage online financial services effectively except participant I4. Participants I1, I2 and I3 received support from digital carers. Using the demographic information in Tables 4.1 and 4.2 in sections 4.1.1 and 4.2.1, it was noted that 'education' and 'household' have an interconnection. Older people with higher educational backgrounds who live alone utilise digital financial services without any formal or informal support. This finding about the interrelation is novel in the context of digital financial services.

- Income and job – section 2.3.1 has also highlighted the studies which confirm that people with a higher income and a higher occupational status are internet users which, in turn, indicates that they have a higher intention to adopt digital financial services. This study partially confirms this finding. Tables 4.1 and 4.2 demonstrates that all the interview participants in this study did not have any financial constraints; therefore, they had the required equipment to utilise digital financial services. In terms of occupation, some older people (e.g. participants S1 and I4) with high-ranking professional status utilised digital financial services efficiently. Conversely, some older people (e.g. participants I2 and P2) with higher occupational status had the intention to adopt digital financial services but factors such as fear and additional support rendered by digital carers and intermediaries prevented them from fully utilising such services. Also, some older people (e.g. participant C3) with low occupational status utilise digital financial services but receive minor support from family members as they resided with their partner.

Other yellow colour-coded factors in the 'human' section were validated through the interview findings, confirming that previous research studies have reported these challenges. Citations for these studies have already been provided in section 2.3.1.

In terms of novel factors in the 'human' section in Figure 4.11, 14 blue colour-coded factors are new factors affecting older people which have not been identified in previous research in

the context of digital financial services. These factors were identified through thematic analysis except marital status and multigenerational household:

- Marital status – it was observed through interviews that older women from ethnic minority groups who reside with their husbands do not handle their finances; their partners carried out financially related activities through in-person interactions or online. This was supported by the findings obtained from employees (see section 4.1.3.1).
- Multigenerational household – older people from ethnic minority groups who live in multigenerational households (participants I1 and P1 – see tables 4.1 and 4.2) received digital support from other members of the family. They become fully dependent on digital carers; this prevents them from acquiring the digital skills to use digital financial services by themselves.

Concerning institutions that provide online financial services section in Figure 4.11, ‘credit unions’ were not discovered through interviews. However, all the other yellow colour-coded factors have been discussed during the interviews.

Pertaining to the ‘society’ section, libraries were not recognised through the findings; older participants in the study received support from digital carers or organisations. Organisations provide more assistance to individuals with digital financial services as employees’ aim is to enhance their digital skills through interactions. Moreover, older people whose first language is not English receive language support from individuals at specific ethnic minority organisations and this type of support may not be available at libraries.

In terms of the novel factors in the ‘society’ section, lack of help and hidden costs were identified as new factors in relation to digital financial services:

- Lack of help – it was observed through findings that older people received a lack of help from society to access online financial services. Although digital carers provide an extensive amount of support, the quality and continuity of their support cannot be assured. Interview findings showed that digital carers feel frustrated when they have to repeat instructions. This indicates that older people may not learn and focus on the

activity due to digital carers' frustration. Also, older people with disabilities who live alone may not have connections with individuals in the external world; they could become excluded from the digitalised realm. Moreover, employees at organisations can only offer limited support. Older people may not be able to clarify all their technological doubts in such environments and they may not have the opportunities to ask for help outside of the employees' working hours. In addition to this, non-inclusive interfaces indicate that older people are being digitally excluded by online financial services providers. Interface issues (e.g. icons, removing items from online shopping baskets) faced by older people suggest that service providers have to develop interfaces which could foster older people in accessing digital financial services.

- Hidden costs – costs such as time, effort and money were mentioned several times throughout this chapter. Hidden costs associated with online financial services have not been explored in previous studies. Not only older people but digital carers and employees are affected by these costs frequently. These costs could only be reduced through older people's use of online financial services in the context of everyday lives.

Figure 4.11 displays facilitators and barriers regarding older people's use of online financial services. Some factors may create more task-related difficulties, for example, undertaking certain tasks on 'online shopping' websites could be a complicated process for some older people. There are many complex tasks, for instance, adding and removing items from an online shopping basket (Thomas et al., 2025b). Interview findings predominantly identified the challenges that older people experience in accessing digital financial services. Themes and codes generated from intermediaries and older people's interviews assisted in the mapping process. Mapping the interview findings and observations to Figure 2.1 helped in determining the novel factors in relation to older people's access to online financial services such as multigenerational households, cultural traits and humiliation. Thus, this context-specific visual representation of the factors could be employed to enhance our understanding of the factors related to older people's use of digital financial services. This type of visual representation has not been created yet; therefore, this is one of the key contributions of this study.

4.5. Summary

This chapter identified the key interview findings acquired from older people aged 65 and over and intermediaries. Semi-structured interviews were conducted over two phases: 14 and 8 interviews in phase 1 and phase 2 of interviews, respectively. Recruiting older participants for phase 1 of interviews was a complicated task as the study commenced subsequent to the Covid lockdown. Phase 2 interviews were carried out due to limited data produced from ethnic minority groups in phase 1. Also, phase 2 of interviews was required to test the theoretical tool – this is discussed in the following chapter.

Following the interviews, data was analysed through thematic analysis, resulting in the exploration of the multifaceted challenges encountered by older people from different participant groups and those whose first language is not English. Intersecting codes were also identified through the analysis process. These findings were explained in detail in the relevant sections of this chapter. Findings assisted in bridging the gaps by addressing the two research questions. Furthermore, interview findings were leveraged to modify and revise the categorised representation of the factors related to online financial services (Figure 2.1). Undiscovered factors i.e. factors which were not explored through this study, corroborated findings and novel factors were mapped into four different sections, resulting in a new diagram (Figure 4.11). This updated version provides insights into the factors that could act as barriers or facilitators in the context of older people's use of online financial services.

CHAPTER 5

Theoretical Tool

Data gathered through the first phase of the interviews was used to develop a theoretical tool (Thomas et al., 2025a) and this assisted in addressing the third research question mentioned in chapter 1. As discussed in chapter 3, personas developed from qualitative data facilitated in recognising broad factors that could positively or negatively influence older people's access to digital financial services. The tool developed using the data from the analysis and interpretation of the interview data is comprised of ten factors that could contribute to the challenges experienced by older people in accessing online financial services. In order to gauge these factors, this tool utilises a scale ranging from 0 to 5. Quantifying the factors would aid digital service providers and intermediaries in identifying the barriers that are hindering them from accessing digital financial services. This chapter incorporates elucidations of the process of developing the theoretical tool, justifications for including each factor, explications of the process of populating the tool, explanations of the findings derived from the populated tables and descriptions of how this tool could be employed in developing potential interventions in future.

5.1 Similar Resources

Although similar tools have been developed in the past, they do not explicitly address the various challenges experienced by the individuals on online services:

- Digital Competence (DigComp) framework (Vuorikari et al., 2022): The EU's aim is, by 2030, at least 80% of the population should possess basic digital skills. Therefore, the Digital Competence Framework (DigComp) was created by the European Commission to enable people to monitor and enhance their digital skills to become digitally competent. The tool can also be used for education and training programmes. This tool encompasses 21 digital competences divided into 5 key areas:
 - Information and data literacy – browsing, evaluating and managing data and digital content

- Communications and collaboration – interacting, sharing and collaborating through digital technologies
- Digital content creation – developing, integrating and programming
- Safety – protecting health, devices and personal data in digital environments
- Problem solving – solving technical problems and identifying digital competence gaps.

This tool utilises a Digital Skills Indicator (DSI) to assess an individual's digital skills. Various technological activities are associated with each of the five key areas mentioned above and DSI indicator ('basic': one activity, 'above basic': more than one activity, 'at least basic': basic or above basic skills) is utilised on each area to recognise an individual's skill level. This tool could be deployed for self-assessment and personal development by identifying the digital competence gaps. It could also be utilised in the society to alleviate digital exclusion.

- Essential Digital Skills framework (Department for Education, 2022): It is an initiative by the UK Department for Education (England and Wales) to facilitate people to enhance their digital skills. This tool introduces five key components of digital skills that are essential for life and work:
 - Communicating – communicate, collaborate and share online
 - Handling information and content – find, manage and store digital information
 - Transacting – buying and selling goods online
 - Problem Solving – using digital tools and online services to seek solutions
 - Being safe and legal online – staying safe online

The framework also incorporates a section on 'foundation' skills which are developed for individuals who are non-internet users or who utilises technology scarcely. Obtaining these foundation skills (e.g. turning on a device and updating a password) would stimulate individuals to interact with technology. This tool could also be utilised by service providers and organisations to provide training for people to gain digital skills.

Although these types of tools could be utilised to foster people to obtain digital competencies, they do not predominantly focus on the several challenges faced by people in the use of online services. A theoretical tool which would help organisations and intermediaries to identify and quantify the challenges that older people face with online services, specifically online financial services. Therefore, the tool formed from this study could be deployed to assess the factors that contribute to the issues encountered by older people in the use of digital financial services.

5.2 Formation of Theoretical Tool

As discussed in chapter 3, following phase 1 of the interviews, the notion of developing personas was conceived when the interviewees described older people they are acquainted with who are facing challenges in using online financial services. This led to the creation of seven personas (see Figure 3.3 – chapter 3 for an example of a persona and Appendix D for the remaining six personas). Since interviewees discussed older people who had challenges, it was necessary to include this data in the study through a relevant method. Hence, the data was utilised to create the personas. Following the creation of one persona, it was noted that there were several broad factors that could be utilised to develop a theoretical tool with a scale ranging from 0 to 5. Additional factors which were identified through literature review were incorporated in the tool, for example, access to equipment/connection and financial literacy. Factors which could not be scaled were not included such as gender and ethnicity. In total, ten factors that could negatively or positively influence older people's use of online financial services were included in the tool.

5.3 Scale Factors Involved in the Tool

The upcoming sub-sections elucidate the ten factors included in the theoretical tool. Justifications for including each factor are supported by the qualitative data obtained from phase 1 of the semi-structured interviews (chapter 4). Also, the semantics of the scale ranging from 0 to 5 associated with each attribute are explained.

The highest value that could be given to each factor is a score of 5 and the minimum value is 0. For example, a score of 5 for the 'language' factor indicates that the individual does not face any linguistic challenges while a score of 0 means that the person has major language

issues. A score of 0 for any factor indicates that the individual is facing various barriers related to that factor and a score of 5 indicates that there are no barriers. Generally, a five-point scale is utilised to rate the factors; this tool utilises a six-point scale due to the additional options required for several attributes e.g. varying levels of education and basic digital skills. Hence, a six-point scale was placed for each factor to ensure consistency was sustained. The choice of scale has to be based on user’s ease i.e. is it easy to carry out the tool, is it consistent etc (Russo et al., 2021); therefore, more importance was given to user’s convenience.

Table 5.1 illustrates all the factors and the linked scale.

Table 5.1: Theoretical tool

<u>Scale</u>						
<u>Factors</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Support						
Formal Education						
Language						
Basic digital skills						
Technology experience in occupation						
Disabilities						
Financial literacy						
Confidence						
Access to equipment/connection						
Fear						

5.3.1. Support

In order to utilise online services, older people receive support from other individuals, for example, volunteer groups, friends and relatives (Kaijanen and Stenberg, 2018). This was confirmed through the interview findings. Interview findings have proven that some older people require additional support from digital carers or organisations to carry out the tasks on online financial services: “My son is always there, my daughter in law is very, very nice, very helpful. So, they do it for me” [I1]. In addition to the support received from family

members or friends, some older people approach organisations such as *Glasgow's Golden Generation* to learn and obtain assistance with online financial services: "And they are very helpful and I have learned quite a lot there. So, I'm quite happy to be going to the class" [S3]. These interview excerpts suggest that older people could receive two types of support: formal or informal. Informal support refers to the help obtained from digital carers while formal support refers to the assistance acquired from employees and organisations. Any type of support could facilitate older people to gain the skills required to learn technology. However, as mentioned in chapter 4, extensive support could hinder some older people from learning and carrying out the tasks on online financial services by themselves. Therefore, 'support' was included as a factor in the tool. A score of 0 for support denotes that the individual is totally relying on formal or informal support while a score of 5 denotes that the individual does not receive any form of assistance. The higher the score, the lower the level of support received from others:

A scale of 0: I am significantly dependent on formal/informal support.

A scale of 1: I am moderately dependent on formal/informal support.

A scale of 2: I am somewhat dependent on formal/informal support.

A scale of 3: I am partially dependent on formal/informal support.

A scale of 4: I receive a low level of digital help through formal/informal support.

A scale of 5: I do not receive any formal or informal support for online financial services i.e. I can use digital financial services completely independently.

5.3.2. Formal Education

Chapter 2 has already highlighted that older people's education could influence the use and adoption of the internet. Older people (those aged 65 and over) with higher education qualifications are more likely to utilise the internet (Lissitsa and Chachashvili-Bolotin, 2015). Following the phase 1 interviews, it was noted that some older people who had higher educational attainment received support from family members due to their fear which prevented them from accessing online financial services. As well as this, some older people with an adequate educational background who live alone leveraged online financial services without any form of support. Moreover, lack of education could be a challenge that prevents older people from accessing digital financial services: "She had limited education, like five years, just because in those days, it was kind of a safety issue...leaving out of the village to

study and things like that. So, she didn't go out of the village to study" [DC3]. Digital carer DC3 perceived that education would assist an individual to grasp the English language skills which is required to learn and access the technology. This was briefly mentioned in section 4.1.4.3. Thus, 'formal education' was included as a factor to analyse whether there are any connections between education and other factors and to examine if education level played a role in older people's use of online financial services:

A scale of 0: no education

A scale of 1: primary education

A scale of 2: secondary education/college

A scale of 3: bachelor's degree

A scale of 4: post graduate degrees

A scale of 5: three or more university degrees

Table 4.1 in section 4.1.1 displays participants' qualification skills; this was utilised to create the scale shown above. A scale of 0 implies that the individual did not receive any education while a score of 5 indicates that the individual received several degrees.

5.3.3. Language

Language challenges are evident in people whose first language is not English (Goodall et al., 2010). Hence, language could influence older people's intention to access digital financial services. Language was not a major problem experienced by the older participants in phase 1 of the interviews. However, digital carer DC3 validated that language is an issue for older people, especially for those from ethnic minority groups (see section 4.1.4.1). This is an additional level of difficulty for older people who are intending to understand the digital terms. Also, employee E3 stated that some people are illiterate i.e. they cannot read or write in their own language. Language can also be a challenge for people who have English as their first language, due to issues of illiteracy, learning difficulties, various forms of dementia etc. Hence, language was included as a factor in the theoretical tool:

A scale of 0: I am not good at reading, writing or speaking in the English language.

A scale of 1: I am only partially good at writing in English.

A scale of 2: I am only partially good at speaking in English.

A scale of 3: I am only partially good at reading in English.

A scale of 4: I am only partially good at reading, writing and speaking in English.

A scale of 5: I have good proficiency in the English language.

In general, older people prefer face-to-face communication (Yuan et al., 2016). This could indicate that they may learn technology quickly through verbal communication; therefore, speaking is considered as more literate than writing in this tool.

Reading has a higher score than verbal communication as older people have difficulties in quickly understanding speech (Murphy et al., 2006). They could utilise simple guidelines or step-by-step instructions using illustrations to comprehend the basic processes of online financial services if they have major difficulties in oral communication.

5.3.4. Basic Digital Skills

In the UK, around 4.7 million people (i.e. more than 1 in 3 over 65s) lack the basic digital skills to use the internet, for example, turning on the device, connecting to Wi-Fi and modifying the passwords (Age UK, 2024c). This indicates that a significant number of older people are digitally excluded. Phase 1 interviews have also proven that older people lack the digital skills to utilise online financial services. Employee E1 stated, “Quite often, a lot of the people who I’m supporting are completely brand new to digital technology themselves” [E1]. Also, if there’s “anything that needs a digital input...they, just don’t do it. They don’t know how to do it” [E4]. This clearly demonstrates that older people’s lack of digital skills prevents them from using and accessing technology. In order to measure an individual’s digital skills through this tool, the framework produced by the UK’s Department for Education was utilised to create the scale. There are five digital skills that are required for life: communicating (e.g. Facetime), handling information and content (e.g. using iCloud to store files), transacting (e.g. online banking), problem solving (e.g. seeking solutions through online videos), being safe and legal online (e.g. creating strong passwords using special characters) (Department for Education, 2022).

A scale of 0: I do not have any of the five digital skills listed above.

A scale of 1: I have one out of five digital skills listed above.

A scale of 2: I have two out of five digital skills listed above.

A scale of 3: I have three out of five digital skills listed above.

A scale of 4: I have four out of five digital skills listed above.

A scale of 5: I have all the essential digital skills listed above.

A score of 5 indicates that the individual has all the five essential digital skills mentioned in the framework and a score of 0 implies that the individual did not acquire any of the required skills. It is necessary to include the 'basic digital skills' factor in the tool as these skills are required to utilise online financial services. Also, the score would enable an individual to apprehend the degree of digital skills that the older person possess.

5.3.5. Technology Experience in Occupation

Online financial services such as online banking are leveraged by individuals who have a higher occupational status (Karjaluoto et al., 2002). Occupation could influence people's use of digital financial services. Individuals who had technological experience at the workplace are more likely to learn and access technology: "If you had a job, like, I don't know, working in an office or teaching or something like that, then you're more likely to have been working with technology" [E1]. This denotes that individuals who had prior technological experience at the workplace would have the benefit of adapting to the technological world more easily. Thereby, utilising online financial services to carry out basic financial tasks in their everyday lives.

Similar to 'basic digital skills', this factor utilises the UK Department for Education's framework to assess an individual's work-related digital competencies. The framework includes different examples of the skills required for the workplace: communicating (e.g. sending emails to colleagues), handling information and content (e.g. utilising a calendar at the workplace), transacting (e.g. accessing password protected payslips), problem solving (e.g. using software to seek solutions), being safe and legal online (e.g. not sharing data without consent) (Department for Education, 2022).

A scale of 0: I do not have any of the five work-related digital skills listed above.

A scale of 1: I have one out of five work-related digital skills listed above.

A scale of 2: I have two out of five work-related digital skills listed above.

A scale of 3: I have three out of five work-related digital skills listed above.

A scale of 4: I have four out of five work-related digital skills listed above.

A scale of 5: I have all the essential work-related digital skills listed above.

A score of 5 implies that the individual acquired all the essential work-related digital skills which, in turn, means that they can efficiently utilise online financial services. A score of 0 indicates that the individual did not obtain any work-related digital skills; therefore, they could have challenges in learning and accessing digital financial services.

5.3.6. Disabilities

Interview data demonstrated that older people with disabilities have challenges in learning the technology: “Especially with older generation, the older you get, the more likely you are to have problems with your cognitive abilities, maybe different forms of dementia, that type of thing. Yeah, I would say that it’s definitely a little bit of a barrier to learning or might slow learning down a little bit more” [E1]. Also, digital carer DC3 mentioned her father who has various health problems such as COPD, heart issues and cancer. Learning the technology is not his main priority; therefore, he is dependent on his children to carry out online financial services. People with disabilities face major complexities in accessing the internet (Zhang et al., 2016). Hence, ‘disabilities’ was included as a factor:

A scale of 0: I have significant health issues/disabilities which completely prevents me from using online financial services.

A scale of 1: I have major difficulties in using the online financial services due to health issues/disabilities, but I can use these services through additional support e.g. friends, family etc.

A scale of 2: I have major difficulties in using the online financial services due to health issues/disabilities, but I can use these services without additional support.

A scale of 3: I face minor difficulties in using the online financial services due to disabilities/health issues.

A scale of 4: I have a number of health issues/disabilities which may not prevent me from using online financial services.

A scale of 5: I do not have any disabilities/health issues.

A score of 5 for this factor indicates that the individual does not have any disabilities which deter them from learning and accessing online financial services while a score of 0 indicates that severe disabilities impede them from leveraging such services in everyday contexts.

5.3.7. Financial Literacy

Analysing and utilising relevant financial products to handle personal finances (e.g. savings, budgeting, loans etc) require an adequate amount of knowledge and skills – this is referred to as financial literacy skills (Capuano and Ramsay, 2011). In this theoretical tool, not leveraging online financial services indicate that the individual encounters monetary loss for travelling to banks and shops to conduct activities which could be carried out online. This, in turn, denotes that they have a lower degree of financial literacy skills. Lower financial literacy skills can hinder older people from accessing digital financial services as they are used to carrying out the activities in the conventional way. This factor was not derived through thematic analysis as this was not a key challenge experienced by older people from ethnic minority groups. The notion of including this factor arose when the narratives involved in the personas showed that older people had a lack of financial literacy skills due to their minimal use of digital financial services for monetary management.

A scale of 0: I do not possess any financial literacy skills

A scale of 1: I extremely rarely use digital financial services; therefore, my financial literacy skills are very low.

A scale of 2: I rarely use online financial services; therefore, my financial literacy skills are low.

A scale of 3: I use online financial services occasionally; therefore, my financial literacy skills are below average.

A scale of 4: I use online financial services frequently; therefore, my financial literacy skills are average.

A scale of 5: I have significant financial literacy skills as I always use a variety of online financial services.

5.3.8. Confidence

Chapter 2 has already stated that lack of confidence prevents older people from accessing the internet – see section 2.3.1.7. This was confirmed through the findings from the phase 1 interviews. ‘Lack of confidence’ was a code that emerged from the thematic analysis carried out on the interview transcripts gathered from employees, digital carers, ‘White: Scottish’

and 'Indian, Indian Scottish or Indian British' participants. Interview findings demonstrated that this factor had interconnections with other factors such as fear, digital skills and experience/knowledge – see Figures 4.3 and 4.5. In order to identify an individual's varying levels of confidence and to examine whether confidence had interconnections with other factors, this attribute was included in the tool.

A scale of 0: I do not have any confidence in using online financial services.

A scale of 1: I am slightly confident in using online financial services.

A scale of 2: I am somewhat confident in using online financial services.

A scale of 3: I am moderately confident in using online financial services.

A scale of 4: I am very confident in using online financial services.

A scale of 5: I am significantly confident in using online financial services.

5.3.9. Access to Equipment/Connection

Ofcom report declared that only 1% of 18-24 age group, 1% of 25-34, 3% of 35-44, 2% of 45-54 and 3% of 55-64s do not have internet access at home while 34% of older people aged 65 and over do not have internet access at home in the UK (Ofcom, 2022). This clearly denotes that older people require support to access the devices to use the internet. In the absence of that support, digital divide would be perpetuated. Not having the required equipment or connection (e.g. laptop, smartphone or Wi-Fi) to access online financial services would hinder people from leveraging such services. One of the reasons for not utilising online financial services is the cost associated with the equipment (Hayes and Martin, 2007). Such services are inaccessible to those who cannot afford the devices. This was confirmed through employees' interview findings (see section 4.1.4.4). Concurrently, digital carers may not provide the support to set up the equipment at older people's houses as they would phone them frequently – this was mentioned by digital carer DC3 (see section 4.1.4.1).

A scale of 0: I do not have any reliable access to a device and internet connection to use digital financial services.

A scale of 1: I have very little access to a reliable device and internet connection.

A scale of 2: I have some, but not always reliable, access to a device and internet connection.

A scale of 3: I have good access to a reliable device and internet connection.

A scale of 4: I have very good and reliable access to a device and internet connection.

A scale of 5: I have excellent and very reliable access to a device and internet connection.

5.3.10. Fear

Interview findings showed that fear was one of the common challenges experienced by older people in accessing digital financial services. Older people may not utilise such services due to their fear of financial scams, fear of making mistakes or fear interconnected with other factors, for example, fear and isolation, fear and trust - see section 4.1.4.4. In order to determine the degree of fear an individual possesses, this factor was incorporated into the tool.

A scale of 0: I have extreme fear when using online financial services or I do not use such services due to my extreme fear.

A scale of 1: I have significant fear when using online financial services.

A scale of 2: I have moderate fear when using online financial services.

A scale of 3: I have somewhat fear when using online financial services.

A scale of 4: I have slight fear when using online financial services.

A scale of 5: I have no fear when using online financial services.

If an individual has a lack of interest towards technology or does not utilise online financial services, then 'fear' and 'confidence' cannot not be quantified easily. In such scenarios, assess the scores obtained for other factors to generate a score for 'fear' and 'confidence'. For instance, a score of 0 could be provided for both factors if the individual obtained a score of 0 for 'language' and/or 'support' since this implies that they are fully dependent on digital carers or organisations to conduct the tasks on online financial services.

People may not access digital financial services such as online banking due to the complexity of tasks (Hayes and Martin, 2007). This theoretical tool does not include 'task-related complexities' as a factor. Intermediaries mentioned the impediments that older people encounter on the tasks associated with specific online financial services, for example, challenges in removing the items from the online shopping basket, complexities in understanding the two-factor authentication and difficulties in carrying out the tasks involved in international money transfer apps – these points were outlined in section 4.1. Varying

levels of task-related complexities could prevent older people from reaching the transaction stage in an online financial service. Additional investigation would be required for task-related complexities as it is a broad area; therefore, this aspect could be examined as part of future work.

5.4 Populating the Theoretical Tool

A description of the theoretical tool along with the scale factors that could be utilised by the society is shown in Appendix F.

The forthcoming sub-sections focus on examples of applying the scale to qualitative data, and the findings derived from the populated tables.

5.4.1. Examples of Applying the Scale to Qualitative Data

The scale applied to persona 3 in Appendix D is shown below in Figure 5.1. Corresponding justifications are displayed below the figure; some explanations include interview excerpts to support the scores given to the factors.

Figure 5.1 clearly illustrates that Kunti (name generated for persona 3) has major barriers as she received a score of 0 or 1 for all the factors. She has been receiving intensive assistance from her daughter and husband as she is housebound due to various health issues. Potential interventions are required to assist her in accessing digital financial services, for example, home-based training sessions to develop her digital skills and to help her overcome linguistic challenges. Kunti is from India; therefore, the scores reflect the challenges that older people from ethnic minority groups may experience in accessing online financial services in the later stages of their lives.

<i>Scale</i>						
Factors	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Support	0					
Formal Education		1				
Language	0					
Basic digital skills	0					
Technology experience in occupation	0					
Disabilities	0					
Financial literacy	0					
Confidence	0					
Access to equipment/connection	0					
Fear	0					

Justification

Support – 0 – “Her daughter takes care of their online services such as contents insurance.”

Formal Education – 1 - because she only attended school for approx. 5 years.

Language – 0 because she can’t speak English fluently.

Basic digital skills – 0 – “She only uses landline phone and she hasn’t used a computer or smartphone”.

Technology experience in occupation – 0 – she was a housewife.

Disabilities – 0 – Parkinson’s, broken hip and mobility issues. “she’s housebound; her husband takes care of her”.

Financial literacy – 0 – she doesn’t use any online financial services. “Her daughter takes care of their online services such as contents insurance. Kunti doesn’t have her own bank account but she lives with her husband who has an account.”

Confidence – 0 – She never used online services before. Also, “pandemic and health issues have had a negative impact on her confidence.” Her daughter is helping her out with such services.

Access to equipment/connection – 0 – no Wi-Fi

Fear – 0 – a score of 0 for fear as she has never used online financial services before. However, she is receiving help from her daughter.

Figure 5.1: Scale applied to persona 3

Figure 5.2 (see below) displays another example of applying the scale to qualitative data. In this instance, interview participant S1’s data was utilised to populate the table.

Figure 5.2 portrays that participant S1 is exceptional at leveraging online financial services. Since S1 was a ‘White: Scottish’ participant, she did not have any language issues and she lives alone, not receiving any form of support from digital carers or organisations. In terms of education, S1 obtained a postgraduate degree, and she also had technological experience at the workplace; this could be considered as one of the reasons why participant S1 utilises online financial services efficiently.

<u>Scale</u>						
<u>Factors</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Support						5
Formal Education					4	
Language						5
Basic digital skills						5
Technology experience in occupation						5
Disabilities						5
Financial literacy						5
Confidence						5
Access to equipment/connection						5
Fear					4	

Justification

Support – 5 – no help required, she finds solutions to her problems through YouTube or other sources like google.

Formal Education – 4 – postgraduate degree.

Language – 5 – no language issues.

Basic digital skills – 5 – carries out every online activity without assistance.

Disabilities – 5 – no disabilities.

Prior technological experience/knowledge – 5 – used a computer when she was working. Used to be a manager in social work, retired.

Financial literacy – 5 – conducts banking related activities and transactions through laptop, dealt with finance in work.

Confidence – 5 – good confidence to conduct everything without help from others.

Access to equipment/connection – 5 – uses a laptop.

Fear – 4 - *"we bought a shower screen online and it came, it was fine. It was far too big. So, it had to be returned to the seller, which was down south and the midlands. I went onto a website. And it was people who did journeys, the people that are travelling from Scotland to England that they are in bands and saying that they give you a price to actually take your item down. So anyway, I had arranged by say, this guy to collect the item and to deliver it. And the item was worth about 150 pounds, the delivery was about 40 pounds. And he came here. And I really should have taken his registration number but I didn't anyway, the item has never delivered and obviously he kept the item and the money."*

"...I would be much more wary if I was getting into that sort of kind of a service again, and somebody here was collecting an item, I would do take a photograph of their car registration or band registration."

Figure 5.2: Scale applied to participant S1's interview transcript

Upon examining both Figures 5.1 and 5.2, it is evident that diverse factors interplay in older people's access to digital financial services. Receiving a lower score for many factors suggest that the individual require potential interventions with formal or informal support while higher scores for many factors indicate that the individual may not require significant support due to their capability of handling digital financial services by themselves.

See Appendix G to view all the populated tables for the remaining six personas and fourteen older people’s interview transcripts (total = 22 populated tables).

5.4.2 Findings from Populated Tables

Along with the interconnections identified through interview data (see chapter 4 – Figures 4.1, 4.2, 4.3, 4.4, 4.6, 4.8), the populated tables in Appendix G provided several findings irrespective of ethnicity or gender. A spreadsheet containing all the derived scores from seven personas and fifteen older people’s interview transcripts are shown in Figure 5.3.

Colour code:										
	Support, Confidence, Fear									
	Formal education, technology experience in occupation, Financial literacy									
	Basic Digital skills, Financial Literacy									
	Disabilities									
	Language									
	Support	Formal Education	Language	Basic Digital Skills	Technology experience in occupatio	Disabilities	Financial Literacy	Confidence	Access to equipment/connectio	Fear
Participant S1	5	4	5	5	5	5	5	5	5	4
Participant S2	2	2	5	3	2	5	4	3	5	3
Participant S3	0	2	5	3	0	5	2	2	5	1
Participant C1	0	3	4	3	2	5	0	2	5	0
Participant C2	0	1	0	2	0	5	0	0	5	0
Participant C3	4	3	5	5	0	5	5	5	5	4
Participant C4	0	1	0	1	0	5	0	0	5	0
Participant C5	0		5	2	0	5	0	0	5	0
Participant P1	0	1	2	0	0	0	0	0	5	0
Participant P2	1	2	4	2	0	4	2	3	5	1
Participant P3	1	2	4	2	0	5	0	1	5	0
Participant I1	0	3	4	1	0	4	0	0	5	0
Participant I2	1	5	5	1	0	5	0	0	5	0
Participant I3	0	2	5	2	0	4	0	0	5	0
Participant I4	5	4	5	5	4	2	4	5	5	5
Persona 1	0	2	0	1	0	5	0	0	5	0
Persona 2	0	2	5	0	0	1	0	0	0	0
Persona 3	0	1	0	0	0	0	0	0	0	0
Persona 4	2	2	5	2	1	5	1	2	5	4
Persona 5	0	3	5	0	1	5	1	1	5	0
Persona 6	0	1	5	0	0	5	1	0	5	5
Persona 7	0	0	5	0	0	1	1	0	5	0

Figure 5.3: Obtained scores from qualitative data

Colour code for Figure 5.3:

Red = support, confidence, fear

Green = formal education, technology experience in occupation, financial literacy

Blue = basic digital skills, financial literacy

Amber = disabilities

Light orange = language

- Support, confidence and fear – older people who received low scores for fear and confidence obtained a low score for ‘support’. As previously mentioned, a score of 0 could be generated for fear and confidence if the individual has no interest towards technology or they do not utilise digital financial services; therefore, scores for these factors are generated by evaluating the scores obtained from other factors. Data obtained through the tool demonstrated that older people who receive immense

support through digital carers or organisations have lower degrees of confidence and/or fear i.e. a score of 0 for both factors.

- Formal education, technology experience in occupation and financial literacy – older people who had higher educational backgrounds (i.e. postgraduate degrees or above), possessed a higher level of financial literacy skills and had prior technological experience at the workplace. Receiving higher scores for these factors demonstrated that older people utilise online financial services without additional support.
- Basic digital skills and financial literacy – individuals who received a score of 0 for financial literacy showed that they had lower levels of basic digital skills. This indicates that older people who lack these skills are more likely to depend on formal or informal support.
- Disabilities – older people who received a score of 0 for disabilities receive immense support from others – this was mentioned in chapter 4. They require support as they lack the digital skills to adopt and use online financial services.
- Language, support, financial literacy, confidence and fear – older people who received a score of 0 for language (i.e. extreme language issues) had lower levels of financial literacy skills and confidence and higher levels of fear. Hence, they received support from others to access online financial services. This finding shows that language plays a key role in influencing older people’s intention to adopt digital financial services. Scores also indicate that linguistic issues may hinder older people from gaining and enhancing the required digital skills to utilise online financial services.
- Access to equipment/connection – although scores show that this factor does not contribute negatively to access online financial services, most of the older people do not utilise the devices efficiently to carry out the basic activities on digital financial services. Figure 5.3 shows that other factors hinder them from leveraging such services.

In addition to the aforementioned findings, barriers faced by older people from specific ethnic minority groups were identified through the populated tables (see Figure 5.4 below).

Colour code:											
	Confidence, Fear										
	Support, Confidence, Fear										
	Basic Digital skills, Financial Literacy										
	Language										
	Support, Basic Digital Skills, Confidence, Fear										
	Support, Basic Digital Skills										
	Support	Formal Education	Language	Basic Digital Skills	Technology experience in occupation	Disabilities	Financial Literacy	Confidence	Access to equipment/connection	Fear	
White: Scottish											
Participant S1		5	4	5	5	5	5	5	5	5	4
Participant S2		2	2	5	3	2	5	4	3	5	3
Participant S3		0	2	5	3	0	5	2	2	5	1
Chinese, Chinese Scottish or Chinese British											
Participant C1		0	3	4	3	2	5	0	2	5	0
Participant C2		1	1	0	2	0	5	0	4	5	0
Participant C3		4	3	5	5	0	5	5	5	5	4
Participant C4		0	1	0	1	0	5	0	0	5	0
Participant C5		0	5	5	2	0	5	0	0	5	0
Persona 1		0	2	0	1	0	5	0	0	5	0
Pakistani, Pakistani Scottish or Pakistani British											
Participant P1		0	1	2	0	0	0	0	0	5	0
Participant P2		1	2	4	2	0	4	2	3	5	1
Participant P3		1	2	4	2	0	5	0	1	5	0
Persona 7		0	0	5	0	0	1	1	0	5	0
Indian, Indian Scottish or Indian British											
Participant I1		0	3	4	1	0	4	0	0	5	0
Participant I2		1	5	5	1	0	5	0	0	5	0
Participant I3		0	2	5	2	0	4	0	0	5	0
Participant I4		5	4	5	5	4	2	4	5	5	5
Persona 2		0	2	5	0	0	1	0	0	0	0
Persona 3		0	1	0	0	0	0	0	0	0	0
African, African Scottish or African British											
Persona 4		2	2	5	2	1	5	1	2	5	4
Persona 5		0	3	5	0	1	5	1	1	5	0
Persona 6		0	1	5	0	0	5	1	0	5	5

Figure 5.4: Scores for ethnic minority groups

Colour code for Figure 5.4:

Purple = confidence, fear

Red = Support, confidence, fear

Blue = Basic digital skills, financial literacy

Light orange = language

Green = support, basic digital skills, confidence, fear

Yellow = support, basic digital skills

‘White: Scottish’: Figure 5.4 displays that the ‘White: Scottish’ participants had no language issues as English is their first language. Also, they had higher confidence and lower fear levels when compared with other cohorts. Based on the scores, these participants had minor issues compared to other ethnic minority groups.

‘Chinese, Chinese Scottish or Chinese British’: the scores generated for the ‘language’ factor depict that they face linguistic challenges and therefore, they received support from others. Also, a connection is demonstrated through support (level of dependence/independence), confidence and fear; those who received lower scores for confidence and fear showed that they received significant support from digital carers or organisations, indicating that they have lower basic digital skills. More than 50% of the Chinese people received a score of 0 for financial literacy and these individuals had lower basic digital skills. This implies that there is

an interconnection between financial literacy and basic digital skills; those who lack digital skills have a lower degree of financial literacy skills.

‘Pakistani, Pakistani Scottish or Pakistani British’: those who scored 0 out of 5 for the ‘support’ factor received a score of 0 for basic digital skills, confidence and fear. This suggests that older people from ‘Pakistani, Pakistani Scottish or Pakistani British’ ethnic minority group receive formal/informal support due to their lack of digital skills, lower levels of confidence and higher levels of fear.

‘Indian, Indian Scottish or Indian British’: colour-coded cells show that they face similar issues to older people from ‘Chinese, Chinese Scottish or Chinese British’ ethnic minority group. Those who obtained a score of 0 for confidence and fear were the ones who received extreme support from digital carers and organisations. Also, people who scored 0 out of 5 for financial literacy skills had a lower degree of basic digital skills. Although these barriers were identified, language was not an issue faced by this group.

‘African, African Scottish or African British’: the personas recorded under this subgroup demonstrate that language is not a barrier as English is the official language in Ghana. However, personas that scored a 0 out of 5 for basic digital skills received immense support from digital carers, indicating that they have a lack of digital skills.

Scores obtained through the theoretical tool indicate that multiple factors impede older people from leveraging online financial services and the quantified factors provide a deeper understanding of the issues experienced by older people aged 65 and over. The scores obtained from the tool could be exploited to determine the type of solutions required for an individual, for example, task-oriented solutions, training sessions and digital solutions. The tool could provide insights for intervention and focus for better support for the older and ethnic minority people.

5.5. Testing of the Tool

Following the development of the theoretical tool, it was tested on all the developed personas. Each factor was scored by reviewing the sentences and examining the overall

impressions derived from each persona. The tool was also tested on all the older people's interview transcripts (phase 1 of interviews). For further testing, data from eight semi-structured interviews (phase 2 of interviews) were utilised to test the tool.

As mentioned previously, populated tables containing the scores generated for all the interviewed older people and personas are shown in Appendix G. It was noted that semi-structured interviews would be one of the most appropriate methods to quantify the factors as the interviewee would have the opportunity to expand their responses through narratives; detailed explanations are beneficial to gauge the factors. Moreover, older people may not be able to quantify the factors by themselves due to having issues articulating their own challenges in the use of online financial services. Additional support may be required for vulnerable people to carry out this theoretical tool. Since the interview transcripts and personas were successfully mapped onto the tool and a range of scores was recorded, this tool could be deployed to develop potential interventions, including personalised ones, that would be beneficial for older people in relation to digital financial services.

Although the tool was tested by the researcher, this can cause issues regarding subjectivity. Hence, a study was carried out which enabled four researchers to test the theoretical tool using the developed personas. Each researcher was given six personas (remaining persona was used in the theoretical tool guide as an example – Appendix F) and asked to create six populated tables. Personas were utilised instead of interview transcripts as transcripts could not be given out for studies due to the length of each document. Personas were created from qualitative data; therefore, the inclusion of these personas was an appropriate methodological way to carry out the study.

An email with participant information sheet and consent form (see Appendix H) was sent to four fellow researchers and was asked to sign the consent form if they were willing to take part in the online study. Once the digitally signed consent forms were received through email, instructions (Appendix I), theoretical tool guide (Appendix F) and theoretical tool tables (a document showing six personas and six theoretical tool tables) were given. Instructions document clearly stated that they have to commence the study by reading the theoretical tool guide to understand how the six-point scale is used to quantify each factor using

qualitative data. Furthermore, this is a subjective tool; therefore, individual judgement, reasoning and perceptions are required to generate meaningful scores. If an individual could not provide a score for a factor, then they can leave it blank. Populated tables were sent back to the researcher through email. This resulted in 24 populated tables (see Appendix J). Participants did not have issues in generating the scores for each persona. One participant did not provide a score for 'formal education' factor for personas 4, 5 and 6. This is shown in the populated tables. Obtained scores were recorded on excel and saved as a csv file (see Appendix K to view the first few rows: F1 stands for factor 1, 'support', on the theoretical tool, F2 – formal education, F3 – language etc. P1 means participant 1, P2 – participant 2 etc. Scores are recorded for each persona (persona1, persona2, persona3 etc). In total, the csv file has 240 rows (6 personas x 4 participants x 10 factors).

In order to assess the inter-rater reliability among the four participants, Krippendorff's Alpha was used (Krippendorff, 2011). This measure determines participants' level of agreement across all the personas for each factor. Krippendorff's alpha was chosen as the appropriate reliability coefficient as it is flexible and can handle any missing data, any number of raters and any level of measurement (ordinal, nominal, interval etc) (Krippendorff, 2011).

Alpha value for each factor was computed using Krippendorff library on python (see Appendix L). In order to calculate the alpha values, the csv file was uploaded and a loop was used to iterate through each factor (F1, F2, F3 etc) in the data. A matrix was created for each factor where the rows are personas (items being rated) and the columns are participants (testers) and contains theoretical scores as values. The matrix is converted into a numeric array and Krippendorff alpha is calculated for that factor. 'Ordinal' is chosen as the level of measurement as the tool uses a six-point scale (0-5) and the differences between the numbers are not equal; a score of 0 means major challenges in relation to the factor while a score of 5 indicates no challenges; each factor is scored based on individual perceptions. Once the alpha value was created for a factor, it was stored and all the values were printed out at the end (see Appendix L).

In order to confirm the obtained Krippendorff alpha values, a web tool created by Marzi et al. (2024) was utilised. This webpage computes the values by uploading a csv file. A csv file was

created for each factor where the rows correspond to the individual items being rated (personas) and the columns represent the testers (participants) (see Appendix M to view the matrix created for each factor). 'NA' indicates missing values. Alpha values obtained through this tool and python matched (see Appendix N).

Krippendorff (2018) outlined thresholds to measure the level of agreement among the raters:

- Alpha value = aim for 1.00 -> strong agreement
- Alpha value > 0.800 -> reliable agreement
- Alpha value between 0.667 and 0.800 -> tentative conclusions only
- Alpha value < 0.667 -> unreliable

The alpha values obtained through this study show that factor F3 - language (0.955) had the highest inter-rater reliability among the participants followed by factor F6 - disabilities (0.949). These values represent a satisfactory level of agreement among all the participants. The values acquired for factors F2 – formal education (0.772), F4 – basic digital skills (0.672), F7 – financial literacy (0.682) and F9 – access to equipment/connection (0.684) indicates moderate agreement (Marzi et al., 2024). Factors F1 – support (0.335), F5 – technology experience in occupation (0.334), F8 - confidence (0.437) and F10 - fear (0.493) denotes no agreement among the participants. Further verification is required to confirm these values. The sample size is six personas; therefore, this has an effect on the computed values. Results can only be considered as preliminary, not definitive. Increasing the sample size could lead to more reliable and stable scores. Nevertheless, low alpha values could be obtained even if the sample size is large due to various reasons such as inaccurate interpretation of factors or raters not properly quantifying each factor using their own reasoning and judgement.

Since the sample size is small, it is ideal to explore the bootstrap confidence intervals. Resampling methods such as bootstrap can be used to determine how much the alpha value might vary in new samples (Gwet, 2011). The web page developed by Marzi et al. (2024) incorporates bootstrapping and confidence intervals which was created by utilising the descriptions outlined by Hayes and Krippendorff (2007). The tool enables the user to select the confidence interval level and the number of bootstrap iterations. For each factor, the

rows (personas) were resampled 1000 times and a range of reliability values was calculated at 95% confidence interval level [range -> lower limit and upper limit]. These limits change in different iterations. The number of bootstrap iterations was set to 1000 as a higher number of iterations could lead to stable results and 95% is the common confidence interval used in bootstrap. See Appendix N for the lower and upper limits for each factor. The results show that all the lower limits are low, indicating weak or no inter-rater agreement. However, the upper bounds are quite high, ranging from 0.666 to 1.000, representing moderate to strong inter-rater agreement. A definitive conclusion cannot be made using these limits; therefore, this indicates that the reliability is uncertain. Increasing the sample size could lead to producing a more robust estimate.

Despite the fact that the alpha values cannot be fully utilised to determine the inter-rater agreement among the participants, the study with the researchers showed that individuals could map qualitative data to the tool to quantify the factors. This indicates that the factors which contribute to the challenges faced by older people could be explored through this developed tool.

5.6 An Instructional Approach to Developing Potential Interventions

Potential solutions could be developed in various ways through the theoretical tool. Inclusive solutions could not be created for each factor shown on the tool i.e. a solution could not be developed for each factor that would be beneficial for each person. Ideal solutions cannot be created through this method.

This tool encompasses three static factors: formal education, technology experience in occupation and disabilities. Any challenges regarding these factors cannot be solved through conclusive solutions. For instance, technological experience at the workplace cannot be improved, they either have technological experience or not. However, support, fear and confidence can be improved to some extent through potential interventions which would aid older people in adopting and using online financial services.

One efficient method to create concrete interventions would be examining the scores that the individual obtained for the four main factors: basic digital skills, access to

equipment/connection, language and financial literacy. These factors could be largely enhanced. All the other six factors could be considered as indicators which would assist in establishing the optimal solution(s) required for an individual's obstacles neighbouring the four main factors. For example, the quantified factors shown in Figure 5.1 demonstrate that the individual obtained a score of 0 for the four main factors. Possible solutions such as step-by-step instructions, training sessions through the support of organisations or other pertinent interventions would be required for this individual to improve or promote their use of utilise online financial services. Nevertheless, the individual is facing major challenges through other factors which is evident from the scores she obtained. For example, she has a lack of confidence, extreme disabilities and a lower educational background. Hence, home-based training with formal and informal support would be more appropriate for her to grasp the basic digital skills to use technology. A fully digital solution like a chatbot would create more complexities; therefore, oral communication would be ideal for her to understand the basic technological terms. Moreover, digital carers would have to assist her with the learning process due to her language issues or an interpreter could help her to learn the technology using her first language. In this way, her financial literacy skills and confidence would be increased to a certain degree. The solution mentioned above would help her to comprehend the technology and eventually, the processes regarding online financial services.

Varying levels of tasks could be incorporated for each developed solution, for example, 'beginner', 'intermediate' and 'difficult' levels for training sessions or group sessions. Those who obtained a score of 0 for most of the factors could focus on 'beginner' levels with additional support and those who encounter minor complexities could carry out the tasks associated with the 'difficult' level.

Instead of developing one intervention for the ten factors, many solutions could be created for the factors and the most impactful interventions could be chosen depending on the scores obtained for the four main factors and the six indicators. This would lead to the facilitation of digital inclusion.

Figure 5.5 briefly displays step-by-step instructions on how to exploit this tool to identify the factors that negatively or positively influence older people's use of online financial services.

Conduct interviews with intermediaries or older people aged 65 and over identifying information regarding demographic details, for example, occupation, family, language etc and the individual's challenges in the use of online financial services.



Apply the 6-point scale to each interview transcript or persona by reading the sentences. A score could also be given to factors using the impression conveyed from the individual's tone of conversation during interviews. See section 'scale factors' for details on the scores for each factor.



Read the options for each factor and rate each factor using a score between 0 and 5.



Assess the scores obtained for the 4 main factors: basic digital skills, access to equipment/connection, language and financial literacy.



Determine the solutions for the 4 main factors by reviewing the scores obtained from the other 6 factors.



Customised/personalised solution for the user.

Figure 5.5: Workflow

Firstly, qualitative data has to be gathered through selected methods, for example, interviews and surveys. This data should include demographic information (e.g. education, occupation, marital status etc) and detailed explanations of the various issues they encounter on online financial services. An employee at an organisation could engage with an older individual and use a paper-based theoretical tool table to create notes for each factor or generate a score while they are discussing the challenges related to online financial services. It is ideal to collate qualitative data during one-to-one sessions instead of focus groups as this would enable intermediaries to successfully produce a score for each factor, resulting in creating meaningful scores for one table. Populated tables from many organisations could be provided to financial service providers to produce statistics that would be useful for developers when creating online banking apps. For example, if 55% of older people aged 65 and over are facing language issues, assistive features are required. These statistics would also be useful for policymakers and the government as they could interact with relevant stakeholders to produce inclusive interventions. Furthermore, intermediaries could assist an older individual

on specific areas once the challenges are identified through the scores. Also, digital carers can utilise this tool in a home environment while assisting older family members. In order to produce robust scores, training would be required for employees/volunteers and digital carers through workshops in libraries or online training sessions as this would assist them to understand the semantics of the factors and the corresponding scale.

Following the first step on Figure 5.5, each interview transcript or the personas should be mapped to the 6-point scale i.e. quantify the factors using the obtained information from each individual. During the interviews, older people may not share all their challenges. In such cases, an approximate score could be generated for factors by utilising the narratives they shared. Also, a score could be provided using the impression conveyed from the individual's tone of conversation during interviews. The second stage in Figure 5.5 directs the user to 'scale factors' section to view the scale associated with each factor – this can be seen in the theoretical tool in Appendix F as Figure 5.5 was extracted from there.

If personas are being deployed to generate the scores, real information except the individual's name, and other personal identity is required i.e. accurate details are essential for the tool to produce meaningful scores which would aid in identifying the issues that older people face. As mentioned in chapter 3, this study created seven personas containing accurate information. Therefore, mapping the personas onto the tool led to accurate scores and as a result, positive and negative factors were recognised. Non-factual information is necessary for the tool to produce optimal output.

The third step is providing a score between 0 and 5 by utilising the scale options linked to each factor. Examine the scores they acquired for the four main factors: basic digital skills, access to equipment/connection, language and financial literacy. Determine the ideal solution(s) that would improve the four main factors by reviewing the scores obtained from the six indicators: support, fear, confidence, formal education, technology experience in occupation and disabilities. In the final stage, customised solutions could be provided for the user or personalised interventions for all people with similar scores in each of the four main categories.

In addition to the technique mentioned above, cumulative scores could also be utilised to generate interventions. Figure 5.6 displays a column showing the cumulative score created for each older participant and persona:

Colour code:											
Cumulative Score											
Support	Formal Education	Language	Basic Digital Skills	Technology experience in occupatio	Disabilities	Financial Literacy	Confidence	Access to equipment/connectio	Fear	Cumulative Score	
Participant S1	5	4	5	5	5	5	5	5	5	4	48
Participant S2	2	2	5	3	2	5	4	3	5	3	34
Participant S3	0	2	5	3	0	5	2	2	5	1	25
Participant C1	0	3	4	3	2	5	0	2	5	0	24
Participant C2	0	1	0	2	0	5	0	0	5	0	13
Participant C3	4	3	5	5	0	5	5	5	5	4	41
Participant C4	0	1	0	1	0	5	0	0	5	0	12
Participant C5	0		5	2	0	5	0	0	5	0	17
Participant P1	0	1	2	0	0	0	0	0	5	0	8
Participant P2	1	2	4	2	0	4	2	3	5	1	24
Participant P3	1	2	4	2	0	5	0	1	5	0	20
Participant I1	0	3	4	1	0	4	0	0	5	0	17
Participant I2	1	5	5	1	0	5	0	0	5	0	22
Participant I3	0	2	5	2	0	4	0	0	5	0	18
Participant I4	5	4	5	5	4	2	4	5	5	5	44
Persona 1	0	2	0	1	0	5	0	0	5	0	13
Persona 2	0	2	5	0	0	1	0	0	0	0	8
Persona 3	0	1	0	0	0	0	0	0	0	0	1
Persona 4	2	2	5	2	1	5	1	2	5	4	29
Persona 5	0	3	5	0	1	5	1	1	5	0	21
Persona 6	0	1	5	0	0	5	1	0	5	5	22
Persona 7	0	0	5	0	0	1	1	0	5	0	12

Figure 5.6: Cumulative Scores

Colour code for Figure 5.6:
Blue = Cumulative Score

Cumulative score is the sum of all the scores added up for the ten factors. The higher the cumulative score, the lower the barriers that each individual faces with digital financial services. The maximum score an individual can gain is 50; therefore, any score above 25 could be considered as a threshold for deciding the type of intervention(s) required for the individual. An older person who receives a score below 25 may require basic interventions and anyone who receives a score above 25 could commence with an ‘intermediate’ level and then gradually transition to ‘difficult’ levels of the developed solution. The threshold of 25 is the midpoint and it is completely arbitrary – this can be set to a different value.

Moreover, the cumulative scores could be used to distinguish older people with major and minor barriers within a specific ethnic minority population. This would be advantageous for an organisation as this could assist them in identifying the individuals who require additional support within a cohort.

Another efficient method to create interventions would be using the populated tables to examine the barriers that are prevalent across the board irrespective of ethnicity and gender or the tables could be utilised to focus on a specific ethnic minority group to recognise the common barriers within the group – both these techniques were followed to produce the findings in the previous section (section 5.4.2). In this way, common patterns that are emerging can be identified easily and this would give additional insight into the area of digital financial services. If further interviews are conducted for each ethnic minority group, the tool could be used to profile different groups, and more barriers would be revealed. This would provide future directions for interventions that are essential for specific groups.

5.7 Reflection on the development and nature of the tool

As previously mentioned in sections 3.5.2 and 5.2, the theoretical tool was developed through qualitative data. Creation of one persona led to the notion of developing this tool. After reviewing the persona, it was observed that there were several broad factors that could positively or negatively influence older people's access to digital financial services. These factors were noted and recorded. Factors identified through literature review were also incorporated, except for some attributes which could not be scaled (e.g. gender, ethnicity). Ultimately, ten factors were identified. An experimental design approach was followed to determine whether the factors could be quantified to explore older people's challenges with digital financial services. Hence, the intention to develop a theoretical tool that would be beneficial for intermediaries and other relevant stakeholders to determine the factors that could contribute to older people's challenges in using online financial services emerged. Identifying these barriers could facilitate intermediaries to aid older people in a more efficient way.

The tool encompasses a scale ranging from 0 to 5. A score of 0 means major challenges and a score of 5 represents no challenges surrounding the factor. Due to the varying levels of each factor, consistency was maintained using a six-point scale. A scale would enable individuals to quickly explore the challenges experienced by the older individual. After analysing the qualitative data (e.g. interview transcripts and personas), individual judgement and perceptions have to be utilised to produce a meaningful score for each factor as this is a

subjective tool. Inaccurate scores could be produced if an individual could not interpret the tool or the qualitative data adequately.

When compared with an idealised, objective measurement scale (e.g. a survey using fixed criteria or numerical scores to produce reliable quantifiable data), this tool relies on human interpretations and reasoning which would have an impact on the process of generating a score for each factor. An objective version of the current tool could have qualitative data (e.g. interview excerpts) for each factor which do not require human judgement and perceptions to generate a score; this could produce consistent and unbiased results. Also, a scale which has the same response options for each score on each factor (e.g. 0 -> strongly disagree, 1-> disagree.... 5 -> strongly agree) could produce more reliable data. Such objective tools could be easily validated through reliability tests.

In the developed subjective tool, individuals interpret qualitative data (e.g. interview transcripts or personas) in diverse ways and different perceptions could produce varying scores for each factor. As well as this, factors could be interpreted inaccurately that could have a negative impact on the scores. Even if the tool is tested with many individuals, each populated table for each older individual could show different scores due to the subjective nature of the tool. People who work closely with the older people who are being assessed through the tool could generate meaningful scores as they are more familiar with the challenges experienced by older people. Although this research produced quantified factors using qualitative data, the tool could not be applied to the wider population without further validation. Nevertheless, the testing with four researchers confirmed the fact that qualitative data could be utilised to gauge the factors that could negatively or positively influence older people's use of digital financial services.

5.8 Summary

The third research question in chapter 1 was addressed through the development of the theoretical tool:

How to assess the factors that contribute to the challenges encountered by older people?

The factors derived from the personas and literature review led to the development of the theoretical tool. The factors incorporated in the theoretical tool were acquired from the personas to determine whether the identified factors can be gauged to understand older people's issues with online financial services. Hence, this is an experimental design. The tool incorporates ten factors with a scale ranging from 0 to 5 that could be leveraged to provide a quantifiable understanding of the negative or positive factors that influence older people's access to online financial services.

Regardless of ethnicity, this theoretical tool can be used for any older individual. The main aim of this tool is to permit service providers to map any persona or interview transcript to the tool to measure the issues that older people encounter in the use of online financial services. This would allow stakeholders to recognise the gaps which hinder older people from accessing such services and produce interventions such as policies or strategies which could prevent the barriers from escalating. Moreover, quantified factors would assist stakeholders in determining whether a solution is necessary for the individual. If a solution is required, they could choose the optimal solutions by reviewing the scores for the factors.

In addition to showing the levels of difficulties that people face, the populated tables would provide an idea of how similar or diverse are people's levels of challenges depending on their various personal circumstances. Also, the scores would assist in recognising the areas that should be prioritised prior to developing the interventions. Furthermore, it would show which barriers are common across the board and which barriers are particularly applicable or relevant for certain types of population.

Not only would this tool foster older people to access online financial services but also the intermediaries who aid older people with such services can use this tool to identify the common patterns, for example, common challenges faced by specific ethnic minority groups and most/least common obstacles experienced by older people in an organisation. Identifying such patterns would aid in developing more meaningful inclusive interventions by targeting specific groups. Although this theoretical tool was created using the data related to online financial services, similar tools could be developed for other areas by gathering relevant qualitative data, for example, older people's use of social media.

Older people aged 65 and over approach libraries and organisations to receive assistance with digital services. Hence, utilising this tool at various organisations could produce a set of data that would determine the common challenges faced by older people in the community. This data could be utilised to create diverse solutions that would assist in decreasing the barriers; thereby, mitigating digital exclusion.

Exploiting this novel tool would create a tangible impact by addressing the issues experienced by older people. Thereby, further development can emerge in various areas, for example, technological development, digital literacy and financial literacy skills development and formal/informal support development. As more people begin to utilise this tool, the challenges faced by older people aged 65 and over would be recognised and the creation of beneficial interventions would motivate people to utilise digital financial services.

CHAPTER 6

Conclusion

Findings from this Scotland-based study illustrated that older people (those aged 65 and over) from diverse ethnic backgrounds who reside in urban areas encounter challenges that could deter them from accessing online financial services. Although the barriers were explored, several limitations of this study (e.g. generalisability issues, a small sample of interview participants and personas) were identified, which are discussed further later.

This final chapter intends to summarise the whole research by referring to the aims and research questions and describing the key findings, contributions and elucidations on the limitations of this research. Also, providing recommendations on how certain areas of the study could be taken forward for future work. One of the aims of this chapter is to address research question four: how do the contributions of this study lead to new interventions that could address the challenges faced by older people. This is answered in sections 6.3 and 6.5 of this chapter.

6.1 Revisiting the Research Objectives and Research Questions

As discussed in section 1.2, the aims of this study were:

- To focus on older people's (those aged 65 and over) interactions with online financial services and explore the barriers faced by them in accessing such services, including older people whose first language is not English and those from ethnic minority groups. In order to achieve this objective, semi-structured interviews were chosen as the most suitable data collection instrument to collate data from older people and intermediaries. This resulted in identifying the key challenges experienced by older people from diverse ethnic minority groups.
- The findings facilitated the validation of another objective of this study which was to provide a theoretical contribution to knowledge by enhancing our understanding of the key challenges encountered by older people. Not only would the findings increase our insights into the general barriers which could impede older people who are aged

65 and over from accessing digital financial services but also the challenges faced by those from ethnic minority groups as this has not been addressed in previous studies (research questions 1 and 2).

- Another aim was to create a pathway to assist in developing inclusive interventions which could generate a positive impact in the society. This was achieved by the contributions of this research – the visual representation of the factors, key findings from the interviews, the updated version of the categorised representation of the factors and the theoretical tool would facilitate service providers in developing potential solutions, thereby, promoting digital inclusion. Meaningful interventions would lead to the decline of hidden costs linked to older people and intermediaries (Thomas et al., 2024). Thus, older people could save their time, money and effort by not travelling to the banks and shops and utilise it for personal activities and this would enhance social sustainability i.e. individuals such as older people and digital carers would have a better quality of life through the interventions.

The theoretical tool could assist in identifying the factors that could positively or negatively influence older people's access to digital financial services (research question 3). Hence, stakeholders such as the government and organisations, including intermediaries could deploy the populated tables to modify or produce new online financial services/products that could aid older people to utilise online financial services in everyday contexts. This could help reduce digital exclusion, increase digital literacy and financial literacy skills to a great extent. The contributions of this study would lead to the development of diverse interventions such as digital solutions, task-oriented solutions and recommendations (research question 4) as the data clearly demonstrated that older people aged 65 and over encounter several challenges that further promote the digital divide.

6.2 Key Findings

The main challenges experienced by older people from ethnic minority groups were described in chapter 4. Thematic analysis led to the identification of various themes and codes which assisted in answering the two research questions. One of the key challenges encountered by the majority of the older people was fear. Fear hinders older people from using the internet

(Hill et al., 2015). This, in turn, affects their use and adoption of digital financial services. Interview data shows that different forms of fear prevent older people from utilising digital financial services such as fear of financial scams and fear of making mistakes. Some older people have a fear of losing their hard-earned money through online; therefore, they prefer conventional methods.

Pertaining to specific ethnic minority groups, unique findings were identified, for example, older people from 'Chinese, Chinese Scottish and Chinese British' ethnic minority group had language difficulties which can impede them from using online financial services. Although language has been identified as an issue for people whose first language is not English (Harvey and Brazier, 2022), linguistic challenges faced by older people from Chinese community in the context of digital financial services have not been established in prior studies. Due to the language barrier and fear, they rely on others to conduct online tasks. Most of the interviewed participants required digital support from digital carers or the employees at *Wing Hong* to carry out the activities on online financial services. Also, they approached the *Bank of China* to carry out banking activities as they could easily communicate with the staff using their mother tongue. They preferred to engage with employees when they wanted to clarify any doubts regarding banking tasks. However, hidden costs are associated with such in-person interactions. These hidden costs are novel findings in the area of digital financial services. Digital carers who support older people with such services spend many hours carrying out the tasks free of charge; they face challenges while helping them, for example, they lose patience and become frustrated (Thomas et al., 2024). Similar challenges are experienced by the employees as well. Older people spend their money and time on traveling to different locations to conduct basic online financial-related activities (Thomas et al., 2025b). Such hidden costs have not been addressed in previous research.

Furthermore, minor cultural traits were established through the interviews with older women. Men in South Asian households control domestic finance including women's income and most of the women are not involved in making any decisions regarding their earnings (Chowbey, 2017). This finding was partially corroborated through this study. Interviewed women from the Indian and Pakistani communities showed subtle traits of men handling the finances in the household and this can influence women's use of online financial services.

Traditionally many South Asian women provide care for their families after marriage; therefore, they may not take the initiative to manage domestic finance and learn online financial services. Education could also play a role in influencing women to access such services – this was confirmed by participant DC3 (digital carer); some Indian women may not grasp the language due to lack of education. After migrating to the UK, they focus on their families instead of transitioning to the technological realm. However, the Indian women who were interviewed had higher levels of education but they preferred their family members to deal with finances including online financial services. An employee also stated that many older men from ethnic minority groups control the finances in their households either through online or face-to-face interactions. This is a new finding regarding older married men and women. Older women from ethnic minority groups look after their families while older men (husbands) deal with financial related activities even if they lack digital skills to utilise online financial services.

Another unique finding recognised through this research was that older people who live in multigenerational households receive a significant amount of support from family members with digital financial services, they do not have to access online services as they are fully relying on digital carers to carry out the tasks on behalf of them. Although these older people do not utilise such services, not acquiring the intention to adopt and use digital financial services indicates that they do not possess the digital skills required to carry out online activities by themselves. Support received from a multigenerational household would hinder older people from accessing online financial services and this has been established through this research.

Other novel findings were also discovered through interviews such as isolation, humiliation, frustration and hesitance. All these findings were discussed in chapter 4 and were shown on the updated version of the visual representation of the factors in section 4.4, Figure 4.11. Such factors have not been explicitly discussed in other studies; therefore, this study adds new knowledge regarding older people's challenges in the use of online financial services.

In conjunction with these findings, interconnections were also identified through the interviews with older people and intermediaries. Connections between factors were

recognised through thematic analysis and were discovered through the codes that emerged from each participant group. Diverse connections were established, for example, fear and previous financial scams, fear and confidence, lack of digital skills and lack of experience or knowledge – these were explained in chapter 4. One of the interesting findings was determined through the connection between ‘education’ and ‘household’ - older people with higher educational qualifications who live alone did not receive formal or informal support to carry out the online financial services. They had the skills to conduct online activities by themselves and they also knew how to seek solutions when faced with issues related to online financial services. Such relationships between factors have not been discussed in previous qualitative studies in the context of digital financial services.

In addition to the interview findings, the populated tables from the theoretical tool generated several unique findings, for instance, older people who received a score of 0 for fear and confidence had lower scores for the ‘support’ factor i.e. they received digital support from others due to barriers regarding fear and confidence. Also, people who received a score of 0 for the ‘financial literacy’ factor had lower basic digital skills. Hence, they received formal or informal support. These findings indicate that the interplay between the factors creates many barriers which could prevent older people from accessing digital financial services.

6.3 Contributions

The four main contributions of this study are:

1. A visual representation of the identified factors
2. Barriers faced by different groups of older people
3. An updated version of the categorised representation of the factors
4. Theoretical tool

Not only would this research contribute to theoretical knowledge by enhancing our understanding of the challenges faced by older people aged 65 and over but the contributions of this study would also lead to new interventions that could increase digital literacy skills and decrease digital exclusion (research question 4).

The visual representation of the identified factors (Figure 2.1) would allow an individual to comprehend the factors that could act as barriers or facilitators in relation to digital financial services. The four main categorised areas (human, technology, society and institutions that provide online financial services) in Figure 2.1 demonstrate that the factors which are closely associated with online financial services could be clustered. Due to limited studies on those aged 65 and over, papers related to older people's internet use, internet banking and other online services were utilised to determine the factors that could influence them in the adoption and use of online financial services collectively. Following the identification of the factors through literature review, Figure 2.1 was created. This is a key contribution as it provides an in-depth knowledge of the areas which could facilitate or prevent older people from accessing digital financial services. As new factors are established through studies in the future, further factors could be included in the diagram. This figure could be utilised by service providers to recognise the areas which have to be taken into consideration before developing online products or services as this promotes the creation of inclusive interventions.

Additionally, data from semi-structured interviews provided unique findings regarding ethnic minority groups which have not been disclosed in previous studies. Online financial services have not been investigated as a whole; previous researchers focused on one specific digital financial service, for example, online banking or online shopping. Therefore, the interview data obtained through this study contributes to knowledge by highlighting the challenges faced by vulnerable people with online financial services, especially older people from ethnic minority groups. The first two research questions were addressed through the interview findings. Thus, the existing research gaps were bridged. Not only older people's challenges but intermediaries' challenges were also discovered through the interviews which demonstrated that older people's lack of digital financial services use has an impact on other people in the society. These findings would provide stakeholders, specifically financial service providers some deeper insights regarding older people's use of digital financial services and this could stimulate the creation of new products/services or amendments to the existing online financial services, for example, adding text along with the icons.

Following the interviews with older people and intermediaries, data from the interviews were mapped onto the visual representation of the factors (Figure 2.1). One of the key

contributions of this study is the updated version of the categorised representation of the factors (Figure 4.11). This is novel in the area of online financial services. Figure 4.11 illustrates the new factors established through this study: the identified factors which were validated through the interviews and several undiscovered factors i.e. factors which were recognised in other studies but not in this research. Figure 4.11 portrays various factors that are facilitators or barriers in older people's use of online financial services, for example, lack of confidence is an obstacle while higher educational qualifications could be considered as a facilitator. In the future, the connections between the factors could be determined as this could be one of the approaches for developing interventions which would reduce the grey digital divide. Also, as part of future research, the interaction between previously identified factors and the new factors could be explored and utilised to determine how the interconnections affect older people's overall user efficacy in accessing digital financial services. As well as this, further research could be undertaken to examine which factors pose implications for specific groups of the population, for example, older people from ethnic minority groups and older women etc. Financial service providers could easily utilise Figure 4.11 to acknowledge the clustered factors in the four key areas that may create barriers for older people when accessing digital financial services and this would facilitate the design and development process of an inclusive product or service.

Although the context-specific visual representation of the factors aids the public in advancing their knowledge regarding older people's use of digital financial services, it does not demonstrate which factors negatively or positively contribute to older people's use of such services. However, this could be achieved through the use of the theoretical tool. The tool developed from the personas subsequent to phase 1 of interviews would permit intermediaries and other stakeholders to quantify the factors that may contribute to the challenges encountered by older people. The broad factors recognised through the personas and literature review led to the creation of the tool. Gauging the factors using the scale ranging from 0 to 5 would facilitate stakeholders in recognising the factors which may negatively or positively influence older people in the use of online financial services.

The theoretical tool is one of the major contributions of this study as it could be deployed to generate various forms of data that would assist in developing potential interventions. For

example, organisations such as *Wing Hong* and *Glasgow's Golden Generation* could populate the tables for older people to recognise the barriers that are common across the board regardless of ethnicity and gender or the scores could be used to identify prevalent barriers within a specific ethnic minority group. Also, differentiated challenges faced by diverse groups of population could emerge through the populated tables. Identification of such patterns would assist intermediaries to comprehend the type of solutions required for an older person or a specific group within the community. This study had a limited number of interview participants from ethnic minority groups. Further interviews would generate more populated tables which could assist in identifying various patterns that can be utilised to profile different groups. This, in turn, paves the way for stakeholders to implement interventions for specific groups of older people.

Furthermore, as mentioned in section 5.5, cumulative scores would assist in determining the type of solution(s) required for an individual by setting a threshold, for instance, anyone who receives a score above 25 could begin with the 'intermediate' level of the developed solution and could progressively shift to higher levels. Similarly, anyone who has a relatively higher cumulative score could be provided with difficult tasks related to online financial services. Cumulative scores could be easily utilised by stakeholders to differentiate older people within a specific community. Also, the varying ranges of scores would lead to creating various potential solutions for many cohorts of older people aged 65 and over. Further support could be provided by intermediaries to those who attain lower scores.

Additionally, the scores obtained for the six indicators -- support, fear, confidence, formal education, technology experience in occupation and disabilities -- could be used to determine the most suitable solution(s) required for an individual's challenges surrounding the four main factors (basic digital skills, access to equipment/connection, language and financial literacy). Intermediaries could develop customised or personalised interventions for people with similar scores in each of the four main factors. Utilising these solutions would enable many older people to overcome the challenges simultaneously.

The aforementioned ways of developing the solutions are only feasible if the tool generates accurate scores i.e. fictitious data cannot be utilised to explore the impediments experienced

by older people in the use of online financial services. Qualitative data would assist in quantifying the factors and identifying the real barriers. Thus, providing a basis for creating ideal solutions that would reduce digital exclusion and increase older people's digital literacy skills to some extent.

All the contributions of this research demonstrated that there are several challenges that older people, including those from ethnic minority groups encounter in the use of online financial services. Each contribution was developed using the data acquired from previous stages; therefore, they are interconnected in one way or another. Data from this study would provide assistance to organisations, the government and future researchers to design solutions which would address the identified challenges.

This study took the approach to focus on the theoretical aspect instead of developing concrete solutions (e.g. digital tools) and this provides key contributions to knowledge. Furthermore, the research findings would be advantageous to researchers who focus on HCI as the identified challenges could be utilised to carry out further studies with older people. Since people utilise online services such as online banking and online shopping to seek information in everyday contexts, this research also contributes to everyday life information seeking (ELIS) (Savolainen and Thomson, 2022, Savolainen, 2023). Savolainen and Thomson (2022) introduced an updated model of ELIS which could be utilised to comprehend how people interact with information in their day-to-day lives. It predominantly focuses on the social and cultural factors. The main components of the model are information seeking, information use, information sharing and information creating. This study showed that older people may not seek and use information from digital financial services due to several challenges such as cultural traits and significant support rendered from digital carers/organisations. Since the ELIS model and the data from this research could be used simultaneously to understand the importance of information practices when creating new products/services for older people, this study provides new insights into the information science field.

6.4 Limitations

A range of limitations affected this research which had an impact on the data collated from participants, for instance, there were complexities in identifying older people aged 65 and over for the semi-structured interviews. The recruitment process commenced following the Covid-19 lockdown. This prevented several organisations from taking the initiative to provide assistance to this study as they were engaged in offering support to the elderly population who were isolated during the lockdown. Due to this issue, an equal number of participants could not be recruited for each participant group. Arguably, if more interviews were conducted with older people from ethnic minority groups, further barriers could have been established through thematic analysis. Also, more populated tables could have been generated through the theoretical tool which could have demonstrated diverse and prevalent challenges encountered by different groups of older people.

Due to a lack of participants, gender was not considered as a major attribute and therefore, gender disparities were not significantly identified. Nevertheless, the intermediaries who are employees briefly mentioned regarding gender issues – this was mentioned in sections 4.1.3.1. and 4.4. In addition to this, major complexities faced by older women from ethnic minority groups were not recognised. If more interviews were carried out, gender inequalities and cultural traits among ethnic minority groups could have been explored. In addition to this, more intermediaries could be interviewed to gather narratives and insightful data which would help in creating more personas.

Also, the small number of personas containing factual information were created from second-hand accounts (interviews with intermediaries) instead of direct engagement with older people aged 65 and over. Intermediaries may not fully share older people's challenges and perspectives on online financial services and this reduces the validity of the personas. Although these personas were produced with the intention of including and retaining the real information of older people obtained from the interviews with intermediaries, more appropriate and effective personas could be produced through interviews with end users. Additionally, some of the personas (personas 4, 5 and 6 in Appendix D) are based on demographic groups (ethnic group: 'African, African Scottish or African British') that were not represented in the interviews. This would not reveal all the issues experienced by a specific

cohort and this is a generalisability issue as the information shown in the personas could not be applied to a wider group of population. A high number of personas are required to comprehend the specific challenges surrounding a particular group's issues such as gender, ethnicity and digital skills. As well as this, the empathic accuracy of the personas is low as intermediaries cannot convey end users' emotions, feelings and personal opinions in the context of online financial services.

Furthermore, this research did not receive the opportunity to interview employees at libraries to determine the support provided to older people regarding online financial services. Although libraries were approached for interviews, positive responses were not acquired. Some libraries dealt with vulnerable people, for example, older people with dementia; therefore, library staff were reluctant to take part in the study. Due to this, digital carers and non-profit organisations were approached to gather relevant data. Older people whose first language is not English receive significant support from specific ethnic minority organisations as they can easily communicate with others who speak the same language. If these older people reach out to libraries, they may not receive language support and may struggle to comprehend the instructions and processes explained by the employees. Thus, more importance was given to organisations in order to recruit the target population.

Additionally, not all the stakeholders were directly involved in the study, for example, government committees and financial service providers/organisations. Incorporating such stakeholders could produce data related to older people's use of digital financial services and their perspectives on how this research could impact them would be established. However, due to time constraints and the complexities in recruiting older people, qualitative data from the relevant stakeholders could not be obtained. Thus, this could be taken forward as part of future work. If banks and institutions are willing to share the data related to older people's challenges then this could be combined with the findings of this study to produce more context-specific data. Also, due to the absence of engagement with financial service organisations, their perspectives on the recommendations for future work cannot be explored. Only end users and intermediaries (digital carers and employees) were involved to carry out this study to understand the barriers experienced by older people. Thus, the recommendations mentioned in section 6.5 were developed from the researcher's

knowledge on the topic and the insights obtained from the interactions with interview participants. Input from financial service experts would have resulted in deriving suggestions for potential solutions that could aid older people in accessing digital services. Also, as part of further research, interviews with financial sector professionals could be carried out to gain valuable feedback on the theoretical tool as this would lead to the development of potential solutions through co-designing (e.g. creation of chatbots for older people).

In terms of the developed theoretical tool, an inclusive solution could not be created for each factor which would satisfy each person's requirements i.e. each person has their own challenges due to personal life situations. The tool assists in creating ideas for developing interventions which would decrease digital exclusion to some extent. Even though the tool included several factors that could contribute to the challenges faced by older people, some scale options had to be merged due to the use of a six-point scale in the tool, for example, the scale descriptions for the 'formal education' factor show that a score of 2 represents secondary education/college. As part of future work, this could be separated into different scale options depending on the scale point used throughout the tool.

The tool was tested using personas and older people's interview transcripts. In order to validate the tool, more interviews with older people, including those from ethnic minority groups are required to ensure that this tool could be fully utilised by diverse cohorts of older people. Many populated tables would aid stakeholders to explicitly understand the key factors that contribute to the challenges faced by older people. The tool was also tested with four fellow researchers to reduce subjectivity-related issues. Six personas were provided to each researcher to generate scores for the factors, resulting in 24 populated tables. This data was utilised to calculate the Krippendorff alpha values to evaluate the inter-rater agreement among the researchers. Due to the small sample size of personas, the generated alpha values are not fully reliable. Hence, increasing the sample size could produce more stable Krippendorff alpha values, thereby determining the reliability of the developed theoretical tool.

Also, the interview findings produced from a small number of participants led to the identification of a limited number of novel factors. More interviews would produce more data

that could be utilised to map the findings onto Figure 4.11 (updated version of Figure 2.1), resulting in comprehensive findings for the four main areas -- human, technology, society and institutions that provide online financial services.

Another limitation is the absence of documenting data saturation. Initially, the plan was to include an equal number of male and female participants for each ethnic group. However, this was not feasible due to the limited number of interview participants. Although new themes and codes emerged from the interview data, further interviews are required to verify the findings. Data collection was stopped following three or more interviews with each ethnic group as there were difficulties in recruiting older people from specific ethnic groups. Due to the involvement of various ethnic groups, a larger sample size is required to record data saturation (i.e. until no new data is being produced from the interviews).

Although there were several limitations, this study received data from 22 semi-structured interviews which helped in identifying the major challenges faced by older people in accessing digital financial services. This data led to the creation of other contributions which could be used by the stakeholders as an initial foundation to develop potential interventions for the vulnerable people.

6.4.1 Generalisability limitations

Since the participants in this study were recruited from urban areas in one Scottish city, which is also the largest one in Scotland, the findings may not be generalisable to the broader population. For instance, older people aged 65 and over who reside in rural areas may experience different challenges compared to those in urban areas. Many bank branches and shops are situated in urban areas and older people could access it easily whereas those residing in rural areas may have a longer distance between their homes and a nearby branch. Furthermore, findings from this study showed that older people from ethnic groups in urban areas have more opportunities to access and engage with organisations to learn and adopt digital services. This is beneficial for those with linguistic challenges as they could receive language support from intermediaries of specific ethnic cohorts. Older people in rural areas may not have the resources to learn and obtain digital support and this could be a major barrier for those with language issues.

Older people who reside in other geographic locations may face different challenges compared to those identified in this study. For example, older people from ethnic minority groups who reside in England may face issues that were not identified from the participants in Scotland. Certain regions may have higher populations of specific ethnic groups which could lead to a larger sample size of interviews, resulting in novel datasets. This study was conducted with intermediaries and older people from ethnic groups in a Scotland-based urban area. Thus, the findings could only be applied to similar settings and environments.

This study also included a small interview sample size; therefore, concrete claims cannot be made using the obtained findings – these can only be considered as preliminary insights. Also, this has an impact on intersectionality, for example, women from ethnic minority groups may have less control over their finances, which cannot be completely proved through the small number of interviews conducted in this research. More interviews are required to determine whether the interrelation between gender and ethnicity plays a role in influencing older people's access to online financial services. Furthermore, the data procured through the thematic analysis cannot be generalised to the wider population as some themes/codes were substantiated by a quote from only a single participant. Thus, more evidence is required through a large number of interview participants to confirm the findings on ethnic groups. Further research would assist in validating the insights gained from this study.

6.5 Recommendations

This section describes how the findings of this study would lead to future areas of research which would result in creating inclusive interventions that address the obstacles faced by older people.

6.5.1 Disabilities

Through the interview findings, it was evident that older people who had disabilities had major issues in accessing the internet. This study did not concentrate on people with disabilities as this is a broad area which requires medical professionals to comprehend the key issues faced by older people with disabilities in the use of online financial services. People

with visual impairment and those with mobility issues require assistive technologies such as text-to-speech software and screen reader. Not having inclusive designs is already an existing issue faced by visually impaired older people (Okonji et al., 2015). In order to incorporate assistive features in digital financial services, input from financial service providers, medical practitioners and disabled people are essential. Developing solutions by engaging with many stakeholders would result in a positive impact that is beneficial for the marginalised people.

6.5.2 Hidden Costs

Hidden costs associated with online financial services were determined through this research (Thomas et al., 2024) and this is an area for future studies. Intermediaries and older people are affected by costs such as effort, time and money. Research carried out on these costs would determine various disadvantages of not utilising online financial services and the impact of facing such hidden costs in everyday lives would be revealed. Also, new hidden costs could be explored through future work.

Section 4.1.3.3 briefly discussed intermediaries' challenges and hidden costs that were recognised through the interviews with 4 employees and 3 digital carers. Digital carers spend a significant amount of their time aiding older family members with digital financial services. This study has not investigated the hidden costs surrounding South Asian digital carers; Asian children who reside with parents provide digital support. When a child moves out, the younger sibling would take over to offer assistance to their parents. In order to confirm this, more interviews with digital carers from ethnic minority groups are required.

More interviews with intermediaries would assist in identifying more hidden costs and the challenges they face while helping older people. Since this study established several costs linked to the participant groups, the impact of older people not leveraging digital financial services was determined to some extent. This data could be used by stakeholders to design solutions which would minimise the direct and indirect costs faced by older people and those who assist them with online services.

6.5.3 Task-related Complexities

As outlined in section 5.3.10, older people have complexities in carrying out certain tasks on specific digital financial services, for example, difficulties in removing the items from the online shopping basket and not knowing how to create a memorable password using special characters. Task-related complexities hinder older people from conducting the activities on online financial services; therefore, a further study is essential to recognise the specific tasks where older people may face challenges. Data from such studies would reveal the varying levels of task-related impediments that could be used to prioritise online financial services which require immediate amendments. Also, a plethora of barriers regarding specific tasks would be explored, for example, interface issues – small text, lack of instructions, icons without text etc. Identifying obstacles on specific tasks would facilitate financial service providers to modify and create inclusive interfaces.

6.5.4 Co-designing

Since this study identified several challenges regarding interfaces, the design of a digital tool could be developed through co-designing. Involving many stakeholders in the co-designing phase would be more impactful as this would generate more comprehensive design ideas. The creation of a website showing step-by-step instructions and demos could support older people with online financial services. Such ideas could be demonstrated through a low-fidelity prototype to engage with older people during co-designing sessions. Paper-based low-fidelity prototypes would be more useful for older people who lack the digital skills to use technological devices. Older people's input in such studies would assist in creating functionalities that are beneficial for them in accessing digital financial services.

Furthermore, high-fidelity prototypes created using software such as Figma could be utilised to show designs to financial service providers and older people who have basic digital skills. Co-designing using these prototypes would provide a detailed visual design of the digital solution. Interactive elements such as buttons and links would allow stakeholders to have a clear idea of the final product or service.

Not only digital tools but various solutions could be co-designed and developed by using the data from this study, for example, people-oriented solutions: customised training sessions

focussing on older people who received lower scores on the theoretical tool. Also, task-oriented solutions: step-by-step instructions showing how to transfer money to a new payee. Co-designing is an effective method to utilise the contributions of this study to produce prototypes of several interventions.

6.5.5 Interfaces

Diverse issues related to interfaces were determined through the interviews with the participant groups (see sections 4.1.4.2, 4.1.4.3, 4.1.4.4), for instance, complexities in understanding icons like love heart on online shopping websites, multiple drop-down menus on Amazon website and complications in using such portals on phone due to the scrolling required to view the content. Older people who are not familiar with these interfaces have difficulties in using the online financial services. One of the reasons for the existence of digital exclusion is non-inclusive online products/services. Inclusive interfaces are required to encourage older people to utilise online financial services. In order to develop such portals, vulnerable people have to be involved in the design and development stages of digital services. A satisfying experience would be acquired through well-designed websites; this would enable users to return to the interface to repeat the processes (Pi et al., 2012). Web developers have to follow the Web Content Accessibility Guidelines (WCAG) (W3C, 2024) to ensure that the online financial products/services are designed for marginalised people, including those with disabilities. Since this is a broad area, input from intermediaries and digital carers as well as web developers are required to make major modifications to portals by acknowledging the challenges identified through this study.

6.5.6 Artificial Intelligence

The proliferation of AI (Artificial Intelligence) is expanding the technological world in many ways. Hence, the data from this research could be used in the future to develop AI solutions, for example, chatbots can be trained to assist older people in accessing digital financial services. It can also be trained using the populated tables of the theoretical tool. The scores obtained from the tool would enable the program to comprehend the challenges faced by the individuals and generate ideal solutions for them. This would be a major intervention which would aid older people and intermediaries.

Furthermore, an older person who has the basic digital skills to utilise the internet could directly interact with conversational AI systems to receive support on online financial services. Such AI assistants would be useful for those who experience isolation as these computer programs replicate human conversations. This means that several human-related challenges could be minimised, for example, isolation, fear, confidence and language difficulties. Older people from ethnic minority groups can use the chatbots to translate the instructions into their first language and the text-to-speech feature could be utilised by those who may have difficulties with reading. Utilising such AI agents could increase older people's confidence and decrease their fear of digital financial services as they are constantly receiving reassurance through human-like interactions.

6.5.7 Everyday Life Information Seeking (ELIS)

Although section 6.3 briefly discussed how this study contributes ELIS, there is a future area of research on ELIS model (Savolainen and Thomson, 2022). The model only illustrates how information seeking is influenced by social and cultural factors. This study showed that human psychological factors such as fear and confidence could contribute to the challenges faced by older people in accessing online financial services. Therefore, incorporating the psychological or emotional factors into the model could add new knowledge to ELIS. Also, this could assist in enhancing our knowledge of the information practices and information behaviour of older people in the context of digital financial services. Updating the model to show how emotional factors could affect information seeking would aid financial service providers to understand many of the diverse factors that need to be considered when developing inclusive interventions for older people.

6.5.8 Unified Theory of Acceptance and Use of Technology (UTAUT2)

UTAUT2 model was created to explore people's technology acceptance i.e. why they use or not use technologies (Venkatesh et al., 2012). This model is comprised of several constructs such as performance expectancy, effort expectancy and social influence, that are utilised to design a survey questionnaire to gather quantitative data. Each construct is gauged using a Likert-scale. Although this study gathered data through interviews to identify older people's challenges, further data could be collected through questionnaires which could be leveraged to recognise the factors that influence older people's intention to access online financial

services. Also, findings on the correlations between the factors would add new knowledge regarding the challenges faced by older people. Statistics would assist stakeholders in having a clear idea of the key challenges that need to be addressed through potential solutions.

Further constructs could be included in the UTAUT2 model using the data obtained from this study. For example, fear could be incorporated as this was one of the common challenges identified through interviews. Additional interviews or other research methods would be required prior to adding new constructs to the model to ensure that the factors are majorly influencing people's use of digital financial services. This would produce more accurate statistics that would result in meaningful data for future interventions.

6.5.9 Practical Implications and Recommendations for Stakeholders

There are many ways in which the theoretical tool could be applied in practice by various stakeholders, for example:

- **UX designers:** they could utilise the tool as a checklist during the design process of a new banking app for accessibility barriers e.g. the statistics/scores generated for the 'disabilities' factor could be used to determine whether diverse assistive features are required for those with disabilities. When developing such features, the scores obtained for 'language' would have to be taken into account to create functionalities that would aid older people with linguistic challenges. Also, in order to increase their confidence and reduce their fear, minimal authentication steps and user-friendly interface could aid them to adopt and learn the app without significant informal or formal support. Thereby, reinforcing their digital literacy and financial literacy skills. Designers could use this tool during meetings with fellow co-workers to ensure that they are addressing the factors shown in the tool when designing an inclusive app.
- **Policymakers:** once a verification process involving two-factor authentication on online banking has been developed, the major barriers identified through the populated tables could be used to determine whether the digital verification feature included inclusive functionalities. For instance, if a particular ethnic group has significant linguistic issues, the option to change the language to a desired one should

be incorporated as this vastly reduces digital exclusion. As well as this, the developed feature should be tested with various end users such as ethnic groups, people with disabilities, people who possess a lower degree of financial literacy skills and those with low level digital skills to confirm inclusivity prior to making the product publicly available. People with a low level of digital skills may face particular task-related complexities, for example, having confusions with various authentication/verification steps on digital banking. Hence, financial regulators have to carry out this testing process to ensure that the proposed features would address the challenges faced by a specific cohort.

- Intermediaries – employees at an organisation can generate a table with scores for each individual to comprehend the challenges faced by a specific group. For example, older people with lower digital skills may encounter other issues which prevent them from accessing digital financial services. They may face language issues which hinder them from increasing their confidence to learn technology. In such cases, intermediaries could provide specific training to improve their digital literacy skills with the assistance of an interpreter. Furthermore, a digital carer could apply this tool while helping their parents to explore their key issues in accessing a specific digital financial service (e.g. a high level of fear due to not being able to carry out the online transaction). The digital carer can help the individual to reduce their fear by examining the lower scores obtained for other factors.
- Researchers – research could be carried out with a group of older people in an urban area and utilise the tool to examine confidence and fear barriers. The generated scores could be used to understand older people's challenges surrounding these two factors and compare the findings with the scores obtained from various geographic locations. This could assist in producing new interventions for reducing digital exclusion.

6.6 Summary

This chapter discussed how the research questions and the aims of the study were achieved and provided recommendations on future areas of research. Most importantly, explanations

of how the contributions of the study could lead to new interventions that would address the barriers faced by older people were highlighted.

Since online financial services were not explored collectively in previous studies, this research adds new knowledge regarding older people's difficulties with several financial services. Also, this study produced some key contributions which provide insights into the factors that could contribute to the challenges experienced by older people in accessing digital financial services. The contributions can produce many interventions which would decrease the grey digital divide, increase older people's digital literacy skills and enrich their lifestyles.

References

- ABBAS PANJWANI, L. B. 2025. *Access to cash and banking services* [Online]. Available: <https://commonslibrary.parliament.uk/research-briefings/cbp-9453/> [Accessed 10 May 2025].
- ADEOYE-OLATUNDE, O. A. & OLENIK, N. L. 2021. Research and scholarly methods: Semi-structured interviews. *Journal of the american college of clinical pharmacy*, 4, 1358-1367.
- AGE UK. 2016a. *Age-friendly banking* [Online]. Available: https://www.ageuk.org.uk/globalassets/age-uk/documents/reports-and-publications/reports-and-briefings/money-matters/rb_april16_age_friendly_banking.pdf [Accessed 14 November 2021].
- AGE UK. 2016b. *Scamming and its effect on vulnerable individuals* [Online]. Available: www.ageuk.org.uk/siteassets/documents/reports-and-publications/reports-and-briefings/safe-at-home/age_uk_briefing_fraud_and_scams_sept_2016.pdf [Accessed 7 May 2025].
- AGE UK. 2019. *Later Life in the United Kingdom 2019* [Online]. Available: https://www.ageuk.org.uk/globalassets/age-uk/documents/reports-and-publications/late_life_uk_factsheet.pdf [Accessed 15 December 2021].
- AGE UK. 2021a. *Age UK behind the headlines. Short-changed: How the decline of cash is affecting older people* [Online]. Available: https://www.ageuk.org.uk/siteassets/documents/reports-and-publications/reports-and-briefings/money-matters/behind_the_headlines_shortchanged.pdf [Accessed 7 January 2026].
- AGE UK. 2021b. *IT Training* [Online]. Available: <https://www.ageuk.org.uk/services/in-your-area/it-training/> [Accessed 14 November 2021].
- AGE UK. 2022. *Ageing and older population UK statistics for 2022* [Online]. Available: <https://www.ageukmobility.co.uk/mobility-news/article/ageing-and-older-population-uk-statistics-for-2022> [Accessed 16 December 2023].
- AGE UK. 2023a. *As bank branches continue to close, a new Age UK report reveals that 4 in 10 over 65s with a bank account do not manage their money online* [Online]. Available: <https://www.ageuk.org.uk/latest-press/articles/2023/as-bank-branches-continue-to-close-a-new-age-uk-report-reveals-that-4-in-10-over-65s-with-a-bank-account-do-not-manage-their-money-online/> [Accessed 9 May 2025].
- AGE UK. 2023b. *You can't bank on it anymore* [Online]. Available: www.ageuk.org.uk/siteassets/documents/reports-and-publications/reports-and-briefings/money-matters/the-impact-of-the-rise-of-online-banking-on-older-people-may-2023.pdf [Accessed 7 May 2025].
- AGE UK. 2024a. *Digital Champion Programme 2022-2026* [Online]. Available: <https://www.ageuk.org.uk/our-impact/programmes/digital-skills/digital-champions/> [Accessed 1 April 2024].
- AGE UK. 2024b. *Facts and Figures about digital inclusion and older people* [Online]. Available: <https://auk-cms-web2.ageuk.org.uk/globalassets/age-uk/documents/reports-and-publications/reports-and-briefings/active-communities/internet-use-statistics-june-2024.pdf> [Accessed 8 May 2025].
- AGE UK. 2024c. *More than 1 in 3 over 65s (4.7 million) lack the basic digital skills to use the internet successfully* [Online]. Available: <https://www.ageuk.org.uk/latest-press/articles/2024/more-than-1-in-3-over-65s-4.7-million-lack-the-basic-skills-to-use-the-internet-successfully/> [Accessed 22 April 2025].

- AKGÜL, Y. 2018. Banking Websites in Turkey: an Accessibility, Usability and Security Evaluation. *İşletme Araştırmaları Dergisi*, 10, 782-796.
- ALALWAN, A. A., DWIVEDI, Y. K., RANA, N. P., LAL, B. & WILLIAMS, M. D. 2015. Consumer adoption of Internet banking in Jordan: Examining the role of hedonic motivation, habit, self-efficacy and trust. *Journal of Financial Services Marketing*, 20, 145-157.
- ALDAS-MANZANO, J., LASSALA-NAVARRÉ, C., SANZ-BLAS, S., ALDÁS-MANZANO, J., LASSALA-NAVARRÉ, C., RUIZ-MAFÉ, C. & SANZ-BLAS, S. 2009. Key drivers of internet banking services use. *ONLINE INFORM REV*, 33, 672-695.
- ALEXOPOULOU, S., ÅSTRÖM, J. & KARLSSON, M. 2022. The grey digital divide and welfare state regimes: a comparative study of European countries. *Information Technology & People*, 35, 273-291.
- AMEME, B. 2015. The impact of customer demographic variables on the adoption and use of internet banking in developing economies. *Journal of internet banking and commerce*, 20, 1.
- AN, L., MUÑOZ, D., PEDELL, S. & STERLING, L. Understanding confidence of older adults for embracing mobile technologies. Proceedings of the 34th Australian Conference on Human-Computer Interaction, 2022. 38-50.
- ANGEL, J. L., JIMENEZ, M. A. & ANGEL, R. J. 2007. The economic consequences of widowhood for older minority women. *The Gerontologist*, 47, 224-234.
- ANWAR, S., ALBURAICI, G., IBRAHIMI, A. & QADRI, L. Digital Banking Issues Experienced by Older People. 2024 10th International Conference on Optimization and Applications (ICOA), 2024. IEEE, 1-5.
- ARENAS GAITÁN, J., PERAL PERAL, B. & RAMÓN JERÓNIMO, M. 2015. Elderly and internet banking: An application of UTAUT2.
- ASMI, F. & ISHAYA, T. Understanding the behavior of the elderly towards Internet Banking in the UK. proceeding of the 2nd International Conference on Social Eco-Informatics, October, 2012. 21-26.
- BANDURA, A. 1977. Self-efficacy: toward a unifying theory of behavioral change. *Psychological review*, 84, 191.
- BARCLAYS. 2021a. *Accessibility and Disability* [Online]. Available: <https://www.barclays.co.uk/accessibility/> [Accessed 13 November 2021].
- BARCLAYS. 2021b. *Post Office Banking* [Online]. Available: <https://www.barclays.co.uk/ways-to-bank/post-office-banking/> [Accessed 14 November 2021].
- BARCLAYS. 2025. *Third-party access to bank accounts* [Online]. Available: <https://www.barclays.co.uk/third-party-access/> [Accessed 7 May 2025].
- BASRI, N. A. H. & GANI, N. A. 2023. The Relationship Between Perceived Ease of Use and ICT Adoption among Elderly. *Jurnal Evolusi*, 4.
- BHATTACHARJEE, P., BAKER, S. & WAYCOTT, J. Older adults and their acquisition of digital skills: A review of current research evidence. Proceedings of the 32nd Australian Conference on Human-Computer Interaction, 2020. 437-443.
- BLOMKVIST, S. 2002. Persona—an overview. Retrieved November, 22, 2004.
- BOOTH, L. 2023. *Statistics on access to cash, bank branches and ATMs* [Online]. Available: <https://researchbriefings.files.parliament.uk/documents/CBP-8570/CBP-8570.pdf> [Accessed 29 October 2025].
- BOYLE, P., MITCHELL, O. S., MOTTOLA, G. R. & YU, L. 2025. Declining financial and health literacy among older men and women. *The Journal of the Economics of Ageing*, 30, 100547.

- BRAUN, V. & CLARKE, V. 2006. Using thematic analysis in psychology. *Qualitative research in psychology*, 3, 77-101.
- BRAUN, V. & CLARKE, V. 2013. Successful qualitative research: A practical guide for beginners.
- BRAUN, V. & CLARKE, V. 2019. Reflecting on reflexive thematic analysis. *Qualitative research in sport, exercise and health*, 11, 589-597.
- BUTTON, M., SHEPHERD, D., HAWKINS, C. & TAPLEY, J. 2025. Fear of fraud amongst older adults: a hidden epidemic? *Security Journal*, 38, 1-21.
- CAPUANO, A. & RAMSAY, I. 2011. What causes suboptimal financial behaviour? An exploration of financial literacy, social influences and behavioural economics. *An Exploration of Financial Literacy, Social Influences and Behavioural Economics (March 23, 2011)*. *U of Melbourne Legal Studies Research Paper*.
- CASSELDEN, B. 2023. Not like riding a bike: How public libraries facilitate older people's digital inclusion during the Covid-19 pandemic. *Journal of Librarianship and Information Science*, 55, 704-718.
- CENTRE FOR ECONOMICS AND BUSINESS RESEARCH. 2022. *The economic impact of Digital inclusion in the UK* [Online]. Available: <https://www.goodthingsfoundation.org/policy-and-research/research-and-evidence/research-2024/digital-inclusion-uk-economic-impact> [Accessed 13 August 2023].
- CHAIMAA, B., NAJIB, E. & RACHID, H. 2021. E-banking overview: concepts, challenges and solutions. *Wireless Personal Communications*, 117, 1059-1078.
- CHANG, Y.-N., LIM, Y.-K. & STOLTERMAN, E. Personas: from theory to practices. Proceedings of the 5th Nordic conference on Human-computer interaction: building bridges, 2008. 439-442.
- CHAOUALI, W. & SOUIDEN, N. 2019. The role of cognitive age in explaining mobile banking resistance among elderly people. *Journal of Retailing and Consumer Services*, 50, 342-350.
- CHAPMAN, C. N. & MILHAM, R. P. The personas' new clothes: methodological and practical arguments against a popular method. Proceedings of the human factors and ergonomics society annual meeting, 2006. SAGE Publications Sage CA: Los Angeles, CA, 634-636.
- CHENG, H. How does interaction design affect user experience throughonline shopping interfaces? IOP conference series: Materials science and engineering, 2019. IOP Publishing, 012076.
- CHOUDRIE, J., ZAMANI, E. & OBUEKWE, C. 2022. Bridging the digital divide in ethnic minority older adults: an organisational qualitative study. *Information Systems Frontiers*, 24, 1355-1375.
- CHOWBEY, P. 2017. Women's narratives of economic abuse and financial strategies in Britain and South Asia. *Psychology of Violence*, 7, 459.
- COMPAINE, B. M. 2001. *The digital divide: Facing a crisis or creating a myth?*, Mit Press.
- CONNECTINGSCOTLAND. 2022. *Connecting Scotland - supporting everyone in Scotland to get online* [Online]. Available: <https://connecting.scot> [Accessed 19 May 2022].
- COOPER, A. 2004. The inmates are running the asylum.
- CRENSHAW, K. 2013. Demarginalizing the intersection of race and sex: A black feminist critique of antidiscrimination doctrine, feminist theory and antiracist politics. *Feminist legal theories*. Routledge.
- CURRAN, K., WALTERS, N. & ROBINSON, D. 2007. Investigating the problems faced by older adults and people with disabilities in online environments. *Behaviour & Information Technology*, 26, 447-453.

- DAI, J., MIEDEMA, J., HERNANDEZ, S., SUTTON-LALANI, A. & MOFFATT, K. Cognitive accessibility of digital payments: A literature review. Proceedings of the 20th International Web for All Conference, 2023. 116-121.
- DAVIDSON, S. 2018. Digital Inclusion Evidence Review 2018.
- DAVIS, F. D. 1989. Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS quarterly*, 319-340.
- DEPARTMENT FOR EDUCATION. 2022. *Essential Digital Skills Framework* [Online]. Available: <https://www.gov.uk/government/publications/essential-digital-skills-framework> [Accessed 8 June 2023].
- DEPARTMENT FOR WORK AND PENSIONS. 2025. *Planning and preparing for later life 2024* [Online]. Available: <https://www.gov.uk/government/publications/planning-and-preparing-for-later-life-2024/planning-and-preparing-for-later-life-2024> [Accessed 7 January 2026].
- DICK, J. & HARVEY, J. 2025. The Importance of Financial and Pension Literacy in Closing the Financial Advice Gap in the UK. *Social Policy and Society*, 1-26.
- DISABILITY RIGHTS UK. 2021. *Four in ten banks fail Disabled customers, says Which?* [Online]. Available: <https://www.disabilityrightsuk.org/news/2021/july/four-ten-banks-fail-disabled-customers-says-which?> [Accessed 27 January 2025].
- FINANCE FOUNDATION. 2016. *When I'm 84. Locking the door on the older door: The challenge facing Britain's banks.* [Online]. Available: <http://www.thefinancefoundation.org.uk/images/the-finance-foundation-when-im-84.pdf> [Accessed 23 December 2021].
- FUGLERUD, K. S. The barriers to and benefits of use of ICT for people with visual impairment. International Conference on Universal Access in Human-Computer Interaction, 2011. Springer, 452-462.
- GATSOU, C., POLITIS, A. & ZEYGOLIS, D. 2017. Seniors' experiences with online banking. *2017 Federated Conference on Computer Science and Information Systems (FedCSIS)*, 11, 623-627.
- GATTO, S. L. & TAK, S. H. 2008. Computer, Internet, and e-mail use among older adults: Benefits and barriers. *Educational Gerontology*, 34, 800-811.
- GEE, J. P. 2014. *An introduction to discourse analysis: Theory and method*, routledge.
- GERRARD, P. & CUNNINGHAM, J. B. 2003. The diffusion of internet banking among Singapore consumers. *International journal of bank marketing*.
- GILSTER, P. 1997. *Digital literacy*, Wiley Computer Pub. New York.
- GITLOW, L. 2014. Technology use by older adults and barriers to using technology. *Physical & Occupational Therapy in Geriatrics*, 32, 271-280.
- GLASGOW LIFE. 2023. *Digi-PALS* [Online]. Available: <https://www.glasgowlife.org.uk/event/1/digi-pals> [Accessed 5 December 2023].
- GLASGOW LIFE. 2025. *Digital Skills Workshops* [Online]. Available: <https://www.glasgowlife.org.uk/event/1/digital-skills-workshops> [Accessed 7 May 2025].
- GOODALL, K., WARD, P. & NEWMAN, L. 2010. Use of information and communication technology to provide health information: what do older migrants know, and what do they need to know? *Quality in Primary Care*, 18, 27-32.
- GORKOVENKO, K., TIGWELL, G. W., NORRIE, C. S., WAITE, M. & HERRON, D. ShopComm: Community-Supported Online Shopping for Older Adults. AAATE Conf., 2017. 175-182.
- GOUNDAR, S. & SATHYE, M. 2023. Exploring access to financial services by visually impaired people. *Journal of Risk and Financial Management*, 16, 96.

- GOV. 2018. *Equality and diversity* [Online]. Available: <https://www.gov.uk/government/organisations/home-office/about/equality-and-diversity> [Accessed 20 October 2021].
- GOV. 2019. *Internet use* [Online]. Available: <https://www.ethnicity-facts-figures.service.gov.uk/culture-and-community/digital/internet-use/latest#full-page-history> [Accessed 21 December 2021].
- GOV. 2022. *Scottish Income Tax: 2022-2023* [Online]. Available: <https://www.gov.scot/publications/scottish-income-tax-2022-2023/> [Accessed 5 May 2022].
- GREWAL, I., NAZROO, J., BAJEKAL, M., BLANE, D. & LEWIS, J. 2004. Influences on quality of life: a qualitative investigation of ethnic differences among older people in England. *Journal of Ethnic and Migration Studies*, 30, 737-761.
- GUO, X., SUN, Y., WANG, N., PENG, Z. & YAN, Z. 2013. The dark side of elderly acceptance of preventive mobile health services in China. *Electronic Markets*, 23, 49-61.
- GURITNO, S. & SIRINGORINGO, H. 2013. Perceived usefulness, ease of use, and attitude towards online shopping usefulness towards online airlines ticket purchase. *Procedia-Social and Behavioral Sciences*, 81, 212-216.
- GWET, K. L. 2011. On the Krippendorff's alpha coefficient. *Manuscript submitted for publication. Retrieved October, 2, 2011.*
- HALL, L., GÓMEZ, J. M. & LICHTENBERG, P. A. 2023. Trust and betrayal in older adult financial exploitation. *Aging & mental health*, 27, 2466-2473.
- HAMILTON, C. 2016. Changing service provision in rural areas and the possible impact on older people: a case example of compulsory post office closures and outreach services in England. *Social Policy and Society*, 15, 387-401.
- HANIF, Y. & LALLIE, H. S. 2021. Security factors on the intention to use mobile banking applications in the UK older generation (55+). A mixed-method study using modified UTAUT and MTAM-with perceived cyber security, risk, and trust. *Technology in Society*, 67, 101693.
- HARGITTAI, E. 2003. The digital divide and what to do about it. *New economy handbook*, 2003, 821-839.
- HARGITTAI, E. & DOBRANSKY, K. 2017. Old Dogs, New Clicks: Digital Inequality in Skills and Uses among Older Adults. *CAN J COMMUN*, 42, 195-212.
- HARVEY, M. & BRAZIER, D. 2022. E-government information search by English-as-a Second Language speakers: The effects of language proficiency and document reading level. *Information Processing & Management*, 59, 102985.
- HARVEY, M., HASTINGS, D. P. & CHOWDHURY, G. 2021. Understanding the costs and challenges of the digital divide through UK council services. *Journal of Information Science*, 01655515211040664.
- HAVERS, B., TRIPATHI, K., BURTON, A., MARTIN, W. & COOPER, C. 2024. Exploring the Factors Preventing Older Adults From Reporting Cybercrime and Seeking Help: A Qualitative, Semistructured Interview Study. *Health & Social Care in the Community*, 2024, 1314265.
- HAYES, A. F. & KRIPPENDORFF, K. 2007. Answering the call for a standard reliability measure for coding data. *Communication methods and measures*, 1, 77-89.
- HAYES, S. C. & MARTIN, F. B. 2007. Consumers with an intellectual disability and carers. *Journal of intellectual disabilities.*, 11, 9-21.
- HECKER, I. & LOPREST, P. 2019. Foundational Digital Skills for Career Progress. *Urban Institute*.

- HILL, R., BETTS, L. R. & GARDNER, S. E. 2015. Older adults' experiences and perceptions of digital technology:(Dis) empowerment, wellbeing, and inclusion. *Computers in Human Behavior*, 48, 415-423.
- HINDU MANDIR GLASGOW. 2024. *Introduction* [Online]. Available: <https://www.hindumandirglasgow.org/> [Accessed 1 March 2023].
- HODGE, H., CARSON, D., CARSON, D., NEWMAN, L. & GARRETT, J. 2017. Using Internet technologies in rural communities to access services: The views of older people and service providers. *Journal of Rural Studies*, 54, 469-478.
- HUANG, T. 2023. Expanding the UTAUT2 framework to determine the drivers of mobile shopping behaviour among older adults. *Plos one*, 18, e0295581.
- HYDE, K. F. 2000. Recognising deductive processes in qualitative research. *Qualitative market research: An international journal*.
- IVANKINA, L. I., TRUBCHENKO, T. G., KRUKOVAC, E. M., SHAI DULLINA, A. R., SHAFTELSKAYA, N. V. & CHERNYAK, V. K. 2017. The Use of Information and Communication Technologies by Elderly People (Sociological Survey Data). *EUR PROC SOC BEHAV*, 19, 235-242.
- JIN, X., KUANG, E. & FAN, M. 2021. "Too old to bank digitally? ": A Survey of Banking Practices and Challenges Among Older Adults in China. 557-814.
- JOHANNES, V. 2025. How can UTAUT2 help companies understand technology adoption?: A case study on technology acceptance amongst elderly individuals.
- JUN, M. & CAI, S. 2001. The key determinants of internet banking service quality: a content analysis. *International journal of bank marketing*.
- KAIJANEN, S. & STENBERG, L. 2018. How to empower old people to join the digitalization of services? *Gerontechnology*, 17, 58-58.
- KARJALUOTO, H., MATTILA, M. & PENTO, T. 2002. Factors underlying attitude formation towards online banking in Finland. *International journal of bank marketing*, 20, 261-272.
- KEMP, S., SITGES MACIA, E. & ERADES-PÉREZ, N. 2025. Worry about online fraud and older adults: Avoidant and protective responses. *Journal of Criminology*, 58, 446-465.
- KIM, H. N. 2021. Characteristics of Technology Adoption by Older Adults with Visual Disabilities. *INT J HUM-COMPUT INT*, 37, 1256-1268.
- KIM, J. S., KIM, H. J., KIM, M. & KIM, S. H. 2025. Hand Motion Control Ability Between Young and Older Adults: Comparative Study. *JMIR FORM RES*, 9, e65224.
- KIM, Y. K. & HAN, S. H. 2021. Internet Use and Cognitive Functioning in Later Life: Focus on Asymmetric Effects and Contextual Factors. *The Gerontologist*.
- KNOWLES, B. & HANSON, V. L. 2018. Older adults' deployment of 'distrust'. *ACM Transactions on Computer-Human Interaction (TOCHI)*, 25, 1-25.
- KÖNIG, R. & SEIFERT, A. 2020. From online to offline and vice versa: change in Internet use in later life across Europe. *Frontiers in Sociology*, 5, 4.
- KORPELA, V., PAJULA, L. & HÄNNINEN, R. 2023. Older Adults Learning Digital Skills Together: Peer Tutors' Perspectives on Non-Formal Digital Support. *Media and Communication*, 11, 53-62.
- KOSKOSAS, I. 2011. The pros and cons of internet banking: a short review. *Business excellence and management*, 1, 49-58.
- KRIPPENDORFF, K. 2011. Computing Krippendorff's alpha-reliability.
- KRIPPENDORFF, K. 2018. *Content analysis: An introduction to its methodology*, Sage publications.
- KURNIAWAN, S. & ZAPHIRIS, P. derived web design guidelines for older people. Proceedings of the 7th international ACM SIGACCESS conference on Computers and accessibility, 2005. 129-135.

- LAKSHMAN, K. & SULAIMAN, N. 2019. A Perception on E-Banking services towards Urban and Rural Educated Senior citizens.
- LAM, J. C. & LEE, M. K. 2006. Digital inclusiveness--Longitudinal study of Internet adoption by older adults. *Journal of Management Information Systems*, 22, 177-206.
- LATULIPE, C., DSOUZA, R. & CUMBERS, M. Unofficial proxies: How close others help older adults with banking. Proceedings of the 2022 CHI Conference on Human Factors in Computing Systems, 2022. 1-13.
- LEE, H., LIM, J.-A. & NAM, H.-K. 2022. Effect of a digital literacy program on older adults' digital social behavior: a quasi-experimental study. *International journal of environmental research and public health*, 19, 12404.
- LIN, Y.-C., LIANG, J.-C., YANG, C.-J. & TSAI, C.-C. 2013. Exploring middle-aged and older adults' sources of Internet self-efficacy: A case study. *Computers in Human Behavior*, 29, 2733-2743.
- LING, G. M., FERN, Y. S., BOON, L. K. & HUAT, T. S. 2016. Understanding customer satisfaction of internet banking: A case study in Malacca. *Procedia Economics and Finance*, 37, 80-85.
- LISSITSA, S. & CHACHASHVILI-BOLOTIN, S. 2015. Does the wind of change blow in late adulthood? Adoption of ICT by senior citizens during the past decade. *Poetics*, 52, 44-63.
- LLOYDS. 2021. *Appointing someone to manage your affairs* [Online]. Available: <https://www.lloydsbank.com/help-guidance/customer-support/someone-to-manage-your-affairs.html> [Accessed 13 November 2021].
- LLOYDS. 2023. *Free Digital Skills Training* [Online]. Available: <https://www.lloydsbank.com/help-guidance/get-skills-and-support-near-you.html> [Accessed 16 August 2023].
- LLOYDS BANK. 2018. *UK Consumer Digital Index* [Online]. Available: https://www.lloydsbank.com/assets/media/pdfs/banking_with_us/whats-happening/LB-Consumer-Digital-Index-2018-Report.pdf [Accessed 21 December 2021].
- LUSARDI, A. & MITCHELL, O. S. 2023. The importance of financial literacy: Opening a new field. *Journal of Economic Perspectives*, 37, 137-154.
- MACEDO, I. M. 2017. Predicting the acceptance and use of information and communication technology by older adults: An empirical examination of the revised UTAUT2. *Computers in human behavior*, 75, 935-948.
- MAGUIRE, M. A Study of Older People's Attitudes Towards Digital Banking. International Conference on Human-Computer Interaction, 2024. Springer, 278-289.
- MARKY, K., RAGOZIN, K., CHERNYSHOV, G., MATVIHENKO, A., SCHMITZ, M., MÜHLHÄUSER, M., EGHTEBAS, C. & KUNZE, K. 2022. "Nah, it's just annoying!" A deep dive into user perceptions of two-factor authentication. *ACM transactions on computer-human interaction*, 29, 1-32.
- MARTINS, C., OLIVEIRA, T. & POPOVIĆ, A. 2014. Understanding the Internet banking adoption: A unified theory of acceptance and use of technology and perceived risk application. *International journal of information management*, 34, 1-13.
- MARZI, G., BALZANO, M. & MARCHIORI, D. 2024. K-Alpha calculator–krippendorff's alpha calculator: a user-friendly tool for computing krippendorff's alpha inter-rater reliability coefficient. *MethodsX*, 12, 102545.
- MCGINN, J. & KOTAMRAJU, N. Data-driven persona development. Proceedings of the SIGCHI conference on human factors in computing systems, 2008. 1521-1524.

- MILLER, L. M. S., CALLEGARI, R. A., ABAH, T. & FANN, H. 2024. Digital literacy training for Low-Income older adults through undergraduate Community-Engaged learning: Single-Group Pretest-Posttest study. *JMIR aging*, 7, e51675.
- MILNE, S., DICKINSON, A., CARMICHAEL, A., SLOAN, D., EISMA, R. & GREGOR, P. 2005. Are guidelines enough? An introduction to designing Web sites accessible to older people. *IBM systems journal*, 44, 557-571.
- MITZNER, T. L., BORON, J. B., FAUSSET, C. B., ADAMS, A. E., CHARNESS, N., CZAJA, S. J., DIJKSTRA, K., FISK, A. D., ROGERS, W. A. & SHARIT, J. 2010. Older adults talk technology: Technology usage and attitudes. *Computers in human behavior*, 26, 1710-1721.
- MONEY, A., HALL, A., HARRIS, D., EOST-TELLING, C., MCDERMOTT, J. & TODD, C. 2024. Barriers to and facilitators of older people's engagement with web-based services: qualitative study of adults aged > 75 years. *JMIR aging*, 7, e46522.
- MOORE, R. 2000. Access to banking services and credit for UK ethnic minorities, refugees and asylum seekers. *Radical Statistics*, 75, 16-24.
- MORGAN, P. J., HUANG, B. & TRINH, L. Q. 2019. The need to promote digital financial literacy for the digital age. *IN THE DIGITAL AGE*.
- MUKHTAR, M. 2015. Perceptions of UK based customers toward internet banking in the United Kingdom. *Journal of Internet banking and Commerce*, 20, 1-38.
- MURPHY, D. R., DANEMAN, M. & SCHNEIDER, B. A. 2006. Why do older adults have difficulty following conversations? *Psychology and aging*, 21, 49.
- NAIK, A. S. Assistive Technology in Banking. 2024 15th International Conference on Computing Communication and Networking Technologies (ICCCNT), 2024. IEEE, 1-6.
- NATIONAL RECORDS OF SCOTLAND. 2011. *Ethnicity* [Online]. Available: <https://www.scotlandscensus.gov.uk/census-results/at-a-glance/ethnicity/> [Accessed 6 March 2022].
- NATWEST. 2021. *Caring for someone vulnerable* [Online]. Available: <https://www.natwest.com/life-moments/caring-for-vulnerable-relatives.html> [Accessed 13 November 2021].
- NEWMAN, I. 2000. A Conceptualization of Mixed Methods: A Need for Inductive/Deductive Approach to Conducting Research.
- NUNES, F., SILVA, P. A. & ABRANTES, F. Human-computer interaction and the older adult: an example using user research and personas. Proceedings of the 3rd international conference on Pervasive technologies related to assistive environments, 2010. 1-8.
- NVIVO. 2024. *What's new* [Online]. Available: <https://help-nv.qsrinternational.com/20/mac/Content/about-nvivo/whats-new.htm> [Accessed 9 September 2022].
- OECD. 2021. *Elderly population* [Online]. Available: <https://data.oecd.org/pop/elderly-population.htm> [Accessed 20 October 2021].
- OFCOM. 2022. *Adults' Media use and Attitudes report* [Online]. [Accessed 25 October 2022].
- OKONJI, P., LHUSSIÉ, M., BAILEY, C. & CATTAN, M. 2015. Internet use: Perceptions and experiences of visually impaired older adults. *Journal of Social Inclusion*, 6, 120-145.
- OLIVER, D. G., SEROVICH, J. M. & MASON, T. L. 2005. Constraints and opportunities with interview transcription: Towards reflection in qualitative research. *Social forces*, 84, 1273-1289.

- OLPHERT, C., DAMODARAN, L. & MAY, A. Towards digital inclusion—engaging older people in the ‘digital world’. *Accessible Design in the Digital World Conference 2005*, 2005. 1-7.
- OMOTAYO, F. O. & AKINYODE, T. A. 2020. Digital Inclusion and the Elderly: The Case of Internet Banking Use and Non-Use among older Adults in Ekiti State, Nigeria. *Covenant Journal of Business and Social Sciences*, 11.
- ONS. 2019. *Exploring the UK’s digital divide* [Online]. Available: <https://www.ons.gov.uk/peoplepopulationandcommunity/householdcharacteristics/homeinternetandsocialmediausage/articles/exploringtheuksdigitaldivide/2019-03-04> [Accessed 21 December 2021].
- ONS. 2020a. *Internet access-households and individuals, Great Britain: 2020* [Online]. Available: <https://www.ons.gov.uk/peoplepopulationandcommunity/householdcharacteristics/homeinternetandsocialmediausage/bulletins/internetaccesshouseholdsandindividuals/2020> [Accessed 4 November 2021].
- ONS. 2020b. *Internet users, UK:2020* [Online]. Available: <https://www.ons.gov.uk/businessindustryandtrade/itandinternetindustry/bulletins/internetusers/2020> [Accessed 14 December 2021].
- ONYIA, O. P. & TAGG, S. K. 2011. Effects of demographic factors on bank customers’ attitudes and intention toward Internet banking adoption in a major developing African country. *Journal of Financial Services Marketing*, 16, 294-315.
- OPEN BANKING. 2021. *The future of financial services* [Online]. Available: <https://www.openbanking.org.uk> [Accessed 29 October 2021].
- OTTER. 2025. *The #1 AI Meeting Assistant* [Online]. Available: <https://otter.ai/> [Accessed 24 August 2022].
- PARKER, C., SCOTT, S. & GEDDES, A. 2019. Snowball sampling. *SAGE research methods foundations*.
- PARVANEH, G. & AMIRNIMA, N. 2011. A new framework for customer satisfaction in electronic commerce. *Australian Journal of Basic and Applied Sciences*, 5, 1952-1961.
- PERAL-PERAL, B., VILLAREJO-RAMOS, Á. F. & ARENAS-GAITÁN, J. 2020. Self-efficacy and anxiety as determinants of older adults’ use of Internet Banking Services. *Universal access in the information society*, 19, 825-840.
- PÉREZ-RUGOSA, V., DOMÍNGUEZ-VALDÉS, E., RODRÍGUEZ-RODRÍGUEZ, A., FONTANA-OLOT, P., BIANCHI, V., LLADÓ-JORDAN, G. & SARABIA-COBO, C. 2025. Digital Care for Older People: Digital Literacy, Technophobia and Technophilia. *Sage Open Aging*, 11, 30495334251395873.
- PI, S.-M., LIAO, H.-L. & CHEN, H.-M. 2012. Factors that affect consumers' trust and continuous adoption of online financial services. *International Journal of Business and Management*, 7, 108.
- PLAID. 2017. *What is the Open Banking Standard?* [Online]. Available: <https://fin.plaid.com/articles/what-is-the-open-banking-standard/> [Accessed 29 October 2021].
- POLASIK, M. & WISNIEWSKI, T. P. 2009. Empirical analysis of internet banking adoption in Poland. *International Journal of bank marketing*.
- POSTOFFICE. 2021. *Your bank now in your Post Office* [Online]. Available: <https://www.postoffice.co.uk/everydaybanking> [Accessed 29 December 2021].
- RAJAABELINA, L., BRUN, I., LINE, R. & CLOUTIER-BILODEAU, C. 2021. Not all elderly are the same: fostering trust through mobile banking service experience. *INT J BANK MARK*, 39, 85-106.

- RAMÓN JERÓNIMO, M., PERAL PERAL, B., ARENAS GAITÁN, J. & VILLAREJO RAMOS, Á. F. 2014. Gender Gap in the Use of Internet Banking Services: the Case of Elderly People. *Contributo da Gestao para a sustentabilidade das organizaçoes e da sociedade. XXIV Jornadas Luso-Espanholas de Gestão Científica.*(02.2014. Leiria, Portugal).
- RUIU, M. L. & RAGNEDDA, M. 2016. Between digital inclusion and social equality: the role of public libraries in Newcastle upon Tyne. *Library and Information Research*, 40, 69-87.
- RUSSO, G. M., TOMEI, P. A., SERRA, B. & MELLO, S. 2021. Differences in the use of 5- or 7-point likert scale: an application in food safety culture. *Organizational Cultures*, 21, 1.
- SAUNDERS, M., LEWIS, P. & THORNHILL, A. 2023. *Research methods for business students*, Pearson education.
- SAVOLAINEN, R. 1995. Everyday life information seeking: Approaching information seeking in the context of “way of life”. *Library & information science research*, 17, 259-294.
- SAVOLAINEN, R. 2007. Information behavior and information practice: reviewing the “umbrella concepts” of information-seeking studies. *The library quarterly*, 77, 109-132.
- SAVOLAINEN, R. 2023. Everyday life as an evolving context of information behaviour. *Aslib Journal of Information Management*, 75, 940-960.
- SAVOLAINEN, R. & THOMSON, L. 2022. Assessing the theoretical potential of an expanded model for everyday information practices. *Journal of the Association for Information Science and Technology*, 73, 511-527.
- SIREN, A. & KNUDSEN, S. G. 2017. Older adults and emerging digital service delivery: A mixed methods study on information and communications technology use, skills, and attitudes. *Journal of aging & social policy*, 29, 35-50.
- STOLPER, O. A. & WALTER, A. 2017. Financial literacy, financial advice, and financial behavior. *Journal of business economics*, 87, 581-643.
- TEKIN, K. & GULERYUZ, E. H. 2020. Determinants of Internet Banking Adoption in Turkey. *Journal of Yaşar University*, 15, 167-176.
- THOMAS, D., CHOWDHURY, G. & RUTHVEN, I. Exploring older people's challenges on online banking/finance systems: Early findings. Proceedings of the 2023 Conference on Human Information Interaction and Retrieval, 2023. 333-337.
- THOMAS, D., CHOWDHURY, G. & RUTHVEN, I. Are older people battling with digital financial services? iConference 2024: Wisdom, Well-being, Win-win, 2024.
- THOMAS, D., CHOWDHURY, G. & RUTHVEN, I. A framework to facilitate older people in leveraging online financial services. International Conference on Asian Digital Libraries, 2025a. Springer, 305-319.
- THOMAS, D., CHOWDHURY, G. & RUTHVEN, I. 2025b. Grey digital divide: factors associated with older people’s use of the Internet for financial transactions in the UK. *Journal of Documentation*.
- THOMAS, D. R. 2006. A general inductive approach for analyzing qualitative evaluation data. *American journal of evaluation*, 27, 237-246.
- TSATSOU, P. 2022. Vulnerable people’s digital inclusion: intersectionality patterns and associated lessons. *Information, Communication & Society*, 25, 1475-1494.
- UENO, A., DENNIS, C. & DAFOULAS, G. A. 2023. Digital exclusion and relative digital deprivation: Exploring factors and moderators of internet non-use in the UK. *Technological Forecasting and Social Change*, 197, 122935.

- UK FINANCE. 2018. *Financial Inclusion in a Digital Age* [Online]. Available: <https://www.ukfinance.org.uk/system/files/UK-Finance-Financial-Inclusion-AW-web.pdf> [Accessed 15 December 2021].
- UK FINANCE. 2021. *2021 Half year fraud update* [Online]. Available: <https://www.ukfinance.org.uk/system/files/Half-year-fraud-update-2021-FINAL.pdf> [Accessed 29 December 2021].
- UK FINANCE. 2023. *Criminals steal over half a billion pounds and nearly 80 percent of app frauds start online* [Online]. Available: <https://www.ukfinance.org.uk/news-and-insight/press-release/criminals-steal-over-half-billion-pounds-and-nearly-80-cent-app> [Accessed 7 May 2025].
- UNIVERSITY OF EDINBURGH. 2021. *What does Equality, Diversity and Inclusion mean?* [Online]. Available: <https://www.ph.ed.ac.uk/equality-diversity-and-inclusion/about-edi/what-does-equality-diversity-and-inclusion-mean> [Accessed 20 October 2021].
- VAPORTZIS, E., GIATSI CLAUSEN, M. & GOW, A. J. 2017a. Older adults perceptions of technology and barriers to interacting with tablet computers: a focus group study. *Frontiers in psychology*, 8, 294305.
- VAPORTZIS, E., GIATSI CLAUSEN, M. & GOW, A. J. 2017b. Older Adults Perceptions of Technology and Barriers to Interacting with Tablet Computers: A Focus Group Study. *FRONT PSYCHOL*, 8, 1687.
- VENKATESH, V., MORRIS, M. G., DAVIS, G. B. & DAVIS, F. D. 2003. User acceptance of information technology: Toward a unified view. *MIS quarterly*, 425-478.
- VENKATESH, V., THONG, J. Y. & XU, X. 2012. Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology. *MIS quarterly*, 157-178.
- VROMAN, K. G., ARTHANAT, S. & LYSACK, C. 2015. "Who over 65 is online?" Older adults' dispositions toward information communication technology. *Computers in Human Behavior*, 43, 156-166.
- VUORIKARI, R., JERZAK, N., KARPINSKI, Z., POKROPEK, A. & TUDEK, J. 2022. Measuring Digital Skills across the EU: Digital Skills Indicator 2.0. *Publ. Off. Eur. Union*, 1-21.
- W3C. 2024. *How to Meet WCAG* [Online]. Available: https://www.w3.org/WAI/WCAG22/quickref/?versions=2.2¤tsidebar=%23col_customize#text-alternatives [Accessed 12 January 2022].
- WILSON-MENZFELD, G., ERFANI, G., YOUNG-MURPHY, L., CHARLTON, W., DE LUCA, H., BRITAIN, K. & STEVEN, A. 2025. Identifying and understanding digital exclusion: a mixed-methods study. *Behaviour & Information Technology*, 44, 1649-1666.
- WILSON, S. A., BYRNE, P., RODGERS, S. E. & MADEN, M. 2022. A systematic review of smartphone and tablet use by older adults with and without cognitive impairment. *Innovation in Aging*, 6, igac002.
- WING HONG. 2024. *Wing Hong Chinese Elderly Group* [Online]. Available: <https://winghong.org/> [Accessed 1 March 2023].
- XAVIER, A. J., D'ORSI, E., DE OLIVEIRA, C. M., ORRELL, M., DEMAKAKOS, P., BIDDULPH, J. P. & MARMOT, M. G. 2014. English Longitudinal Study of Aging: can Internet/E-mail use reduce cognitive decline? *Journals of Gerontology Series A: Biomedical Sciences and Medical Sciences*, 69, 1117-1121.
- YONG, S.-T. & GATES, P. 2014. Born Digital: Are they really digital natives? *International Journal of e-Education, e-Business, e-Management and e-Learning*, 4, 102.

- YOON, H. S. & STEEGE, L. M. B. 2013. Development of a quantitative model of the impact of customers' personality and perceptions on Internet banking use. *Computers in Human Behavior*, 29, 1133-1141.
- YUAN, S., HUSSAIN, S. A., HALES, K. D. & COTTEN, S. R. 2016. What do they like? Communication preferences and patterns of older adults in the United States: The role of technology. *Educational Gerontology*, 42, 163-174.
- ZHANG, J., PURGATHOFER, P., BRERETON, M., FITZPATRICK, G. & GÜLDENPFENNIG, F. Handle the way: Enhancing web accessibility for people with disability. Proceedings of the 2016 ACM Conference Companion Publication on Designing Interactive Systems, 2016. 117-120.

Appendix A – Interview Questions

Semi-structured interview script for adults whose first language is English

Open ended questions:

Prior to the interview, participant and researcher will introduce themselves to each other (2 mins)

1. Find information on demographic factors:
 - What is your gender? Male or female
 - What is your education level? (High school, college degree or undergraduate/masters/PhD degree)
 - Are you retired/working?
 - i. What was/is your occupation?
 - ii. What was/is your income? (over £12,570 - £14,732, over £14,732 – £25,688, over £25,688 – £43,662, over £43,662 – £150,000, over £150,000)
 - Are you living – alone/with a partner/in a multigenerational household?
 - What is your marital status? (Married/not married)
 - Are you part of first generation or second generation?

2. Go through each online financial activity in the following list and ask questions for each item:
 - Online shopping (e.g., clothes, shoes, accessories)
 - Internet banking
 - Buying or renewing existing insurance policies (e.g., car insurance, home insurance, health insurance etc)
 - Tickets to cultural or other events
 - Bought a transport service (e.g., flight ticket, local bus, train, taxi (including Uber))

Questions for each activity shown above:

1. How do you carry out this activity? (Online, in-person, help from someone or other ways) Explain your answer.

If participant conducts this activity via **online** then ask the following questions:

- i. How often do you carry out this activity? (did you use it in the last 3 months or did you use it over 3 months ago)
- ii. Which website do you use? Which device do you use? (e.g., laptop, mobile, desktop)
- iii. What kind of challenges do you experience while using this online financial service (e.g., fear of financial scams, lack of confidence, lack of digital skills, lack of equipment, website design issues, lack of internet/financial knowledge etc) Please explain your answer.
- iv. Do you receive help on this activity? If yes, what kind of help are you provided with (organisations, demo sites, phone calls etc)? Is it helpful?

Do you think you'll always require help with this activity? Please explain your answer.

If participant **doesn't conduct this activity via online**, then ask the following questions:

- i. Are there any reasons for not completely using this online financial service (e.g., fear of scams, lack of confidence, lack of digital skills, lack of equipment, website design issues, lack of internet/financial knowledge etc). Please explain your answer.
 - ii. Do you think you can only carry out this online activity if you receive help from someone? Why?
3. Are there any similar financially related tasks that you carry out online or through other ways (e.g., payment of council tax, payment of car tax, payment of fines etc). Please explain your reasons for not conducting the activity through online OR please explain the challenges that you face while using this digital service.
 4. What are the implications of not using the online financial services? Can you give me some examples (e.g., extra time is needed to carry out the tasks, journey to a bank to transfer money, journey to a shop to buy something, what do you do when an item is out of stock in a shop etc)
 5. Do you think online financial services are useful? Why?
 6. Do you prefer in-person payments or online transactions? Why?
 7. Any other comments?

Semi-structured interview script for adults whose first language is not English and for those who are from ethnic minority groups

Prior to the interview, participant and researcher will introduce themselves to each other (2 mins)

1. Find information on demographic factors:
 - What is your gender? Male or female
 - **This question is for those from ethnic minority groups:** What is your ethnicity? (Chinese or Pakistani)
 - What is your education level? (High school, college degree or undergraduate/masters/PhD degree)
 - Are you retired/working?
 - i. What was/is your occupation?
 - ii. What was/is your income? (over £12,570 - £14,732, over £14,732 – £25,688, over £25,688 – £43,662, over £43,662 – £150,000, over £150,000)
 - Are you living – alone/with a partner/in a multigenerational household?
 - What is your marital status? (Married/not married)
 - Are you part of first generation or second generation?

2. Go through each online financial activity in the following list and ask questions for each item:
- Online shopping (e.g., clothes, shoes, accessories)
 - Internet banking
 - Buying or renewing existing insurance policies (e.g., car insurance, home insurance, health insurance etc)
 - Tickets to cultural or other events
 - Bought a transport service (e.g., flight ticket, local bus, train, taxi (including Uber))

Questions for each activity shown above:

1. How do you carry out this activity? (Online, in-person, help from someone or other ways) Explain your answer.

If participant conducts this activity via **online** then ask the following questions:

- i. How often do you carry out this activity? (did you use it in the last 3 months or did you use it over 3 months ago)
- ii. Which website do you use? Which device do you use? (e.g., laptop, mobile, desktop)
- iii. What kind of challenges do you experience while using this online financial service (e.g., **Language**, family problems, fear of scams, lack of confidence, lack of digital skills, lack of equipment, website design issues, lack of internet/financial knowledge etc) Please explain your answer.
- iv. Do you receive help on this activity? If yes, what kind of help are you provided with (organisations, demo sites, phone calls etc)? Is it helpful? Do you think you'll always require help with this activity? Please explain your answer.

If participant **doesn't conduct this activity via online**, then ask the following questions:

- i. Are there any reasons for not completely using this online financial service (e.g., **Language**, family problems, fear of financial scams, lack of confidence, lack of digital skills, lack of equipment, website design issues, lack of internet/financial knowledge etc). Please explain your answer.
- ii. Do you think you can only carry out this online activity if you receive help from someone? Why?

3. Are there any similar financially related tasks that you carry out online or through other ways (e.g., payment of council tax, payment of car tax, payment of fines etc). Please explain your reasons for not conducting the activity through online OR please explain the challenges that you face while using this digital service.
4. What are the implications of not using the online financial services? Can you give me some examples (e.g., extra time is needed to carry out the tasks, journey to a bank to

transfer money, journey to a shop to buy something, what do you do when an item is out of stock in a shop etc)

5. Do you think online financial services are useful? Why? **Question for those having language difficulties:** Do you think it would be easier to use online services if you received it in your own language? Explain your answer
6. Do you prefer in-person payments or online transactions? Why?
7. Any other comments?

Semi-structured interview script for volunteers/employees and for those who aid older people with online financial services

Prior to the interview, participant and researcher will introduce themselves to each other (2 mins)

1. What kind of difficulties do you find in older people's use of online **financial** activities? (e.g., fear of financial scams, language issues, lack of confidence, lack of digital skills, lack of equipment, website design issues, lack of internet/financial knowledge etc) Please explain your answer using examples.
2. **Question for volunteers/employees:** Do male or female older adults seek for more help? Do you know any other information about them, for example, education, occupation, income, ethnicity, do they live alone, first/second generation etc.
3. What kind of digital financial services do they seek help for (e.g., internet banking, online shopping, buying insurance policies etc) Which websites do they commonly use? E.g., RBS, Bank of Scotland, amazon etc)
4. Do you feel frustrated when you have to repeat the instructions to older people? Any other personal challenges e.g., losing patience when helping older people?
5. How do you help older people on digital financial services? (e.g., do you direct them to demo sites, phone calls etc) Is it helpful for them?
6. **Question for volunteers/employees:** How frequently do you provide help, on which aspects, and how much time do you spend for such help sessions/activities?
Question for relatives and friends (digital carers): How much time do you spend to help older people (e.g., 2 hours per week, 1 hour every 2 days etc). Do you get these hours out of studying time, entertainment time, sleep time etc? Do you feel your time is lost when you provide help for older people? Why?
7. Do you think more older people will use digital financial services if there are concrete solutions? In what ways could we provide:
 - a. help/support around technological barriers (for example, website design issues - clear instructions on websites, larger font size etc)

- b. training around personal issues like confidence, fear, trust etc.
- c. support around language issues, digital skill issues, financial literacy issues etc
- d. support around any other specific issues that you can think of?

8. Any other comments?

Appendix B – Participant Information Sheet/Consent Form



Participant Information Sheet for older people (those aged 65 or over), employees/volunteers/digital carers

[FOR USE WITH STANDARD PRIVACY NOTICE FOR RESEARCH PARTICIPANTS]

Name of department: Computer and Information Sciences

Title of the study: Investigating user interactions with online banking/finance systems

Introduction

My name is Dain Thomas. I am a first year PhD student at University of Strathclyde. My research focusses on older people's interactions on online banking/finance systems (i.e., any website which involve monetary transactions – internet banking, online shopping etc). This study will investigate human/behavioural, technological and societal challenges to accessing online financial websites by older people aged 65 or over from ethnic minority groups, people whose first language is English and people whose first language is not English. Older people have several issues in using digital financial services; obstacles could be linked with digital skills, language, income, fear or other factors.

My contact details are shown at the end of this document.

What is the purpose of this research?

Although previous studies suggest solutions for older people on the use of online financial activities, technological solutions have not been implemented yet. Hence, this research intends to propose various solutions in the form of recommendations as well as technological solutions in order to solve the challenges encountered by older people on digital financial services. There have not been any studies so far with older people from ethnic minority groups and older people whose first language is not English in the context of digital financial services and this has been established through literature review. Data acquired from interviews and other phases of this study will enable libraries, government and organisations to understand the challenges experienced by older people.

Do you have to take part?

No.

Participation is voluntary and participants have the right to withdraw from the study before publishing the work.

What will you do in the project?

This information sheet and associated activities are only relevant for phase 1 of this study. Research will be carried out in four phases. First phase is interviews. Participants will be included in other phases if they are willing to participate.

During phase 1 interviews, a number of questions (approx. 7/8 questions) will be asked to each participant; questions are mainly related to older people's technological/human/behavioural/societal challenges in the use

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of online financial services. Participant is required to read the Instructions sheet, Information Sheet (this document), Privacy Notice and consent form before the interview (phase 1). A participant can only participate in the interview if consent form is signed.

Duration of research: min. 3 years, max. 4 years

Why have you been invited to take part?

This research aims to understand the challenges older people face in accessing digital financial services and also to investigate whether older people from ethnic minorities and older people whose first language is not English face any specific/unique challenges. Attributes such as ethnicity, language and gender will be used in data analysis to understand whether such attributes pose any specific types of challenges for older people using digital financial services.

A range of participants will be invited to take part in Phase 1.

Participants who will take part in the interviews are:

- older men and women from two ethnic minority groups - Chinese and Pakistani
- older people whose first language is English
- older people whose first language is not English
- family, friends or relatives who aid older people on online financial services
- volunteers/employees from organisations who helps older people with online activities.

Condition: all older adults are aged 65 and over. Both internet users and non-users will be involved in the interviews.

You have been invited to take part in the interview as you fall into one of the categories shown above.

What information is being collected in the project?

A semi-structured interview will be conducted with each participant so that they can talk about anything related to the question and an exact answer is not expected. Individual interviews will enable participants to share any issues that they might be reluctant in communicating with groups of people.

Data collected from older people whose first language is English

- Older people's demographics such as income, education, gender etc
- Challenges on online financial services
- Benefits of online financial services and implications of not using these services

Data collected from older people whose first language is not English and people from ethnic minority groups:

- Older people's demographics such as income, education, gender, **ethnicity** etc
- Challenges on the use of online financial services, for example, **language** issues, **family problems**
- Benefits of online financial services and implications of not using these services

Data collected from volunteers/employees and those who aid older people with online financial services:

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- Experience of working with older people
- Older people's challenges on digital services
- Time spent with older people on online financial activities
- Solutions that could help older adults

Who will have access to the information?

Data will be anonymised i.e., participants' names and personal details will not be disclosed at any point in the study. Interview data will only be shared with supervisor and participant, if requested. If participant reveals personal information (e.g., names, contact details) during interview, then this will be deleted from the transcribed data.

Where will the information be stored and how long will it be kept for?

Face-to-face interviews will be recorded using a phone. Audio files will be imported into a transcription software (e.g., Otter) and data will be analysed using a data analysis software (e.g., NVivo). Prior to the interview, instructions sheet, information sheet (this document), privacy notice and consent form will be given. Signed consent forms will be scanned and stored electronically; paper copies will be shredded once scanned. Audio files, consent forms and transcribed data will be stored on OneDrive.

For those having online interviews, laptop voice recorder will be used to record virtual interviews. Audio files will be imported into a transcription software (e.g., Otter) and data will be analysed using a data analysis software (e.g., NVivo). Instructions sheet, information sheet (this document), privacy notice and consent form will be sent via email before commencing the interview. Participant will be required to digitally sign the consent form and send it to the researcher through email. This will be stored on OneDrive. Audio files and transcribed data will be stored on OneDrive as well.

Thematic analysis will be carried out on transcribed data and this will be stored on PURE (University's data repository) which will be publicly accessible after publication. Interview responses will be displayed on articles and PhD thesis but participants' personal information (e.g., names) will not be disclosed at any point in the study; data will only be used for research purposes. Audio files, consent forms and transcribed data will be deleted from OneDrive after the completion of research.

Thank you for reading this information – please ask any questions if you are unsure about what is written here.

All personal data will be processed in accordance with data protection legislation. Please read our [Privacy Notice for Research Participants](#) for more information about your rights under the legislation.

What happens next?

In order to find out more information about the project, contact the researcher using the details shown at the bottom of this document. If any older adults aged 65 or over would like to take part in other phases of this study then please write your email address and sign the second part on consent form.

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If you no longer wish to be involved in the research, thanks for your attention and time for reading this document.

Participants will be notified through email/organisation once research results are published. Also, participants will receive feedback through email/organisation following the completion of research.

Researcher contact details:

Researcher's name: Dain Thomas

Researcher's email: dain.thomas.2015@uni.strath.ac.uk

Chief Investigator details:

Supervisor: Prof. Gobinda Chowdhury

Email: gobinda.chowdhury@strath.ac.uk

University of Strathclyde
Department of Computer and Information Sciences,
Livingstone Tower
Richmond Street

Glasgow
G1 1XH

This research was granted ethical approval by the Departmental Ethics Committee.

If you have any questions/concerns, during or after the research, or wish to contact an independent person to whom any questions may be directed or further information may be sought from, please contact:

Secretary to the Departmental Ethics Committee
Department of Computer and Information Sciences,
Livingstone Tower
Richmond Street

Glasgow
G1 1XH
email: ethics@cis.strath.ac.uk

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Consent Form for older people (those aged 65 or over), employees/volunteers/digital carers

Name of department: Department of Computer and Information Sciences

Title of the study: Investigating user interactions with online banking/finance systems.

- I confirm that I have read and understood the Participant Information Sheet for the above project and the researcher has answered any queries to my satisfaction.
- I confirm that I have read and understood the Privacy Notice for Participants in Research Projects and understand how my personal information will be used and what will happen to it (i.e. how it will be stored and for how long).
- I understand that my participation is voluntary and that I am free to withdraw from the project at any time, up to the point of completion, without having to give a reason and without any consequences.
- I understand that I can request the withdrawal from the study of some personal information and that whenever possible researchers will comply with my request. This includes the following personal data:
 - audio recordings of interviews that identify me;
 - my personal information from transcripts.
- I understand that anonymised data (i.e. data that do not identify me personally) cannot be withdrawn once they have been included in the study.
- I understand that any information recorded in the research will remain confidential and no information that identifies me will be made publicly available.
- I consent to being a participant in phase 1 of this project.
- I consent to being audio recorded as part of the project

(PRINT NAME)	
Signature of Participant:	Date:

This part is only applicable for older people aged 65 or over:

- I consent to being a participant in phases 3 and 4 of this project.

(PRINT NAME)	
Signature of Participant:	Date:
Email address:	

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Appendix C - Instructions

Instructions

I, Dain Thomas (PhD student), confirm that my supervisor, Prof. Gobinda Chowdhury, has seen and accepted my planned study and the ethics application for phase 1.

Phase 1

- Read Information Sheet and Privacy Notice. Ask questions if there are any doubts.
- Sign the consent form. A participant can only take part in the study if the consent form is signed.
- Phone/laptop will be used to record the interview (only voice recordings, video is not taken).
- Duration of the interview is approximately 30 minutes.
- Questions are related to online financial activities.
- Masks will be worn, if required.

Appendix D – Personas

Persona 1

Name: Chen Yang

Age: 68

Gender: Female

Ethnicity: Chinese

Occupation: retired in 1990; used to work as a pharmacist in China

Marital status: Married

Chen came to UK from China to babysit her grandkids while her daughter and son-in-law are away to work. She received education from secondary school. She doesn't know how to use technology; therefore, she always needs help from another person. Her daughter buys clothes for her from online websites; she sits with her to show each item, once she's happy with the chosen items, her daughter buys it for her. She doesn't leave the house for anything and she's not fluent with English language.

The only app she uses is WeChat but her digital skills are really low. She knows how to click links in messages and how to take photos/videos of her grandkids and post it on group chat. In China, she always uses cash for everything. She's adequate with personal finances as she saves a lot of money; she doesn't like spending too much. There's always someone to assist her so she believes that there's no need to learn digital skills and her patience level is low so it is difficult to teach her about technology.

Goals:

- Become more independent by using online shopping websites without anyone's help.
- Obtain basic digital skills to carry out online activities in the easiest way possible as the patience level is low.

Persona 2

Name: Rajiv Sharma

Age: 80

Gender: Male

Ethnicity: Indian

Occupation: worked at shops, street lighting etc.

Marital status: Married

Rajiv was born in a rich family in India and he moved abroad after marriage as his wife was residing in UK. Although his first language is not English and he left school at the age of 16 after passing school leaving exams from India, he has a good proficiency in the English language. When he moved to UK, he did various jobs such as street lighting, Asian shops and family business. He faced a lot of racism and people treated him badly.

Higher education was not something he wanted to pursue and he has never used a computer or smartphone to conduct any online activities. He lost confidence once he was asked to stay inside the house during pandemic. Lack of confidence is one of the factors which prohibited him from using technological devices.

Rajiv stopped working prior to retirement; he has some health issues such as heart problems, depression, cancer and COPD. He also takes care of his wife who is housebound. His daughter, who's in her 50s, handles all their digital services in her own house including insurance policies as they do not have Wi-Fi. He and his wife live by themselves in a tenement flat. Rajiv travels to the bank to carry out his banking tasks as he does not use online banking.

Goals:

- Acquire digital skills in order to use computer/smartphone.
- Learn how to conduct online banking and online insurance policies.
- Increase confidence.

Persona 3

Name: Kunti Sharma

Age: 77

Gender: Female

Ethnicity: Indian

Occupation: Housewife

Marital status: Married

Kunti was in India until the age of 15 and she had limited education; she only went to school for approximately 5 years due to safety issues in villages. After moving to UK with her parents, she did not continue her education as she already passed the education age. Kunti went to India to get married when she was 20 and came back as her parents were in the UK and then her husband came. Despite being in the UK for a long time, she's not fluent in the English language. Therefore, her daughter, who's in her 50s, usually seeks interpreting services to assist her mother with GP appointments. She has three kids and she spent the majority of her life spending time looking after her grandchildren. Thus, she didn't have much time to learn about technology. She doesn't have any issues with problem solving or understanding anything; sometimes her language just holds her back.

She is considered to be part of the second generation as her parents initially moved to the UK, making them the immigrants of first generation. She became a housewife after getting married. She only uses landline phone and she hasn't used a computer or smartphone and she doesn't have access to Wi-Fi. Her daughter takes care of their online services such as contents insurance. Kunti doesn't have her own bank account but she lives with her husband who has an account. She has Parkinson's, a broken hip and faces some mobility issues. Hence, she's housebound; her husband takes care of her and they live together in a tenement flat. She hardly goes outside due to her health problems. Pandemic and health issues have had a negative impact on her confidence.

Goals:

- Overcome language barrier and acquire digital skills in order to use computer/smartphone.
- Learn how to conduct online insurance policies.
- Increase confidence.

Persona 4

Name: Kwame Adu

Age: 65+

Gender: Male

Ethnicity: Black British

Occupation: used to work in military in Ghana; currently working in UK.

Marital status: Married

Kwame migrated to UK about 30 years ago (first generation). He was in the military in Ghana. He lives with his wife and they have kids who have all moved out.

He seeks help for online financial services from a student who he met in a church. Kwame travels to his house whenever he requires assistance with digital services. He uses two mobile apps to carry out banking activities. However, sometimes he becomes confused by terminology and processes such as OTP. He uses a really large font size. In Bank of Scotland app, it asks for password and memorable information. He couldn't differentiate between these two; therefore, the student taught him how to use fingerprint (biometric) to prevent him from typing the memorable information every time he logs in. He's intimidated by the complicated processes. Hence, there is a lack of confidence.

Kwame is a good learner; he takes notes while the student demonstrates the processes to him and after that he doesn't need help. He gives an attempt by himself using the instructions he wrote down. He doesn't have language issues as his first language is English. As part of his job in UK, he has to send a lot of emails so he has some basic digital skills and these skills were mostly acquired beforehand. But whenever he needs help, he would ask the student as he fully trusts him.

Goals:

- Understand the difference between password and memorable information.
- Overcome terminology issues.
- Increase confidence on the use of online banking apps.

Persona 5

Name: Felicia Ansah-Kumi

Age: 65+

Gender: Female

Ethnicity: Black British

Occupation: Nurse

Marital status: Married

Felicia, who migrated from Ghana (first generation) is currently working as a nurse in the UK. Her first language is English. She is married and has kids. Kids have moved out and she does not have any digital skills so she approaches a student for help with money transfer app, Lemonade Finance app. Felicia and the student became friends by attending the same church.

In order to conduct international money transfers, there should be sufficient funds in the app account. Funds can be added through the app. Felicia was scared to carry out this process. She was confused; she wasn't sure why money had to be added to her account in the app before sending money over to Ghana. She thinks that the money would go somewhere else instead of her own account.

Felicia is a good learner as she writes down all the instructions on how to carry out online financial processes. But she still meets the student when she needs assistance with the app.

Goals:

- Acquire digital skills in order to conduct monetary transactions without relying on another person.
- Increase confidence.

Persona 6

Name: Kojo Asante

Age: 65+

Gender: Male

Ethnicity: Black British

Occupation: Security

Marital status: Married

Kojo works as security in UK. He migrated from Ghana (first generation) and he is currently living with his wife. His first language is English. They have kids but they all moved out. Kojo does not have any digital skills so sometimes he requires additional help to conduct digital financial services. In terms of prior technological experience/knowledge, he doesn't use a lot of online services as he works as a security. He met a student in a church they regularly attend. He goes to student's residence whenever he needs assistance with the app that he uses for international money transfers.



Kojo was not sure how to conduct the signup process in the app. He had to enter information such as first name, surname, date of birth and had to enter a password with special characteristics. He found it quite difficult to comprehend this. In his first attempt, an error was displayed so the student had to create a password for him. For the verification part, an ID card had to be provided; he thought he could use any ID card. These were some of the challenges he encountered while using the app.



He writes down all the instructions when the student is demonstrating the processes on the app. He is not scared to carry out the transactions but his lack of digital skills prevent him from confidently carrying out the processes by himself.

Goals:

















- Enhance confidence by acquiring the digital skills required to use the app without assistance from another person.
- Learn how to create password during signup process.
- Learn how to upload the relevant ID document for verification

Appendix E – NVivo Coding
















codes-Pakistanis			
 Name		Files	References
 Challenges		0	0
○ abuse		1	1
○ attitude		1	1
○ disabilities		2	5
○ fear		3	11
○ lack of confidence		1	1
○ lack of digital skills		2	8
○ lack of education		1	1
○ lack of experience or knowledge		2	3
○ lack of help		1	3
○ lack of interest		2	5

Indians			
 Name		Files	References
 Challenges		0	0
○ abuse		1	1
○ attitude		1	1
○ cultural traits		1	1
○ disabilities		1	5
○ fear		3	16
○ interface issues		1	1
○ isolation		1	2
○ lack of access		1	2
○ lack of awareness		1	1
○ lack of confidence		4	7
○ lack of digital skills		1	1
○ lack of experience or knowledge		1	1
○ lack of interest		2	2
○ language difficulties		1	1

Scottish

  Name	 Files	References
  Challenges	0	0
 fear	4	12
 interface issues	4	13
 lack of concentration	1	1
 lack of confidence	3	6
 lack of digital skills	2	5
 lack of experience or knowledge	3	7
 lack of help	2	3
 lack of interest	3	7
 lack of satisfaction	1	1
 learning difficulties	1	1
 overwhelming	1	1

Chinese

  Name	 Files	References
  Challenges	0	0
 attitude	5	10
 fear	5	18
 interface issues	1	1
 lack of confidence	3	4
 lack of digital skills	5	14
 lack of experience or knowledge	4	4
 lack of interest	2	2
 language difficulties	3	13
 learning difficulties	1	1
 overwhelming	1	1

Codes Search Project

Name	Files	References
lower income	1	3
frustration- (older p	1	2
learning difficulties	1	1
addiction	1	1
abuse	1	2
hesitance	2	4
lack of concentratio	2	2
isolation	2	6
lack of interest	2	3
trust	2	5
language difficulties	2	4
lack of confidence	3	4
fear	3	12
interface issues	3	5

lack of concentration

<Files\Phase1-EmployeesInterviews\P1[6-9-22]> - \$ 1 reference coded [0.30% Coverage]

Reference 1 - 0.30% Coverage

Just because I think anything more than an hour, then people start to lose concentration.

<Files\Phase1-EmployeesInterviews\P2[31-08-22]> - \$ 1 reference coded [0.97% Coverage]

Reference 1 - 0.97% Coverage

That's quite a good time, because a lot of them.

11:15

Sorry, I got another call. And that's a good amount of time, because after an hour, they lose attention. So we don't want to keep it going on for too long as well.

DigitalCarers Search Project

Name	Files	References
learning difficulties	1	1
attitude	1	1
fear	1	3
interface issues	1	5
lack of access	1	2
disabilities	1	2
cultural traits	1	1
lack of education	1	1
lack of patience	1	1
language difficulties	2	2
lack of confidence	2	4
isolation	2	2
lack of digital skills	2	4
lack of help	2	3
lack of experience or knowledge	3	9

lack of digital skills

<Files\Phase1-DigitalCarers\P2[09-05-23]> - \$ 2 references coded [0.48% Coverage]

Reference 1 - 0.17% Coverage

it was a husband and wife, again from church.

Reference 2 - 0.32% Coverage

so for those ones let me see in terms of their digital skills, I think its almost none.

<Files\Phase1-DigitalCarers\P3[09-05-23]> - \$ 2 references coded [1.49% Coverage]

Reference 1 - 0.98% Coverage

Well, with my parents, I just, I just find they don't really have a clue about anything online, you know, they don't really know how to use any technologies. I mean, you know, they don't know how to access PC, they don't know how to get onto social media, they don't know how to, you know, like, send an email, they don't know anything about that at all.

Reference 2 - 0.51% Coverage

Indians Search Project

Name	Files	References
Challenges	0	0
attitude	1	1
disabilities	1	5
interface issues	1	1
lack of digital skills	1	1
lack of experience or knowledge	1	1
language difficulties	1	1
isolation	1	2
cultural traits	1	1
lack of access	1	2
lack of awareness	1	1
abuse	1	1
lack of interest	2	2
fear	3	16
lack of confidence	4	7

fear

<Files\Phase1-FirstLanguageIsNotEnglish\P1[10-05-23]> - \$ 5 references coded [11.31% Coverage]

Reference 1 - 5.03% Coverage

Is there any reason why you don't do online shopping?

03:39

Because I'm not used to. Have you tried using it before? I learned how to do shop online. But I just started doing it on the phone. When to the point. Put the things in basket then after that I stopped.

04:02

Okay, good. Okay. Yeah. Okay, so I guess you were scared? Yes. Yes. Yeah.

04:12

No confidence.

04:13

Confidence Yeah. Okay.

CODE STRIPES

- advantages
- interface issues
- previous financial scams
- internet banking
- lack of confidence
- online shopping

Coding Density

Appendix F – Theoretical Tool

This theoretical tool uses qualitative data to provide a quantifiable understanding of the factors that contribute to the challenges confronted by older people aged 65 and over. The intention is to map any persona or transcript to this tool to measure the issues experienced by the individual and establish possible solutions to aid older people in the use of online financial services.

Exploiting this tool would allow intermediaries to develop new policies/strategies to assist vulnerable people in the society. Moreover, it could lead to making amendments to existing products/services. Also, stakeholders such as organisations and digital carers could produce potential interventions through the utilization of this tool which may contribute to reducing digital exclusion. Not only would this tool identify the factors which could impede older people from the adoption of digital financial services but it would also help to quantify the barriers in order to recognize whether a solution is required for an individual. A tangible impact could be produced through this novel tool which could address the challenges confronted by older people.

A table demonstrating the 10 factors and the associated scale is shown in Table 1 below.

Table 1. Theoretical tool

	<u>Scale</u>					
<u>Factors</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Support						
Formal Education						
Language						
Basic digital skills						
Technology experience in occupation						
Disabilities						
Financial literacy						
Confidence						
Access to equipment/connection						
Fear						

Scale Factors

This section will briefly elucidate the justifications for the inclusion of each attribute portrayed in Table 1 and the semantics of the numbers involved in the scale.

A score of 5 is the maximum value that could be given to a factor and a score of 0 is the minimum value. For instance, a score of 5 for the 'basic digital skills' factor indicates that the person has all the essential digital skills whereas a score of 0 denotes that the individual does not possess any basic digital skills.

Support: Receiving informal support (family, friends or relatives) or formal support (organisations, community centres) could facilitate older people to learn and understand technology. However, this could also mean that they might not carry out the tasks by themselves due to additional support.

A scale of 0: I am significantly dependent on formal/informal support.

A scale of 1: I am moderately dependent on formal/informal support.

A scale of 2: I am somewhat dependent on formal/informal support.

A scale of 3: I am partially dependent on formal/informal support.

A scale of 4: I receive a low level of digital help through formal/informal support.

A scale of 5: I do not receive any formal or informal support for online financial services i.e. I can use digital financial services completely independently.

Formal education: this is a factor that can influence older people's adoption of internet; people with higher education utilizes internet (Lissitsa and Chachashvili-Bolotin, 2015). Someone with a higher level of education may have better learning skills and is more likely to adopt online financial services unless other factors prevent them from using these services, for example, fear.

A scale of 0: no education

A scale of 1: primary education

A scale of 2: secondary education/college

A scale of 3: bachelor's degree

A scale of 4: post graduate degrees

A scale of 5: three or more university degrees

Language: people whose first language is not English may encounter language issues in the use of ICT (information and communication technology) (Goodall et al., 2010). Therefore, this factor could have an influence on the adoption of online financial services.

A scale of 0: I am not good at reading, writing or speaking in the English language.

A scale of 1: I am only partially good at writing in English.

A scale of 2: I am only partially good at speaking in English.

A scale of 3: I am only partially good at reading in English.

A scale of 4: I am only partially good at reading, writing and speaking in English.

A scale of 5: I have good proficiency in the English language.

Basic digital skills: UK's Department for Education produced a framework which highlights the five essential digital skills that are crucial for life: communicating (e.g., WhatsApp), handling information and content (e.g., using a browser to search information), transacting (e.g., online banking, e-commerce), problem solving (e.g., watching online videos to find a solution, using online chat facilities), being safe and legal online (e.g., not posting anything on online about others without their consent, not sharing login details with anyone) (Department for Education, 2022).

A scale of 0: I do not have any of the five digital skills listed above.

- A scale of 1: I have one out of five digital skills listed above.
- A scale of 2: I have two out of five digital skills listed above.
- A scale of 3: I have three out of five digital skills listed above.
- A scale of 4: I have four out of five digital skills listed above.
- A scale of 5: I have all the essential digital skills listed above.

Technology experience in occupation: individuals with a high-level occupation are more likely to use online banking (Karjaluoto et al., 2002). This denotes that people who had technological experience in their workplace have higher likelihood of adopting digital financial services unless other barriers are preventing them from using such services.

UK's Department for Education mentions additional digital skills for work: communicating (e.g., sending emails to co-workers and sharing documents with them), handling information and content (e.g., using a calendar to keep track of the schedule), transacting (e.g., analysis of digital payslips), problem solving (e.g., using software to resolve problems at work), being safe and legal online (e.g., reporting dubious emails to the appropriate team at the workplace) (Department for Education, 2022).

- A scale of 0: I do not have any of the five work-related digital skills listed above.
- A scale of 1: I have one out of five work-related digital skills listed above.
- A scale of 2: I have two out of five work-related digital skills listed above.
- A scale of 3: I have three out of five work-related digital skills listed above.
- A scale of 4: I have four out of five work-related digital skills listed above.
- A scale of 5: I have all the essential work-related digital skills listed above.

Disabilities: individuals with disabilities have major difficulties in using internet (Zhang et al., 2016). This emphasizes the need to develop inclusive solutions which, in turn, suggests that disability is a factor which could contribute to the barriers in the use of digital financial services.

- A scale of 0: I have significant health issues/disabilities which completely prevents me from using online financial services.
- A scale of 1: I have major difficulties in using the online financial services due to health issues/disabilities but I can use these services through additional support e.g., friends, family etc.
- A scale of 2: I have major difficulties in using the online financial services due to health issues/disabilities but I can use these services without additional support.
- A scale of 3: I face minor difficulties in using the online financial services due to disabilities/health issues.
- A scale of 4: I have a number of health issues/disabilities which may not prevent me from using online financial services.
- A scale of 5: I do not have any disabilities/health issues.

Financial literacy: this factor is associated with the knowledge and skills required to evaluate and use financial products which would help them to manage their personal finances efficiently, for example, savings, budgeting, investment, loans etc (Capuano and Ramsay, 2011). In this tool, not using digital financial services suggest that the individual inherits a financial loss from travelling to banks, shops etc which, in turn, means that their financial literacy skills are low.

A scale of 0: I do not possess any financial literacy skills.

A scale of 1: I extremely rarely use digital financial services; therefore, my financial literacy skills are very low.

A scale of 2: I rarely use online financial services; therefore, my financial literacy skills are low.

A scale of 3: I use online financial services occasionally; therefore, my financial literacy skills are below average.

A scale of 4: I use online financial services frequently; therefore, my financial literacy skills are average.

A scale of 5: I have significant financial literacy skills as I always use a variety of online financial services.

Confidence: older people lack confidence in using the internet (Lam and Lee, 2006). Thus, it is vital to include this as a factor as this challenge could be addressed through the use of this tool.

A scale of 0: I do not have any confidence in using online financial services.

A scale of 1: I am slightly confident in using online financial services.

A scale of 2: I am somewhat confident in using online financial services.

A scale of 3: I am moderately confident in using online financial services.

A scale of 4: I am very confident in using online financial services.

A scale of 5: I am significantly confident in using online financial services.

Access to equipment/connection (e.g., laptop/smartphone/WIFI): some people may not have access to the internet due to the cost of equipment/connection which would hinder them from accessing digital financial services (Hayes and Martin, 2007). Thus, this is a factor which has to be taken into consideration. According to Ofcom report, 34% of people aged 65 and over do not have access to internet at home in the UK whereas only 1% of 18-24 age group, 1% of 25-34, 3% of 35-44, 2% of 45-54 and 3% of 55-64s do not have internet access at home (Ofcom, 2022).

A scale of 0: I do not have any reliable access to a device and internet connection to use digital financial services.

A scale of 1: I have very little access to a reliable device and internet connection.

A scale of 2: I have some, but not always reliable, access to a device and internet connection.

A scale of 3: I have good access to a reliable device and internet connection.

A scale of 4: I have very good and reliable access to a device and internet connection.

A scale of 5: I have excellent and very reliable access to a device and internet connection.

Fear: this is a common challenge among older people in the use of online financial services. Older people perceive that they'll make mistakes (Lam and Lee, 2006). There could be several reasons why their fear acts as a barrier such as prior experience of financial scams and fear of losing money.

A scale of 0: I have extreme fear when using online financial services or I do not use such services due to my extreme fear.

A scale of 1: I have significant fear when using online financial services.

A scale of 2: I have moderate fear when using online financial services.

A scale of 3: I have somewhat fear when using online financial services.

A scale of 4: I have slight fear when using online financial services.

A scale of 5: I have no fear when using online financial services.

Sometimes factors 'Fear' and 'Confidence' cannot be quantified easily if the individual does not use online financial services or if they have a lack of interest in technology. In this case, other factors could be reviewed to generate a score for 'Fear' and 'Confidence'. For example, a score of 0 could be given for both factors if they received a score of 0 for 'Language' and/or a score of 0 for 'Support' as this indicates that they are receiving immense support from others to carry out digital financial services.

This scale was applied to persona shown in Figure 1. See Figure 2 for the scores given to each factor and the corresponding justifications.

Name: Aamina Muhammed
Age: 70+
Gender: Female
Ethnicity: Pakistani
Occupation: No job; never worked
Marital status: Married

Aamina is part of first generation who migrated to UK with her husband from Pakistan at a young age. She lived majority of her life in UK and she's not educated (i.e., no school/university education). She encountered some domestic violence and she lives by herself. She always needs someone to aid her with online activities. Aamina has children who are in their 40s now.

Aamina is adequate with English language but she is autistic and she has severe anxiety. Therefore, she had difficulties in communicating with people around her. Due to her health condition, staff from mental health organisation provided long explanations to teach her digital financial services. Yet, she had difficulties to comprehend everything in general.

Staff goes to her house three times a week for two hours. If she wanted help with bank-related tasks then she would have to go to the bank to deal with it which consumes a lot of her time. Then she wouldn't have assistance with anything else. Someone told her about online banking and she receives help from staff on digital banking services. Since she doesn't have any digital skills, she faced many issues. For example, she paid for an expensive TV package. Staff told her about how she could receive basic packages online. But she doesn't trust it; she's happy with what she knows. She doesn't want to phone them up as this could lead to other problems. Aamina wouldn't leave the house without the staff; she always stayed in the house.

She relied on state benefits as she never worked in the UK before. Aamina was being looked after by the state as her children were all grown up. She had a daughter who was in her 30s. She went to university and she also had mental health issues like her mother. She helped her with all the online tasks. Unfortunately, she passed away in 2020 and Aamina lost all the support from the one person who used to help her with everything.

Even though Aamina receives assistance from organisation, she still hasn't been able to grasp the digital skills due to her mental health; she has a routine that she follows. If anything changes, she won't be able to cope really well.

Goals:

- Become more independent by learning some useful services, for example, online TV packages, online banking which could facilitate day to day life.
- Increase trust on online services.

Figure 1: Persona

<i>Scale</i>						
Factors	0	1	2	3	4	5
Support	0					
Formal Education	0					
Language						5
Basic digital skills	0					
Technology experience in occupation	0					
Disabilities		1				
Financial literacy		1				
Confidence	0					
Access to equipment/connection						5
Fear	0					

Support – 0 - because she lives by herself. She had a daughter who used to help her but she passed away in 2020. She doesn't receive help from family. She completely relies on the organisation.

Formal Education – 0 – never had any education.

Language – 5 - she's good with English.

Basic digital skills – 0 – no digital skills.

Technology experience in occupation – 0 – never worked in the UK.

Disabilities – 1 – mental health issues. She follows a strict routine.

Financial literacy – 1 – she started to use digital financial services through the assistance provided by staff.

Confidence – 0 – still receives help from staff on online services.

Access to equipment/connection – 5 – she uses digital banking services. Hence, she has access to equipment.

Fear – 0 – she's scared if she will fall into other problems by dealing with online services.

Fig. 1. Tool applied to persona

- **This is a subjective tool; therefore, individual judgement, reasoning and perceptions are required to generate a score for each factor.**
- If there are difficulties in providing a score for a factor then please leave it blank.

A guide to developing potential interventions

Although the theoretical tool shown in Table 1 has 10 factors, it is not feasible to develop inclusive solutions for each factor that would be useful for every older person. A concrete solution could not be created for factors such as formal education, technology experience in occupation and disabilities – these 3 static factors cannot be improved through solutions, for example, education – an older person's formal education cannot be enhanced; they either received higher secondary education or not.

Potential interventions could be developed to increase formal/informal support, reduce fear and elevate an individual's confidence in the use of digital financial services to some extent. However, instead of creating a solution for each factor where the individual encounters challenges, assess the scores that the individual gained for basic digital skills, access to

equipment/connection, language and financial literacy as conclusive interventions could be developed for these 4 factors. All the other 6 factors could act as indicators which would determine the ideal solution(s) required for the individual's challenges surrounding the 4 main factors.

For instance, see the quantified factors in Figure 2 shown above. 2 out of the 4 main factors have relatively low scores – these factors are basic digital skills and financial literacy. Therefore, an online tool, training or other relevant interventions would be required to enhance these skills in the individual. Having said that, the scores obtained for the other factors demonstrate that she's experiencing some issues such as lack of confidence, fear, disabilities etc. Hence, additional support would be required from organisations. Digital support from organisations would be essential if the developed online tool is a solution as the individual does not receive family support. Also, the online tool should be user-friendly and not complicated as the individual did not receive any education and does not have any prior technological experience. The tool itself could have interfaces where it clearly explains how to improve financial literacy skills, information related to training and step-by-step instructions etc. As well as this, a number of training sessions could increase the individual's confidence and fear. Even though these solutions seem beneficial, the individual has mental health issues which could prevent them from increasing their digital skills fully. Nevertheless, through the assistance of mental health organisation and other relevant interventions, the individual could learn about online banking and other digital financial services.

Customised/personalised solutions can have varying levels of help or tasks, for example, training sessions could have 'beginner' levels for people who received a score of 0 for basic digital skills and financial literacy skills; 'difficult' levels could be incorporated for those who experience fewer complexities. Prioritising the solutions by assessing the 6 factors would lead to a better impact than developing one main solution for all 10 factors. In this way, digital inclusion would be facilitated.

Workflow

The steps required to carry out this theoretical tool is briefly shown below in Figure 2.

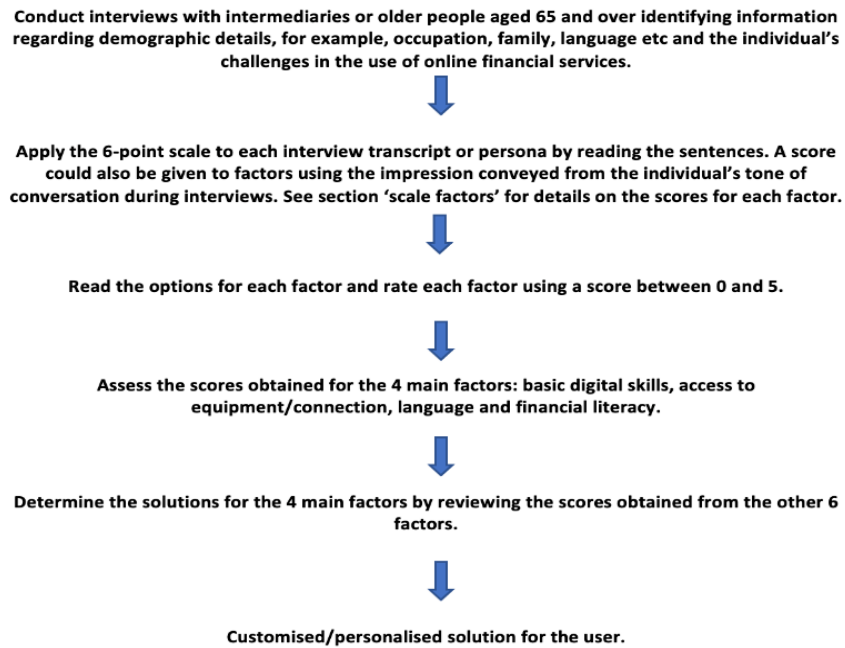


Fig. 2. Workflow

In addition to the technique mentioned above, cumulative scores could also be utilised to generate interventions. Cumulative score is the sum of all the scores added up for the ten factors. The higher the cumulative score, the lower the barriers that each individual faces with digital financial services. The maximum score an individual can gain is 50; therefore, any score above 25 could be considered as a threshold for deciding the type of intervention(s) required for the individual. An older person who receives a score below 25 may require basic interventions and anyone who receives a score above 25 could commence with an 'intermediate' level and then gradually transition to 'difficult' levels of the developed solution.

Moreover, the cumulative scores could be used to distinguish older people with major and minor barriers within a specific ethnic minority population. This would be advantageous for an organisation as this could assist them in identifying the individuals who require additional support within a cohort.

Another efficient method to create interventions would be using the populated tables to examine the barriers that are prevalent across the board irrespective of ethnicity and gender or the tables could be utilised to focus on a specific ethnic minority group to recognise the common barriers within the group. In this way, common patterns that are emerging can be identified easily and this would give additional insight into the area of digital financial services.

Leveraging this novel tool would produce a real impact by addressing the issues experienced by older people. Thereby, further development can emerge in various areas, for example, technological development, skills development and formal/informal support development. As more people begin to utilise this tool, the challenges faced by older people aged 65 and over would be recognised and the creation of beneficial interventions would motivate people to utilise digital financial services.

Appendix G – Populated Tables

Participant S2

<i>Scale</i>						
Factors	0	1	2	3	4	5
Support			2			
Formal Education			2			
Language						5
Basic digital skills				3		
Technology experience in occupation			2			
Disabilities						5
Financial literacy					4	
Confidence				3		
Access to equipment/connection						5
Fear				3		

Justification

Support – 2 – lives with her husband who helps her with online transactions.

Education – 2 – high school

Language – 5 – no language issues.

Basic digital skills – 3 – uses various websites but requires reassurance from husband before conducting transactions.

Disabilities – 5 – no disabilities.

Technology experience in occupation – 2 – used a computer at a workplace; used to work as a social worker prior to retirement. *"We used the computer in work, to write up reports and read files and things like that. But no, I don't think that. I think using a mobile phone is totally different from using a computer."*

Financial literacy – 4 – conducts minor banking related activities (e.g., account balance, direct debits, transactions) through online banking. Utilizes online websites -> saving money on the expenses linked with travelling to banks, shops etc.

Confidence – 3 – getting better at online websites. *"I'm becoming more familiar with some. So, I'm now becoming more confident doing it than I would have been maybe a year ago, two years ago"*.

Access to equipment/connection – 5 – uses a smartphone.

Fear – 3 – *"Yeah, I would always be very wary of doing anything. I wouldn't really do anything on my own I would get the reassurance of my husband, or my son to make sure that it's not a scam."* *"Yeah, just the fear of pressing that last button"*.

Participant S3

	<u>Scale</u>					
<u>Factors</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Support	0					
Formal Education			2			
Language						5
Basic digital skills				3		
Technology experience in occupation	0					
Disabilities						5
Financial literacy			2			
Confidence			2			
Access to equipment/connection						5
Fear		1				

Justification

Support – 0 – she receives a lot of help from her sons on online financial services.

Education – 2 – high school.

Language – 5 – no language issues.

Basic digital skills – 3 – uses shopping websites but requires help from others, deals with emails, deletes scam emails, capture/send pictures. *“I’m not particularly good. I can do a certain amount. But I get stuck at times.”*

Disabilities – 5 – no disabilities.

Technology experience in occupation – 0 – no prior experience. Used to work as a nursing assistant until retirement.

Financial literacy – 2 – doesn’t use internet banking -> losing money on the expenses linked with travelling to banks, post office etc. Takes euros and gives it to family members to give grandchildren abroad. She does carry out online shopping expect the transaction part and her sons deal with insurance policies.

Confidence – 2 – *“I carry out online shopping on somethings small items. And big items. I before I press the final button, I always get one of my family to check it out for me, because I’m not really confident about it.”*

Access to equipment/connection – 5 – uses an iPad

Fear – 1 – *“I’m always worried about scams. So very often I, I confirm with one of my family, like, before I finally press the send button, whatever, because I’m never really sure to be honest with you.”*

Participant C1

	<u>Scale</u>					
<u>Factors</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Support	0					
Formal Education				3		
Language					4	
Basic digital skills				3		
Technology experience in occupation			2			
Disabilities						5
Financial literacy	0					
Confidence			2			
Access to equipment/connection						5
Fear	0					

Justification

Support – 0 – *“definitely 100% depending on her husband but in the future if her husband is no longer here, her daughter will help her and friends will also help her as well.”*

Formal Education – 3 – university – bachelor’s degree

Language – 4 – only partially good at reading, writing or speaking in English. (Even though an interpreter was asking the questions, she understood what the researcher was saying and tried to say a few answers.)

Basic digital skills – 3 – uses WhatsApp, google maps, *“She will use the default apps in apple.”*

Technology experience in occupation – 2 – used to work as an interpreter. *“I think her agency’s website is online and then she’ll have to use the website to see what time she’s going to what appointments.” “...and she’ll send emails to them?...Yeah.”*

Disabilities – 5 – no disabilities.

Financial literacy – 0 – doesn’t use any online services; husband does all the digital financial services for the participant. *“When it comes to any online stuff her husband does most of the... he has a responsibility to do a lot of stuff even when it comes to...so she will make the call herself but when needed online services her husband will deal with everything.”*

Confidence – 2 – *“so confidence wise, she’s 50%. So, when she has to use it she’s maybe not the most confident but she will probably do it but she doesn’t feel the need to use online stuff.”*

Access to equipment/connection – 5 – participant has access to equipment/connection.

Fear – 0 – *“...with online shopping she tried to kind of buy something from online but she asked her husband to check it through for her. She didn’t actually click checkout so she never purchased anything but her husband was saying that she ordered everything completely wrong. So that was like the first and the last time.”*

- *“so, she’s a little bit scared. But mostly because she’s quite a clumsy person. She tends to make a lot of mistakes, especially online. And when it comes to online, it’s harder to kind of fix that mistake.”*

Participant C2

Scale						
Factors	0	1	2	3	4	5
Support	0					
Formal Education		1				
Language	0					
Basic digital skills			2			
Technology experience in occupation	0					
Disabilities						5
Financial literacy	0					
Confidence	0					
Access to equipment/connection						5
Fear	0					

Justification

Support – 0 – she lives alone. She's a divorcee. "So, most of the time, she will ask people from here Wing Hong to buy insurance for her and she'll just give them the money, but they will be the one to buy stuff online for her. And then sometimes she also ask her son to do it."

"Sometimes he doesn't pick up her calls, doesn't answer her quick enough then she'll come to Wing Hong so they always help a lot."

Formal Education – 1 - primary school

Language – 0 – "She can't really write a lot and she also is really bad at spelling. Speaking wise again, she's quite poor at speaking. And often when it comes to reading, she has learned to read the essential subs like when it comes to doctors letters, she will know how to...she'll read that."

Basic digital skills – 2 - "language barrier and also she's not familiar with phones, laptops this digital technology in general...so both are challenges." She uses WeChat, Facebook, WhatsApp, google for translation, weather app, YouTube videos.

Technology experience in occupation – 0 – used to work in a kitchen at a takeaway shop, didn't use technology at workplace.

Disabilities – 5 – no disabilities.

Financial literacy – 0 – doesn't use any online services; no online shopping, nothing. "so online banking always in person. She's never tried to even call them never tried online banking its always in person. She goes into a bank and do all her stuff." Reason: "So it's just language barrier and also she's unfamiliar with the online technologies."

Confidence – 0 – "she's not very confident she's quite scared of getting scammed."

Access to equipment/connection – 5 – participant has access to equipment/connection.

Fear – 0 – "she's really scared of being scammed." ".....doesn't know how to use technology at all and also the fear as well." "She's had experiences with online scamming before."

Participant C3

<i>Scale</i>						
Factors	0	1	2	3	4	5
Support					4	
Formal Education				3		
Language						5
Basic digital skills						5
Technology experience in occupation	0					
Disabilities						5
Financial literacy						5
Confidence						5
Access to equipment/connection						5
Fear					4	

Justification

Support – 4 – husband deals with insurance policies and transport service tickets but she could do it if she wanted to.

Formal Education – 3- university degree from Hong Kong.

Language – 5 – knows how to read, write and speak in English. Participant spoke in English without interpreter's help.

Basic digital skills – 5 – uses chat feature on banking website when stuck. Carries out transactions and transfers money between accounts. Uses WhatsApp and WeChat.

Technology experience in occupation – 0 – used to work as an interpreter, didn't use technology at workplace.

Disabilities – 5 – no disabilities.

Financial literacy – 5 – does online shopping, online banking. *"I pay my credit card by direct debit. So, I usually just check whether I've got enough money in the current account to pay the credit card."*

Confidence – 5 – very confident to use online financial services and to tackle any issues.

Access to equipment/connection – 5 – participant has access to equipment/connection.

Fear – 4 – *"just need to be cautious about what website I use."*

- *"When I tried to renew my driving license...I went to the website and pressed the first one that came because it's like a government website. But that was a scam."*

Participant C4

	<u>Scale</u>					
<u>Factors</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Support	0					
Formal Education		1				
Language	0					
Basic digital skills		1				
Technology experience in occupation	0					
Disabilities						5
Financial literacy	0					
Confidence	0					
Access to equipment/connection						5
Fear	0					

Justification

Support – 0 – her kids help her out with all the online financial services.

Formal Education – 1 – middle school in Hong Kong.

Language – 0 – *“So first of all the language barrier, she doesn’t speak English.”*

Basic digital skills – 1 – online shopping – she won’t do it by herself *“she will ask her daughter to help her.”* She hasn’t done any online transactions because she hasn’t learned it yet. House insurance – *“her son will deal with everything.”* *“When it comes to train tickets, flight tickets her daughter her kids will buy it for her.”* She uses WhatsApp; *“her phones sole purpose is for her to communicate with her friends and her kids and occasionally if they don’t have a lot to talk about then text.”*

Technology experience in occupation– 0 – she was a housewife.

Disabilities – 5 – no disabilities.

Financial literacy – 0 – doesn’t use any online services; *“she doesn’t do online banking at all.”* She goes to Bank of China to carry out banking activities.

Confidence – 0 – *“she doesn’t have confidence because she’s literally unaware.”* She doesn’t have the confidence to do any tasks.

Access to equipment/connection – 5 – participant has access to equipment/connection.

Fear – 0 – *“...if I do use it through my kids, there’s no fear because she trusts her kids.”* However, she hasn’t used the services yet and she receives immense support from her kids. Also, language is a barrier.

Participant C5

<i>Scale</i>						
Factors	0	1	2	3	4	5
Support	0					
Formal Education	NIL	NIL	NIL	NIL	NIL	NIL
Language						5
Basic digital skills			2			
Technology experience in occupation	0					
Disabilities						5
Financial literacy	0					
Confidence	0					
Access to equipment/connection						5
Fear	0					

Justification

Support – 0 – lives with husband. Husband and children does everything for her.

Formal Education – participant didn't want to mention it.

Language – 5 – knows how to read, write and speak in English. Participant spoke in English without interpreter's help.

Basic digital skills – 2 – uses WhatsApp and Google maps. Doesn't use any online financial services. *"Because my son work in technology. So, he told me, just delete and report."*

Technology experience in occupation – 0 – used to work as an interpreter, didn't use technology at workplace.

Disabilities – 5 – no disabilities.

Financial literacy – 0 – doesn't use any online services; husband and children does all the digital financial services for the participant.

"my husband, he deals with that sort of things. I just, I just concentrate on living."

Income before retirement? - *"my husband deal with this sort of things. I just work."*

Confidence – 0 – *"are you confident to use website? No"*

Access to equipment/connection – 5 – participant has access to equipment/connection.

Fear – 0 – *"I don't trust all those technology things. Right? Yes. Okay, because you hear all those scary stories."*

Participant P1

<i>Scale</i>						
Factors	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Support	0					
Formal Education		1				
Language			2			
Basic digital skills	0					
Technology experience in occupation	0					
Disabilities	0					
Financial literacy	0					
Confidence	0					
Access to equipment/connection						5
Fear	0					

Justification

Support – 0 – lives with kids’ family – a multigenerational household. Kids do everything for him.

Formal Education – 1 - primary school

Language – 2 – needed an interpreter to answer the questions but he could understand and partially speak in English.

Basic digital skills – 0 – doesn’t use technology at all. *“Not really interested to use it.”*

Technology experience in occupation– 0 – he was a shopkeeper, didn’t use technology at workplace.

Disabilities – 0 – he has dementia.

Financial literacy – 0 – doesn’t use any online services; wife and kids do all the digital financial services for the participant. His family deals with his bank account.

Confidence – 0 - he has never used technology. However, a score of 0 was given as he is receiving immense support from family. Also, his basic digital skills are low. He also has disabilities.

Access to equipment/connection – 5 – participant has access to equipment/connection. *“he’s got a mobile phone.”*

Fear – 0 - He has never used technology. His kids do everything for him. A score of 0 was given as he is receiving immense support from family. Also, his basic digital skills are low. He also has disabilities.

Participant P2

<i>Scale</i>						
Factors	0	1	2	3	4	5
Support		1				
Formal Education			2			
Language					4	
Basic digital skills			2			
Technology experience in occupation	0					
Disabilities					4	
Financial literacy			2			
Confidence				3		
Access to equipment/connection						5
Fear		1				

Justification

Support – 1 – “sometimes, you know, money wise, you know, sometimes she helps me to send the money.”

Formal Education – 2 - received metrics (high school graduate) then learned a course for one year in UK (crash course)

Language – 4 – partially good at reading, writing and speaking in English. Participant spoke in English without interpreter’s help.

Basic digital skills – 2 – uses WhatsApp and uses online banking app.

Technology experience in occupation – 0 –didn’t use technology at workplace. “only repairing.” “not the technology part.”

Disabilities – 4 – health issue: has some difficulties in walking but this does not prevent him from using online services.

Financial literacy – 2 – does a little bit of online banking: “sometimes, you know, money wise, you know, sometimes she helps me to send the money.” Shopping: prefers in-person shopping but daughter helps with online shopping if needed: “she orders for us and coming in our house, we are paying her.” Insurance policy: “they send me a letter... so you always stick with the same insurance provider?...last five years..yes....sometimes I ask my daughter to see if it’s cheaper.”

Confidence – 3 – “moderately” confident.

Access to equipment/connection – 5 – participant has access to equipment/connection.

Fear – 1 – “a lot of frauds going on in this world you know?” Researcher: “so does that mean you have a fear of scams?.....Yes.....But I can handle them no problem right. They phone in the house to get your account number.”

“the new things going on in our area....people pretend they are from police and they’re trying to get your bank details.”

Participant P3

	<i>Scale</i>					
Factors	0	1	2	3	4	5
Support		1				
Formal Education			2			
Language					4	
Basic digital skills			2			
Technology experience in occupation	0					
Disabilities						5
Financial literacy	0					
Confidence		1				
Access to equipment/connection						5
Fear	0					

Justification

Support – 1 – “you tried using Amazon?...Yeah. Daughter again. Choose and send to daughter.” “I’m sending my daughter. I want to buy this one. Okay, she’s handling money because I’m very scared.”

Researcher: “she will have to go to you [husband] for the banking part.....Yeah. For buying Amazon or online shopping you will go to your kids...Yeah”

Formal Education – 2 - received metrics (high school graduate)

Language – 4 – partially good at reading, writing and speaking in English.

Basic digital skills – 2 – uses WhatsApp and websites like Amazon and Tesco to find garden items. Uses Google to search information.

Technology experience in occupation – 0 – didn’t use technology at workplace.

Disabilities – 5 – no disabilities.

Financial literacy – 0 – husband deals with the financial part. She only uses online websites for shopping (except the transactions).

Confidence – 1 –She doesn’t use online banking or carry out any online transactions.

Access to equipment/connection – 5 – participant has access to equipment/connection.

Fear – 0 – Researcher: “so how come you are scared to do the...transaction part?...Fear of financial scams? Aye, I’m not actually comfortable, comfortable right from inside. So, if you’re not comfortable, I’m not doing anything.”

“Because a lot of frauds nowadays.”

Participant I1

<i>Scale</i>						
Factors	0	1	2	3	4	5
Support	0					
Formal Education				3		
Language					4	
Basic digital skills		1				
Technology experience in occupation	0					
Disabilities					4	
Financial literacy	0					
Confidence	0					
Access to equipment/connection						5
Fear	0					

Justification

Support – 0 – lives with husband, son and their family (multi-generational household). She's fully dependent on her husband, son and daughter in law.

Formal Education – 3 – graduated with a degree in Economics and English in India. Completed one year of Masters in English but couldn't complete it due to marriage.

Language – 4 – she's partially good at reading, writing and speaking in English.

Basic digital skills – 1 – uses phone for WhatsApp and email.

Technology experience in occupation – 0 – used to work in their own post office before retirement.

Disabilities – 4 – health issue: she deals with arthritis.

Financial literacy – 0 – doesn't use any online financial services. Prefers doing everything in-person.

Confidence – 0 – she doesn't have any confidence to use online financial services: "No confidence."

Access to equipment/connection – 5 – uses a smartphone.

Fear – 0 – she stopped doing online shopping due to fear; she learned how to add items in the online shopping basket but she didn't go further: "Put the things in the basket then after that I stopped....i don't want to lose my money".

She's scared to use online banking app.

Participant I2

	<u>Scale</u>					
<u>Factors</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Support		1				
Formal Education						5
Language						5
Basic digital skills		1				
Technology experience in occupation	0					
Disabilities						5
Financial literacy	0					
Confidence	0					
Access to equipment/connection						5
Fear	0					

Justification

Support – 1 – doesn't use any online financial services due to his fear. He does everything in-person but sometimes his son helps him out. He has a mobile banking app but he only uses it to check the balance and to make small payments to window cleaners. *"If it is a big amount I go to the bank, they'll do it."* He's scared to send big amounts.

Formal Education – 5 – BA in teaching from India, he did Bachelor of Arts again, MSc from Strathclyde, diploma in education from Glasgow University, teachers training from Jordan Hill College.

Language – 5 – he's fluent in the English language.

Basic digital skills – 1 – *"I send emails and receive emails."* Even though he has an online banking app, he doesn't have the skill to use it. *"But I still don't have the skill to use the app."*

Technology experience in occupation – 0 – used to work as a multicultural officer but there was no internet then.

Disabilities – 5 – no disabilities.

Financial literacy – 0 – he doesn't use any online financial services except limited use of online banking app.

Confidence – 0 – *"I had a bad experience on online shopping. I don't have that much confidence."*

Access to equipment/connection – 5 – uses a smartphone.

Fear – 0 – *"I don't want to have a shock or, or don't want to lose money. So safe... safety is not to get involved in it."*

He doesn't do online shopping: *"I better go in and feel safe."*

"Main thing is old people don't want to lose their hard-earned money and because they know they won't be able to recover it again."

Participant I3

Factors	Scale					
	0	1	2	3	4	5
Support	0					
Formal Education			2			
Language						5
Basic digital skills			2			
Technology experience in occupation	0					
Disabilities					4	
Financial literacy	0					
Confidence	0					
Access to equipment/connection						5
Fear	0					

Justification

Support – 0 – She knows how to do online shopping but can't do the transaction due to her fear; her husband deals with all the online financial services. He returns the items through online when the item does not fit her.

Formal Education – 2 – completed one year of BA degree in India. She came here to stay with her parents. Went to college here but didn't complete it due to marriage.

Language – 5 – she's fluent in the English language.

Basic digital skills – 2 – on online shopping websites, she will go to her husband when it comes to the transaction part. She knows how to search information on online.

Technology experience in occupation – 0 – used to work as a wages clerk.

Disabilities – 4 – health issues: *"my arthritis really.... and I had my both knees operated, I had my elbow operated, I had my feet...hand, everything..."*

Financial literacy – 0 – she has an online banking app but she never used it because her husband deals with the financial part. He does all the tasks on online financial services.

Confidence – 0 – she has a lack of confidence when it comes to the transaction part.

Access to equipment/connection – 5 – uses a smartphone.

Fear – 0 – *"I can do it. But when I go up to payment, then um, I'm a bit...you know, just in case...scared? Yeah."*

"Just want to make sure this is the right site and right people."

Participant I4

<i>Scale</i>						
Factors	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Support						5
Formal Education					4	
Language						5
Basic digital skills						5
Technology experience in occupation					4	
Disabilities			2			
Financial literacy					4	
Confidence						5
Access to equipment/connection						5
Fear						5

Justification

Support – 5 – He does everything by himself - online shopping, online banking, insurance policies (gocompare website)

Formal Education – 4 – MBBS then came to UK to do FRCS.

Language – 5 – he's fluent in the English language.

Basic digital skills – 5 – used to work as a surgeon. Also, he uses online financial services. He'll use YouTube or other online sources to learn about new websites. *"I had to introduce her [daughter] to WhatsApp."*

Technology experience in occupation – 4 – used to work as a consultant so assuming that he used some sort of technology.

Disabilities – 2 – he has some major health issues but this does not stop him from using digital services.

Financial literacy – 4 – uses online financial services. *"I transferred money to a charitable shop. And I do that a number of times."*

Confidence – 5 – fully confident to use online financial services.

Access to equipment/connection – 5 – uses a smartphone.

Fear – 5 – He is not scared to learn about technology.

Persona 1

	<u>Scale</u>					
<u>Factors</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Support	0					
Formal Education			2			
Language	0					
Basic digital skills		1				
Technology experience in occupation	0					
Disabilities						5
Financial literacy	0					
Confidence	0					
Access to equipment/connection						5
Fear	0					

Justification

Support – 0 – because she lives with her daughter when she visits UK. *“She doesn’t know how to use technology; therefore, she always needs help from another person”*.

Formal Education – 2 - secondary education.

Language – 0 – she’s not fluent with English language.

Basic digital skills – 1 – she uses WeChat to click links and view messages.

Technology experience in occupation – 0 - no, seems like she never used technology

Disabilities – 5 – no disabilities.

Financial literacy – 0 – She doesn’t use any online financial services.

Confidence – 0 – She’s not interested in technology. However, a score of 0 was given because she receives immense support from family, basic digital skills are low and language is a barrier.

Access to equipment/connection – 5 – participant has access to equipment/connection. She uses smartphone.

Fear – 0 – a score of 0 was given as she is receiving help from family.

Persona 2

<i>Scale</i>						
Factors	0	1	2	3	4	5
Support	0					
Formal Education			2			
Language						5
Basic digital skills	0					
Technology experience in occupation	0					
Disabilities		1				
Financial literacy	0					
Confidence	0					
Access to equipment/connection	0					
Fear	0					

Justification

Support – 0 – he lives with his wife who is housebound. His daughter deals with all the digital services.

Formal Education – 2 - because he left school when he was 16.

Language – 5 because he can speak English fluently.

Basic digital skills – 0 - never used computer or smartphone.

Technology experience in occupation – 0 – never used a computer/smartphone.

Disabilities – 1 – he’s experiencing a number of health issues: heart problems, depression, cancer and COPD.

Financial literacy – 0 – he doesn’t use any online financial services. *“Rajiv travels to the bank to carry out his banking tasks as he does not use online banking.” “His daughter, who’s in her 50s, handles all their digital services in her own house including insurance policies as they do not have Wi-Fi.”*

Confidence – 0 – *“Lack of confidence is one of the factors which prohibited him from using technological devices.”* He never used online financial services. His daughter is helping him out with such services.

Access to equipment/connection – 0 – no Wi-Fi

Fear – 0 – a score of 0 was given for fear as he has never used online financial services before. Also, he is receiving help from his daughter.

Persona 4

<i>Scale</i>						
Factors	0	1	2	3	4	5
Support			2			
Formal Education			2			
Language						5
Basic digital skills			2			
Technology experience in occupation		1				
Disabilities						5
Financial literacy		1				
Confidence			2			
Access to equipment/connection						5
Fear					4	

Justification

Support – 2 – “He seeks help for online financial services from a student who he met in a church. Kwame travels to his house whenever he requires assistance with digital services.”

Formal Education – 2 - he was in the military so seems like he had secondary education.

Language – 5 – first language is English.

Basic digital skills – 2 – Digital carer only knows that he uses online banking apps.

Technology experience in occupation – 1 – “As part of his job in UK, he has to send a lot of emails”.

Disabilities – 5 – no disabilities.

Financial literacy – 1 – he only uses online banking apps to view the balance and to carry out some bank transactions. He doesn't use any other digital financial services.

Confidence – 2 – lacks confidence as he seeks help from the student. But he tries to do it by himself using his written instructions. “*He's intimidated by the complicated processes.*”

Access to equipment/connection – 5 – he uses a smartphone.

Fear – 4 – Sometimes he needs assistance: “*But whenever he needs help, he would ask the student as he fully trusts him.*”

Persona 5

<i>Scale</i>						
Factors	0	1	2	3	4	5
Support	0					
Formal Education				3		
Language						5
Basic digital skills	0					
Technology experience in occupation		1				
Disabilities						5
Financial literacy		1				
Confidence		1				
Access to equipment/connection						5
Fear	0					

Justification

Support – 0 – “she approaches a student for help with money transfer app, Lemonade Finance app.”

Formal Education – 3 – nurse

Language – 5 – first language is English.

Basic digital skills – 0 – “she does not have any digital skills”

Technology experience in occupation – 1 – assuming that she uses a computer at work as she is a nurse.

Disabilities – 5 – no disabilities.

Financial literacy – 1 – uses an international money transfer app to send money abroad.

Confidence – 1 – “lacks confidence as she usually seeks help from the student.” But she tries to learn the money transfer app by writing the instructions down.

Access to equipment/connection – 5 – she uses a smartphone.

Fear – 0 – “In order to conduct international money transfers, there should be sufficient funds in the app account. Funds can be added through the app. Felicia was scared to carry out this process. She was confused; she wasn’t sure why money had to be added to her account in the app before sending money over to Ghana. She thinks that the money would go somewhere else instead of her own account.”

Persona 6

<u>Scale</u>						
<u>Factors</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Support	0					
Formal Education		1				
Language						5
Basic digital skills	0					
Technology experience in occupation	0					
Disabilities						5
Financial literacy		1				
Confidence	0					
Access to equipment/connection						5
Fear						5

Justification

Support – 0 – “He goes to student’s residence whenever he needs assistance with the app that he uses for international money transfers.”

Formal Education – 1 – assuming that he attended school since he is working as a security.

Language – 5 – first language is English.

Basic digital skills – 0 – “Koja does not have any digital skills so sometimes he requires additional help”.

Technology experience in occupation – 0 – “he doesn’t use a lot of online services as he works as a security.”

Disabilities – 5 – no disabilities.

Financial literacy – 1 – uses an international money transfer app to send money abroad.

Confidence – 0 – “his lack of digital skills prevent him from confidently carrying out the processes by himself.”

Access to equipment/connection – 5 – uses a smartphone.

Fear – 5 – “He is not scared to carry out the transactions”. He needs help due to his lack of digital skills.

Persona 7

<u>Scale</u>						
<u>Factors</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Support	0					
Formal Education	0					
Language						5
Basic digital skills	0					
Technology experience in occupation	0					
Disabilities		1				
Financial literacy		1				
Confidence	0					
Access to equipment/connection						5
Fear	0					

Support – 0 - because she lives by herself. She had a daughter who used to help her but she passed away in 2020. She doesn't receive help from family. She completely relies on the organisation.

Formal Education – 0 – never had any education.

Language – 5 - she's good with English.

Basic digital skills – 0 – no digital skills.

Technology experience in occupation – 0 – never worked in the UK.

Disabilities – 1 – mental health issues. She follows a strict routine.

Financial literacy – 1 – she started to use digital financial services through the assistance provided by staff.

Confidence – 0 – still receives help from staff on online services.

Access to equipment/connection – 5 – she uses digital banking services. Hence, she has access to equipment.

Fear – 0 – she's scared if she will fall into other problems by dealing with online services.

Appendix H – Participant Information sheet/Consent form for theoretical tool study



Participant Information Sheet for Research Students

[FOR USE WITH STANDARD PRIVACY NOTICE FOR RESEARCH PARTICIPANTS]

Name of department: Computer and Information Sciences

Title of the study: A theoretical tool to determine older people's barriers in accessing digital financial services

Introduction

My name is Dain Thomas. As part of corrections for my PhD thesis, I am conducting a short study with fellow researchers to validate a tool developed as part of my doctoral studies. My study has already demonstrated that older people (those aged 65 and over) experience various challenges that could influence their intention to adopt and use online financial services such as online banking, online shopping and insurance policies. In this research, online financial services are defined as any website which has a component of monetary transaction. Older people may not access such services due to fear, lack of digital skills, lack of confidence and linguistic challenges. Diverse barriers were recognised through interviews with older people and intermediaries, resulting in the creation of several personas which led to the development of a theoretical tool consisting of 10 factors with a scale ranging from 0 to 5. This tool can be used to identify various factors that could negatively or positively influence older people's access to online financial services.

Contact details of the researcher, supervisor and the department are shown at the end of this document.

What is the purpose of this research?

One of the main objectives of this study is to enable other individuals to test the subjective tool using the data acquired from the interviews. This, in turn, ensures that stakeholders could utilise this tool in the future to quantify the factors using qualitative data to comprehend the challenges faced by older people. Furthermore, it is vital to ensure that individuals could easily use the theoretical guide to provide a score for each factor. This tool would enable intermediaries such as employees and digital carers to understand the factors that contribute to the key challenges experienced by older people in the use of online financial services. Also, scores could be used to categorise people in an organisation and specific interventions could be developed for them. Financial service providers could also use the tool data to recognise the barriers faced by diverse groups of older people in society. As a result, amendments to existing online financial services and/or new products could be created.

Do you have to take part?

No. Participation is not obligatory and you have the right to withdraw from the study at any point; participant's decision will be respected.

What will you do in the project?

Once the consent form (see the end of this document) has been signed and sent back to the researcher via email, 'instructions.pdf' file will be sent to the participant's email. This file contains a number of bullet points on how you could carry out this study. Firstly, you have to familiarise yourself with the theoretical tool by reading the 'TheoreticalToolGuide.pdf'. Subsequently, open 'ToolTables.docx' and read persona 1 and generate scores for the 10 factors using the scale mentioned in the 'TheoreticalToolGuide.pdf'. A score of 0 out of 5 indicates that the individual is experiencing major challenges in relation to the factor whereas a score of 5 means that there are no barriers. Individual judgement and perceptions are necessary to create a score for each factor. If you have difficulties in creating a score for a factor then please leave it blank. In the end, there should be 6 populated tables, one for each persona. Once you have completed populating the tables, send the 'ToolTables' file to the researcher.

The duration of this study is approximately 40 minutes – 1 hour, depending on your reading speed and how quickly you interpret the tool and the personas to generate a score for each factor.

Why have you been invited to take part?

You have been invited to take part in this study as you are a researcher in the department.

What information is being collected in the project?

Through this study, consent forms and 6 populated tables will be obtained from each participant. Each table consists of 10 factors, a score for each of these factors is generated by using the six-point scale (0-5) on the provided personas. These personas were created using the interview data which were already carried out as part of the PhD study.

Participant's personal information is not required for this study.

Who will have access to the information?

The tables will only be viewed by the researcher and the supervisor.

Where will the information be stored and how long will it be kept for?

Consent form and populated tables will be stored on OneDrive and will be kept until the PhD thesis is accepted.

What happens next?

The populated tables will be utilised to calculate, report and discuss the results of an appropriate inter-reliability statistic. Obtained results will appear in the thesis. Also, the results could be used to publish conference papers/journal articles. Following the completion of PhD research, data will be deleted from OneDrive.

If you are no longer interested in this study, please do not sign the consent form. Thanks for spending your valuable time to read this.

The place of useful learning

The University of Strathclyde is a charitable body, registered in Scotland, number SC015263



This study and the associated ethics application were seen and approved by the supervisor and was granted ethical approval by the Departmental Ethics Committee.

If there are any questions regarding the study, please use the contact details shown below:

Contact details:

Researcher's name: Dain Thomas

Researcher's email: dain.thomas.2015@uni.strath.ac.uk

Supervisor's name: Prof. Gobinda Chowdhury

Email: gobinda.chowdhury@strath.ac.uk

Departmental Ethics Committee:

Department of Computer and Information Sciences,

Livingstone Tower

Richmond Street

Glasgow

G1 1XH



Consent Form for Research Students

Name of department: Department of Computer and Information Sciences

Title of the study: A theoretical tool to determine older people's barriers in accessing digital financial services

- I confirm that I have read and understood the information shown above.
- I confirm that I have read and understood how the data will be retained and what will happen to it (i.e., how it will be stored and for how long).
- I understand that my participation is voluntary and that I am free to withdraw from the study at any time, up to the point of completion, without having to give a reason and without any consequences.
- I understand that anonymised data (i.e., data that do not identify me personally) cannot be withdrawn once they have been included in the study.
- I understand that any information recorded in the study will remain confidential.

Print Participant Name:	
Participant Signature:	Date:

Appendix I – Instructions for theoretical tool study

Instructions

You received this file and all the relevant files through email as you have signed and sent back the consent form to the researcher.

- Please read the 'TheoreticalToolGuide.pdf' to understand how the factors and the six-point scale (0-5) can be used to populate a table using qualitative data. This file includes an example showing how a persona was used to provide scores for the factors in the table.
- Open 'ToolTables', read persona 1 and please fill out the corresponding table using the scale explanations mentioned in the 'theoreticaltoolguide.pdf'. Please repeat this process for personas 2, 3 4, 5 and 6.

Reminder: In order to create meaningful scores, personal reasoning, individual judgement and perceptions are required.

- At the end of the document (ToolTables.docx), please include your comments regarding the tool. Once you have completed populating the tables, please send the 'ToolTables' file to the researcher.

Appendix J – Researchers’ populated tables

Participant 1

<i>Scale</i>						
<u>Factors</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Support	0					
Formal Education			<u>2</u>			
Language	0					
Basic digital skills		<u>1</u>				
Technology experience in occupation	0					
Disabilities						5
Financial literacy	0					
Confidence		<u>1</u>				
Access to equipment/connection						5
Fear		1				

<i>Scale</i>						
<u>Factors</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Support						5
Formal Education		<u>1</u>				
Language						5
Basic digital skills	0					
Technology experience in occupation	0					
Disabilities		<u>1</u>				
Financial literacy	0					
Confidence	0					
Access to equipment/connection	0					
Fear	0					

<u>Scale</u>						
<u>Factors</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Support	0					
Formal Education		<u>1</u>				
Language		<u>1</u>				
Basic digital skills	0					
Technology experience in occupation	0					
Disabilities		<u>1</u>				
Financial literacy	0					
Confidence	0					
Access to equipment/connection	0					
Fear	0					

<u>Scale</u>						
<u>Factors</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Support					<u>4</u>	
Formal Education			<u>2</u>			
Language						5
Basic digital skills				<u>3</u>		
Technology experience in occupation			<u>2</u>			
Disabilities						5
Financial literacy					4	
Confidence	0					
Access to equipment/connection						5
Fear	0					

<u>Scale</u>						
<u>Factors</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Support					<u>4</u>	
Formal Education				<u>3</u>		
Language						5
Basic digital skills		<u>1</u>				
Technology experience in occupation	0					
Disabilities						5
Financial literacy				<u>3</u>		
Confidence	0					
Access to equipment/connection						5
Fear	0					

<u>Scale</u>						
<u>Factors</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Support				<u>3</u>		
Formal Education			<u>2</u>			
Language						5
Basic digital skills		<u>1</u>				
Technology experience in occupation	0					
Disabilities						5
Financial literacy	0					
Confidence				<u>3</u>		
Access to equipment/connection						5
Fear				<u>3</u>		

Participant 2

	<u>Scale</u>					
<u>Factors</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Support				<u>x</u>		
Formal Education			<u>x</u>			
Language	<u>x</u>					
Basic digital skills		<u>x</u>				
Technology experience in occupation	<u>x</u>					
Disabilities						<u>x</u>
Financial literacy		<u>x</u>				
Confidence		<u>x</u>				
Access to equipment/connection					<u>x</u>	
Fear		<u>x</u>				

	<u>Scale</u>					
<u>Factors</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Support	<u>x</u>					
Formal Education		<u>x</u>				
Language						<u>x</u>
Basic digital skills	<u>x</u>					
Technology experience in occupation	<u>x</u>					
Disabilities	<u>x</u>					
Financial literacy		<u>x</u>				
Confidence	<u>x</u>					
Access to equipment/connection	<u>x</u>					
Fear		<u>x</u>				

<u>Scale</u>						
<u>Factors</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Support	<u>X</u>					
Formal Education		<u>X</u>				
Language	<u>X</u>					
Basic digital skills	<u>X</u>					
Technology experience in occupation	<u>X</u>					
Disabilities	<u>X</u>					
Financial literacy	<u>X</u>					
Confidence	<u>X</u>					
Access to equipment/connection	<u>X</u>					
Fear	<u>X</u>					

<u>Scale</u>						
<u>Factors</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Support			<u>X</u>			
Formal Education			<u>X</u>			
Language						<u>X</u>
Basic digital skills					<u>X</u>	
Technology experience in occupation					<u>X</u>	
Disabilities						<u>X</u>
Financial literacy					<u>X</u>	
Confidence				<u>X</u>		
Access to equipment/connection						<u>X</u>
Fear				<u>X</u>		

<u>Scale</u>						
<u>Factors</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Support			<u>x</u>			
Formal Education				<u>x</u>		
Language						<u>x</u>
Basic digital skills					<u>x</u>	
Technology experience in occupation					<u>x</u>	
Disabilities						<u>x</u>
Financial literacy				<u>x</u>		
Confidence			<u>x</u>			
Access to equipment/connection						<u>x</u>
Fear		<u>x</u>				

<u>Scale</u>						
<u>Factors</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Support			<u>x</u>			
Formal Education			<u>x</u>			
Language						<u>x</u>
Basic digital skills		<u>x</u>				
Technology experience in occupation		<u>x</u>				
Disabilities						<u>x</u>
Financial literacy			<u>x</u>			
Confidence			<u>x</u>			
Access to equipment/connection						<u>x</u>
Fear					<u>x</u>	

Participant 3

	<i>Scale</i>					
<u>Factors</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Support	0					
Formal Education			<u>2</u>			
Language		<u>1</u>				
Basic digital skills		<u>1</u>				
Technology experience in occupation		<u>1</u>				
Disabilities						5
Financial literacy				<u>3</u>		
Confidence		<u>1</u>				
Access to equipment/connection				<u>3</u>		
Fear			<u>2</u>			

	<i>Scale</i>					
<u>Factors</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Support	0					
Formal Education			<u>2</u>			
Language						5
Basic digital skills	0					
Technology experience in occupation		<u>1</u>				
Disabilities		<u>1</u>				
Financial literacy			<u>2</u>			
Confidence		<u>1</u>				
Access to equipment/connection		<u>1</u>				
Fear		1				

	<u>Scale</u>					
<u>Factors</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Support	0					
Formal Education		<u>1</u>				
Language		<u>1</u>				
Basic digital skills	0					
Technology experience in occupation	0					
Disabilities		<u>1</u>				
Financial literacy		<u>1</u>				
Confidence	0					
Access to equipment/connection	0					
Fear		1				

	<u>Scale</u>					
<u>Factors</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Support			<u>2</u>			
Formal Education				<u>3</u>		
Language						5
Basic digital skills				<u>3</u>		
Technology experience in occupation				<u>3</u>		
Disabilities						5
Financial literacy					4	
Confidence				<u>3</u>		
Access to equipment/connection					4	
Fear				<u>3</u>		

	<u>Scale</u>					
<u>Factors</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Support			<u>2</u>			
Formal Education				<u>3</u>		
Language						5
Basic digital skills			<u>2</u>			
Technology experience in occupation				<u>3</u>		
Disabilities						5
Financial literacy				<u>3</u>		
Confidence			<u>2</u>			
Access to equipment/connection					4	
Fear			<u>2</u>			

	<u>Scale</u>					
<u>Factors</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Support			<u>2</u>			
Formal Education			<u>2</u>			
Language						5
Basic digital skills			<u>2</u>			
Technology experience in occupation		<u>1</u>				
Disabilities						5
Financial literacy				<u>3</u>		
Confidence				<u>3</u>		
Access to equipment/connection					4	
Fear					4	

Participant 4

			<u>Scale</u>			
<u>Factors</u>	0	1	2	3	4	5
Support	✓					
Formal Education			✓			
Language	✓					
Basic digital skills			✓			
Technology experience in occupation	✓					
Disabilities						✓
Financial literacy		✓				
Confidence	✓					
Access to equipment/connection						✓
Fear	✓					

			<u>Scale</u>			
<u>Factors</u>	0	1	2	3	4	5
Support	✓					
Formal Education			✓			
Language						✓
Basic digital skills	✓					
Technology experience in occupation	✓					
Disabilities	✓					
Financial literacy		✓				
Confidence	✓					
Access to equipment/connection	✓					
Fear	✓					

	<u>Scale</u>					
<u>Factors</u>	0	1	2	3	4	5
Support	✓					
Formal Education		✓				
Language	✓					
Basic digital skills	✓					
Technology experience in occupation	✓					
Disabilities	✓					
Financial literacy	✓					
Confidence	✓					
Access to equipment/connection	✓					
Fear	✓					

	<u>Scale</u>					
<u>Factors</u>	0	1	2	3	4	5
Support				✓		
Formal Education	-	-	-	-	-	-
Language						✓
Basic digital skills					✓	
Technology experience in occupation		✓				
Disabilities						✓
Financial literacy					✓	
Confidence			✓			
Access to equipment/connection						✓
Fear				✓		

	<u>Scale</u>					
Factors	0	1	2	3	4	5
Support				✓		
Formal Education	-	-	-	-	-	-
Language						✓
Basic digital skills	✓					
Technology experience in occupation	✓					
Disabilities						✓
Financial literacy				✓		
Confidence		✓				
Access to equipment/connection					✓	
Fear		✓				

	<u>Scale</u>					
Factors	0	1	2	3	4	5
Support				✓		
Formal Education	-	-	-	-	-	-
Language						✓
Basic digital skills	✓					
Technology experience in occupation	✓					
Disabilities						✓
Financial literacy			✓			
Confidence		✓				
Access to equipment/connection					✓	
Fear						✓

Appendix K – CSV file

1	persona	participant	factor	score
2	persona1	P1	F1	0
3	persona1	P2	F1	3
4	persona1	P3	F1	0
5	persona1	P4	F1	0
6	persona1	P1	F2	2
7	persona1	P2	F2	2
8	persona1	P3	F2	2
9	persona1	P4	F2	2
10	persona1	P1	F3	0
11	persona1	P2	F3	0
12	persona1	P3	F3	1
13	persona1	P4	F3	0
14	persona1	P1	F4	1
15	persona1	P2	F4	1
16	persona1	P3	F4	1
17	persona1	P4	F4	2
18	persona1	P1	F5	0
19	persona1	P2	F5	0
20	persona1	P3	F5	1
21	persona1	P4	F5	0
22	persona1	P1	F6	5
23	persona1	P2	F6	5

Appendix L – Krippendorff – python

```
theoreticaltoolscores.csv  alphascores.py  ×
1  import pandas as pd
2  import krippendorff
3
4  dataset = pd.read_csv("theoreticaltoolscores.csv")
5
6  alphavalues = {}
7
8  for factor in dataset['factor'].unique():
9      subset = dataset[dataset['factor'] == factor]
10     matrix = subset.pivot_table(index='person', columns='participant', values='score')
11     # matrix.columns.name = None
12     # matrix.index.name = None
13     # print(factor)
14     # print(matrix)
15     # print(matrix.shape)
16
17     data = matrix.to_numpy()
18     alpha = krippendorff.alpha(reliability_data=data.T, level_of_measurement='ordinal')
19     alphavalues[factor] = alpha
20
21 print("\nKrippendorff's Alpha for each factor:")
22 for factor, alpha in alphavalues.items():
23     print(f"{factor}: {alpha:.3f}")
```

```
Krippendorff's Alpha for each factor:
F1: 0.335
F2: 0.772
F3: 0.955
F4: 0.672
F5: 0.334
F6: 0.949
F7: 0.682
F8: 0.437
F9: 0.684
F10: 0.493
```

Appendix M – csv file for each factor

F1 – support

	A	B	C	D
1	0	3	0	0
2	5	0	0	0
3	0	0	0	0
4	4	2	2	3
5	4	2	2	3
6	3	2	2	3
7				

F2 – Formal education

	A	B	C	D
1	2	2	2	2
2	1	1	2	2
3	1	1	1	1
4	2	2	3 NA	
5	3	3	3 NA	
6	2	2	2 NA	
7				

F3 – Language

	A	B	C	D
1	0	0	1	0
2	5	5	5	5
3	1	0	1	0
4	5	5	5	5
5	5	5	5	5
6	5	5	5	5

F4 – Basic digital skills

	A	B	C	D
1	1	1	1	2
2	0	0	0	0
3	0	0	0	0
4	3	4	3	4
5	1	4	2	0
6	1	1	2	0

F5 – Technology experience in occupation

	A	B	C	D
1	0	0	1	0
2	0	0	1	0
3	0	0	0	0
4	2	4	3	1
5	0	4	3	0
6	0	1	1	0

F6 - Disabilities

	A	B	C	D
1	5	5	5	5
2	1	0	1	0
3	1	0	1	0
4	5	5	5	5
5	5	5	5	5
6	5	5	5	5

F7 – Financial literacy

	A	B	C	D
1	0	1	3	1
2	0	1	2	1
3	0	0	1	0
4	4	4	4	4
5	3	3	3	3
6	0	2	3	2

F8 - Confidence

	A	B	C	D
1	1	1	1	0
2	0	0	1	0
3	0	0	0	0
4	0	3	3	2
5	0	2	2	1
6	3	2	3	1

F9 – Access to equipment/connection

	A	B	C	D
1	5	4	3	5
2	0	0	1	0
3	0	0	0	0
4	5	5	4	5
5	5	5	4	4
6	5	5	4	4

F10 - Fear

	A	B	C	D
1	1	1	2	0
2	0	1	1	0
3	0	0	1	0
4	0	3	3	3
5	0	1	2	1
6	3	4	4	5

Appendix N – Krippendorff alpha values computed from the web tool

F1

Confidence Interval (CI)

95% CI 1000 Iterations

Result

Min Rate: 0
Max Rate: 5
Items With More Than One Rate: 6
Number of Pairable Rates: 24

Krippendorff's Alpha (Ordinal Scale): **0.335**
Bootstrap Confidence Interval (95% CI): [-0.131, 0.666]

F2

Krippendorff's Alpha (Ordinal Scale): **0.772**

Bootstrap Confidence Interval (95% CI): **[0.137, 1.000]**

F3

Krippendorff's Alpha (Ordinal Scale): **0.955**

Bootstrap Confidence Interval (95% CI): **[0.699, 0.992]**

F4

Krippendorff's Alpha (Ordinal Scale): **0.672**

Bootstrap Confidence Interval (95% CI): **[0.107, 0.955]**

F5

Krippendorff's Alpha (Ordinal Scale): **0.334**

Bootstrap Confidence Interval (95% CI): **[-0.170, 0.729]**

F6

Krippendorff's Alpha (Ordinal Scale): **0.949**

Bootstrap Confidence Interval (95% CI): **[0.681, 0.989]**

F7

Krippendorff's Alpha (Ordinal Scale): **0.682**

Bootstrap Confidence Interval (95% CI): **[-0.002, 0.968]**

F8

Krippendorff's Alpha (Ordinal Scale): **0.437**

Bootstrap Confidence Interval (95% CI): **[0.020, 0.711]**

F9

Krippendorff's Alpha (Ordinal Scale): **0.684**

Bootstrap Confidence Interval (95% CI): **[-0.221, 0.881]**

F10

Krippendorff's Alpha (Ordinal Scale): **0.493**

Bootstrap Confidence Interval (95% CI): **[-0.091, 0.723]**