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Review

How to Popularize Smartphones among Older Adults: A Narrative Review and a New Perspective with Self-Efficacy, Social Capital, and Individualized Instruction as Key Drivers

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Abstract: Information and Communication Technology (ICT) such as smartphones has been attracting attention to prevent elderly people from becoming isolated. For this reason, recent research has proposed training methods for acquiring smartphone functions. However, since the types of smartphone functions required vary from person to person, a one-size-fits-all approach fails to engage all individuals adequately, leading to limited outcomes. On the other hand, with a view to social implementation, it is necessary to clarify a method that is effective in both cost and time. Previous research suggests that self-efficacy and social capital are the keys to acquiring smartphone skills among elderly people. Therefore, in this review, while looking back at previous research, we propose a study to demonstrate that by providing careful individual instruction by an experienced instructor to elderly people with little experience in smartphones and then having them take turns teaching other participants after the instruction, their self-efficacy and social capital can be increased, and a positive spiral effect can be achieved to maximize the improvement of smartphone skills widely.

Keywords: information and communication technology; smartphone; older adults; self-efficacy; social capital; individualized instruction

Citation: Kokubun, K. How to Popularize Smartphones among Older Adults: A Narrative Review and a New Perspective with Self-Efficacy, Social Capital, and Individualized Instruction as Key Drivers. *Psychol. Int.* **2024**, *6*, 769–778. https://doi.org/10.3390/psycholint6030048

Academic Editor: Eleni Mitsea

Received: 15 August 2024
Revised: 5 September 2024
Accepted: 10 September 2024
Published: 12 September 2024

1. Introduction

Today, social isolation is a problem for many older adults. Social isolation can occur due to retirement or the death of a partner or friend [1,2], and can sometimes lead to cognitive decline and poor mental and physical health [3,4], and in severe cases, can increase the risk of death, including suicide [5]. One technology that may help mitigate social isolation and the related mental and physical health issues is information and communication technology (ICT). Previous studies have shown that the use of ICT, such as smartphones, has a positive effect on the cognitive function of older adults [6] and reduces the risk of depression [7–9]. Relatedly, smartphones have been shown to play a beneficial role in disease management, including care of diabetes [10] and Alzheimer's disease [11]. In addition, recent technological advances are transforming ICT into accessible tools for older people with disabilities. For example, the use of smartphones is changing from traditional visual interfaces to interactions using alternative body senses such as touch and gestures [12]. Furthermore, incorporating smartphone use into the lives of older adults may facilitate activities such as internet-based banking [13] and shopping [14], enriching the daily lives of older adults with mobility issues. In this review, we review recent intervention studies aimed at popularizing smartphone use among older adults, point out the limitations of these studies, and propose new intervention studies based on personalized approaches and peer learning strategies.

2. Factors That Hinder or Promote Smartphone Use among the Elderly

Despite these benefits, it is not easy to spread ICT to the elderly. According to the "2022 Communication Usage Trend Survey" by the Ministry of Internal Affairs and Communications in Japan [15], the smartphone ownership rate in Japan is 77.3%, while it is low at 27.3%

for those aged 80 and over. In addition, even if some elderly people have smartphones, they mainly use them for phone and email functions and do not utilize other functions. In the "Public Opinion Survey on the Use of Information and Communication Devices in 2020" by the Cabinet Office in Japan [16], the reasons why elderly people aged 70 and over do not use smartphones included "I don't think it's necessary for my life", "I don't know how to use it", and "I think I can leave it to my family if necessary". On the other hand, the number of situations in which smartphones are necessary has increased significantly compared to before and is expected to increase further in the future. In addition, as shown in the 2023 White Paper on the Aging Society [17], more than half of elderly households are single-person or couple-only, and it is assumed that many elderly people do not have children or grandchildren nearby to ask them how to use smartphones.

The most common argument for why elderly people avoid ICT is related to their physical decline. Age-related physical changes make it difficult to understand and use technology [18]. For example, cognitive decline is associated with poorer performance in daily activities and may negatively affect the acceptance of new technologies by elderly people [19,20]. In addition, depression, which is common among elderly people, may increase negative emotions and inhibit adaptation to new technologies [21]. When these conditions are combined, elderly people are unable to use ICT well, feel embarrassed about it, experience lower confidence, and increase anxiety, which may lead to them avoiding ICT even more [22]. Results from a recent cross-sectional study also show low ICT use, especially among older adults with multimorbidity [23].

However, physical decline due to aging is not the only barrier to ICT use among older adults. Previous studies have identified the lack of self-efficacy and social capital as the main obstacles to ICT use [24,25]. For older adults, those with existing social support are more likely to receive assistance with ICT maintenance and troubleshooting, and therefore tend to use ICT more [24,26,27]. ICT helps older adults maintain connections with family, friends, former colleagues, acquaintances, and new contacts with common interests and needs [28]. ICT also allows older adults to find new hobbies, such as online courses or virtual communities of interest, improve their abilities, and participate in enjoyable activities without time constraints. In addition, advising others with acquired knowledge has a significant positive impact on older adults' self-confidence. The gained confidence translates into self-efficacy, which encourages further ICT use [28].

3. Healthy Aging and ICT

However, it is not enough to simply increase the ICT use of older adults. When older adults feel that the end of their life is approaching, they try to actively engage in relationships that they perceive as meaningful in their lives [29]. Therefore, excessive or compulsive ICT use can lead to a decrease in well-being [30]. In addition, the use of ICT can lead to compulsive behaviors or addictions, which may weaken social connections in daily life and reduce social and psychological well-being [31]. Furthermore, passive ICT use may lead to feelings of inferiority and jealousy, which may reduce well-being [32]. Previous studies have shown that the main reasons why older adults drop out of the Internet are a lack of meaningful content, nothing worth reading or watching, and a lack of time to use it [33]. Fears of privacy violations and reduced security, for example, worries about internet fraud and technology malfunctions, are also major reasons why older people avoid ICT [34,35]. Therefore, it is necessary to give older people what they want and encourage them to learn it, rather than imposing the use of ICT without considering the actual needs and interests of older adults.

The World Health Organization (WHO) has proposed healthy aging as an important concept that aims to create an environment and opportunities to maintain a functional state and ultimately achieve universal well-being [36]. Healthy aging refers to the process of developing and maintaining "functional capabilities" to enable well-being in older people. According to the WHO, functional capabilities are a concept that includes various capabilities necessary for an individual to engage in valued and meaningful activities

and are composed of internal capabilities, which are a composite of physical and mental capabilities, environmental factors, and the interaction between these two elements [36]. The WHO suggests that countries monitor functional capacity, internal capacity, and environmental factors as indicators of the progress of healthy aging [37].

It is possible to promote healthy aging by making good use of ICT. For example, health is a major concern for older people, so promoting digital health technologies is an effective way to popularize ICT among older people [38]. For example, in recent years, a remotely delivered home exercise program has been proposed for socially isolated elderly people [39]. The development and dissemination of such technology will be one of the incentives for health-conscious elderly people to adopt ICT. However, considering the above discussion that it is not only physical and mental health that inhibits ICT use among older people, promoting healthy aging does not necessarily promote the spread of ICT. If what many older people want from ICT is health, then one effective way to popularize ICT to them is to use health as an opportunity, but conversely, it is not surprising that healthier older people do not need health information as much and therefore do not become more interested in ICT. Consistent with this speculation, previous research has shown that older adults with better self-care have lower preference attitudes toward smart health services [40]. However, if the aim is to popularize ICT through the circulation of self-efficacy and social capital, it is significant to have healthy older people enter the ICT circulation.

4. Review of Previous Intervention Studies and Future Study Perspectives

Compared to the studies highlighting the benefits of ICT, there is less evidence that ICT training improves ICT proficiency among older adults. However, there is evidence that group-based ICT training is effective in promoting skills and digital literacy [41–43]. In one study by Zhao et al. [43], 344 older participants were assigned to either an intervention group or a waitlist control group in a randomized controlled trial. The authors believe that previous studies had high dropout rates because the training was not systematic and therefore participants did not feel the benefits. Therefore, this intervention study was the first to help participants acquire smartphone functions under a systematic program. The intervention group, who received a smartphone training program once a week for 20 weeks, was shown to improve smartphone competency and quality of life. However, even if the training in these studies was effective for some older adults, it is unlikely that it was as effective for many other older adults. This is because, as mentioned above, older adults have individual differences in what they want from ICT, and a uniform approach that does not take individual autonomy and preferences into account could discourage the adoption of technologies. This is also reflected in the low effect sizes of some indicators shown in this study.

Therefore, recent studies have argued for a move away from a one-size-fits-all approach to individualized approaches to education and learning [44–46]. In one of these studies, a qualitative study conducted by Betts et al. [44] with 17 older adults revealed that older adults are interested in acquiring more skills and, at the same time, want to acquire knowledge through personalized, one-on-one learning sessions. Arthanat et al. [45] conducted a two-year randomized controlled trial in which 83 older adults were divided into an intervention group and a control group, followed by one-on-one ICT training between coaches and participants at six-month intervals to promote access to and use of digital resources. As a result, older adults in the intervention group were more engaged in various leisure, health management, and daily activities than older adults in the control group. They also showed a significant increase in technology acceptance and maintained a sense of independence. Meanwhile, in a study of older adults living alone by Fields et al. [46], 83 participants were randomly assigned to an intervention group or a waiting list group, with the intervention group provided with tablets, broadband, and one-on-one training. Volunteer coaches provided iPad lessons in participants' homes for a total of eight sessions each week and assessed self-reported loneliness, social support, technology use, and confidence at baseline and follow-up. As a result, while there was no change in loneliness

in the intervention group, there was a slight, significant improvement in social support and confidence in technology and a significant increase in technology use. Furthermore, in interviews, many participants stated that their confidence in technology had increased. These results indicate that one-on-one, careful instruction over time is more effective than uniform instruction.

Considering these trends, future intervention studies on ICT training should not be uniform, such as gathering participants in a large classroom and conducting lectures, but should be individualized with one-on-one instruction according to the participants' needs to maximize the effectiveness of the intervention. However, if social implementation is taken into consideration, it must naturally be feasible in terms of cost-effectiveness or time-of-day effectiveness. If training is designed to be too costly and time-consuming to meet individual needs, it will be that much more difficult to continue the business. It seems that existing research has not seriously addressed this issue. It is necessary to be able to perform adequately in terms of cost and time while taking advantage of the benefits of individual education. Therefore, we propose incorporating into the research model the improvement in self-efficacy and knowledge about ICT functions that comes from advising others on acquired knowledge, as confirmed in the review paper by Chen and Schlz [28].

Self-determination theory asserts that self-efficacy is a determining factor for intrinsically motivating people [47]. Therefore, previous research has shown that self-efficacy plays an important role in behavioral change [48]. In addition, previous cross-sectional analyses have shown that intrinsic motivation may affect ICT use and life satisfaction among older adults [49,50]. Among these, Wang et al. [49] analyzed the influencing factors of technology adoption using questionnaire response data administered to 286 participants aged 46 years or older and found that physiological limitations and anxiety of aging had a significantly negative effect, while knowledge, intrinsic motivation, and usage expectancy had a significant positive effect on behavioral intention. On the other hand, many studies have confirmed that helping others increases self-efficacy. For example, Barlow & Hainsworth [51] conducted semi-structured telephone interviews at two time points, before and after training, to explore the motivations of 22 older volunteers when they undertook training to become lay leaders in an arthritis self-management program. The results revealed that volunteering was motivated by three primary needs: to fill the void in life left by retirement, to feel useful members of society by helping others, and to find a peer group. The results suggest that volunteering among older adults helps to offset the losses associated with retirement and declining health.

Cognitive scientists offer a different explanation for the learning effect of teaching: they argue that learning is enhanced when people are placed in a situation where they must understand information and make it understandable to others [52,53]. For example, in an experiment by Nestojko et al. [52], 56 university students were randomly divided into two groups and asked to read and memorize a text about a war. Prior to the experiment, the two groups were instructed to either study as if they had a test coming up (Group 1) or study as if they were going to teach other students (Group 2). As a result of the experiment, Group 2 was able to recall the content more accurately than Group 1. The authors of the paper argue that the difference in results may be because people naturally try to summarize the main points of things when they think they must teach others. Similar results were obtained in a study by Koh et al. [53] involving 124 university student participants, with the authors arguing that recalling previously memorized information in a form that others can understand may help strengthen memories.

There is already a substantial body of research showing the effects of the spread of ICT. However, there is still insufficient research on how to popularize ICT among the elderly. Considering the existence of publication bias, which means that experiments that produce significant results are more likely to be published as papers, it can be assumed that it will be more difficult to change the elderly's attitude toward ICT and popularize it. This suggests the limitations of the method used in previous research, in which a coach teaches a student unilaterally (even if it is one-on-one instruction). Therefore, the author recommends that

future research verify the hypothesis that the experience of teaching other participants the smartphone functions they have acquired will increase their interest and knowledge in smartphones, and as a result, their own proficiency will also improve.

5. A Proposal for New Intervention Study Design

For example, we will design the study as follows: The study will be a randomized controlled trial (RCT). Assuming that two measurements will be taken in total for the intervention and control groups, the effect size (partial eta squared value) will be a moderate 0.06 and the significance level will be 5% with a power of 80%. The sample size required to test interactions using repeated measures ANOVA and within-group changes using post-hoc t-tests will be calculated as 68 people (34 people in each group) using G*Power 3.1.9.7. Considering the possibility of dropouts, 80 people (40 people in each group) will be planned as study subjects. Participants must be healthy men and women aged 65 or older who have never used a smartphone or have only used the calling function. First, both the intervention and control groups will gather at a designated venue and answer a common questionnaire asking about smartphone knowledge, usage, and well-being defined as physical and mental health. The questionnaire will be created with reference to the indicators of Zhao et al. [43], Arthanat et al. [45], and Fields et al. [46]. After that, both the intervention and control groups will undergo training aimed at acquiring various smartphone functions (communication with family, health management, household finances, schedule management, online seminars, entertainment, flashlight function, emergency call function, etc.). The instructors will be professional instructors who are familiar with smartphone functions. In this case, participants will be asked in advance about their preferences and will be taught in order of their interest in the functions they are most interested in. This measure is based on the findings of previous research that older people are less interested in ICT functions [33] and the intrinsic motivation theory that says that the more you are interested in something, the higher your mastery will be [47]. In addition, participants in the intervention group will continue to take the course from the second time onwards and will also serve as coaches for participants in the control group. Specifically, they will train other participants as primary coaches under the supervision of a professional instructor. The intervention group coach will also answer questions from participants in the control group. During this time, the professional coach does not interfere but instead provides feedback to both the intervention and control group participants after the primary coaching was completed, such as making up for shortcomings. This is to prevent the primary coach from losing motivation to learn other smartphone functions by instilling a sense of shame in them for not being able to coach well. Both the intervention and control groups are allowed to use smartphones freely after the training, and every three months (i.e., 3, 6, 9, and 12 months after the training), they gather at a designated venue to answer the same questionnaire and receive training. It is expected that the act of teaching other participants increases self-efficacy for participants in the intervention group compared to participants in the control group, and they become proficient more quickly.

The advantage of this method is that the participants themselves can take on some of the role of coach, saving on the costs and time required for one-on-one instruction. If it is proven that the act of teaching elderly people creates a spiral of mutual help among elderly people through increased self-efficacy, it will become easier for organizations that have been hesitant to enter the market in the past because it was not cost-benefit-based to do so, and it will likely become easier to provide ICT education to the elderly. See Table 1 and Figure 1. First, the elderly start learning the technology they like (“study with interest”). This allows them to more quickly and easily realize that ICT is fun and useful (“experience the fun and practicality”). The more fun ICT is, the faster they can learn it (“fast learning”). The elderly then teach other elderly people the ICT they have learned (“teach others”). The act of teaching others increases their confidence in their own abilities (“self-efficacy”). Higher confidence in their own abilities reduces their sense of discomfort with ICT and increases their motivation to learn other functions (“study with interest”).

Table 1. Comparison of previous studies with this study.

	Zhao et al. [43]	Arthanat et al. [45]	Fields et al. [46]	Future Research
Purpose	Systematic training	Implementation of individual specific training	Implementation of individual specific training	Building a positive spiral by utilizing self-efficacy and social capital
Number of participants	344	83	83	68
Term	20 weeks	2 years	8 weeks	1 year
Contents	The intervention group received a smartphone training program once a week, while the control group received no intervention.	The intervention group received one-to-one ICT training at six-month intervals to promote access to and use of digital resources; the control group received no intervention.	The intervention group received iPad lessons once a week in participants' homes, while the control group received no intervention.	Both the intervention and control groups will receive a smartphone training program at three-month intervals. In addition, the intervention group will provide coaching to the control group.
Result	The intervention group had improved smartphone competency and quality of life compared with the control group.	The intervention group showed significantly greater acceptance of technology and maintained a sense of independence compared to the control group.	The intervention group showed improved confidence and use of technology compared with the control group.	(Expected outcome) The intervention group will have improved smartphone competency and quality of life compared to the control group.

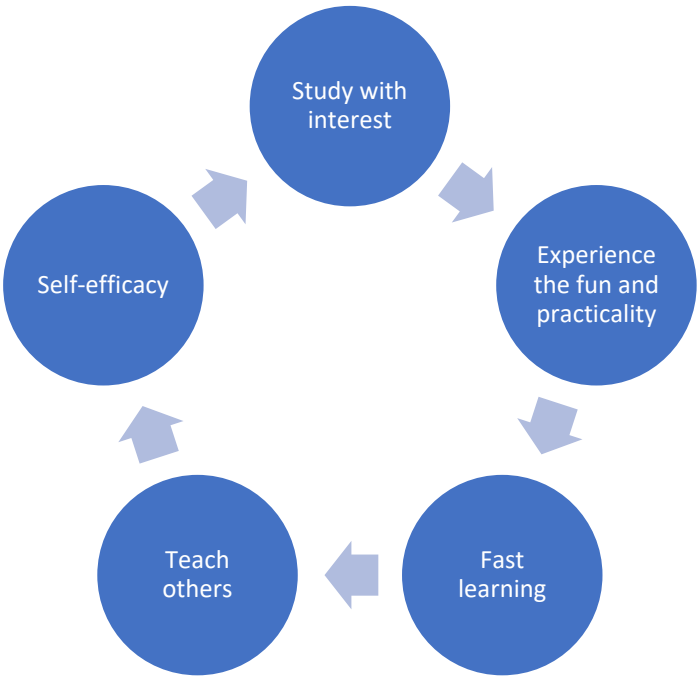

Figure 1. The possibility that social capital and self-efficacy promote Information and Communication Technology (ICT) use among older adults.

6. Discussion

In this paper, we reviewed the advantages and disadvantages of ICT adoption by the elderly, the promoting and inhibiting factors in ICT adoption, and recent intervention studies, and made suggestions for future intervention studies. While research on ICT use by the elderly is accumulating, there are few studies that clarify how to encourage ICT use

by the elderly, and the effectiveness has not been fully verified. Previous research suggests that one-on-one instruction is more effective than a uniform method, but at the same time, it also suggests that there are limitations to the effectiveness in terms of cost and time if participants simply passively receive training. In this study, we discussed the possibility that elderly people can become more effectively familiar with smartphone functions by increasing their self-efficacy through the act of learning smartphone functions and teaching them to other participants in an environment where they can obtain rich social capital, such as one-on-one instruction, and proposed future research.

Of course, there are several other barriers that must be overcome to implement this in society. The positive spiral of elderly people teaching each other, as proposed in this study, is not only more effective but also less costly than traditional one-on-one instruction. However, even so, the role that ordinary elderly people can play is only a supporting role, and it is unlikely that personnel who can provide one-on-one guidance in a more specialized position will be completely unnecessary. In addition, in situations where elderly people teach each other, a person in charge is needed to guarantee their identity and accept complaints so that they do not become anxious. Issues that need to be considered include who should take on such roles and who should provide resources such as operating capital, equipment, and personnel. Currently, governments and non-profit organizations (NPOs) introduce and match senior volunteers, either paid or unpaid, but they only play a passive role of introducing elderly people who are willing to volunteer to those who need them, and there is no training with an awareness of the positive spiral proposed in this study. Despite this, the number of people who want to provide volunteer work is small compared to the number of people who want to receive volunteer work, and as a result, NPOs are not only unable to match them well, but often forced to reduce funding for other projects to cover operational costs (from an interview survey conducted by the author at a certain NPO).

In addition, the analytical model proposed in this study has the potential for further improvement. To date, many studies have clarified the "benefits" of promoting the use of ICT such as smartphones among the elderly [8–14]. In contrast to these studies, this study reviewed the "methods" of promoting the use of smartphones among the elderly [43,45,46] and proposed a new method of individualized instruction based on both self-efficacy and social capital. However, some of the studies that deal with "benefits" can be used as references when considering the "methods" for dissemination. For example, a recent review of RCTs found that multigenerational interactions using ICT tend to increase mutual understanding between people of different generations [54]. In the long term, this increased mutual understanding could contribute to the spread of ICT by broadening the range of interests and concerns of the elderly. In addition, having younger generations teach ICT may promote the spread of ICT among the elderly in the short term as well. This is because some elderly people say that they are more likely to follow advice from their grandchildren's generation than from their own or their children's generation (according to the author's interviews with elderly people). Therefore, it may be worth considering modifications such as incorporating multigenerational elements into the individual instruction proposed in this paper, which is based on both self-efficacy and social capital. For example, a method in which experienced instructors teach high school and university student volunteers, who then teach the elderly, is attractive not only in terms of effectiveness but also in terms of cost and time, and is a strategy worth trying to promote the spread of ICT among the elderly.

Despite these limitations, demonstrating that a positive spiral consisting of social capital and self-efficacy promotes the mastery of ICT functions among the elderly should be of great significance as a first step toward social implementation.

7. Conclusions

In this review, we considered the advantages and disadvantages of promoting smartphones to the elderly and looked back at recent intervention studies to confirm that individualized instruction is more effective in helping elderly people acquire skills than uniform education and that the challenges of the former are cost and time, but previous research

has not seriously addressed this issue. Therefore, this review proposed future research to clarify how to promote the widespread use of smartphones effectively, and at low cost by involving elderly people in teaching other elderly people, creating a positive spiral that combines self-efficacy and social capital among the elderly.

Funding: This research received no external funding.

Data Availability Statement: No datasets were analyzed in this study.

Conflicts of Interest: The author declares no conflict of interest.

References

1. Savikko, N.; Routasalo, P.; Tilvis, R.; Strandberg, T.; Pitkälä, K. Predictors and subjective causes of loneliness in an aged population. *Arch. Gerontol. Geriatr.* **2005**, *41*, 223–233. [CrossRef] [PubMed]
2. Freak-Poli, R.; Kung, C.S.J.; Ryan, J.; Shields, M.A. Social Isolation, Social Support, and Loneliness Profiles Before and After Spousal Death and the Buffering Role of Financial Resources. *J. Gerontol. Ser. B* **2022**, *77*, 956–971. [CrossRef] [PubMed]
3. Cacioppo, J.T.; Cacioppo, S. Social Relationships and Health: The Toxic Effects of Perceived Social Isolation. *Soc. Pers. Psychol. Compass* **2014**, *8*, 58–72. [CrossRef] [PubMed]
4. Yu, B.; Steptoe, A.; Chen, Y.; Jia, X. Social isolation, rather than loneliness, is associated with cognitive decline in older adults: The China Health and Retirement Longitudinal Study. *Psychol. Med.* **2020**, *51*, 2414–2421. [CrossRef]
5. Holt-Lunstad, J. The Major Health Implications of Social Connection. *Curr. Dir. Psychol. Sci.* **2021**, *30*, 251–259. [CrossRef]
6. Kamin, S.T.; Lang, F.R. Internet Use and Cognitive Functioning in Late Adulthood: Longitudinal Findings from the Survey of Health, Ageing and Retirement in Europe (SHARE). *J. Gerontol. Ser. B* **2018**, *75*, 534–539. [CrossRef]
7. Fonseca, A.; Osma, J. Using Information and Communication Technologies (ICT) for Mental Health Prevention and Treatment. *Int. J. Environ. Res. Public Health* **2021**, *18*, 461. [CrossRef]
8. Kim, J.; Lee, H.Y.; Won, C.R.; Barr, T.; Merighi, J.R. Older adults' technology use and its association with health and depressive symptoms: Findings from the 2011 National Health and Aging Trends Study. *Nurs. Outlook* **2020**, *68*, 560–572. [CrossRef]
9. Lee, M.-A.; Ferraro, K.F.; Kim, G. Digital technology use and depressive symptoms among older adults in Korea: Beneficial for those who have fewer social interactions? *Aging Ment. Health* **2020**, *25*, 1839–1847. [CrossRef]
10. Bonoto, B.C.; de Araújo, V.E.; Godói, I.P.; de Lemos, L.L.P.; Godman, B.; Bennie, M.; Diniz, L.M.; Junior, A.A.G. Efficacy of Mobile Apps to Support the Care of Patients With Diabetes Mellitus: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. *JMIR mHealth uHealth* **2017**, *5*, e4. [CrossRef]
11. Park, J.; Wiese, L.A.K.; Holt, J. Online Chair Yoga and Digital Learning for Rural Underserved Older Adults at Risk for Alzheimer's Disease and Related Dementias. *Clin. Gerontol.* **2023**, 1–17. [CrossRef] [PubMed]
12. Senjam, S.S.; Manna, S.; Bascaran, C. Smartphones-Based Assistive Technology: Accessibility Features and Apps for People with Visual Impairment, and its Usage, Challenges, and Usability Testing. *Clin. Optom.* **2021**, *13*, 311–322. [CrossRef] [PubMed]
13. Peral-Peral, B.; Villarejo-Ramos, F.; Arenas-Gaitán, J. Self-efficacy and anxiety as determinants of older adults' use of Internet Banking Services. *Univers. Access Inf. Soc.* **2019**, *19*, 825–840. [CrossRef]
14. Soh, P.Y.; Heng, H.B.; Selvachandran, G.; Anh, L.Q.; Chau, H.T.M.; Son, L.H.; Abdel-Baset, M.; Manogaran, G.; Varatharajan, R. Perception, acceptance and willingness of older adults in Malaysia towards online shopping: A study using the UTAUT and IRT models. *J. Ambient. Intell. Humaniz. Comput.* **2020**, 1–13. [CrossRef]
15. Ministry of Internal Affairs and Communications in Japan. *Survey on Trends in Telecommunications Usage in 2022*; Ministry of Internal Affairs and Communications: Tokyo, Japan, 2023.
16. Cabinet Office in Japan. *Public Opinion Survey on the Use of Information and Communications Devices in 2020*; Cabinet Office: Tokyo, Japan, 2021.
17. Cabinet Office in Japan. *2023 White Paper on Aging Society*; Cabinet Office: Tokyo, Japan, 2024.
18. Campbell, R.J.; Nolfi, D.A. Teaching Elderly Adults to Use the Internet to Access Health Care Information: Before-After Study. *J. Med. Internet Res.* **2005**, *7*, e19. [CrossRef]
19. Ryu, M.-H.; Kim, S.; Lee, E. Understanding the factors affecting online elderly user's participation in video UCC services. *Comput. Hum. Behav.* **2009**, *25*, 619–632. [CrossRef]
20. Mitzner, T.L.; Savla, J.; Boot, W.R.; Sharit, J.; Charness, N.; Czaja, S.J.; Rogers, W.A. Technology Adoption by Older Adults: Findings From the PRISM Trial. *Gerontologist* **2018**, *59*, 34–44. [CrossRef]
21. Cotten, S.R.; Ford, G.; Ford, S.; Hale, T.M. Internet use and depression among older adults. *Comput. Hum. Behav.* **2012**, *28*, 496–499. [CrossRef]
22. Saunders, E.J. Maximizing Computer Use among the Elderly in Rural Senior Centers. *Educ. Gerontol.* **2004**, *30*, 573–585. [CrossRef]
23. Fotteler, M.L.; Kocar, T.D.; Dallmeier, D.; Kohn, B.; Mayer, S.; Waibel, A.-K.; Swoboda, W.; Denkinger, M. Use and benefit of information, communication, and assistive technology among community-dwelling older adults—A cross-sectional study. *BMC Public Health* **2023**, *23*, 2004. [CrossRef]
24. Tsai, H.-Y.S.; Shillair, R.; Cotten, S.R.; Winstead, V.; Yost, E. Getting Grandma Online: Are Tablets the Answer for Increasing Digital Inclusion for Older Adults in the U.S.? *Educ. Gerontol.* **2015**, *41*, 695–709. [CrossRef] [PubMed]

25. Cornejo, R.; Tentori, M.; Favela, J. Enriching in-person encounters through social media: A study on family connectedness for the elderly. *Int. J. Hum.-Comput. Stud.* **2013**, *71*, 889–899. [CrossRef]
26. Eronen, J.; Portegijs, E.; Rantanen, T. Health-related resources and social support as enablers of digital device use among older Finns. *J. Public Health* **2024**, 1–10. [CrossRef]
27. Friemel, T.N. The digital divide has grown old: Determinants of a digital divide among seniors. *New Media Soc.* **2014**, *18*, 313–331. [CrossRef]
28. Chen, Y.-R.R.; Schulz, P.J. The Effect of Information Communication Technology Interventions on Reducing Social Isolation in the Elderly: A Systematic Review. *J. Med. Internet Res.* **2016**, *18*, e18. [CrossRef]
29. Carstensen, L.L.; Isaacowitz, D.M.; Charles, S.T. Taking time seriously: A theory of socioemotional selectivity. *Am. Psychol.* **1999**, *54*, 165–181. [CrossRef]
30. Muusses, L.D.; Finkenauer, C.; Kerkhof, P.; Billedo, C.J. A longitudinal study of the association between Compulsive Internet use and wellbeing. *Comput. Hum. Behav.* **2014**, *36*, 21–28. [CrossRef]
31. Marttila, E.; Koivula, A.; Räsänen, P. Does excessive social media use decrease subjective well-being? A longitudinal analysis of the relationship between problematic use, loneliness and life satisfaction. *Telemat. Inform.* **2020**, *59*, 101556. [CrossRef]
32. Wang, C.-Y.; Wu, Y.-C.; Su, C.-H.; Lin, P.-C.; Ko, C.-H.; Yen, J.-Y. Association between Internet gaming disorder and generalized anxiety disorder. *J. Behav. Addict.* **2017**, *6*, 564–571. [CrossRef] [PubMed]
33. Chiu, C.-J.; Liu, C.-W. Understanding Older Adult's Technology Adoption and Withdrawal for Elderly Care and Education: Mixed Method Analysis from National Survey. *J. Med. Internet Res.* **2017**, *19*, e374. [CrossRef]
34. Braun, M.T. Obstacles to social networking website use among older adults. *Comput. Hum. Behav.* **2013**, *29*, 673–680. [CrossRef]
35. Lee, C.; Coughlin, J.F. PERSPECTIVE: Older Adults' Adoption of Technology: An Integrated Approach to Identifying Determinants and Barriers. *J. Prod. Innov. Manag.* **2014**, *32*, 747–759. [CrossRef]
36. World Health Organization. *World Report on Ageing and Health*; World Health Organization: Geneva, Switzerland, 2015. Available online: https://www.who.int/publications/i/item/9789241565042 (accessed on 14 August 2024).
37. World Health Organization. *Decade of Healthy Ageing: Baseline Report*; World Health Organization: Geneva, Switzerland, 2020. Available online: https://apps.who.int/iris/bitstream/handle/10665/338677/9789240017900-eng.pdf (accessed on 14 August 2024).
38. Sun, X.; Yan, W.; Zhou, H.; Wang, Z.; Zhang, X.; Huang, S.; Li, L. Internet use and need for digital health technology among the elderly: A cross-sectional survey in China. *BMC Public Health* **2020**, *20*, 1386. [CrossRef]
39. D'oliveira, A.; De Souza, L.C.; Langiano, E.; Falese, L.; Diotaiuti, P.; Vilarino, G.T.; Andrade, A. Home Physical Exercise Protocol for Older Adults, Applied Remotely During the COVID-19 Pandemic: Protocol for Randomized and Controlled Trial. *Front. Psychol.* **2022**, *13*, 828495. [CrossRef]
40. Murthy, S.R.; Mani, M. Discerning Rejection of Technology. *SAGE Open* **2013**, *3*. [CrossRef]
41. Bert, F.; Giacometti, M.; Gualano, M.R.; Siliquini, R. Smartphones and Health Promotion: A Review of the Evidence. *J. Med. Syst.* **2013**, *38*, 9995. [CrossRef]
42. Parker, S.J.; Jessel, S.; Richardson, J.E.; Reid, M.C. Older adults are mobile too! Identifying the barriers and facilitators to older adults' use of mHealth for pain management. *BMC Geriatr.* **2013**, *13*, 43. [CrossRef] [PubMed]
43. Zhao, X.; Wang, L.; Ge, C.; Zhen, X.; Chen, Z.; Wang, J.; Zhou, Y. Smartphone application training program improves smartphone usage competency and quality of life among the elderly in an elder university in China: A randomized controlled trial. *Int. J. Med. Inform.* **2019**, *133*, 104010. [CrossRef]
44. Betts, L.R.; Hill, R.; Gardner, S.E. "There's Not Enough Knowledge Out There": Examining Older Adults' Perceptions of Digital Technology Use and Digital Inclusion Classes. *J. Appl. Gerontol.* **2017**, *38*, 1147–1166. [CrossRef]
45. Arthanat, S. Promoting Information Communication Technology Adoption and Acceptance for Aging-in-Place: A Randomized Controlled Trial. *J. Appl. Gerontol.* **2019**, *40*, 471–480. [CrossRef]
46. Fields, J.; Cemballi, A.G.; Michalec, C.; Uchida, D.; Griffiths, K.; Cardes, H.; Cuellar, J.; Chodos, A.H.; Lyles, C.R. In-Home Technology Training Among Socially Isolated Older Adults: Findings From the Tech Allies Program. *J. Appl. Gerontol.* **2020**, *40*, 489–499. [CrossRef] [PubMed]
47. Ryan, R.M.; Deci, E.L. Intrinsic and Extrinsic Motivations: Classic Definitions and New Directions. *Contemp. Educ. Psychol.* **2000**, *25*, 54–67. [CrossRef] [PubMed]
48. Diotaiuti, P.; Valente, G.; Corrado, S.; Mancone, S. Assessing Decentering Capacity in Athletes: A Moderated Mediation Model. *Int. J. Environ. Res. Public Health* **2023**, *20*, 3324. [CrossRef] [PubMed]
49. Wang, K.H.; Chen, G.; Chen, H.-G. A model of technology adoption by older adults. *Soc. Behav. Pers. Int. J.* **2017**, *45*, 563–572. [CrossRef]
50. Zhang, Q.; Guo, X.; Vogel, D. Information and Communication Technology Use for Life Satisfaction among the Elderly: A Motivation Perspective. *Am. J. Health Behav.* **2021**, *45*, 701–710. [CrossRef]
51. Barlow, J.; Hainsworth, J. Volunteerism among older people with arthritis. *Ageing Soc.* **2001**, *21*, 203–217. [CrossRef]
52. Nestojko, J.F.; Bui, D.C.; Kornell, N.; Bjork, E.L. Expecting to teach enhances learning and organization of knowledge in free recall of text passages. *Mem. Cogn.* **2014**, *42*, 1038–1048. [CrossRef]

53. Koh, A.W.L.; Lee, S.C.; Lim, S.W.H. The learning benefits of teaching: A retrieval practice hypothesis. *Appl. Cogn. Psychol.* **2018**, *32*, 401–410. [CrossRef]
54. Webster, M.; Norwood, K.; Waterworth, J.; Leavey, G. Effectiveness of Intergenerational Exchange Programs Between Adolescents and Older Adults: A Systematic Review. *J. Intergener. Relatsh.* **2023**, 1–42. [CrossRef]