



# Together We turn Uncertainty into Action: Understanding the Role of Artificial Intelligence in Supporting the Financial Concerns of Older Adults

Yubin Choi  
School of Computing, KAIST  
Republic of Korea  
yubin.choi@kaist.ac.kr

Dasom Choi  
Department of Industrial  
Design, KAIST  
Republic of Korea  
dasomchoi@kaist.ac.kr

Hwajung Hong  
Department of Industrial  
Design, KAIST  
Republic of Korea  
hwajung@kaist.ac.kr

## Abstract

Artificial Intelligence (AI) advancements have transformed digital banking by offering services such as personalized recommendations and interactive chatbots. However, only some AI systems target older adult users, given their relatively low usage of digital banking. Conversely, older adults may benefit the most from AI as handling finances becomes increasingly crucial after retirement. Our paper aims to fill this gap by 1) understanding the everyday financial concerns of older adults near retirement age and 2) exploring interests and needs in AI supporting their financial concerns. To understand the perspectives of older adults regarding the support of financial needs with AI, we conducted co-design workshops with 14 older adults. Our findings revealed three key concerns: retirement planning, grown children's education and marriage expenses, and family healthcare costs. Also, participants were willing to use AI to glean the financial information they lacked and grow self-efficacy. Finally, we discuss the design opportunities of using AI to support older adults' financial decisions.

## CCS Concepts

• **Human-centered computing** → **Empirical studies in accessibility**; • **Social and professional topics** → **Age**.

## Keywords

Older Adults; Inclusive design; Human-AI Interaction; Financial AI

## ACM Reference Format:

Yubin Choi, Dasom Choi, and Hwajung Hong. 2023. Together We turn Uncertainty into Action: Understanding the Role of Artificial Intelligence in Supporting the Financial Concerns of Older Adults. In *Computer Supported Cooperative Work and Social Computing (CSCW '23 Companion)*, October 14–18, 2023, Minneapolis, MN, USA. ACM, New York, NY, USA, 6 pages. <https://doi.org/10.1145/3584931.3607018>

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for components of this work owned by others than the author(s) must be honored. Abstracting with credit is permitted. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee. Request permissions from [permissions@acm.org](mailto:permissions@acm.org).  
CSCW '23 Companion, October 14–18, 2023, Minneapolis, MN, USA  
© 2023 Copyright held by the owner/author(s). Publication rights licensed to ACM.  
ACM ISBN 979-8-4007-0129-0/23/10...\$15.00  
<https://doi.org/10.1145/3584931.3607018>

## 1 INTRODUCTION

Artificial Intelligence (AI) has profoundly advanced digital banking. Based on deep learning, contemporary banking services provide personalized solutions, 24-7 continual customer service [7], bill negotiations based on personal finances tracking features (e.g., Mint [33]), risk comparisons for investment portfolios [8], fraud detection [32], robo-advisor investment [16], and market predictions (e.g., BloombergGPT [45]).

However, current AI-infused financial services predominantly cater to economically active demographics. Older adult customers—hesitant about adopting digital banking [13]—are markedly under-represented in fintech services. Notably, the COVID-19 pandemic spurred an overall increase (76%) in mobile banking usage after bank branches closed down [4]. Nevertheless, the impact of the pandemic has been particularly severe on vulnerable elderly households [19], as evidenced by the meager 18.7% digital banking usage rate among older adults [20].

Ironically, older adults stand to benefit greatly from AI-assisted financial management. With prolonged longevity, financial management becomes critical for retired older adults who must rely on fixed incomes (e.g., pension, rent) and liquidize assets for the rest of their lives. After retirement, older adults become vulnerable to drastic economic fluctuations due to inflation [2, 28] or ill health. This leads to an increased risk of bankruptcy [6, 10, 29] and greater economic insecurity compared to other adult groups [34]. Therefore, elderly poverty is a pressing social issue in aging societies, including Korea [21, 23, 48]. AI holds the potential to alleviate these issues by offering personalized financial management, risk management strategies, and financial education [31], such as insights on when to convert assets into income [47], to older adults unable to afford professional financial advisors. Moreover, AI can automatically detect financial fraud to prevent older adults from losing life savings. Thus, AI holds promise for alleviating the unique financial challenge older adults face.

A branch of CSCW and HCI research aimed to understand the financial practice of older adults. For example, in receiving help from close others in banking [27], tracking finances [24], and examining long-term financial practices [31]. A number of studies have sought to identify the major challenges older adults go through when interacting with digital banking, such as ambiguous affordances, low accessibility, and privacy concerns [22, 39, 40]. While these studies highlight the comprehensive challenges older adults face in digital banking, there is little research on how older adults think of the latest AI-leveraged financial services.

Participant ID	Gender	Age	Retirement status	Pre-retirement or current Job	Education
P1	Female	57	Planning $\leq 4$ years	Government employee	Masters Degree
P2	Male	68	Retired 2 years ago	Nuclear Fusion Engineering Researcher	Ph.D.
P3	Female	61	Retired this year	Private academy teacher	Undergraduate Degree
P4	Female	62	Planning $\leq 1$ year	Pharmacist	Undergraduate Degree
P5	Male	62	Hope to work as long as possible	Private Banker	Undergraduate Degree
P6	Female	61	Retired this year	Farmer	Middle school Degree
P7	Male	70	Retired last year	Chemical Engineering Researcher	Ph.D.
P8	Male	71	Retired 4 years ago	Mechanical Engineering Researcher	Masters Degree
P9	Male	66	Planning $\leq 5$ years	Entrepreneur	Masters Degree
P10	Male	64	Retired last year	Admiral	Masters Degree
P11	Male	60	Hope to work as long as possible	Doctor of Korean Traditional Medicine	Ph.D.
P12	Female	56	Husband planning $\leq 10$ years	Homemaker	Undergraduate Degree
P13	Female	56	Hope to work as long as possible	University lecturer	Ph.D.
P14	Female	57	Planning $\leq 1$ year	Office clerk	Undergraduate Degree

Table 1: Demographics of study participants.

Several works have focused on older adults' opinions on AI. Shandilya focused on the perception of general AI-enabled everyday technologies [35]. However, they were not limited to finance. One research by Bank of America surveyed the opinion of five generation groups, ranging from the Silent Generation to Generation Z, on AI as a financial advisor per se [1]. In contrast, we focus on older adults nearing retirement age and their perception of using various AI-infused functions for their finance in a more detailed manner.

To fill the gap between existing research and the potential of AI-leveraged financial systems for older adults, we pose two research questions:

- RQ1. What are the everyday financial concerns of older adults nearing retirement age?
- RQ2. What are the opportunities AI can provide to older adults' everyday financial concerns?

We conducted co-designed workshops with 14 Korean older adults. Co-design is a common method in older adults research [30] to include marginalized opinions [46], bring a new perspective on technology [41], and establish a sense of product ownership [30].

Our findings revealed that retirement planning, funding children's education and marriage, and managing healthcare expenses for family members were the main financial concerns among the participants. Participants were eager to use AI to obtain personalized financial advice and grow self-efficacy in their financial management. Participants particularly highlighted the importance of retaining autonomy over financial decisions, expressing concerns about humans being replaced, and the trustworthiness of AI. Finally, we discuss the design opportunities to support older adults' financial concerns.

## 2 METHODS

Our goal was to explore older adults' attitudes and potential needs in using AI services for their everyday financial concerns. We aimed to specify when they wanted AI or not. To this end, we conducted co-design workshops using worksheets (Figure 1) where participants were asked to imagine detailed AI personas and functions.

### 2.1 Participants

Participants were recruited in two ways. We posted flyers at welfare centers and public libraries in Daejeon, South Korea, and snowball sampled additional participants based on respondent referrals. 14 participants were selected for diversity in retirement status, occupation, and demographics from the initial pool of 18 replies. All participants completed the IRB-approved workshop and received \$25 and a souvenir as an appreciation.

The participants had a mean age of 62.2 years old (SD=5.0, range: 56-71), with an equal gender distribution (Table 1). Six participants were recent retirees, while four planned to retire in the coming years. Three participants desired to work as long as possible, and one participant planned to work for ten more years (Table 1). Regarding technology usage, twelve participants were using mobile banking daily, except for P5 (internet banking) and P9 (offline banking). Four participants (P2, P7, P9, P10) considered themselves knowledgeable about AI, while others claimed to be novices, having only encountered AI through the news media. All participants had used at least one AI-embedded service (e.g., machine translators, AI speakers, automobiles), with or without knowing them. All participants made their own financial decisions regarding their finances, although they discussed them with their spouses. Apart from P5, all participants (including retirees) expressed feeling unprepared for retirement.

### 2.2 Co-design Workshop

The workshop consisted of three main activities: 1) a debriefing interview, 2) writing everyday financial concerns, and 3) making an ideal AI persona.

In the debriefing interview, participants answered short questions about their interest in finance and their experiences with fintech and AI (average duration: 17 minutes). This session aimed to understand their general perception of AI and financial status.

Secondly, participants wrote major financial concerns that bothered them daily in a worksheet. They elaborated on the positive and negative actions or thoughts related and an overall reflection on those concerns.

Finally, participants created their ideal AI persona using the worksheet (see Figure 1). During this process, participants named their personal AI and specified their preferred gender, age, communication modalities, personality, and characteristics of their AI

Financial concern (n= 14, multiple responses allowed)	Details
<b>Healthcare cost</b> (n=12, 86%)	Paying for the current healthcare cost of family members (e.g. spouse, aging parents) or concern about future healthcare costs stemming from aging
<b>Retirement Planning</b> (n=10, 71%)	Unsure how to plan retirement or whether the current plan will be feasible in the future
<b>Children's marriage/college tuition</b> (n=10, 71%)	Want to give money for children's marriage (especially housing fees), and college tuition but seems not enough
<b>Finding a bridge job</b> (n=6, 43%)	Want to find a bridge job before completely exiting the labor force because they want to earn more income or want to feel fulfillment working
<b>Living with pension</b> (n=4, 100% among those who retired, 29% in total)	Pension is not enough to support the previous lifestyle (e.g., hobbies)
<b>Spending</b> (n=4, 29%)	Want to spend less
<b>Debt</b> (n=3, 21%)	Paying the debt
<b>Inheritance</b> (n=3, 21%)	How and what to inherit to children
<b>Financial Management</b> (n=3, 21%)	Which real estate, stock to invest
<b>Saving Tax</b> (n=3, 21%)	How to pay less tax
<b>Avoiding Financial Scam</b> (n=2, 14%)	Concerns about getting financially scammed

Table 2: Financial concerns of 14 participants (multiple responses allowed)

(example shown in Figure 1). Then, participants brainstormed how they wanted their AI to address their financial concerns, indicating cautionary aspects and desired functions, and imagined what their ideal AI would comment on their financial concerns.

Our workshop was open-ended without specific guidelines, but reminders of AI-embedded products were given when two participants (P4, P6) encountered difficulty in envisioning AI functions. Participants were encouraged to think beyond the current capabilities of AI. Each workshop lasted approximately one hour and was audio-recorded.

## 2.3 Data Analysis

We transcribed the audio recordings, and two authors open-coded transcriptions and worksheets using a thematic coding approach [9, 42]. The coding focused on the daily financial concerns of older adults nearing retirement age, their desire for financial AI, and their expectations for AI. Initially, 66 code themes were generated using ATLAS.ti [3]. After three iterations, we finalized two potent themes: the complexity of considering family members and the desire for AI to support self-efficacy.

## 3 FINDINGS

### 3.1 Major everyday financial concerns of older adults near retirement age (RQ1)

The three most common financial concerns of participants were (1) retirement planning, (2) paying family healthcare costs, and (3) supporting grown children's education and marriage expenses. The 11 financial concerns summarized in Table 2 were shaped by the unique interests as they thought about their last moments and the financial statuses of older individuals.

Our findings indicate that older adults' financial concerns are complex as they encompass not only their own needs but also those of their family members. For example, in line with common South Korean culture, ten participants wanted to financially support their

grown children's marriage and beyond high school education (e.g., pay a certain percentage of the housing prices) [18, 26].

My (37 years old) son plans to get married, but I feel sorry that I can't help a lot. But, if I give him that much money, I'm worried about when my wife or I'll be sick. That's what worries me the most. (P7)

This social context led participants to hope AI would provide valuable information for their family members. For example, some participants wanted AI to recommend the housing trend of the 20s to keep in mind when preparing housing for their grown child (P14), to notice savings for their grown child marriage (P4), or even to inform career opportunities for their college-aged children to achieve financial independence (P12).

In addition to their children, participants also expressed concerns about their aging parents. Four participants (P1, P10, P11, P12) were paying for the convalescent hospital and healthcare fees of their aging parents (over 85 years old). However, they didn't expect their children to pay for them. Therefore, they were uncertain about their own future financial stability (at the time of our study, National Pension Reform was a big social agenda in South Korea [17]) and the rising healthcare costs (P1, P2, P4, P7, P11, P13). While participants wanted to entitle more pensions, they did not have time to search or did not know a trustworthy resource.

I'll end up in a nursing hospital like my parents are now. But who'll take care of me? My kid's generation is different. They only have one or no siblings, so it's hard for them to support as we did (P11 divided the parents' care cost among five siblings). We have to make it ourselves, relying on pension and retirement planning. But the national pension seems to get reformed soon because of the low birth rate and hyper-aging society. It's hard to trust only that. I regret having no alternative pension. I have to work till I can. (P11)

Hello, I am "Self management for financial freedom"(AI name) built to support your financial decision

저는 [P14 Name] 님의 슬기로운 금융 생활을 도와주는 AI [부채를 줄이는 자기계좌]입니다.

**Gender:** Male **Age:** 50  
**Communication method:** mobile + voice  
**Personality:** low voice, advice X, use honorifics, (give me) true facts

**What I (AI) should be cautious of:**

- Protecting personal information
- (Recommend) fundamental way. I wish it was not myopic or temporal (solution)
- Support on practicing (financial habits) without getting tired of financial life

성별 남	나이 50
소통 방식 음성	특징 진화성 1111111111
성격 말투 = 낮은 목소리, 존댓말, 관용을 베풀	전문성 1111111111
	내 정보에 대한 이해도 1111111111
	타인과 정보 공유 정도 1111111111
	1년 이내 1~2개 (금융, 경제, 관련) 질문

**조심해야 할 부분**

- 개인정보 보호 (해당)
- 근본적인 방법이고, 국지적 이차사 입시발행적역 많으면 좋겠다.
- 금융 상식에 익숙한 10년 이상 지출적으로 실천하도록 도와주기

**잘하는 것**

- 금리비교가 아닌 가장 높은 적금 중리 은행 약리순위 (복리차)
- 내 현금에 맞는 투자 방법을 알려준다 (절매, 펀드, 적금, 보험 등)
- 월 1회 정도 규칙하게 지출 분석해 준다
- 10년 후 정액까지 할라서 이익은 두 배에 (연금, 주식, ... ) 장려투자형

**Characteristics:**

- Affinity (with participant): 5/5
- Professionalism: 3/5
- My (AI's) understanding of you(participant): 5/5
- How much Information (AI) can share with others: 3/5
- Notice 1~2 hot issues (directly related to finance, economics)

**What I'm (AI) good at:**

- Informing the installment savings with highest rate, don't compare
- Telling me how to invest with my cash (auction, fund, installment savings, insurance, etc.)
- Monthly consumption reports
- Information on long-term investment destinations (land, housing, stocks, etc.) that will make profits in 10 years

Worksheet for brainstorming AI persona, characteristics, strength, and cautious points

Figure 1: Worksheet P14 wrote on her ideal AI persona. She wanted her AI to support her in developing good financial habits to change her situation in the long term.

These concerns of their parents were aligned with how participants wanted AI to inform them about average healthcare costs for older adults of the same age as their parents, helping them plan for future healthcare expenses (P1, P11).

### 3.2 Expectation toward financial AI (RQ2)

All participants were willing to use AI that provided the information they felt was "lacking" in relation to their financial concerns, regardless of their negative experiences with AI systems or their knowledge of AI. Some commonly desired information was the highest interest fixed deposits (P1, P4, P6, P12, P13, P14), good financial habits (P1, P6, P7, P9, P11), housing price changes (P5, P9, P10), prediction of Korean bank interest rates (P5, P6), and ideas for a fulfilling post-retirement life (P2). Although the specificity of information varied based on their financial literacy, the underlying focus on the "lack" of financial information remained consistent.

This perception of lacking information was rooted in their growing sense of "losing control of their finances". Participants noted that it was getting harder to predict the uncertainties due to 1) health-related expenses with aging and 2) the complexity of contemporary finance amplified by new technologies (e.g., the sudden appearance of mobile banking reservation system at banks). This led participants, including former engineers (P7, P8), to seek AI's assistance in keeping up with social trends to mitigate the growing fear of *being alienated from society someday*.

However, participants did not want AI to decide on their behalf. Rather, they wanted to embrace AI proactively as a means of support in *supporting* living happy golden age. Some participants said that AI making decisions for them would diminish their sense of worth, feeling "replaceable by AI" (P1). P5 echoed that "*humans are creative. One should manage, control, and organize oneself. It's me who should reflect on my decision and my life even if it turns out wrong.*" There

was one exception (P14) who disliked thinking about "money" and wanted "super-smart" AI to decide everything for her. The majority desired AI to provide the *objective big data* (P3) to enhance their confidence in financial decision-making and regain control of their finances. In short, feeling a sense of self-efficacy was what most of our participants ultimately strived for.

## 4 DISCUSSIONS

Our findings illustrate that the financial concerns of older adults are unique and complex in that they consider their family members. Also, their financial concerns were highly intertwined with socio-economic matters such as inflation, government policies, and low birth rates shaping pensions. These findings shed light on the significance of AI services that learns the personal and socio-economic context of each older adult. Based on these findings, we suggest two design implications of financial AI: 1) provide daily financial information and 2) empower older adults to take the initiative in their interactions with AI.

### 4.1 Providing daily financial information based on the financial literacy of each older adult

As discussed in findings 3.2, participants claimed that finance was becoming *too complicated* and changed rapidly to follow up by themselves. Therefore, participants needed AI to notify desired information. The desired information varied based on the participants' financial literacy. Higher financial literacy participants sought specific professional information (e.g., gross rent multiplier), while those with lower financial literacy desired educational resources and guidance on financial habits. Therefore, AI can apprise desired information of individual users. For example, summarize macroeconomics indicators, notify government policies on pensions, and calculate the expected cost of living rest to help older adults near

retirement better understand and prepare their finances. As *finance does not change in a day* (P14) and is a gradual process, it is vital to inform daily and encourage continued efforts in learning how to handle their financial concerns and find personalized strategies.

## 4.2 Older adults taking the initiative to interact

When communicating about financial concerns, AI should not simply give out information in a one-way manner. Instead, AI should allow room for older adults to take the initiative to lead their interaction with AI. Moreover, older adults should be the final decision-makers unless they don't want to. What older adults seek may not just be the profitability of their finances. Participants wanted to control and make their own decisions, which is consistent with previous works highlighting the sense of self-efficacy in controlling finance is important for older adults [43, 44]. Participants believed delineating their financial goals and making decisions are what makes them valuable. So, to address participants' common opinion that they want to decide for themselves but lack information, AI can assist in giving self-confidence in their decisions. For example, AI could give positive feedback on how users' decision on certain deposits increased their profit. When a participant's decision turns out to lose money, AI can comfort that other similar age group adults also made this mistake and nudge better financial habits. Hence, we need to head toward an AI that can adequately prepare for and accompany older adults' life transitions and respect their values and decisions.

## 5 CONCLUSION

This paper sheds light on the financial concerns of older adults nearing retirement age and their preference for using AI services to mitigate their everyday financial concerns. Co-design workshop results show that retirement planning, paying for healthcare cost, and supporting grown children's marriage or college tuition was their major financial concerns. These concerns represent the complexity of older adults' concerns in considering the uncertainty of family members. We highlight that participants wanted to leverage AI to gain higher self-efficacy in their financial decisions. Participants stressed the importance of deciding for themselves while AI should supply the financial information they desire. We concluded by suggesting design considerations for fostering older adults-specific AI-embedded financial systems. We hope that our work contributes to HCI and to designing for older adults in ways that understand the full experience of aging rather than treating older adulthood as a time of physical decline [25, 36] and social isolation [12], as we all will become an older adult someday.

## 6 LIMITATIONS

One limitation of this study is that participants are from a single country, which may introduce cultural variables. Furthermore, most participants had a higher education level, which may impact their digital [11, 15, 49] and financial literacy [37, 38]. Therefore, our findings may not be generalizable. Instead, based on the rich individual cases, we highlight the potential of considering family members and self-efficacy for older adult-specific financial AI systems. As older adults are known to be heterogeneous groups [5, 14], future

work could include a more diverse sample of older adults, including older adults living in blind areas.

## Acknowledgments

We appreciate our participants for their valuable data and anonymous reviewers for constructive feedback. This work was supported by Korea Advanced Institute of Science and Technology (G04210045).

## References

- [1] [n. d.]. AI and longevity. [https://agelab.mit.edu/static/uploads/mit-agelab-ai-longevity\\_wp-04-21-1357\\_ada.pdf](https://agelab.mit.edu/static/uploads/mit-agelab-ai-longevity_wp-04-21-1357_ada.pdf)
- [2] 2022. Retirement insecurity 2021: Americans' Views of Retirement. <https://www.nirsonline.org/reports/retirementinsecurity2021/>
- [3] atlas.ti. accessed 2023. *atlas.ti*. Retrieved January 11th, 2023 from <https://atlas.ti.com>
- [4] World Bank. 2022. COVID-19 drives global surge in use of digital payments. (2022).
- [5] Julien Bergeot and Roméo Fontaine. 2020. The heterogeneous effect of retirement on informal care behavior. *Health economics* 29, 10 (2020), 1101–1116.
- [6] Tara Siegel Bernard. 2018. 'Too little Too late': Bankruptcy booms among older Americans. <https://www.nytimes.com/2018/08/05/business/bankruptcy-older-americans.html>
- [7] Chandrima Bhattacharya and Manish Sinha. 2022. The Role of Artificial Intelligence in Banking for Leveraging Customer Experience. *Australasian Accounting, Business and Finance Journal* 16, 5 (2022), 89–105.
- [8] Suparna Biswas, Brant Carson, Violet Chung, Shwaitang Singh, and Renny Thomas. 2020. AI-bank of the future: Can banks meet the AI challenge. *New York: McKinsey & Company* (2020).
- [9] Virginia Braun and Victoria Clarke. 2006. Using thematic analysis in psychology. *Qualitative research in psychology* 3, 2 (2006), 77–101.
- [10] Barbara A Butrica and Stipica Mudrazija. 2020. Financial Security at Older Ages. *Center for Retirement Research at Boston College, CRR WP* 19 (2020).
- [11] Longbing Cao. 2020. AI in finance: A review. *Available at SSRN* 3647625 (2020).
- [12] Susan T Charles and Laura L Carstensen. 2010. Social and emotional aging. *Annual review of psychology* 61 (2010), 383–409.
- [13] Jyoti Choudrie, Chike-Obuekwe Junior, Brad McKenna, and Shahper Richter. 2018. Understanding and conceptualising the adoption, use and diffusion of mobile banking in older adults: A research agenda and conceptual framework. *Journal of Business Research* 88 (2018), 449–465.
- [14] Shelia R Cotten, George Ford, Sherry Ford, and Timothy M Hale. 2014. Internet use and depression among retired older adults in the United States: A longitudinal analysis. *Journals of Gerontology Series B: Psychological Sciences and Social Sciences* 69, 5 (2014), 763–771.
- [15] Frederico Cruz-Jesus, Maria Rosalia Vicente, Fernando Bacao, and Tiago Oliveira. 2016. The education-related digital divide: An analysis for the EU-28. *Computers in Human Behavior* 56 (2016), 72–82.
- [16] Francesco D'Acunto, Nagurnanand Prabhala, and Alberto G Rossi. 2019. The promises and pitfalls of robo-advising. *The Review of Financial Studies* 32, 5 (2019), 1983–2020.
- [17] Editorial. 2023. Urgent pension reform. [https://www.koreatimes.co.kr/www/opinion/2023/05/202\\_343757.html](https://www.koreatimes.co.kr/www/opinion/2023/05/202_343757.html)
- [18] Chae Rim Ha. 2021. "After retirement, 170 million won is required for children's education and marriage...Retirement benefits are less than 100 million.". <https://www.yna.co.kr/view/AKR20210111074800002>
- [19] Taiwon Ha. 2023. The effects of COVID-19 and response measures on poverty, household income and household consumption expenditure in South Korea. *Journal of Economic Studies* 50, 1 (2023), 3–17.
- [20] Choi Jae-hee. 2021. [life, unprepared] South Korea's rapid financial digitalization in eyes of seniors. <https://www.koreaherald.com/view.php?ud=20210620000161>
- [21] Choi Jae-hee. 2021. [life, unprepared] South Korea's rapid financial digitalization in eyes of seniors. <https://www.koreaherald.com/view.php?ud=20210620000161>
- [22] Xiaofu Jin and Mingming Fan. 2022. "I Used To Carry A Wallet, Now I Just Need To Carry My Phone": Understanding Current Banking Practices and Challenges Among Older Adults in China. In *Proceedings of the 24th International ACM SIGACCESS Conference on Computers and Accessibility*. 1–16.
- [23] Jooyeon Kang, Jungmin Park, and Jaemin Cho. 2022. Inclusive Aging in Korea: Eradicating Senior Poverty. *International Journal of Environmental Research and Public Health* 19, 4 (2022), 2121.
- [24] Joseph Jofish Kaye, Mary McCuiston, Rebecca Gulotta, and David A Shamma. 2014. Money talks: tracking personal finances. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. 521–530.

- [25] Bran Knowles, Vicki L Hanson, Yvonne Rogers, Anne Marie Piper, Jenny Waycott, and Nigel Davies. 2019. HCI and aging: Beyond accessibility. In *Extended Abstracts of the 2019 CHI Conference on Human Factors in Computing Systems*. 1–8.
- [26] Sun Hyung Kwon. [n. d.]. Public Opinion Poll on Education 2022. <https://www.kedi.re.kr/khome/main/research/selectPubForm.do>
- [27] Celine Latulipe, Ronnie Dsouza, and Murray Cumbers. 2022. Unofficial Proxies: How Close Others Help Older Adults with Banking. In *Proceedings of the 2022 CHI Conference on Human Factors in Computing Systems*. 1–13.
- [28] Wenli Li and Michelle J White. 2019. Financial distress among the elderly: Bankruptcy reform and the financial crisis. (2019).
- [29] Annamaria Lusardi, Olivia S Mitchell, and Noemi Oggero. 2018. The changing face of debt and financial fragility at older ages. In *AEA Papers and Proceedings*, Vol. 108. American Economic Association 2014 Broadway, Suite 305, Nashville, TN 37203, 407–411.
- [30] Sónia Machado, Liliana Vale Costa, and Óscar Mealha. 2021. Co-designing with senior citizens: a systematic literature review. In *International Conference on Human-Computer Interaction*. Springer, 61–73.
- [31] Sana Maqbool and Cosmin Munteanu. 2018. Understanding Older Adults' Long-term Financial Practices: Challenges and Opportunities for Design. In *Extended Abstracts of the 2018 CHI Conference on Human Factors in Computing Systems*. 1–6.
- [32] David Mhlanga. 2020. Industry 4.0 in finance: the impact of artificial intelligence (ai) on digital financial inclusion. *International Journal of Financial Studies* 8, 3 (2020), 45.
- [33] Mint. [n. d.]. Managing money, made simple. <https://mint.intuit.com/>
- [34] Lauren Popham and Susan Silberman. [n. d.]. U.S. Wealth Gap Widening 47 Million Older American Households Facing Financial Risks. <https://assets-us-01.kc-usercontent.com/ffacfe7d-10b6-0083-2632-604077fd4eca/5a0fdb8f-979f-4595-b6c3-85baaabcfc36/part-d-cost-sharing-chart-2023.pdf>
- [35] Esha Shandilya and Mingming Fan. 2022. Understanding Older Adults' Perceptions and Challenges in Using AI-enabled Everyday Technologies. *arXiv preprint arXiv:2210.01369* (2022).
- [36] Waneen Wyrick Spirduso, Karen L Francis, and Priscilla G MacRae. 1995. *Physical dimensions of aging*. Vol. 798. Human kinetics Champaign.
- [37] OO Stryzhak. 2020. The relationship between education, income, economic freedom and happiness. (2020).
- [38] Marzieh Kalantarie Taft, Zare Zardeini Hosein, Seyyed Mohammad Tabatabaei Mehrizi, and Abdoreza Roshan. 2013. The relation between financial literacy, financial wellbeing and financial concerns. *International journal of business and management* 8, 11 (2013), 63.
- [39] John Vines, Mark Blythe, Paul Dunphy, and Andrew Monk. 2011. Eighty something: banking for the older old. In *Proceedings of HCI 2011 The 25th BCS Conference on Human Computer Interaction* 25, 64–73.
- [40] John Vines, Mark Blythe, Paul Dunphy, Vasilis Vlachokyriakos, Isaac Teece, Andrew Monk, and Patrick Olivier. 2012. Cheque mates: participatory design of digital payments with eighty somethings. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. 1189–1198.
- [41] Shengzhi Wang, Khalisa Bolling, Wenlin Mao, Jennifer Reichstadt, Dilip Jeste, Ho-Cheol Kim, and Camille Nebeker. 2019. Technology to support aging in place: Older adults' perspectives. In *Healthcare*, Vol. 7. MDPI, 60.
- [42] Michael Williams and Tami Moser. 2019. The art of coding and thematic exploration in qualitative research. *International Management Review* 15, 1 (2019), 45–55.
- [43] Fredric D Wolinsky and Timothy E Stump. 1996. Age and the sense of control among older adults. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences* 51, 4 (1996), S217–S220.
- [44] Fredric D Wolinsky, Kathleen W Wyrwich, Ajit N Babu, Kurt Kroenke, and William M Tierney. 2003. Age, aging, and the sense of control among older adults: A longitudinal reconsideration. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences* 58, 4 (2003), S212–S220.
- [45] Shijie Wu, Ozan Irsoy, Steven Lu, Vadim Dabravolski, Mark Dredze, Sebastian Gehrmann, Prabhanjan Kambadur, David Rosenberg, and Gideon Mann. 2023. Bloomberggpt: A large language model for finance. *arXiv preprint arXiv:2303.17564* (2023).
- [46] Bo Xie, Allison Druin, Jerry Fails, Sheri Massey, Evan Golub, Sonia Franckel, and Kiki Schneider. 2012. Connecting generations: developing co-design methods for older adults and children. *Behaviour & Information Technology* 31, 4 (2012), 413–423.
- [47] Paul J Yakoboski. 2011. Worries and Plans as Individuals Approach Retirement. *Benefits quarterly* 27, 2 (2011).
- [48] Jie Ye-eun. 2020. [herald interview] “start saving as early as possible for financial freedom in later years”. <https://www.koreaherald.com/view.php?ud=20200614000119>
- [49] Hyunwoo Yoon, Yuri Jang, Phillip W Vaughan, and Michael Garcia. 2020. Older adults' internet use for health information: digital divide by race/ethnicity and socioeconomic status. *Journal of Applied Gerontology* 39, 1 (2020), 105–110.