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THE SCOPING REVIEW ON DIGITAL FINANCIAL LITERACY AMONG OLDER ADULTS

Abstract

This scoping review aims to bring together what we know about digital financial literacy (DFL), especially for older adults. It explores how DFL is defined and understood, how it's measured in different studies, and what kinds of educational programs have been developed to support older people in managing their finances online. This review was guided by the PCC (Population, Concept, Context) framework, allowing for the inclusion of studies on adults aged 18 to 79 to draw insights relevant to older adults. A systematic search of the Web of Science database (2014–2025) was conducted, followed by a two-stage screening and full-text review process. Data were extracted and thematically analyzed to identify how digital financial literacy is defined, measured, and supported through educational interventions, with a focus on age-specific needs and challenges. The review found that most studies assess digital financial literacy (DFL) using surveys and self-report questionnaires focused on knowledge, skills, and fraud awareness. Behavioral experiments, such as randomized controlled trials, provide valuable insights into the effectiveness of different educational approaches. Emerging frameworks emphasize integrating digital literacy with financial literacy and highlight the need for culturally and contextually adaptable interventions, especially for older adults and underserved populations. This review highlights the critical need for integrated financial education that combines knowledge, digital skills, and consumer protection, especially for older adults.

Keywords: digital financial education, digital financial literacy, older adults, older people, scoping review, thematic analysis, digital literacy, financial literacy.

Introduction

The digitalization of financial services has transformed how individuals manage their financial decisions, offering both opportunities and challenges [1]. This shift is particularly significant for older adults, who may face barriers in adapting to digital platforms due to limited digital skills, cognitive changes, or financial vulnerability [2, 3]. As financial transactions increasingly shift online, enhancing

digital financial literacy (DFL) among older populations becomes essential to ensure their financial well-being and social inclusion.

Digital financial literacy is broadly defined as the combination of financial knowledge, digital competencies, and risk awareness necessary to safely and effectively use digital financial services. However, the literature presents diverse conceptual frameworks, measurement approaches, and educational interventions aimed at improving DFL. Understanding these elements is crucial for developing targeted strategies that address the specific needs of older adults.

This scoping review synthesizes existing research on DFL with a focus on older adults, addressing the following research questions:

What are the key definitions and conceptual frameworks of digital financial literacy?

How is digital financial literacy measured in different studies?

What digital financial education interventions have been proposed, and how effective are they?

The paper is structured as follows: The next section provides key definitions and conceptual positioning of DFL as detailed within the studies included in our review, emphasizing their significance and relevance to older adults. This is followed by an analysis of measurement approaches and their applicability to aging populations. The subsequent section reviews digital financial education interventions, evaluating their design, implementation, and effectiveness. Finally, the discussion identifies research gaps and offers recommendations for future systematic reviews and empirical studies, emphasizing the need for age-inclusive strategies to promote financial well-being in the digital era.

Materials and methods

This scoping review follows the PCC (Population, Concept, Context) framework. PCC is particularly suitable given the limited number of studies focusing on older adults. By including adults aged 18 to 79, this review interprets findings from general adult populations to draw insights relevant to older adults, aligning with understanding digital financial literacy (DFL) in financial decision-making.

Eligibility criteria

Studies were included if they: Defined or measured digital financial literacy (DFL) or described educational interventions aimed at improving financial decision-making. Employed tools or scales to assess DFL, including knowledge, digital competencies, and behavioral outcomes. Reported the impact of digital financial education interventions on financial decision-making, such as improved financial knowledge, reduced vulnerability to financial fraud, and enhanced budgeting skills. Importantly, although inclusion criteria encompassed adults aged 18–79, the analytical emphasis of the review distinguishes between age groups to avoid conceptual overgeneralization. Findings are synthesized separately for studies explicitly focused on older adults, mixed-age adult samples, and general adult or student populations. Exclusion criteria included studies that did not focus on financial literacy in digital contexts, lacked empirical data, or were opinion pieces or commentaries.

Search strategy

A comprehensive search was conducted in the Web of Science database, covering the period from 2014 to 2025. The search terms included combinations of keywords such as “digital financial literacy,” “financial education,” “financial literacy,” “financial decision-making,” “older adults,” “elderly,” “older people,” and “senior people.” Boolean operators (AND, OR) were used to capture a wide range of relevant studies. Reference lists of included articles were also scanned for additional studies.

Screening and selection process

The article selection process followed a two-stage approach:

1. Title and abstract screening: Three reviewers independently screened the titles and abstracts of identified articles using Covidence software. Disagreements were resolved through discussion to ensure consistent application of eligibility criteria.

2. Full-text review: Articles that met the inclusion criteria were assessed in full text, and any discrepancies in selection were resolved through consensus (figure 1).

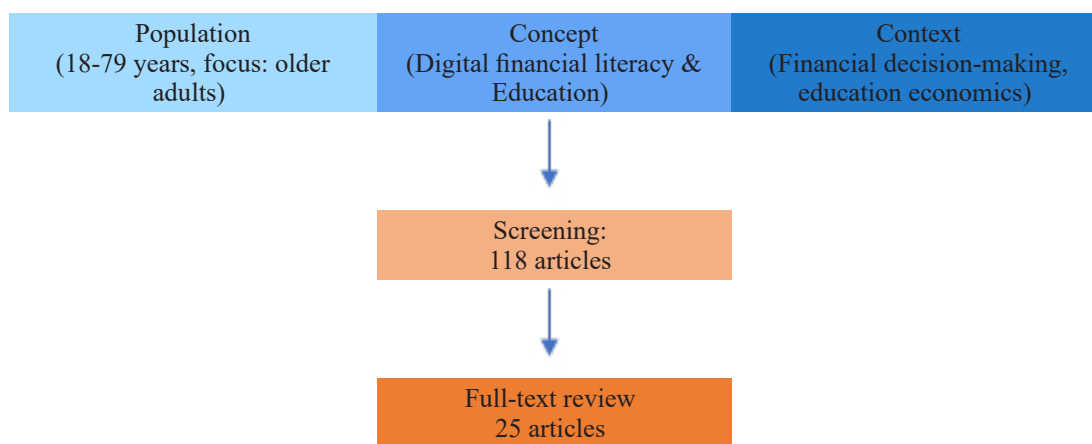


Figure 1 – PCC framework and screening process

Note: Compiled by authors.

Data extraction

Data were extracted using a structured template within Covidence, capturing the following information: Study characteristics, definitions and conceptual frameworks of DFL, measurement tools and scales used to assess DFL, educational interventions aimed at improving DFL and their outcomes on financial decision-making, key findings and implications for older adults.

Data analysis

Given the diverse study designs and outcomes, a qualitative synthesis approach was used to identify patterns, themes, and research gaps. Thematic analysis was conducted to categorize the findings into core themes, including DFL definitions, measurement methods, and intervention effectiveness. Special attention was given to age-specific barriers and facilitators related to digital financial literacy. To address potential conceptual confusion, results were synthesized across two analytical categories: studies explicitly focused on older adults and studies focused primarily on younger/general adult populations.

The initial scoping review revealed that studies frequently referenced widely-cited definitions of (digital) financial literacy and related concepts promoted by international organizations such as the Organization for Economic Cooperation and Development (OECD). In the subsequent result section, we first present these broadly-cited definitions, sourced from the respective organizational documents, alongside the academic literature sourced from our scoping review.

Results and discussion

Results of key definitions and conceptual positioning of digital financial literacy.

According to the Organization for Economic Co-operation and Development (OECD, 2022), Digital Financial Literacy (DFL) is “a combination of knowledge, skills, attitudes, and behaviors necessary for individuals to be aware of and safely use digital financial services and digital technologies to contribute to their financial well-being” [4]. This definition stresses the cognitive and behavioral dimensions of DFL, emphasizing both the awareness of digital financial services and the competencies to use them securely. It expands upon traditional financial literacy (OECD, 2014, 2020), which focuses on the financial awareness, knowledge, skills, attitudes, and behaviors necessary to make sound financial decisions and ultimately achieve financial well-being [4]. Along with the definition of digital literacy provided by the American Library Association: “The ability to use information and communication technologies to find, evaluate, create, and communicate information, requiring both cognitive and technical skills” [5]. These foundational definitions serve as benchmarks for contemporary research in their respective domains. Moreover, they provide the conceptual basis for emerging concepts like digital financial literacy, which integrates elements from both financial and digital literacy to address the competencies required in today’s digital financial landscape.

The Alliance for Financial Inclusion (AFI) further expands on this by defining DFL as “acquiring the knowledge, skills, confidence, and competencies to safely use digitally delivered financial products and services, to make informed financial decisions” (AFI, 2021) highlighting the importance of confidence and informed decision-making, which are particularly critical for older adults who may lack familiarity or comfort with digital financial tools [6].

From an academic perspective, researchers Golden and Cordie (2022) describe an individual with DFL as possessing “the knowledge and skills to use digital devices to make better financial decisions.” This emphasizes the practical application of DFL in daily financial decisions, particularly in an era where more financial transactions are conducted online. The ability to navigate digital tools effectively becomes a critical determinant of financial well-being [7].

In line with this, Morgan et al. (2019) reveal that DFL involves not only knowledge of digital financial products but also awareness of the associated risks and an understanding of consumer rights. This broader view is essential for ensuring that individuals, particularly older adults, can use digital financial tools with a sense of security and awareness of their rights in the digital space [8].

Similarly, Choung et al. (2023) highlight that DFL encompasses the skills required to conduct financial transactions on digital platforms and avoid digital fraud. This is particularly critical for older adults who face challenges in adapting to technological advancements and may require additional support in mastering digital platforms for financial activities [9].

These definitions converge on the idea that DFL requires a combination of digital competencies, such as the ability to use online banking and make secure payments, along with financial knowledge, such as understanding digital financial products and managing online transactions [4, 6, 8, 9]. Given the increasing digitalization of financial services, DFL is especially crucial for older adults, who may face unique challenges due to factors like limited digital skills, cognitive changes, or financial vulnerability.

Conceptual frameworks of DFL often integrate cognitive, behavioral, and technological dimensions. One prominent framework is the Responsible Digital Finance Ecosystem (RDFFE), proposed by the Consultative Group to Assist the Poor (CGAP), which emphasizes customer-centric approaches and collaborative ecosystems to enhance digital financial inclusion (CGAP, 2024). The framework underscores the need for inclusive digital systems that prioritize the security and autonomy of users [10].

Thematic analysis of measurement approaches and educational interventions in digital financial literacy research

In this thematic analysis, we examine the measurement approaches and educational interventions used in recent studies on digital financial literacy (DFL) among adults. The following themes emerged across the studies reviewed (figure 2).

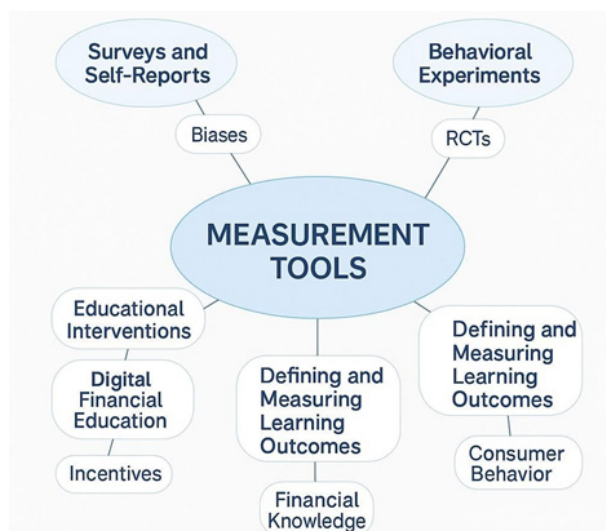


Figure 2 – Thematic analysis of measurement approaches and educational interventions

Note: Compiled by authors based on the provided resources.

Measurement approaches

Surveys and self-reports: Most studies utilized surveys and self-report questionnaires as primary tools for assessing digital financial literacy and its outcomes. For example, Ravikumar et al. (2022) developed a structured questionnaire to assess DFL, focusing on four key dimensions: digital knowledge, awareness of digital financial services, practical usage skills, and fraud avoidance ability [11]. Similarly, Choung et al. (2023) used online surveys to gather self-reported data from Korean adults on DFL, financial knowledge, and financial well-being. These surveys provided valuable insights into how individuals perceive and manage their financial lives in a digital context [9]. Yadav & Banerji (2024) used a questionnaire to collect data from 500 respondents, relying on their self-reported levels of Digital Financial Literacy (DFL), saving behavior, and Investment behavior. The analysis employs Structural Equation Modeling (SEM) with AMOS to examine relationships between these variables, which is typical for survey-based studies [12].

While surveys are valuable for capturing individual perceptions, they are also subject to biases, such as social desirability or recall bias, which can influence the accuracy of self-reported data. Despite this limitation, these tools remain widely used in digital financial literacy research due to their accessibility and ease of data collection.

Behavioral experiments: A notable addition to the measurement tools is the use of behavioral experiments, particularly randomized controlled trials (RCTs). Oberrauch & Kaiser (2024), discussed in more detail below, employed an RCT to compare two distinct interventions: a digital financial education program and an incentivized learning-by-doing approach. The behavioral component of incentivized learning, where participants received vouchers to engage in financial tasks, provided a practical dimension to the assessment of financial literacy. This approach allowed researchers to gauge how experiential learning and direct interaction with financial products impact knowledge acquisition and financial behavior [13].

Educational interventions

Defining and measuring learning outcomes

The studies reviewed adopt varied approaches to defining and assessing financial literacy, with a strong emphasis on empirical evaluation. Blanco et al. (2023) assess the effectiveness of their intervention, using a randomized controlled trial (RCT) that measures financial capability through indicators such as budgeting behavior, confidence in handling unexpected expenses, and reductions in financial stress. Their findings suggest that structured digital interventions can have a statistically significant impact on financial well-being, particularly among low- to moderate-income Hispanic participants [14].

Similarly, Oberrauch and Kaiser (2024) investigate the role of digital financial education in university students' financial knowledge acquisition. Their study employs standardized financial literacy assessments, including the widely used "Big Three" financial literacy questions (Lusardi & Mitchell, 2014), alongside a broader set of measures focused on investment decision-making. Their results indicate that a structured video-based financial education program can enhance financial knowledge, with effects persisting over three months. In contrast, their experiment also tests an alternative approach in which students were provided with pre-paid vouchers to engage with a robo-advisory investment platform. This incentive-based approach, however, showed no significant effect on financial knowledge, suggesting that direct financial education remains a crucial foundation for developing financial competency [13, 15].

Koskelainen et al. (2023) take a broader conceptual approach, arguing that financial literacy in the digital age must account for behavioral changes in consumer interactions with digital financial services. Their work highlights the importance of assessing not only knowledge acquisition but also behavioral adaptations to digital financial ecosystems, such as consumer responses to 'algorithmic nudges', the ability to critically evaluate online financial products, and resilience against digital fraud. They propose a more expansive framework that integrates financial literacy with digital literacy, advocating for financial education that explicitly addresses the risks and opportunities presented by financial technology [16].

Menberu (2024) further expands this discussion by exploring financial education in developing countries, where technology-mediated financial education is viewed as a tool for overcoming infrastructural and accessibility challenges. His systematic literature review underscores that while

technology has made financial education more scalable and adaptable, there remain significant barriers related to infrastructure limitations, digital literacy disparities, and cultural and linguistic inclusivity. These findings suggest that financial education strategies should be designed with contextual adaptability to maximize effectiveness across diverse populations [17].

Digital as both a medium and an outcome in financial education

Across the reviewed studies, digital platforms play a dual role in financial education: they serve as a primary instructional method while also shaping the competencies necessary for financial decision-making in a digital economy. Digital interventions have increasingly replaced traditional, in-person financial education, leveraging mobile technology, online platforms, and interactive tools to facilitate learning. Blanco et al.'s work (2023) exemplifies this shift, using a mobile-first approach that delivers financial education through text messages and emails while integrating digital tools for budgeting and expense tracking [14]. Oberrauch & Kaiser (2024) demonstrate that structured, video-based financial education can enhance financial knowledge retention, particularly in investment-related decision-making, but caution that financial tools alone such as robo-advisory investment platforms do not inherently improve financial literacy without guided instruction [13].

Beyond content delivery, digital literacy itself has become a key financial competency. Koskelainen et al. (2023) emphasize that financial education must extend beyond knowledge acquisition to equip individuals with the skills necessary to assess digital financial products, navigate algorithm-driven decision-making, and critically evaluate fintech services [16]. The integration of AI-driven financial coaching and behavioral nudges further enhances engagement and long-term learning outcomes. In developing countries, digital financial education offers scalable solutions for underserved populations, particularly through mobile-based interventions and interactive voice response systems [17]. However, disparities in digital access and literacy remain significant barriers, requiring adaptable program designs that account for infrastructural limitations and cultural contexts.

Ultimately, while digital platforms provide unprecedented accessibility and engagement, their effectiveness hinges on structured educational design. The evidence suggests that while digital tools facilitate financial management, they are most effective when paired with guided instruction, ensuring that financial literacy extends beyond tool usage to informed and strategic financial decision-making.

Contextual and cultural influences on measuring DFL.

While the definitional foundations of Digital Financial Literacy (DFL) emphasize knowledge, skills, attitudes, and behaviors, these constructs do not manifest identically across diverse socio-cultural and infrastructural milieus. The choice of measurement tools and the interpretation of scores must account for contextual heterogeneity.

Measures developed for urban, digitally well-connected populations typically assume adequate internet access, device ownership, and baseline digital exposure. In low-resource or rural environments, these assumptions break down. A study measuring digital financial literacy in Bosnia and Herzegovina found that urban/rural residence, internet access, education, and income were significant predictors of DFL scores (people in rural areas had lower scores, partly reflecting infrastructure and access gaps) [18].

When infrastructure is lacking due to poor connectivity, limited device reliability, and intermittent power, respondents may struggle with even the mode of survey delivery. Tools that rely on online questionnaires might systematically exclude or bias responses from people with poor connectivity or lower digital confidence. This affects who is measured (selection bias) and what responses mean differences in how “ease of use” is experienced.

Societal norms can shape not only access but also permission and control. The AFI (Alliance for Financial Inclusion) highlights that women may own a mobile device but may be constrained by norms about usage, mobility, or decision-making authority. Even if a woman has a smartphone, she may not be able to use financial apps without her male family member's permission. Thus, measurement items that ask “how often do you use mobile banking” may understate barriers that are structural or normative rather than reflective of individual competence [6].

In some cultural contexts, hierarchical deference or social desirability may lead respondents to over-report confidence or familiarity, especially in survey modes, masking gaps in real competence. Haroz et al. (2021) note the tension between building culturally specific measurement items that better reflect contextual meaning vs building general instruments that allow cross-cultural comparison, balancing cultural specificity and generalizability [19].

Local financial practices informal savings groups, community credit, and mobile money networks, may not align with the “standard” digital financial services assumed in many DFL scales. For instance, in some low-income settings, peer-to-peer mobile money transfers or USSD (Unstructured supplementary service data) based payments might be dominant, rather than app-based banking. A questionnaire that focuses on “app use” may miss the key modalities that people actually use [20].

Language translation can also pose subtle challenges: metaphors or technical terms in one language may not carry the same meaning in another. Instruments need cross-cultural adaptation and validation through pilot testing, back-translation, and cognitive interviewing to ensure respondents interpret items as intended.

Table 1 – Contextual differences and their measurement implications

№	Contextual difference	Measurement challenge	Mitigation/ Design suggestion
1	Poor internet connectivity / low device access	Survey mode excludes many respondents or yields high non-response rates	Offer offline, paper, or IVR versions; sample weighting
2	Gendered norms around technology use	Discrepancy between ownership vs actual use	Ask about permission, control, shared access; supplement with qualitative probing
3	Dominant use of non-app payment modes (e.g., USSD)	App-focused questions miss relevant behavior	Add items for local digital modes (USSD, agent banking)
4	Language or metaphorical mismatch	Respondents misinterpret technical or abstract items	Cognitive interviewing, back-translation and local piloting
5	Variation in financial product ecosystems	Some items are irrelevant or alien	Adapt items to local digital financial instruments (mobile money, community networks)
Note: Compiled by authors based on provided resources.			

Initial results indicate that cultural and contextual variations significantly shape both the construct validity and comparability of DFL measures. Studies highlight, for instance, differences in conceptual framing between developed and developing countries, challenges in applying standardized scales across diverse populations, and the importance of incorporating local digital practices and financial behaviors into measurement tools.

Discussion and implications

This review sought to address three key research questions: (1) What are the key definitions and conceptual frameworks of digital financial literacy (DFL)? (2) How is DFL measured in different studies? (3) What types of digital financial education interventions have been proposed, and how effective are they? By synthesizing findings from a range of studies, this review highlights both the strengths and gaps in current research, offering implications for future scholarship, policy, and practice.

The review found that while definitions of DFL vary, most converge on a multidimensional perspective that includes financial knowledge, digital competencies and risk awareness. The OECD (2022) and Alliance for Financial Inclusion (2021) define DFL as the ability to safely use digital financial services, manage personal finances effectively and protect oneself from financial fraud. These conceptualizations expand upon traditional financial literacy by incorporating digital access, consumer protection, and cybersecurity awareness [4, 6].

Theoretical models of DFL, such as the Responsible Digital Finance Ecosystem (CGAP, 2020) and Koskelainen et al.’s (2023) framework on financial behavior in digital environments, underscore that financial literacy is not static [16]. Instead, it evolves alongside digital finance innovations and algorithm-driven financial services. This means that interventions must account for both cognitive and behavioral shifts in financial decision-making.

For older adults, the integration of digital literacy with financial capability frameworks is essential. As Morgan et al. (2019) and Choung et al. (2023) highlight, older adults face unique barriers, including trust issues with digital platforms, cognitive load when engaging with complex financial products, and increased vulnerability to online fraud. Future research should refine these frameworks to better

account for age-related digital financial challenges and inform interventions that are inclusive, adaptive, and accessible [21].

Measuring digital financial literacy: current approaches and gaps

There is a diversity of approaches to the measurement of financial literacy across the studies. Most rely on self-reported surveys and digital financial literacy tests [9, 11]. These assessments capture basic financial knowledge, digital tool usage and financial confidence but often lack behavioral tracking to determine whether individuals apply their knowledge in real-world financial decisions [16]. A promising approach is the integration of behavioral experiments and randomized controlled trials (RCTs). The study tested an RCT comparing video-based financial education with incentivized financial decision-making through investment vouchers [13]. Their findings suggest that learning-by-doing approaches alone do not enhance financial knowledge unless paired with structured education. This aligns with Blanco et al. (2023), who found that structured digital interventions led to higher financial confidence, budgeting improvements, and stress reduction among low-income Hispanic populations.

However, current DFL assessments tend to focus on knowledge acquisition rather than behavioral change [13, 16]. Moving forward, studies should incorporate transaction data, fintech usage analytics, and financial well-being indicators to assess whether digital literacy improvements translate into long-term financial security and responsible financial behavior [22].

Effectiveness of digital financial literacy interventions

The success of digital financial education programs varies depending on their design, delivery, and target population. Structured digital learning approaches, such as video-based modules and interactive tutorials, have proven to be effective in enhancing financial knowledge and retention. Studies demonstrate that well-structured digital interventions lead to measurable improvements in financial literacy, particularly when participants engage with structured content over time [13, 14].

However, exposure to financial technology tools without accompanying education is insufficient for improving financial literacy. Oberrauch & Kaiser (2024) found that while individuals who received access to robo-advisors gained some familiarity with digital financial tools, they did not demonstrate significant improvements in financial decision-making unless they also received structured financial education [13]. This suggests that experiential learning alone is not enough; digital financial literacy interventions must combine hands-on engagement with guided instruction to be truly effective [8, 23].

Tailored interventions that address the specific needs of different populations are particularly valuable in improving financial literacy outcomes. Menberu (2024) highlights the effectiveness of community-based programs designed for older adults and culturally adapted digital tools that align with the financial behaviors and learning preferences of diverse demographic groups [17]. Such targeted interventions ensure that digital financial education is accessible, relevant, and engaging for different user groups [24].

In addition to structured and targeted learning approaches, gamification and behavioral nudges have emerged as promising strategies to increase engagement in financial education. Studies emphasize that incorporating interactive, game-like elements into digital financial education programs can improve motivation and learning retention, particularly in mobile-based financial literacy programs [16, 25]. These interactive features encourage users to apply their knowledge in real-life financial scenarios, reinforcing learning through practical experience. More research is needed to explore and measure methods designed to gamify the learning process, especially for adult populations [26].

Integrating digital trace data and AI-driven analytics into the measurement of digital financial literacy

The increasing digitization of financial behavior presents new opportunities to enhance the measurement of Digital Financial Literacy (DFL) through the integration of digital trace data and advanced analytical techniques. Digital trace data comprising users' interactions with online banking platforms, digital wallets, or financial learning modules offer objective, fine-grained evidence of actual digital financial behavior. These data can include login frequencies, navigation sequences, transaction choices, and security actions, enabling the observation of demonstrated competencies in authentic digital contexts. Unlike self-reported surveys, which are prone to biases such as recall error and social desirability, trace-based evidence captures behavioral manifestations of literacy and can thus complement subjective measures [27].

The integration of trace data with traditional measurement instruments provides a more comprehensive understanding of DFL by linking cognitive awareness and attitudinal dispositions with behavioral enactment. Digital logs could be used to monitor how individuals adopt budgeting tools, respond to simulated fraud warnings, or engage with mobile banking tutorials. These behavioral insights align with OECD's (2022) call for multidimensional measurement approaches that capture both knowledge and protective digital behaviors [4]. Furthermore, AI-driven analytical techniques, such as clustering, sequence mining, and predictive modeling, can detect patterns of financial engagement and segment users based on learning trajectories or risk exposure [28]. Lessons from digital learning analytics demonstrate the potential of such methods to uncover latent behavioral profiles and to inform adaptive, data-driven interventions that promote financial resilience.

However, the application of digital trace methodologies in DFL research introduces significant ethical, privacy, and governance considerations. The use of behavioral data derived from financial transactions involves sensitive personal information and thus necessitates strict adherence to data protection standards, informed consent, and transparency regarding data use and retention. Scholars have emphasized the importance of privacy-preserving approaches such as differential privacy, secure data enclaves, and federated learning that allow aggregated analysis without compromising individual confidentiality. Moreover, algorithmic transparency and validation against qualitative insights are critical to mitigate the risks of bias or misclassification inherent in AI-driven models [28].

Implications for policy and future research directions

Although relatively few studies explicitly targeted older adults, the synthesis highlights several age-relevant considerations. Older adults may face unique barriers in digital financial environments, including lower digital self-efficacy, cognitive aging-related challenges, and increased vulnerability to online financial fraud. While evidence from general adult populations provides insight into DFL measurement and intervention design, direct applicability to older adults remains underexplored. This gap underscores the need for age-sensitive DFL frameworks, tailored interventions, and measurement tools validated specifically in older populations.

While digital financial education plays a crucial role in improving financial literacy, broader policy and structural interventions are necessary to create a more inclusive and secure digital financial environment. One important avenue for policy development is the establishment of public-private partnerships aimed at expanding access to age-friendly digital financial services. Menberu (2024) argues that collaboration between governments, financial institutions, and technology providers can enhance financial inclusion and ensure that digital financial products are designed with older users in mind [17]. In addition to increasing accessibility, such partnerships can help implement regulatory safeguards to prevent fraud and financial exploitation [29].

Consumer protection policies must also be strengthened to ensure that fintech services operate transparently and equitably, particularly for vulnerable populations. Koskelainen et al. (2023) highlight concerns related to data privacy, algorithmic biases, and the potential for financial manipulation in digital environments [16]. Strengthening regulatory oversight and implementing clearer consumer protection guidelines can help mitigate these risks, ensuring that older adults and other at-risk groups can engage with digital financial services safely and with confidence [30].

Financial institutions have a crucial role to play in integrating financial education directly into fintech applications. Choung et al. (2023) suggest that banks and financial service providers should embed educational resources within their platforms, offering onboarding tutorials, fraud detection alerts, and personalized learning pathways [9]. This approach allows consumers to learn in real-time as they interact with financial services, reinforcing knowledge through direct application.

Looking ahead, future research should explore the potential of adaptive learning technologies and AI-driven financial coaching to enhance financial literacy. Personalized digital education tools that adjust to an individual's learning pace and financial behaviors could improve engagement and retention. Additionally, longitudinal studies that track financial behaviors over time would provide valuable insights into how digital financial literacy translates into long-term financial well-being. By focusing on these areas, researchers and policymakers can continue to refine financial literacy interventions, ensuring they remain relevant and effective in an evolving digital economy.

Conclusion

The current review underscores the urgent need for comprehensive, behaviorally informed financial education programs that integrate financial knowledge, digital literacy, and consumer protection awareness. Digital financial literacy is not merely a technical skill but a critical component of financial security and independence, particularly for older adults navigating an increasingly complex digital economy.

To bridge the digital divide, interventions must focus on equitable access, regulatory safeguards, and adaptive, user-friendly learning models. By leveraging public-private partnerships, digital innovation, and evidence-based educational strategies, stakeholders can work towards a financial landscape where older adults are empowered, informed, and financially secure in an increasingly digital world.

REFERENCES

- 1 Lee S.M., Lee D. Untact: a new customer service strategy in the digital age // *Service Business*. 2019, no. 4(1), pp. 1–22. URL: <https://doi.org/10.1007/s11628-019-00408-2>
- 2 Vercruyssen A., Schirmer W., Geerts N., Mortelmans D. How “basic” is basic digital literacy for older adults? Insights from digital skills instructors // *Frontiers in Education*. 2023, no. 8. URL: <https://doi.org/10.3389/educ.2023.1231701>
- 3 Xie B., Charness N., Fingerman K., Kaye J., Kim M.T., Khurshid A. When going digital becomes a necessity: ensuring older adults’ needs for information, services, and social inclusion during COVID-19 // *Journal of Aging & Social Policy*. 2020, no. 32(4–5), pp. 460–470. URL: <https://doi.org/10.1080/08959420.2020.1771237>
- 4 OECD/INFE survey instrument to measure digital financial literacy. OECD Publishing eBooks. 2024. URL: <https://doi.org/10.1787/548de821-en>
- 5 Digital literacy, libraries, and public policy: Report of the Office for Information Technology Policy’s Digital Literacy Task Force // *American Library Association*. 2013. URL: <https://docs.edtechhub.org/lib/VMF2PYCM>
- 6 Digital Financial Literacy // *Alliance for Financial Inclusion*. 2021, no. 45. URL: <https://www.afi-global.org/publication/digital-financial-literacy/>
- 7 Golden W., Cordie L. Digital Financial Literacy // *Adult literacy education the international journal of literacy language and numeracy*. 2022, no. 4(3), pp. 20–26.
- 8 Morgan P., Huang B., Trinh L. The need to promote digital financial literacy for the digital age // *Realizing education for all in the digital age*. 2019, pp. 40–46. URL: <https://www.adb.org/sites/default/files/publication/503706/adbi-realizing-education-all-digital-age.pdf#page=56>
- 9 Choung Y., Chatterjee S., Pak T. Digital financial literacy and financial well-being. *Finance Research Letters*. 2023, vol. 58, p. 104438. URL: <https://doi.org/10.1016/j.frl.2023.104438>
- 10 Duflos E., Izaguirre J.C., Kumaraswamy S.K., Newbury L.B., Valenzuela M. Responsible digital finance ecosystem (RDFE): a conceptual framework (Working paper) // *CGAP*. 2024. URL: <https://www.cgap.org/research/publication/responsible-digital-finance-ecosystem-rdfe-conceptual-framework>
- 11 Ravikumar T., Suresha B., Prakash N., Vazirani K., Krishna T. Digital financial literacy among adults in India: measurement and validation // *Cogent Economics & Finance*. 2022, no. 10(1). URL: <https://doi.org/10.1080/23322039.2022.2132631>
- 12 Yadav M., Banerji P. Digital financial literacy, saving and investment behaviour in India // *Springer Nature Link*. 2024, vol. 27, pp. 489–507. URL: <https://doi.org/10.1007/s40847-024-00367-z>
- 13 Oberrauch L., Kaiser T. Financial Education or Incentivizing Learning-By-Doing? Evidence from an RCT with Undergraduate Students // *Journal of Behavioral and Experimental Finance*. 2024, no. 43, p. 100954. URL: <https://doi.org/10.1016/j.jbef.2024.100954>
- 14 Blanco L.R., Hernandez I., Thames A.D., Chen L., Serido J. Mind your money: A community-based digital intervention for improving financial capability among Hispanics // *Journal of Economic Behavior & Organization*. 2023, no. 212, pp. 629–643. URL: <https://doi.org/10.1016/j.jebo.2023.05.030>
- 15 Lusardi A., Mitchell O.S. The Economic Importance of Financial Literacy: Theory and evidence // *Journal of Economic Literature*. 2014, no. 52(1), pp. 5–44. URL: <https://doi.org/10.1257/jel.52.1.5>

- 16 Koskelainen T., Kalmi P., Scornavacca E., Vartiainen T. Financial literacy in the digital age – a research agenda // *Journal of Consumer Affairs*. 2023, no. 57(1), pp. 507–528. URL: <https://doi.org/10.1111/joca.12510>
- 17 Menberu A.W. Technology-mediated financial education in developing countries: a systematic literature review // *Cogent Business & Management*. 2024, no.11(1). URL: <https://doi.org/10.1080/23311975.2023.2294879>
- 18 Zaimovic A., Meskovic M.N., Dedovic L., Arnaut-Berilo A., Zaimovic T., Torlakovic A. Measuring digital financial literacy // *Procedia Computer Science*. 2024, no. 236, pp. 574–581. URL: <https://doi.org/10.1016/j.procs.2024.05.068>
- 19 Haroz E.E., Ivanich J.D., Barlow A., O’Keefe V.M., Walls M., Kaytoggy C., Suttle R., Goklish N., Cwik M. Balancing cultural specificity and generalizability: brief qualitative methods for selecting, adapting, and developing measures for research with American Indian communities // *Psychological Assessment*. 2021, vol. 34(4), pp. 311–319. URL: <https://doi.org/10.1037/pas0001092>
- 20 Hanouch M., Chen G. Promoting competition in mobile Payments: The role of USSD // *Research and analysis publications*. 2023, vol. 12. URL: https://www.cgap.org/research/publication/promoting-competition-in-mobile-payments-role-of-ussd?utm_source
- 21 Kamble P.A., Mehta A., Rani N. Financial Inclusion and Digital Financial Literacy: Do they Matter for Financial Well-being? // *Springer Nature Link*. 2024, no. 171, pp. 777–807. URL: <https://doi.org/10.1007/s11205-023-03264-w>
- 22 Jose J., Ghosh N. Digital financial literacy and its impact on financial behaviors: A systematic review // *Proceedings of the International Conference on Financial Literacy and Financial Inclusion*. 2024, pp. 45–67.
- 23 Klapper L., Lusardi A., van Oudheusden P. Financial literacy around the world: Insights from the Standard & Poor’s Ratings Services Global Financial Literacy Survey // *World Bank*. 2019.
- 24 Money smart for older adults: Prevent financial exploitation // *Consumer Financial Protection Bureau*. 2021. URL: <https://www.consumerfinance.gov/consumer-tools/educator-tools/resources-for-older-adults/money-smart-for-older-adults/>
- 25 Setiawan M., Effendi N., Santoso T., Dewi V.I., Sapulette M.S. Digital financial literacy, current behavior of saving and spending and its future foresight // *Economics of Innovation and New Technology*. 2020, no. 31(4), pp. 320–338. URL: <https://doi.org/10.1080/10438599.2020.1799142>
- 26 Zainuddin Z., Chu S.K.W., Othman J. The evaluation of gamification implementation for adult learners: A scale development study based on andragogical principles // *Education and Information Technologies*. 2024, no. 29, pp. 18591–18620. URL: <https://doi.org/10.1007/s10639-024-12561-x>
- 27 Keusch F., Kreuter F. Digital trace data. In *Routledge eBooks*. 2021, pp. 100–118. URL: <https://doi.org/10.4324/9781003024583-8>
- 28 Hernández-De-Menéndez M., Morales-Menendez R., Escobar C.A., Mendoza R. Learning analytics: state of the art // *International Journal on Interactive Design and Manufacturing*. 2022, vol. 16(3), pp. 1209–1230. URL: <https://doi.org/10.1007/s12008-022-00930-0>
- 29 Kali K. Age-friendly banking standards // *National Community Reinvestment Coalition*. 2019. URL: <https://ncrc.org/afb-standards/>
- 30 Boeddu G., Chien J., Istuk, I. Financial consumer protection and fintech: An overview of new manifestations of consumer risks and emerging regulatory approaches. *International Bank for Reconstruction and Development* // *The World Bank*. 2022, vol. 1. URL: <https://documents.worldbank.org/en/publication/documents-reports/documentdetail/515771621921739154/consumer-risks-in-fintech-new-manifestations-of-consumer-risks-and-emerging-regulatory-approaches-policy-research-paper>

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ЕГДЕ ЖАСТАҒЫ АДАМДАРДЫҢ ЦИФРЛЫҚ ҚАРЖЫЛЫҚ САУАТТЫЛЫҒЫ БОЙЫНША ШОЛУ ЗЕРТТЕУІ

Аңдатпа

Бұл ауқымды карталық шолудың мақсаты – егде жастағы адамдар контекстінде цифрлық/сандық қаржылық сауаттылық (ЦҚС/СҚС) бойынша ағымдағы білімді қорытындылау. Зерттеу СҚС қалай анықталатынын және түсінілетінін, әртүрлі зерттеулерде қандай өлшеу әдістері қолданылатынын және онлайн қаржылық басқаруда егде жастағы адамдарға қолдау көрсету үшін қандай білім беру бағдарламалары әзірленетінін зерттейді. Шолу 18–79 жас аралығындағы ересектерге арналған зерттеулерді қосуға және егде жастағы ересектерге қатысты қорытындылар жасауға мүмкіндік беретін РСС (Популяция; Тұжырымдама; Контекст) құрылымына сүйенді. Web of Science (Clarivate) деректер базасында 2014–2025 жылдар аралығында жүйелі іздеу жүргізілді, одан кейін екі кезеңнен тұратын толық мәтіндерді іріктеу және талдау жүргізілді. Анықтамаларға, СҚС өлшеу әдістеріне және жас ерекшеліктеріне сәйкес білім беру шаралары мен қиындықтарына назар аудара отырып, деректер алынды және тақырыптық талдау жасалды. Көптеген зерттеулер білімге, дағдыларға және қаржылық алаяқтық туралы хабардар болуға бағытталған сауалнамалар мен өзіндік есептер арқылы цифрлық қаржылық сауаттылықты бағалайды. Рандомизирленген бақыланатын сынақтарды қоса алғанда, мінез-құлық эксперименттері әртүрлі білім беру тәсілдерінің тиімділігі туралы маңызды деректер береді. Жаңа концептуалды негіз цифрлық сауаттылықты қаржылық сауаттылықпен біріктіру және бағдарламаларды мәдени және контекстік әртүрлілікке бейімдеу, әсіресе егде және осал халықтар үшін қажет екенін атап көрсетеді. Сандық платформалар қаржылық білім беруде және маңызды цифрлық қаржылық дағдыларды дамытуда маңызды рөл атқарады. Шолу білімді, цифрлық дағдыларды және тұтынушыларды қорғауды біріктіретін, әсіресе егде жастағы адамдар үшін жан-жақты қаржылық білім беру қажеттілігін көрсетеді.

Тірек сөздер: сандық қаржылық білім, цифрлық қаржылық сауаттылық, егде жастағы адамдар, скопинг шолу, тақырыптық талдау, сандық сауаттылық, қаржылық сауаттылық.

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ОБЗОР С КАРТИРОВАНИЕМ ЦИФРОВОЙ ФИНАНСОВОЙ ГРАМОТНОСТИ СРЕДИ ПОЖИЛЫХ ЛЮДЕЙ

Аннотация

Целью данного обзора с картированием (scoring review) является обобщение современных знаний о цифровой финансовой грамотности (ЦФГ) в контексте пожилых людей. Исследование изучает, как определяется и понимается ЦФГ, какие методы измерения применяются в разных исследованиях, а также какие образовательные программы разрабатываются для поддержки пожилых людей в управлении финансами онлайн. Обзор выполнен в соответствии с рамочной концепцией РСС (популяция, концепция, контекст), что позволило включить исследования о взрослых в возрасте от 18 до 79 лет и сделать выводы, релевантные для пожилых людей. Проведен систематический поиск в базе Web of Science (Clarivate) за период 2014–2025 гг., затем двухэтапный отбор и анализ полных текстов. Данные были извлечены и тематически проанализированы с акцентом на определения, методы измерения ЦФГ и образовательные интервенции, учитывающие возрастные особенности и вызовы. В большинстве исследований цифровая финансовая грамотность оценивается с помощью опросов и самоотчетов, фокусируясь на знаниях, навыках и осведомленности о финансовых мошенничествах. Поведенческие эксперименты, включая рандомизированные контролируемые испытания, предоставляют важные данные об эффективности различных образовательных подходов. Структурированные цифровые образовательные программы в целом улучшают финансовые знания и принятие решений, тогда как мотивационные методы показывают неоднозначные результаты. Новые концептуальные рамки подчеркивают необходимость интеграции цифровой грамотности с финансовой и адаптации программ к культурному и контекстуальному разнообразию, особенно для пожилых и уязвимых групп населения. Обзор подчеркивает необходимость комплексного финансового образования, объединяющего знания, цифровые навыки и защиту прав потребителей, особенно для пожилых людей.

Ключевые слова: цифровое финансовое образование, цифровая финансовая грамотность, пожилые люди, скопинг-обзор, тематический анализ, цифровая грамотность, финансовая грамотность.

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