Impact of Digital Literacy on Life Satisfaction among Older Adults in South Korea: Analysis of the Mediating Effect of Social Capital

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Submitted to: JMIR Formative Research
on: November 02, 2024

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Abstract

Background: Korea is rapidly transforming into a super-aged society. Research indicates that digital literacy among older adults enhances their life satisfaction. Furthermore, social capital positively affects quality of life, and digital literacy facilitates social capital formation. However, most studies have focused on the direct relationship between digital literacy and life satisfaction; research on the mediating role of social capital remains scarce.

Objective: To analyze the effect of digital literacy on the life satisfaction of older adults in South Korea and to verify whether social capital acts as a mediating factor in this process.

Methods: This descriptive cross-sectional study utilized data from the 2023 Report on the Digital Divide—an annual survey conducted by the Korean Ministry of Science and Information and Communications Technology. The participants included 869 seniors aged 65 years or older. Descriptive statistics, the Pearson correlation analysis, and the three-step multiple regression analysis proposed by Baron and Kenny were performed. The bootstrap method was employed and all analyses were conducted using R version 4.4.1.

Results: The digital literacy of older adults has a significant positive effect on their life satisfaction (? = 0.103, p = .008). Higher levels of social capital are associated with increased life satisfaction among older adults (? = 0.337, p < .001). Digital literacy influences life satisfaction both directly and indirectly. The direct effect without considering social capital is significant (? = 0.103, p = .006). The indirect effect through social capital is also significant (indirect effect = 0.037, p = .025). Social capital partially mediates the relationship between digital literacy and life satisfaction, indicating that improving digital literacy can enhance social capital, which in turn boosts life satisfaction.

Conclusions: This study analyzed the association between digital literacy, social capital, and life satisfaction among older adults in Korea. We identified that social capital mediates the association between digital literacy and life satisfaction among older adults. Our results indicate the importance of developing support measures that focus on improving digital literacy and expanding social capital. This could significantly enhance the psychological well-being and quality of life of older adults.

(JMIR Preprints 02/11/2024:68163)
DOI: https://doi.org/10.2196/preprints.68163

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Conclusions: This study analyzed the association between digital literacy, social capital, and life satisfaction among older adults in Korea. We identified that social capital mediates the association between digital literacy and life satisfaction among older adults. Our results indicate the importance of developing support measures that focus on improving digital literacy and expanding social capital. This could significantly enhance the psychological well-being and quality of life of older adults.

Keywords: digital literacy; digital access; digital competency; digital utilization; life satisfaction; older adults; social capital; mediating effect; aging

Introduction

South Korea is rapidly approaching the stage of a super-aged society, which refers to a country where more than 20% of the population is 65 and older. As of

2024, the population aged 65 and older is approximately 9.9 million, accounting for 19.2% of the total population. It is projected that by 2025, this proportion will exceed 20.0%, officially marking Korea's entry into a super-aged society [1]. As a result of this increase in the older adults' population, the proportion of the economically active population is decreasing. Therefore, the financial and psychological burdens at the individual, family, and national levels are expected to increase because of elderly diseases and care issues. In 2019, the medical expenses of older adults in Korea accounted for over 40.0% of the nation's total medical expenses, and the country recorded the highest older adults' poverty rate among the Organisation for Economic Co-operation and Development (OECD) countries [2]. Moreover, the life satisfaction of older adults aged 65 and over decreased by 2.4% compared to the preceding year, recording 31.9%, which is lower than the overall average. Additionally, satisfaction tended to decrease with age [1].

One proposed solution for addressing aging-related challenges is to enhance the digital technology proficiency of older adults [3,4]. Today, information and communication technology (ICT) plays a crucial role in various aspects of social life, with approximately 5.4 billion people worldwide—or, 67.0% of the global population—using the Internet as of 2023 [5]. This represents a 45.0% increase since 2018, driven by rapid expansion of the Internet and the adoption of smartphones, which have introduced transformative changes not only in individuals' daily lives but throughout society. However, these benefits are not evenly distributed across all social strata, as vulnerable groups such as those with disabilities, low-income populations, and older adults experience challenges due to the digital divide. A 2021 survey of U.S. adults revealed that Internet usage among older adults was 75.0%—significantly lower than the national average of 93.0% [6]. Similarly, a domestic survey on digital information gap identified that those aged 55 and older had the lowest digital literacy compared to other vulnerable groups [7].

As social systems become more digitized, older adults experience considerable difficulties in managing various daily tasks, such as online purchases, bill payments, and financial transactions. Particularly, the rapid expansion of telemedicine and digital healthcare services following the COVID-19 pandemic has significantly increased reliance on digital platforms for health management, resulting in greater challenges for older adults in effectively utilizing these digital technologies [8,9]. These difficulties are further intensified by factors such as resistance to new technologies, psychological barriers, and negative self-perception related to aging [4,10,11]. This can lead to social and economic isolation, ultimately posing a significant risk to the life satisfaction of older adults.

Digital literacy refers to the ability to efficiently use digital technologies, grounded in fundamental literacy skills such as reading, writing, and arithmetic, and encompassing the capacity to search, evaluate, utilize, share, and create content using digital tools such as the Internet and the smartphone [12]. It is a comprehensive concept that transcends the mere access to information, incorporating digital access, digital competency, and digital utilization, enabling the effective use of digital technologies and information [13]. In other words, digital literacy implies a comprehensive capability to proficiently manage and utilize diverse information in a digital environment.

Studies on the relationship between the digital literacy and life satisfaction of older adults suggest that improvements in digital competence can enhance personal development, social connections, and self-esteem, thereby increasing life satisfaction [14]. Additionally, activities such as financial and health information searches and online communication have been found to boost the self-efficacy of older adults, foster positive perceptions of aging, alleviate loneliness and isolation, and ultimately, contribute to improving their overall quality of life [15-17]. Domestic research has also demonstrated that digital access, competency, and utilization level of older adults positively impact their life satisfaction [18-20]. Particularly, the digital literacy of older adults plays a crucial role in maintaining and expanding relationships with family, friends, and the community, thereby positively influencing the formation of social capital [21,22].

Social capital, which refers to the social networks, norms, and trust that arise from interactions among individuals and groups, serves as resources that promotes a sense of community and enables individuals to lead fulfilling lives [23,24]. Previous studies have identified social capital as a vital resource that helps alleviate loneliness and enhances life satisfaction, thereby positively influencing the mental well-being of older adults [25-27]. For example, a study conducted among older adults in China identified that social capital mediated the relationship between perceived neighborhood environment and life satisfaction, thereby enhancing life satisfaction among older adults [28]. During the COVID-19 pandemic, social capital was shown to have positively influenced the quality of life of U.S. adults [29] and to have contributed to the improved quality of life among urban residents in Iran [30].

In summary, the digital literacy of older adults has a positive impact on their life satisfaction, with social capital playing a crucial role in this process. While several studies have explored the relationship between digital literacy and the life satisfaction among older adults, as well as the connection between social capital and quality of life, most have focused on their direct relationships. However, research on how social capital mediates this connection remains scarce. This highlights the need to better understand how digital literacy contributes to life satisfaction, considering the potential mediating role of social capital. Therefore, this study aims to analyze the impact of digital literacy on life satisfaction of Korean older adults and to verify whether social capital acts as a mediating factor in this process.

Methods

Study Design

This study is cross-sectional research aimed at analyzing the mediating effect of social capital on the relationship between the digital literacy and life satisfaction among older adults in Korea.

Data Collection

This study utilized the raw data from the 2023 Report on the Digital Divide—an

annual survey conducted by the Korean Ministry of Science and Information and Communications Technology (MSIT). Considering OECD's definition of older adults and the fact that most countries provide pension and social security benefits to those aged 65 and older, this study defines older adults as those aged 65 and above. Accordingly, response data from individuals aged 65 and older were extracted, processed, and analyzed. The survey was conducted using a structured questionnaire through face-to-face interviews by trained surveyors from a professional survey company. The survey period lasted from October to December 2023. For analysis, the data were de-identified according to the Personal Information Protection Act. The sample was selected using a stratified probability proportional sampling method, considering inclusion probability based on region, gender, and age. Among the 1,239 participants who were aged 65 and older, data of 869 individuals were analyzed, excluding 370 non-Internet users.

Study Variables

Life satisfaction

The dependent variable in this study, life satisfaction, was measured across eight domains of daily life: leisure and cultural activities, financial status, social activities, interpersonal relationships, family relationships, work, physical and mental health, and political engagement. These were assessed using a 4-point Likert scale, and the scores were converted to a 100-point scale. The internal consistency of the measurement items was Cronbach's $\alpha = 0.806$.

Digital literacy

The independent variable in this study, digital literacy, was evaluated by integrating three components: digital access, digital competency, and digital utilization. Digital access was assessed using four items, examining whether participants owned digital devices such as desktops, laptops, and mobile phones, and whether they had constant Internet access (1 for yes, 0 for no). Digital competency was measured using seven items on personal computer (PC) competency and seven items on mobile device competency, each assessed using a 4-point Likert scale ranging from 1 "Strongly disagree" to 4 "Strongly agree." Digital utilization was assessed based on 50 items, divided into categories: whether participants used wired and mobile Internet, the diversity of Internet services used, and advanced Internet utilization. The diversity of Internet service usage included activities such as information and news searches, email, media content, educational content, social networking services (SNS), messengers, blogs, online communities, cloud services, daily information, e-commerce, financial transactions, and public service utilization. Advanced Internet utilization measured the extent of information production and sharing, networking, social participation, and economic activities. All items were rated on a 4-point Likert scale ranging from 1 "Do not use at all" to 4 "Use frequently." The scores for the three components: digital access, digital competency, and digital utilization, were calculated on a weighted 100-point scale based on the methodology outlined in the 2023 Report on the Digital Divide. The internal consistency of these items was Cronbach's $\alpha = 0.967$.

Social capital

The mediating variable in this study, social capital, was measured by assessing the presence of social support networks, such as family and friends, in the online environment for older adults. The survey used a shortened version of the Internet Social Capital Scales (ISCS) developed by Williams [31], which was modified and adapted by the National Information Society Agency of Korea to evaluate social capital levels. The original ISCS consists of 20 items, with 10 items each for bonding social capital and bridging social capital. Bonding social capital assesses aspects such as emotional support, access to scarce or limited resources, and the ability to mobilize solidarity. Bridging social capital evaluates aspects such as outward looking, contact with a wide range of people, a sense of belonging to a larger group, and interactions with broader communities. In this study, the shortened scale with five items each for bonding and bridging social capital, totaling 10 items, was used. All items were rated on a 4-point Likert scale from 1 “Strongly disagree” to 4 “Strongly agree” and converted to a 100-point scale. The internal consistency of these items was Cronbach’s $\alpha = 0.863$.

Control variables

The control variables in this study included socio-demographic characteristics such as gender, age, education level, disability status, household type, and monthly income. Age was categorized into 65–69, 70–74, 75–79, and 80 years or older. Education level was classified into less than elementary school, middle school graduate, high school graduate, and college graduate or higher. Disability status was categorized as “yes” or “no,” household type was classified into single-person households and households with two or more people, and monthly income was divided into five quintiles based on income levels.

Data Analysis

The data were analyzed using the R version 4.4.1 statistical program, and the specific analysis methods are as follows. First, descriptive statistical analysis, including frequency analysis, percentages, means, and standard deviations, was conducted to understand the participants’ socio-demographic characteristics, digital literacy level, life satisfaction, and social capital. Second, the Pearson correlation analysis was performed to identify the associations between the main variables of the study model: digital literacy, life satisfaction, and social capital. Third, to verify the mediating effect of social capital in the association between digital literacy and life satisfaction, a three-step multiple regression analysis suggested by Baron and Kenny [32] was conducted, and the bootstrap method was applied to test the statistical significance. For significance test, 95% confidence interval (CI) was used.

Ethical Considerations

This study was conducted in accordance with the Declaration of Helsinki and received review and approval from the Institutional Research Ethics Committee of the Yonsei University Institutional Review Board in Wonju, South Korea (Approval No.1041849-202410-SB-213-01). All procedures followed the relevant institutional guidelines and regulations, and informed consent was obtained

from all participants or their legal guardians before their participation in the study.

Results

Participants' Characteristics

A total of 869 participants were included in this study (Table 1). There were more females (51.8%) than males (48.2%). By age, the largest group included those aged 65–69 years (42.2%), followed by those aged 70–74 years (34.1%), 75–79 years (18.9%), and 80 years and older (4.8%). Regarding education level, high school graduates accounted for the largest proportion (39.7%), followed by middle school graduates (33.3%), those with elementary school education or lower (20.9%), and college graduates or higher (6.1%). In terms of disability status, the vast majority of respondents (98.4%) did not have a disability, while 1.6% reported having a disability. Household type showed that 18.2% lived in single-person households, while 81.8% lived in households with two or more people. Regarding monthly income, the largest group earned 2-2.99 million KRW (26.8%), followed by 1-1.99 million KRW (24.9%), 4 million KRW or more (21.6%), 3-3.99 million KRW (17.5%), and less than 1 million KRW (9.2%).

The mean digital literacy score was 56.2 points (±10.5), with the subcomponents showing the following mean scores: digital access at 62.4 points (±16.6), digital competency at 47.2 points (±16.5), and digital utilization at 62.2 points (±6.2). The mean life satisfaction score was 64.9 points (±11.0), and the mean social capital score was 67.9 points (±12.0).

Table 1. Respondents' characteristics and degree of study variables (n=869)

Variables		n	%
Gender	Male	419	48.2
	Female	450	51.8
Age	65–69	367	42.2
	70–74	296	34.1
	75–79	164	18.9
	≥ 80	42	4.8
Education level	≤ Elementary school	182	20.9
	Middle school	289	33.3
	High school	345	39.7
	≥ College	53	6.1
Disability	No	855	98.4
	Yes	14	1.6
Live with someone	No	158	18.2
	Yes	711	81.8
Income	< 1million KRW	80	9.2
	1–1.99 million KRW	216	24.9
	2–2.99 million KRW	233	26.8
	3–3.99 million KRW	152	17.5
	≥ 4 million KRW	188	21.6
Digital literacy[a]			56.2±10.5
• Digital access (out of 100) (M±SD)			62.4±16.6
• Digital competency (out of 100) (M±SD)			47.2±16.5
• Digital utilization (out of 100) (M±SD)			62.2±6.2
Life satisfaction (out of 100) (M±SD)			64.9±11.0
Social capital (out of 100) (M±SD)			67.9±12.0

[a]Digital literacy is the sum of access, competency, and utilization, with respective weights of 0.2, 0.4, and 0.4.

Correlation Analysis between Life Satisfaction and Digital Literacy, Social Capital

The results of the Pearson correlation analysis conducted to examine the correlation between digital literacy, social capital, and life satisfaction are presented in Table 2. Life satisfaction showed a statistically significant positive correlation with both digital literacy (r = 0.276) and social capital (r = 0.438), with a stronger correlation observed between life satisfaction and social capital. This indicates that higher digital literacy and higher social capital are associated with greater life satisfaction. Additionally, digital literacy showed a significant positive correlation with social capital (r = 0.216), suggesting that as the digital literacy increases, social capital tends to increase as well.

Table 2. Correlation analysis between life satisfaction and digital literacy, social

capital

Variables	Life satisfaction	Digital literacy	Social capital
Life satisfaction	1		
Digital literacy	0.276(<.001)	1	
Social capital	0.438(<.001)	0.216(<.001)	1

The Mediating Effect of Social Capital on the Association between Digital Literacy and Life Satisfaction

A three-step multiple regression analysis, following the procedure suggested by Baron and Kenny [32], was conducted to examine the effects of digital literacy on life satisfaction and the mediating role of social capital (Table 3). The analysis controlled for gender, age, education level, disability status, and income level.

Model 1 analyzed the effect of digital literacy on social capital. Digital literacy showed a statistically significant positive effect on social capital (β = 0.110, p = .018), indicating that higher levels of digital literacy tend to increase social capital. Additionally, higher education and income levels were associated with increased social capital.
Model 2 examined the effect of digital literacy on life satisfaction. Digital literacy had a statistically significant positive effect on life satisfaction (β = 0.140, p < .001). Higher life satisfaction was observed among those with a college degree or higher (β = 5.399, p = .004) and those with a monthly income of 2–2.99 million KRW (β = 5.642, p < .001), 3–3.99 million KRW (β = 6.524, p < .001), and 4 million KRW or more (β = 7.371, p < .001).

Model 3 analyzed the effects of digital literacy and social capital on life satisfaction. Both digital literacy (β = 0.103, p = .008) and social capital (β = 0.337, p < .001) had statistically significant positive effects on life satisfaction, indicating that both factors contribute to enhancing life satisfaction. Additionally, higher life satisfaction was observed among those with a college degree or higher (β = 3.643, p = .037) and those with a monthly income of 2–2.99 million KRW (β = 4.402, p = .003), 3–3.99 million KRW (β = 4.916, p = .003), and 4 million KRW or more (β = 5.515, p < .001).

The F and p values for each model (Models 1, 2, and 3) were statistically significant (p < .001), indicating that the models fit the data well. Notably, Model 3 demonstrated the highest explanatory power, with an adjusted R-square value of 0.242, when social capital was included.

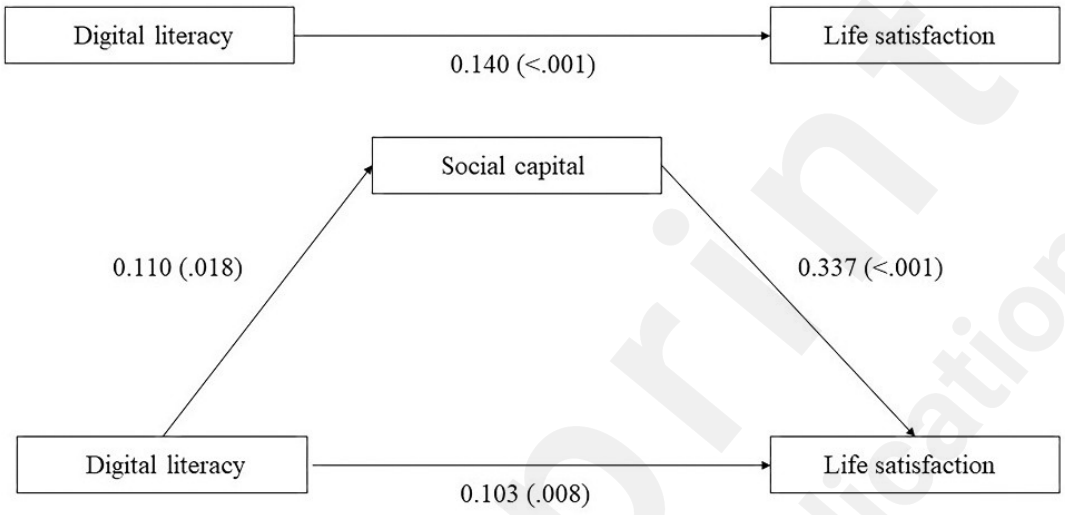
The regression coefficient of the mediating variable, social capital, was statistically significant, and the direct effect of the independent variable, digital literacy, on the dependent variable, life satisfaction (β = 0.140), decreased when social capital was included as a mediator (β = 0.103). This confirms that social capital has a partial mediating effect in the relationship between digital literacy and life satisfaction (Figure 1). Thus, social capital plays a key role in enhancing life satisfaction and digital literacy positively influences life satisfaction through social capital.

Table 3. The mediating effect of social capital on the association between digital literacy and life satisfaction

Variables		Model1		Model2		Model3	
		β(S.E)	t(P)	β(S.E)	t(P)	β(S.E)	t(P)
Gender	Male	Ref		Ref		Ref	
	Female	1.253 (0.818)	1.531 (.126)	-0.276 (0.736)	-0.375 (.708)	-0.699 (0.684)	-1.022 (.307)
Age	65-69	Ref		Ref		Ref	
	70-74	-1.324 (0.934)	-1.417 (.157)	-1.342 (0.840)	-1.597 (.111)	-0.896 (0.780)	1.148 (.251)
	75-79	0.172 (1.171)	0.147 (.884)	0.138 (1.053)	0.131 (.896)	0.080 (0.977)	0.082 (.934)
	≥ 80	-0.477 (1.940)	-0.246 (.806)	-0.287 (1.745)	-0.164 (.870)	-0.1255 (1.619)	-0.078 (.938)
Education level	≤ Elementary school	Ref		Ref		Ref	
	Middle school	3.213 (1.173)	2.738 (.006)	0.745 (1.055)	0.706 (.481)	-0.339 (0.983)	-0.345 (.730)
	High school	4.244 (1.285)	3.302 (.001)	1.686 (1.156)	1.459 (.145)	0.255 (1.079)	0.236 (.813)
	≥ College	5.206 (2.084)	2.497 (.013)	5.399 (1.875)	2.879 (.004)	3.643 (1.745)	2.087 (.037)
Disability	No	Ref		Ref		Ref	
	Yes	1.038 (3.182)	0.326 (.744)	3.403 (2.862)	1.189 (.235)	3.053 (2.655)	1.150 (.250)
Live with someone	No	Ref		Ref		Ref	
	Yes	0.059 (1.224)	0.048 (.961)	-0.363 (1.101)	-0.330 (.742)	-0.383 (1.021)	-0.375 (.708)
Income	<1 million KRW	Ref		Ref		Ref	
	1 – 1.99 million KRW	1.643 (1.655)	0.992 (.321)	2.579 (1.489)	1.732 (.084)	2.025 (1.382)	1.465 (.143)
	2 – 2.99 million KRW	3.676 (1.775)	2.071 (.039)	5.642 (1.596)	3.534 (<.001)	4.402 (1.484)	2.965 (.003)
	3 – 3.99 million KRW	4.765 (1.939)	2.458 (.014)	6.524 (1.744)	3.741 (<.001)	4.916 (1.623)	3.029 (.003)
	≥4 million KRW	5.502 (1.962)	2.805 (.005)	7.371 (1.765)	4.177 (<.001)	5.515 (1.644)	3.354 (<.001)
Digital literacy		0.110 (0.046)	2.364 (.018)	0.140 (0.042)	3.350 (<.001)	0.103 (0.039)	2.647 (.008)
Social capital		-	-	-	-	0.337	11.81

			(0.029) (<.001)
Constant	54.969	51.755	33.214
R-square(adj.R)	.096(.082)	.133(.119)	.255(.242)
F(*P*)	6.51(<.001)	9.38(<.001)	19.48(<.001)

Figure 1. Association between digital literacy, social capital, and life satisfaction



Verification of the Significance of the Mediating Effect of Social Capital

Table 4 presents the results of the bootstrapping analysis performed to verify the statistical significance of the mediating effect of social capital. First, the direct effect of digital literacy on life satisfaction, without mediation by social capital, was 0.103 (p = .006), confirming that digital literacy has a significant direct effect on life satisfaction. The indirect effect, representing the effect of digital literacy on life satisfaction through social capital, was 0.037 (p = .025). The total effect, which combines the direct and indirect effects, was 0.140 (p = .002), indicating that the overall impact of digital literacy on life satisfaction is statistically significant. In other words, digital literacy is an important factor that positively influences life satisfaction, both directly and indirectly, through the mediating role of social capital.

Table 4. Verification of the significance of the mediating effect of social capital

Mediation pathway		*β*	95% CI Lower	95% CI Upper	*p*-value
Indirect effect	Digital literacy → Social capital → Life satisfaction	0.037	0.005	0.070	.025
Direct effect	Digital literacy → Life satisfaction	0.103	0.030	0.180	.006

Total effect	0.140	0.058	0.230	.002

Bootstrapping simulations n=5000

Discussion

Principal Findings

This study analyzed the impact of digital literacy on the life satisfaction among older adults in Korea and examined whether social capital plays a mediating role in this process. The results showed that digital literacy has a positive effect on life satisfaction. This implies that higher digital literacy is associated with greater life satisfaction, and that increased levels of digital access, competency, and utilization lead to higher life satisfaction—this is consistent with the findings of previous studies [18,20,33]. These findings align with research on older adults, where the Internet was perceived as a valuable tool for use in daily life, supporting various online activities such as interpersonal communication, information search, task completion, and leisure activities, which were positively correlated with life satisfaction [34,35]. Similarly, Zheng et al. [15] identified four crucial factors that older adults in the U.S. consider important for Internet use: social connection, self-efficacy, the need to seek financial information, and the need to access health information. These results highlight that Internet use among older adults is an important resource that supports an independent and active elderly life and improves quality of life. During the COVID-19 pandemic, the government of Korea digitalized various public services, and both public and private organizations implemented digital literacy education programs, computer skills training and smartphone usage training to help older adults adapt to digital platforms [36]. Nonetheless, the digital literacy level among older adults remains stagnant, and there exists a digital divide due to differences in digital competency among older adults. According to Lee [20], while the information competency of older adults in Korea has steadily improved since 2019, the proportion of older adults with adequate digital literacy remains below 50%, highlighting the ongoing need for digital competency education programs. Therefore, it is essential to provide tailored education programs that match the digital literacy levels of older adults, considering their specific needs and abilities. Such customized education can effectively reduce the digital divide and enhance the digital adaptability of older adults, thereby improving their quality of life.

Additionally, a higher level of social capital is associated with greater life satisfaction. This finding is consistent with those of studies that have identified a positive effect of social capital on life satisfaction [37-40]. Old age is a phase where social networks shrink and opportunities for social participation become limited, making it difficult to maintain or acquire social capital [41]. Therefore, the formation of social capital is an essential component for successful aging. To support this, creating opportunities for older adults to share their thoughts and build relationships in environments specifically designed for them can help to cultivate social capital. A study examining the impact of social capital components: networks, social participation, and social trust, on life satisfaction across different age groups identified that the factors influencing life satisfaction

varied by age group. Particularly, for older adults, social trust in family, friends, neighbors, and institutions was found to have the greatest impact on life satisfaction among older adults [42]. These findings suggest the need for efforts to create a supportive community environment tailored to the characteristics of older adults, which can help secure the social capital necessary to enhance their life satisfaction.

In this study, social capital showed a partial mediating effect on the relationship between digital literacy and life satisfaction among older adults. This implies that digital literacy directly enhances life satisfaction, as well as indirectly, via social capital. Social capital was confirmed to be a significant determinant of quality of life, aligning with previous research indicating that social capital mediates the relationship between digital utilization and life satisfaction among individuals aged 55 and older [43]. Older adults with higher levels of digital literacy tend to build social relationships and participate in voluntary social activities through online activities, which helps to reduce depression and social isolation, ultimately boosting life satisfaction [44-46]. As demonstrated by Yoon [47], during the COVID-19 situation, a pilot program using digital platforms for social prescriptions targeting Korean older adults successfully expanded their social networks and improved their life satisfaction. Additionally, other studies support the finding that connecting with family and friends via SNS and acquiring greater social resources can improve psychological well-being and quality of life [48,49]. The government of Korea provides digital education for older adults via community service centers, senior welfare centers, and public libraries. It is proposed that digital education for older adults includes programs to enhance the use of SNS and digital hobby and community activities to support the formation of social capital.
Therefore, it is necessary to develop digital programs that not only improve the digital skills of older adults but also support the building of social capital. Such programs can facilitate the adoption of digital tools by older adults, foster social interactions, reduce feelings of isolation, and ultimately, improve their overall quality of life. It is crucial to establish practical support measures to expand social capital within the digital environment.

Limitations and Future Directions

This study has the following limitations. First, as a cross-sectional study, it cannot track changes in causal relationships between variables over time. To better understand how relationships between variables change over time, future studies should utilize longitudinal data. Second, this study focuses on older adults in Korea, which limits the generalizability of the results to other countries or groups with different cultural backgrounds. The relationship between digital literacy and social capital formation may differ between countries, highlighting the need for international comparative studies. Third, owing to the relatively small sample size, caution is required when generalizing the statistical results.
Nevertheless, this study has significance in that it utilized nation-wide raw data from the Korean MSIT, analyzing data representative of the older adults' population in Korea. This study emphasizes the importance of improving digital literacy and expanding social capital to enhance the quality of life of older adults in Korea.

Conclusion

This study analyzed the associations among digital literacy, social capital, and life satisfaction among older adults in Korea. The results showed significant correlations among digital literacy, social capital, and life satisfaction, with social capital mediating the relationship between digital literacy and life satisfaction. These findings underscore that when digital literacy is combined with social capital, it can contribute to enhancing the life satisfaction of older adults. Therefore, improving digital literacy and expanding social capital can promote the psychological well-being and quality of life of older adults, and it is essential to develop support measures to facilitate these improvements. Additionally, future research should explore which aspects of digital literacy are most effective in building social capital and improving life satisfaction among different subgroups of older adults. These efforts can help older adults become better equipped to adapt to the digital environment, ultimately leading to a more independent, connected, and fulfilling life.

Conflicts of Interest

None declared.

Abbreviations

Organisation for Economic Co-operation and Development (OECD)
Information and Communication Technology (ICT)
Korean Ministry of Science and Information and Communications Technology (MSIT)
Personal Computer (PC)
Social Networking Services (SNS)
Internet Social Capital Scales (ISCS)
Confidence Interval (CI)

Data Availability

The study data were collected by MSIT and the Korean National Information Society Agency; the data and questionnaire are disclosed on their website. (https:// www. nia. or. kr/ site/ nia_ kor/ ex/ bbs/ List. do? cbIdx= 81623).

References

1. Statistics Korea. 2024 Elderly Statistics Press Release. 2024. URL: https://kostat.go.kr/board.es?mid=a10301010000&bid=10820&act=view&list_no=432917 [accessed 2024-09-05]
2. Korea Health Promotion Institute. The 5th National Health Plan (Health Plan 2030, 2021-2030). 2021. URL: https://www.mohw.go.kr/board.es?mid=a10401000000&bid=0008&tag=&act=view&list_no=365340 [accessed 2024-09-05]
3. International Telecommunication Union. Ageing in a digital world-from vulnerable to valuable. Geneva, Switzerland: International Telecommunication Union; 2021.
4. Hou F, Cao L, Wang Q. Call for the ageing-inclusive digital economy and related standards: Based on a global survey. ICEME '22: Proceedings of the 2022 13th International Conference on E-business, Management and Economics. 2022:157-62. [doi: 10.1145/3556089.3556175]

5. International Telecommunication Union. ITU Statistics. 2023. URL: https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx [accessed 2024-09-05]
6. Pew Research Center. Internet/broadband fact sheet. 2024. URL: https://www.pewresearch.org/internet/fact-sheet/internet-broadband/ [accessed 2024-09-05]
7. Ministry of Science and ICT, National Information Society Agency. 2023 The report on the digital divide. Sejong, Korea: Ministry of Science and ICT; 2023.
8. Haimi M, Sergienko R. Adoption and use of telemedicine and digital health services among older adults in light of the covid-19 pandemic: Repeated cross-sectional analysis. JMIR Aging. 2024 2024/4/24;7:e52317. [doi: 10.2196/52317] [Medline: 38656768]
9. Mace RA, Mattos MK, Vranceanu AM. Older adults can use technology: why healthcare professionals must overcome ageism in digital health. Transl Behav Med. 2022 Dec 30;12(12):1102-5. [doi: 10.1093/tbm/ibac070] [Medline: 36073770]
10. Choi EY, Kim Y, Chipalo E, Lee HY. Does perceived ageism widen the digital divide? And does it vary by gender? Gerontologist. 2020 Sep 15;60(7):1213-23. [doi: 10.1093/geront/gnaa066] [Medline: 32539099]
11. Mubarak F, Suomi R. Elderly forgotten? Digital exclusion in the information age and the rising grey digital divide. Inquiry. 2022 Jan-Dec;59:469580221096272. [doi: 10.1177/00469580221096272] [Medline: 35471138]
12. Bawden D. Origins and concepts of digital literacy. In: Lankshear C, Knobel M, editors. Digital literacies: Concepts, policies and practices. New York, NY: Peter Lang Publishing; 2008. p. 17-32.
13. Van Dijk J. The deepening divide: Inequality in the information society. London, UK: Sage; 2005.
14. Hasan H, Linger H. Enhancing the wellbeing of the elderly: Social use of digital technologies in aged care. Educ Gerontol. 2016 Nov;42(11):749-57. [doi: 10.1080/03601277.2016.1205425]
15. Zheng R, Spears J, Luptak M, Wilby F. Understanding older adults' perceptions of internet use: An exploratory factor analysis. Educ Gerontol. 2015 Jul 3;41(7):504-18. [doi: 10.1080/03601277.2014.1003495]
16. Fowler JG, Gentry JW, Reisenwitz TH. Analyzing Chinese older people's quality of life through their use of the internet. Int J Consum Stud. 2015 Jul;39(4):324-34. [doi: 10.1111/ijcs.12194]
17. Welch V, Ghogomu ET, Barbeau VI, Dowling S, Doyle R, Beveridge E, et al. Digital interventions to reduce social isolation and loneliness in older adults: An evidence and gap map. Campbell Syst Rev. 2023 Dec;19(4):e1369. [doi: 10.1002/cl2.1369] [Medline: 38024780]
18. Kim SK, Shin HR, Kim YS. The impact of mobile device use ability on life satisfaction of middle-aged and older adults: Focusing on the mediating effect of mobile-based online social participation. J Digit Convergence. 2020 03/28;18(3):23-34. [doi: 10.14400/JDC.2020.18.3.023]
19. Lee S, Han M, Lee J, Kim S. The effect of digital literacy in the elderly on life satisfaction: Serial multiple mediating effects of social participation activities and depression. J Korea Acad Ind Coop Soc. 2023;24(6):406-16. [doi: 10.5762/KAIS.2023.24.6.406]
20. Lee H. Analysis of the impact of digital literacy on life satisfaction (2019-2022) for older adults in South Korea: a national community-based panel study. Sci Rep. 2024 Sep 2;14(1):20399. [doi: 10.1038/s41598-024-71397-0] [Medline: 39223233]
21. Morris ME, Adair B, Ozanne E, Kurowski W, Miller KJ, Pearce AJ, et al. Smart technologies to enhance social connectedness in older people who live at home. Australas J Ageing.

2014 Sep;33(3):142-52. [doi: 10.1111/ajag.12154] [Medline: 24730370]
22. Khosravi P, Rezvani A, Wiewiora A. The impact of technology on older adults' social isolation. Comput Human Behav. 2016 2016/10/01/;63:594-603. [doi: 10.1016/j.chb.2016.05.092]
23. Coleman JS. Social capital in the creation of human capital. Am J Sociol. 1988;94:S95-S120. [doi: 10.1086/228943]
24. Putnam RD. The prosperous community. Am Prospect. 1993;4(13):35-42.
25. Pénard T, Poussing N. Internet use and social capital: The strength of virtual ties. J Econ Issues. 2014;44(3):569-95. [doi: 10.2753/jei0021-3624440301]
26. Mason M, Sinclair D, Berry C. Nudge or compel? Can behavioural economics tackle the digital exclusion of older people. London, UK: International Longevity Centre; 2012.
27. Nyqvist F, Forsman AK, Giuntoli G, Cattan M. Social capital as a resource for mental well-being in older people: a systematic review. Aging Ment Health. 2013;17(4):394-410. [doi: 10.1080/13607863.2012.742490] [Medline: 23186534]
28. Lu N, Wu B. Perceived neighborhood environment, social capital and life satisfaction among older adults in Shanghai, China. Sci Rep. 2022 Apr 23;12(1):6686. [doi: 10.1038/s41598-022-10742-7] [Medline: 35461348]
29. Larnyo E, Tettegah S, Griffin B, Nutakor JA, Preece N, Addai-Dansoh S, et al. Effect of social capital, social support and social network formation on the quality of life of American adults during COVID-19. Sci Rep. 2024 Feb 1;14(1):2647. [doi: 10.1038/s41598-024-52820-y] [Medline: 38302613]
30. Amerian M. Identifying the impact of social capital on quality of urban life (evidence from Iran). Soc Indic Res. 2024 Feb;171(3):921-36. [doi: 10.1007/s11205-023-03287-3]
31. Williams D. On and off the 'net: Scales for social capital in an online era. J Comput Mediat Commun. 2006;11(2):593-628. [doi: 10.1111/j.1083-6101.2006.00029.x]
32. Baron RM, Kenny DA. The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. J Pers Soc Psychol. 1986;51(6):1173-82. [doi: 10.1037/0022-3514.51.6.1173] [Medline: 3806354]
33. Hwang H, Hwang Y. A study on the digital divide among the elderly and its impact on life satisfaction: Focusing on the effect of household composition. J Soc Sci Res. 2017;24(3):359-86. [doi: 10.46415/jss.2017.09.24.3.359]
34. Seifert A, Schelling HR. Seniors online: Attitudes toward the internet and coping with everyday life. J Appl Gerontol. 2018 Jan;37(1):99-109. [doi: 10.1177/0733464816669805] [Medline: 27655237]
35. Lifshitz R, Nimrod G, Bachner YG. Internet use and well-being in later life: a functional approach. Aging Ment Health. 2018 Jan;22(1):85-91. [doi: 10.1080/13607863.2016.1232370] [Medline: 27657190]
36. Jo JS, Song SH, Kim E, Lee J. The challenges of digital technology education for seniors : Focusing on senior learners, instructors and governments. J Next Gener Converg Technol Assoc. 2021;5(1):115-23. [doi: 10.33097/jncta.2021.05.01.115]
37. Chen Y, Li W, Zhang X, Cheng H, Tian Y, Yang H. Association between social capital and quality of life in older adults with subjective cognitive decline: A cross-sectional study. Appl Nurs Res. 2024 Feb;75:151773. [doi: 10.1016/j.apnr.2024.151773] [Medline: 38490797]
38. Kim BJ, Linton KF, Lum W. Social capital and life satisfaction among Chinese and Korean elderly immigrants. J Social Work. 2013;15(1):87-100. [doi: 10.1177/1468017313504699]
39. Kim J, Kim SE. Social capital and life satisfaction of elderly who lives alone: Focusing on

regional difference in depression and public pension. J Soc Sci. 2018;29(3):267-84. [doi: 10.16881/jss.2018.07.29.3.267]
40. Kim MY, Jeon HJ. The impact of smartphone use on life satisfaction in the elderly: The mediating effect of social activity participation. Korean J Gerontol Soc Welfare. 2017;72(3):343-70.
41. Jeon SN. The effects of elderly's depression and social capital on successful aging. J Korean Soc Sch Community Health Educ. 2019;20(3):29-42. [doi: 10.35133/kssche.20191231.03]
42. Chung SD, Sung MH. Relationship between social capital and life satisfaction: a comparison of three different age groups. Health Soc Welf Rev. 2012;32(4):249-72.
43. Yoon HJ, Shin HR, Kim YS. A Study on the Relationship between Level of Digital Information Usage and Life Satisfaction: The Mediating Effect of the Social Capital. Informatization Policy. 2020;27(4):85-100. [doi: 10.22693/NIAIP.2020.27.4.085]
44. Lee BJ, Myung SH. The Impact of Perception of Informatization and Internet Use on the Formation of Social Networks among the Elderly. J Korean Assoc Reg Inf Soc. 2010;13(4):151-79. [doi: 10.22896/karis.2010.13.4.007]
45. Delello JA, McWhorter RR. Reducing the digital divide: Connecting older adults to ipad technology. J Appl Gerontol. 2017 Jan;36(1):3-28. [doi: 10.1177/0733464815589985] [Medline: 26084479]
46. Francis J, Kadylak T, Cotten SR, Rikard RV. When it comes to depression, ict use matters: A longitudinal analysis of the effect of ict use and mattering on depression among older adults. In: Stephanidis C, editor. HCI International 2016 – Posters' Extended Abstracts. Cham: Springer; 2016. p. 301-6.
47. Yoon HJ, Kim HK, Lim JA, Kim JE, Hong E, Shon C, et al. Evaluation of the effectiveness of a social prescribing pilot project for the elderly using a digital platform in the COVID-19 pandemic. Korean Public Health Res. 2022;48(2):1-17. [doi: 10.22900/kphr.2022.48.2.001]
48. Kim MY. The effects of smartphone use on life satisfaction, depression, social activity and social support of older adults. J Korea Acad Ind Coop Soc. 2018;19(11):264-77. [doi: 10.5762/KAIS.2018.19.11.264]
49. Kwon MO, Lee K. The effect of online network use on social capital and psychological well-being. J Korean Manag Assoc. 2015;28(5):1485-503.

Supplementary Files