

AI-DRIVEN FINTECH SOLUTIONS AND FINANCIAL INCLUSION AMONG THE ELDERLY: A SYSTEMATIC REVIEW

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Abstract

Recent progressions within the FinTech space are advancing the way that people receive their financial services globally. Digital finance has improved access, efficiency, and personalization of financial services related to banking, payment, and investment services. However, not all segments of the population have reaped the benefits of these advancements. Older adults are one of the most underserved and at-risk user groups as their usage of digital resources continues to grow within increasingly digitized financial sectors. Older adults face several opt-in barriers attributed to their age, including cognitive decline, low digital literacy and tech anxiety, and trust-related concerns with using a digital service. AI-enabled FinTech solutions such as conversational chatbots, voice-activated applications, biometric users-authentication systems, individually tailored financial recommendations, fraud-detection systems, and adaptable user interfaces represent a significant opportunity to improve the likelihood that seniors will be financially included. The implementation of these types of technological resources can lessen physical, cognitive, and emotional barriers to financial engagement, thus promoting financial independence and confidence. Limited research has been conducted on AI-enabled FinTech from the perspective of older adults; the primary focus has been on consumers in general, and limited attention has been paid to the unique needs and interests of senior citizens. This study will perform a systematic literature review (SLR) of academic, policy, and industry literature on the impacts of AI technology in changing access and increasing confidence in the FinTech sector for senior citizens. The literature reviewed will be categorized into five major areas: accessibility, usability, trust and security, anxiety related to technology, and engagement of consumers in the FinTech marketplace. Overall, findings suggest AI-based tools have the potential to improve both access to and confidence in financial services for seniors, but there continues to be significant gaps related to ethics and design frameworks specific to seniors, long-term trends in adoption of technology, and regulation. Using perspectives from marketing, consumer behaviour, financial inclusion, and information systems, this study will identify critical research gaps and propose pathways for building inclusive, age-friendly, and sustainable AI-based financial ecosystems.

Keywords: *Financial Inclusion, Senior Citizens, Artificial Intelligence, FinTech, Consumer Behaviors*

Introduction

Digital financial services are growing rapidly, changing how financial products are created, distributed and consumed globally. Stronger financial technology (FinTech) products combined with the widespread use of Artificial Intelligence (AI) have changed the way traditional systems work (e.g. making transactions quicker and providing more tailored options, using data to help make decisions about a product or service, making it easier for service providers to reach more customers). Digital banking apps, mobile payment apps, robo/advisory services, AI customer-service tools are what comprise the current financial ecosystem. Although there are many benefits to digital financial services as a result of the innovations mentioned above, those benefits do not exist for most users. In addition to all of the above challenges faced by most users are the challenges faced by seniors who are using digital financial services. Seniors increasingly use financial services to help them manage pensions, savings, health care costs, insurance products and day to day transactions. As more and more seniors/older adults use digital financial services, they are among the least integrated into the digital finance space. Changes/tremors caused by rapid advances in technology and the decrease in access to traditional branch-type service outlets are both contributing factors towards the increased risk of senior citizens becoming financially excluded due to their age (i.e.; increasing numbers of senior citizens not having access to, necessary access to, the ability to use, lack of support in using digital financial services. Several demographic changes around the world indicate that population aging is a significant global demographic trend that will have a substantial impact on financial systems. Improvements in health care, increased life expectancy, and declining fertility rates have all contributed to a steady increase in the percentage of the population aged 60 years or older in both developed and developing nations. Global demographic trends indicate that these population trends will continue to accelerate over the next several decades. As populations age, access to financial resources and services will not only be a social obligation but also an economic requirement. At the same time, many financial institutions are rapidly implementing their service delivery models digitally, often with the expectation that their users will possess a baseline amount of digital literacy, technology familiarity, and cognitive agility. This expectation does not reflect the actual experience, or lack thereof, of many older adults. In addition, many older adults experience a variety of age-related issues, including memory loss, diminished motor skills, visual impairments, and a higher sensitivity to risk. For older adults, many of these same issues are amplified by limited exposure to digital technology and significantly lower confidence levels when they use more complex applications.

As a result of this, there are several barriers to engaging with digital financial services for older adults. These include complicated user interfaces, difficulty using applications and navigation, privacy and cyber-fraud concerns, greater cognitive load and increased technology anxiety. Trust deficits, where older adults are more inclined to worry about losing their money or having their identity stolen and their data misused, make these barriers even stronger. These issues have led to many older adults choosing not to use digital financial platforms or be heavily reliant on family and other intermediaries. This reduces financial autonomy and independence of older adults. AI-driven FinTech solutions have the potential to resolve the age barriers to technology access associated with older adults and support financial inclusion for seniors. Voice-activated interfaces, virtual agents/chatbots, biometric authentication systems, personalized financial recommendations, and AI fraud detection systems are examples of technology that can streamline the user's experience, improve security, and build user trust. The use of voice banking or virtual agents/chatbots should alleviate the need for seniors to use complicated visual interfaces to complete their financial transactions, while biometric authentication allows seniors to authenticate their financial transactions without

having to remember a password or PIN. Personalized AI will also help to ensure that the financial messages that seniors receive use the language and phrases that appeal to older adults and their financial interest and risk profile. Even though there have been many recent technological developments, there are still not enough studies that explain how effective AI-based FinTech solutions are at adding to the financial inclusion of seniors through long-term, meaningful, and trust-based engagement. There is currently a lack of research on AI and FinTech adoption and a large amount of the current research is focused on consumers in general with very little research being on senior-only users. Most studies related to the FiSome of the current issues are centred on financial inclusion have also focused on income-, geography-, or gender-based drivers of financial exclusion, so little research has been carried out to determine if the digital exclusion of seniors is a problem. In addition to a lack of research on the digital exclusion of seniors, a recent literature review found that current literature related to FinTech and AI does not fully explore the unique demands, behaviours, and psychology of seniors. Therefore, the need for a comprehensive, structured, and systematic review of existing literature in relation to how AI-based FinTech products can assist in providing financial inclusion opportunities to seniors has been created. The current study will utilize a systematic literature review (SLR) methodology to develop an understanding of AI-based FinTech and how such products and services aid in providing financial inclusion and access to senior individuals. This study will take a holistic approach (marketing, consumer behaviour, financial inclusion, and IS) to use to determine key research themes, identify gaps in existing research, and recommend future research and practical recommendations regarding the development of digital financial ecosystems that are inclusive, user-friendly, and senior-friendly.

Literature Review

Historically, financial inclusion has been defined as a service-like provision of financial services that are accessible to all in society, whether through effective use or affordability. Initial research performed on financial inclusion focused on income differences, geographic disconnection or separation, and the way in which financial institutions provide financial services to the public. More recent studies have suggested that digital exclusion has now become a key form of financial marginalization (comparable to income, geography, and access to financial institutions) for those living in increasingly technology oriented financial systems. In this changing landscape, senior citizens are a major economic demographic group with a high incidence of digital exclusion. The rate at which we are ageing as a population continues to increase rapidly; this puts additional pressure on our financial system to provide the money, but it is also creating new challenges for the financial system. Older adults are particularly dependent on financial services as they relate to the management of pensions, health care costs, insurance, and savings. Yet, studies have shown consistently that senior citizens experience disproportionate challenges in accessing and using digital financial services. Digital banking platforms are often developed without full consideration of the limitations associated with age-related cognitive, physical and/or psychological characteristics. Therefore, there is an unintended exclusion effect when the design of, and access to, digital banking is not designed for this age demographic. There has been much visibility and acceptance regarding how technological innovations such as FinTech improve the efficiency, accessibility, and reach of the Financial Services Industry globally, but AI technology (including private or customer-facing AI-driven technologies such as Chatbots, Robo-Advisors, Fraud Detection Systems, and Recommendation Engines) has created transformational elements of AI innovations within the overall Financial Services ecosystem. AI technologies also enable the automation of processes, as well as the personalized experience and real-time decision-making opportunities for all users of financial service providers. Originally, there is a performing consensus that all AI technology solutions are

positive by nature, but research indicates that the adoption rate of these technologies, by older generations, is significantly low and non-uniform.

The Technology Acceptance Model (TAM) and the Unified Theoretical Acceptance & Use of Technology (UTAUT) Models, which have been well-researched and tested, have been utilized to study the behaviours of consumers using FinTech, as these are commonly accepted technology adoption models of use for technology behaviours. The common aspects of TAM and UTAUT are that perceived usefulness, ease of use and facilitating conditions are the main variables in determining acceptance of technology use by consumers aged 60+. Researchers have indicated that age-related influences, including but not limited to: cognitive decline and associated anxiety with technology use and higher levels of risk aversion, are all strong indicators and predictors of older adults' decisions regarding whether they will adopt technology products and services. Barriers, believed to prevent older adults from engaging with digital financial services, include these two access and usability issues associated with the digital financial service, which affect older adults in diverse ways than generally reported. Researchers indicate that older adults are more negatively affected by complicated user interfaces; smaller font sizes; and greater multi-step navigation processes, as compared to consumers aged 60 and younger. Researchers agree that older adults require an increased availability of AI-driven technology solutions that offer inclusive access through the use of voice-enabled banking and/or adaptive user interfaces. The use of biometric identification has become popular for providing greater accessibility and increasing security for older adults. Because biometric systems do not require older people to use memory-based methods like passwords and PIN codes, they provide a solution to memory-related problems that many older people experience. The concern of privacy of biometric data will still remain a concern for many senior-aged individuals who are more likely to be risk-averse than younger populations. Trust and security issues are the most important drivers in determining how and to what degree seniors engage with digital trust and security services. Seniors tend to be more sensitive to the issues of financial risk, fraud, and the misuse of personal data than younger populations. The use of AI fraud-detecting systems and real-time transaction alerts has been shown to increase perceived feelings of safety and reduce fears of financial loss. However, because of algorithmic opacity, lack of transparency, and lack of explainability, trust in these systems has not been able to develop into an ongoing relationship with senior-aged users because the majority do not understand how AI-based companies make decisions about their accounts.

The ethical implications of adopting AI for use in financial services has become a prominent theme in recent literature. Researchers have addressed issues such as bias in algorithms, accountability, and transparency when AI systems are applied to historically vulnerable populations. There is a growing consensus among researchers that the use of explainable AI will be necessary to develop the trust needed to keep moving toward long-term adoption of AI systems by seniors. Technology anxiety has been identified as one of the main psychological barriers preventing older adults from using digital financial services. Most researchers agree that the source of this anxiety may be due to an individual's fear of making mistakes, a lack of confidence, or having had poor experiences in the past with technology. Evidence exists that AI-based tools (i.e., conversational agents, guide assistance tools) can help to alleviate anxiety associated with technology through the provision of real-time support/assistance and the ability to provide simple, easily understood explanations. However, researchers suggest that technological solutions must also be accompanied by programs teaching digital literacy and providing human-assisted support. Consumer participation is emerging as a primary benefit of adopting AI-based FinTech products and services. AI-driven behaviours have been shown to create more relevant and engaging experiences for users. By providing users with personalized experiences (for example, advice tailored to the individual, reminders of key events, and behavioural nudges), the user's experience can be further

improved. The most significant consideration when creating personalized experiences for older Americans is to ensure that communication remains simple, direct and non-intrusive to reduce the risk of overwhelming them with too much information. While many studies have shown that consumers experience positive benefits from using FinTech products and services in the short term (i.e., increased engagement), much less is known about long-term engagement or the development of habitual use patterns among older adults.

Objectives of the Study

- To thoroughly research prior studies related to fintech interventions with seniors using artificial intelligence to enable better access to financial products and services.
- To find out the ways in which AI-enhanced tools can provide financial inclusion for older adults using multiple metrics.
- To discuss open-ended issues and areas where research is needed; for example, ethical issues concerning technology, designing for older adults, and driving/maintaining long-range use/adoption of technology.

Research Methodology

Research Design

This research article uses a Systematic Literature Review (SLR) to summarize the literature related to interventions using artificial intelligence (AI), focused on enhancing financial inclusion for senior citizens, under the umbrella of FinTech. An SLR methodology was selected for this review to provide methodological rigour, transparency and replicability, when compared to a traditional narrative review. Due to the subject area having an interdisciplinary background—which encompasses financial inclusion, artificial intelligence, consumer behaviour and information systems—a systematic approach to integrating fragmented literature will limit bias regarding the selection and interpretation of the studies included within this review. To develop the review protocol, prior to conducting the literature search, established SLR methods were followed. The review protocol specified the research objectives; the data sources to be included in the literature search; the strategy for conducting the literature search; the inclusion/exclusion criteria; and finally, an analytical framework for conducting the review. This structured approach will ensure that the review presents a broad and balanced synthesis of existing knowledge-based gaps, while identifying major areas that require additional research.

Data Sources

A wide set of studies was gathered using various academic databases: Scopus; Web of Science; IEEE Xplore; ScienceDirect; and Google Scholar. These databases were chosen for their wide range of coverage of peer-reviewed journals in finance, technology, management, and the social sciences. Also, reports and publications related to policies and industries were used to give the review a practical and regulatory focus. Reports from international organisations; financial regulatory bodies; and FinTech industry organisations helped to highlight real-world examples of developments and emerging practices with AI-based financial services for senior citizens; thereby adding to the review's relevance for policymakers and practitioners.

Search Strategy

Studies were identified through a structured keyword-based search strategy. Keywords and combinations included financial inclusion; senior citizens/elect; elderly users; older adults; AI in FinTech; digital banking; technology adoption; and trust in AI; and technology anxiety.

Searches were improved by using Boolean operators (e.g., 'AND', 'OR') to broaden or narrow coverage and provide complete coverage without adding too much duplication. The results of the searches were limited to English language materials published in the period from 2010 to the present (October 2024). The date range was determined based on capturing research that is relevant to technological advancements in AI and FinTech; ensuring the results were relevant to digital financial systems in operation today.

Inclusion and Exclusion Criteria

The study was designed with clear definitions for inclusion and exclusion to ensure uniformity and relevance. To be included in the study, the research must meet the following criteria:

- Research focused on AI-enabled or digital Financial Technologies (FinTech)
- Research related to older individuals (seniors, elderly, etc.) who use those technologies
- Research focused on a topic related to financial inclusion, adoption, usability, trust and/or involvement with FinTech
- The following criteria were used to exclude studies:
 - no connection to financial services or AI-enabled technology
 - only involve those under age and not older adults
 - no direct relevance to financial inclusion outcomes

A duplicate study was eliminated before screening and reviewing the titles and abstracts to verify relevance to the research question. Studies will be reviewed one at a time for full-text verification.

Study Selection and Screening

There were 3 steps for screening studies:

1. Duplicated studies were removed.
2. Study title and abstract were reviewed for adherence to the research objectives.
3. Full text was examined for adherence to the inclusion criteria.

At this stage, any study lacking empirical or conceptual relevance to AI-driven FinTech or financial inclusion for seniors was excluded from the final sample. The final sample consisted of research articles that were conducted using conceptual analysis, empirical and review papers, and reports related to policy and procedure. Therefore, the sample provided a broad spectrum of theoretical knowledge from which to develop practical application of those theories through a comprehensive synthesis of data collected.

Data Extraction and Synthesis

Data from each selected study were systematically extracted, which consisted of basic information about the authors (including their name and affiliation) as well as the publication date, the research subject, and the methods used in the study. In addition to this, three categories were created to help group the studies into five major themes relating to financial inclusion: access, usability, trust & security, technology anxiety, and consumer engagement. The use of a thematic synthesis approach allowed for a cross-study comparison of the findings that were discovered across all of the studies reviewed; therefore, identifying commonalities within research, contradictions among research, and areas not frequently researched. In contrast to aggregating findings in a quantitative fashion, this systematic review provided a way of using qualitative synthesis to provide insight into the subjective experiences of senior citizens related to the impact of artificial intelligence on financial technology.

Discussion of Findings and Conceptual Framework

Discussion of Findings

The consequences of the systematic review of the literature suggests artificial intelligence driven Financial Technology Programs may have the ability to create significant improvement

in Financial Inclusion of the Elderly. This improvement is not guaranteed or will happen equally throughout all places, the amount of improvement is determined by how the technologies are designed, implemented and governed, and the overall Socioeconomic and Institutional context of where seniors participate in digital financial services. The literature indicates that there are several long-standing barriers that the elderly face when using AI-enabled financial tools and programs, but overall success will require consideration for Age-Specific factors such as Access, Useability, Trust, Anxiety About Technology, and Longevity of Use. These factors do not operate on their own and dynamically interact with each other to produce outcomes of Financial Inclusion (adoption of technology, continual usage of technology, and confidence in finances).

Accessibility

In Accessibility, the most basic of the Financial Inclusion dimensions is addressed by the literature as the most basic of Financial Inclusion dimensions for seniors in digital financial ecosystems. The literature indicates that elderly individuals have Physical, Sensory, and Cognitive barriers preventing access to Standard Digital Financial Platforms. AI-enabled functions such as voice banking, biometric identification, and multilingual interfaces help to significantly reduce barriers to Accessibility to allow for increased inclusion. In this context, the significance of voice-activated systems (applications) cannot be understated. Several studies indicate that using voice commands or conversation-style interfaces within a banking application reduces the amount of visual navigation or manual input needed when using an app and makes it the most suitable method to help seniors who may be visually impaired, have low levels of literacy, or have decreasing motor skills. For example, seniors can use voice command technology to easily perform financial transactions, check account balances, or obtain information without having to exert a mental effort. As well, this will likely be the manner in which most seniors will communicate, thus they will feel a degree of comfort and confidence in the process. Biometric authentication improves seniors' access to banking applications by allowing older adults who may experience difficulties remembering complex passwords or PIN numbers to use fingerprint recognition or facial recognition to log in. This creates a more robust method of securely logging into a banking application, while at the same time providing a senior with a simple and efficient way to log in securely. In a similar fashion, providing a multilingual interface for elders living in multilingual communities enables them to interact with a banking application using their language, thus limiting confusion and reliance on third parties when using an application. In spite of the advances in technology mentioned above, some studies continue to point out persistent barriers due to infrastructure issues that limit how inclusive AI-driven FinTech can be. Many senior citizens are still facing barriers to using digital financial services due primarily to limited access to smartphones; too much cost associated with purchasing smartphones; issues with having a reliable Internet connection; and uneven access to overall Digital Services especially in rural and low-income areas. These statistics indicate that unless there are more forms of technology available to overcome the current barriers, there will be little to no progress made toward the population being able to utilize digital financial services on a regular basis.

Usability

Older adults will not be able to adopt or maintain regular use of digital financial service solutions due to challenges related to usability when accessing these solutions. The reason that older adults find it difficult to use digital financial platforms is due to numerous usability issues such as complicated layouts, small font sizes, vague icons, and using multiple steps to complete transactions. These design aspects result in increased cognitive load and frustration for the user, which often results in older adults giving up trying to use digital platforms after only limited attempts. AI-powered adaptive user interfaces are expected to solve some usability challenges. If an adaptive system adjusts the size of fonts, colour, page layout and

path of movement of items based on how a user interacts with the system and their previous preferences displayed; then this would enable the user to make better choices, as well as be more comfortable and confident in using digital wallets for their financial services. Additionally, AI technology would allow older adults to have access to content that would reduce the amount of information that would be presented to them and present the same content in a more user-friendly format, based on each senior citizen's historical interaction with an adaptive system. As a result of personalisation through the use of AI technology, the user is provided with an additional level of independence, so they will not feel like they need to rely on outside organisations or individuals for assistance or guidance. This literature review shows that the majority of applications created for digital financial platforms design the majority of their services based on the needs of young adults who use technology well; therefore, the applications have little to no value for older adults. The design of the digital platform for those younger users affects the ability of AI technologies to provide older adults with ease of use and confidence in their ability to use these services. There are no standards for designing digital financial applications specifically for the needs of senior adults and there have been no usability tests performed on digital financial platform applications that include older adults in the study population.

Trust and Security

Trust and security are important factors that influence how seniors want to use digital finance. Seniors are often risk-averse and are more sensitive to issues of financial fraud, data breaches, and identity theft. Perception of safety is a major factor in whether seniors will adopt or continue using digital financial services and therefore perceived safety is a very important factor for seniors to use these services. Fraud detection systems using AI technology, instant alerts for transactions and identifying unusual transactions all reinforce seniors' perception of safety by assisting them in identifying questionable transactions and providing quick answers if they need to alert the user. In addition, biometric security provides additional confidence that individuals can't access their digital financial services in an unauthorized manner. According to the literature, these tools and technologies can help to address the fear that seniors have for losing money as a result of fraud and increase confidence in their ability to use online financial services. Despite the positive aspects of these features, there are still some concerns regarding privacy and security relating to data privacy, transparency in algorithmic decision-making and ethical use of individuals' personal information. Many seniors do not feel comfortable with AI-based decisions because they often do not know how the decision was made. Algorithmic opacity (where potential users don't understand how AI makes decisions regarding risk, how AI approves transactions or how AI recommends things) can produce a decrease in trust even when sufficient security measures are in place. The research results support the necessity, for all users, to have transparent and explainable AI that provide understandable and user-friendly communication of their decision-making processes.

Technology Anxiety

For seniors, technology can lead to anxiety and therefore be a barrier to successfully adapting to new technologies through their use of digital finance. Research consistently supports these barriers as factors that cause senior users' anxiety due to their fear of making mistakes when using technology (when they haven't used them before), not feeling confident about the way they have used technology in the past and their previous negative experiences when using technology. This results in either resistance to adopting digital financial transaction platforms or early exit from those platforms. AI conversational agents and guided support technologies are key to addressing technological anxiety. Chatbots and virtual assistants provide real-time assistance and step-by-step guidance when using financial applications, which gives seniors greater confidence in using them. These technologies create a similar experience to that of receiving in-person assistance and therefore help reduce feelings of isolation and uncertainty

when using financial applications. Nevertheless, the literature indicates that AI support needs to be combined with ongoing handholding support. Support that lasts only a short time does not eradicate the anxiety that is entrenched. Digital literacy initiatives, assisted digital service models, and hybrid service models that merge AI with in-person support must address developing long-term confidence for older adults. This finding reinforces the notion that older adults' adoption of technology can be seen as primarily a psychological and social experience rather than a technological experience.

Consumer Engagement

Engaging consumers is one of the primary results of seniors using an AI-integrated financial technology system. Beyond just adopting the technology to use, engaging seniors means they will continue to use it often; they will continue to interact with the product frequently; and they will build their emotional connection to the platform. Literature supports that the personalization of information provided to seniors will enable them to be engaged by tailoring items such as financial advice, notifications reminding them to transact, and communication of the product features to the specific individual's needs and preferences. Personalized recommendations supporting the senior in understanding their own risk tolerance and/or financial needs will help enable seniors to make informed decisions. By sending reminders for transactions as well as continual nudging, the senior user will be able to execute their normal financial transactions such as bill payments, savings and/or additional financial activities without being inundated with a large volume of transactions. Research has demonstrated that seniors respond to non-cumbersome and simplified forms of communication that will allow them to maintain their autonomy when utilizing AI-integrated financial technologies. Despite these optimistic results, there continues to be limited empirical evidence regarding the long-term engagement and habit formation of senior users. Most published empirical research has been focused solely on the initial adoption of the technology or on the short-term use of the technology by seniors. This lack of evidence highlights an opportunity for further longitudinal research to examine the alongside of sustained engagement and trust building associated with the use of AI-enabled financial services with the senior population.

Conceptual Framework

With the information from the systematic literature review, we present a conceptual framework detailing the influence of AI-based FinTech solutions on financial inclusion in later-life people. Through enabling and facilitating Better Financial Inclusion are AI-Based FinTech Solutions (e.g. Chatbots, Voice Assistants, Biometric Security System, and Personalized Recommendation Engines). The influence is created by five mediating dimensions: Accessibility, Usability, Trust and Security, Technology Anxiety, and Consumer Engagement (E.g. New Clients Consumers). Through Better Accessibility and Usability reducing physical and cognitive barriers experienced by people in later-life, along with higher levels of Trust and Security reduce the perceived risks associated with using technology, Lower Technology Anxiety increases the propensity to adopt and Higher levels of Consumer Engagement supports the continued use of AI-Based FinTech Solutions to create increased financial confidence. Also, a set of Moderating Factors that influence the level of financial inclusion for this demographic group, Digital Literacy, Previous Experience with Technology, and Regulatory/Ethical Safeguards have a direct or indirect effect on the strength or direction of the relationship between the AI-Based FinTech Interventions and Financial Inclusion Outcomes. The integration of these dimensions supports a holistic view of Financial Inclusion for this demographic in an AI-enabled digital ecosystem.

Research Gaps, Implications, and Conclusion

Research Gaps and Future Directions

Systematic literature review also concludes that there are critical gaps in our understanding of AI-enabled financial inclusion for seniors. The one major gap that has been identified is that there are no existing design frameworks that are tailored specifically for the elder population. Most current AI based FinTechs are developed based on a generalized user model that inherently favours and prioritizes younger individuals who are generally more tech-savvy. As a result, age-related cognitive, sensory, and psychological factors are usually an afterthought in any AI based design process. There is a significant deficit of empirical information that can be directly applied to the design principles for artificial intelligence (AI) and financial technology (FinTech) solutions from a perspective of gerontological research (i.e., aging research) or application of aging research. A second significant gap in the literature is the absence of longitudinal research that can examine patterns of long-term use and adoption amongst senior citizens. Most of the current literature on senior citizen users of digital financial services focuses on early stages of the adoption process, intentions to use, and/or short-term utilization patterns of digital financial services. While the existing literature does lend some insight into the early stages of senior citizen user adoption of AI and FinTech products and services; it fails to address how seniors' trust, confidence, and engagement have developed over time while using AI and/or FinTech products and services. Senior citizens' financial inclusion is a dynamic and cumulative process that occurs across a large amount of time; so longitudinal methodologies will be useful when examining the senior citizen's habit development, trust development, and engagement development with AI and/or FinTech. The review of literature finds an insufficient emphasis on Ethical Governance (e.g., Data Privacy) and Algorithm Accountability in relation to seniors. While Ethical AI has achieved more notoriety in recent years, the majority of discussions have remained largely theoretical and do not directly discuss the specific vulnerabilities that some older adults experience when engaging with AI systems and the manner in which those AI systems function (i.e., informed consent and how that affects data privacy, algorithmic bias, and explainability, etc.). Furthermore, there is significant need for research to explore the operationalization of Ethical AI Frameworks within Age-Sensitive Financial Services, as this will help ensure that there is Transparency, Fairness, and Autonomy of all Users in these services. Additionally, there is a significant geographical bias in the literature towards developed countries, while there is limited empirical research available on developing and emerging countries. This geographical bias is particularly concerning due to how pronounced the Digital Divide, Infrastructure Barriers, and Cultural Factors impact older adults in developing and emerging countries. In India and other less developed nations, for example, older adults often face multiple challenges (e.g., Illiteracy, Formatting, Limited Digital Access) that affect them significantly more than their counterparts living in developed areas. As such, future research should adopt context-sensitive frameworks that incorporate the lived experiences of seniors across a variety of economic and cultural contexts. Given these gaps, combination (interdisciplinary) and mixed-methods research, drawing on marketing, information technology, geriatrics, psychology and fully developed social policy will be critical in future research. All researchers will need to place an emphasis on longitudinal designs, participatory design methods that include seniors, and comparative research between countries in order to foster comprehensive and nuanced insights into how AI based FinTech solutions can support sustainable and inclusive financial participation by seniors.

Implications

Overall, the results from this systematic literature review will have significant implications for theory, practice and public policy. The study highlights that there are many elements of financial inclusion within the senior population, thereby demonstrating that efforts across multiple sectors, including academia, industry and as regulators, need to work towards creating a coordinated effort to support seniors in achieving financial inclusion.

Theoretical Implications

This research contributes to the financial inclusion and technology adoption literature from a theoretical standpoint by integrating different dimensions of age into an AI driven FinTech context. The existing technology adoption models (e.g. Technology Acceptance Model (TAM), Unified Theory of Acceptance & Use of Technology (UTAUT)) have typically been used with broad-based (general) and younger groups. Therefore, through its review of the theories, this research applies traditional technology acceptance conceptual frameworks in relation to specific dimensions that are especially relevant for seniors, i.e., technology anxiety, cognitive overload, sensitivity to trust and assistance with technology. This research also expands financial inclusion theories by prioritising age-based digital exclusion rather than traditional forms of exclusion (such as income, geographic location, and sex). The review conceptualizes financial inclusion as a multidimensional construct that is affected by issues of accessibility, usability, trust, anxiety and engagement, thus providing a greater theoretical context for examining financial inclusion among seniors and influencing future theory development efforts related to seniors' digital financial behaviors.

Managerial Implications

The report indicates to Financial Technology (FinTech) developers, financial services providers, and service designers of the importance to develop inclusive and age-aware design strategies in their offerings to older adults. Financial services powered by AI must evolve away from offering a “one-size-fits-all” approach to providing older adult-friendly user interfaces, voice-assisted interactions, and simplified processes that meet the skills and preferences of older adults. They also should involve older adults in usability testing to ensure products provide an intuitive, accessible, and confidence-building experience. In addition, the report shows the managerial importance of explainable AI. For older adults to have trust in the use of AI as a tool for decision-making, fraud detection, and recommendations, the financial service organization must communicate in a clear and transparent way how AI arrived at that decision, detected the fraud or provided the recommendation. The report suggests organizations provide education, clear disclosures, and conversational interfaces to demonstrate AI processes to assist facilitate building trust in older adults. In addition, the report points out that older people will be able to learn to use AI tools (which are digital tools that help people use digital services) through the use of assisted digital solutions. Assisted digital solutions use both AI-based tools and human assistance. Therefore, managers should implement hybrid service delivery systems such as AI-enhanced customer care agents or community-based digital help desks to assist in the gradual and consistent adoption of AI by older adults.

Policy Implications

When developing policies promoting equitable access to digital financial services, it is essential for policymakers and regulators to consider the results of this study. For example, there are currently very few regulations specific to older adults that address the unique vulnerabilities and rights of older adults within AI-enabled financial systems. There should be specific regulations for older users that demonstrate a commitment to protecting their personal data, algorithmic transparency, informed consent, and ways to resolve grievances regarding their use of these systems. Therefore, public policies must focus on developing digital literacy and financial education for older adults through the establishment of digital financial literacy programs designed solely for older adults. These programs must not only provide education in general digital skills, but also cover topics such as online scams, how to remain protected when using digital technology, and instilling confidence in older adults to perform online financial transactions. Governments, financial institutions, and civil society organizations can work together to develop and implement accessible, reputable training programs specifically

designed for older users. Finally, public funding will be required to develop digital infrastructure (including low-cost devices and reliable internet access) as well as provide AI-driven financial inclusion, so that it does not further entrench current disparities. Policies that promote inclusivity must account for both technological and economic barriers in order to create enabling environments for older adults.

Conclusion

Based on the results of a systematic literature review, the transformative potential of AI-driven Fintech interventions will add to financial inclusion among older adults by confronting barriers regarding access, usability, trust and engagement; however, technology alone does not guarantee sustainable financial inclusion for older adults. In order for older adults to participate meaningfully in the financial system, the design of AIs must be ethical and transparent, contain trust-building mechanisms, be supported by regulatory frameworks and include human support over the long-term. The interdisciplinary literature synthesised in this research produces a thorough understanding of how AI-enabled financial services can be developed based on the needs and capabilities of older adults. The literature review describes both progress and challenges, serving as a basis for further research, management innovations, and policy developments. In conclusion, developing senior-friendly digital financial ecosystems is technologically an imperative and socially and ethically responsible in an increasingly ageing and digitising world.

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