Original Article

The Relationship between Smartphone Use Motives, Social Capital, Digital Literacy, and Life Satisfaction in Elderly Koreans

Ji-Hyeon Lee [1], *Sung Man Bae [1,2]

1. *Department of Psychology, Graduate School, Dankook University, Cheonan, Republic of Korea*
2. *Department of Psychology and Psychotherapy, College of Health Science, Dankook University, Cheonan, Republic of Korea*

*Corresponding Author: Email: spirit73@hanmail.net, spirit73@dankook.ac.kr

Abstract

Background: As the elderly population increases, interest in life satisfaction in old age is increasing. We aimed to verify the relationship between social capital, smartphone use motives, and digital literacy and life satisfaction in Koreans aged 50-69 yr.

Methods: The data of 7,521 late-middle-aged and older adults from the 2019 survey on smartphone overdependence conducted by the National Information Society Agency were analyzed by hierarchical multi-regression analysis.

Results: A hierarchical multiple regression analysis indicated that income(β=0.062) and educational background(β=0.054) were positively related to life satisfaction. Among the smartphone use motives, lifestyle motive(β=-0.069) was negatively related to life satisfaction. Digital literacy(β=0.145) and Social capital(β=0.425) were positively related to life satisfaction.

Conclusion: Digital literacy and social capital were positively associated with life satisfaction. In addition, this study considered the effects of lifestyle-based apps, while past studies only focused on communication- and leisure-based smartphone activities as factors influencing life satisfaction in adults in their 50s-60s. This study can provide a theoretical framework for therapeutic interventions to improve life satisfaction in the elderly.

Keywords: Smartphone usage types; Digital literacy; Life satisfaction; Elderly; South Korea

Introduction

According to the 2020 Statistics Korea data (1) , individuals aged 65 years or above made up 16.5% of the total population of Korea in 2020 (1) with this proportion increasing due to low birthrates and increased life expectancy. As the elderly increase in number, interest in studying their life satisfaction has risen, with various studies focusing on the topic. Representative factors affecting the life satisfaction of the elderly include gender, age, education, health-related variables, relationships with family and friends, and social capital, such as social activities (2-6).

Social capital is a key variable, especially in relation to life satisfaction in old age. Putnam (7, 8) defined social capital as a characteristic of a social organization, or connections between individuals, such as trust, norm of reciprocity, and networks that can improve the efficiency of society (9). In

past studies, relationships with family, friends, neighbors, and co-workers have been identified as important factors that can increase life satisfaction (10-12). The larger the social network, the higher the life satisfaction of the elderly people (6, 13). Furthermore, social trust was also found to have a positive effect on life satisfaction (14).

In addition to social capital, smartphone use motives are attracting attention as a factor that affects the life satisfaction of the elderly. Although some people report harm from overdependence on smartphones, most people use smartphones in a productive and beneficial manner. Some studies suggest that the impact of smartphone use on life satisfaction varies depending on the motivation of use. Specifically, they argue that the use of smartphones for communication and interaction with others (especially Social Network Service; SNS use) is related to negative emotions arising from factors such as social comparison and depression, and consequently reduces life satisfaction (15, 16). On the other hand, certain studies report that the use of smartphones for communication improves life satisfaction by increasing perceived social support (17, 18). Leisure-based uses of smartphones, which include downloading or streaming music, playing mobile games, watching videos, and reading e-books (19), also improves life satisfaction according to some studies (20-21).

The increased use of smartphones brings with it an increase in the use of lifestyle mobile applications ("apps") such as those made for online transactions, Internet banking, stock transactions, household bookkeeping, and healthcare (22). While older studies did not consider lifestyle as the main motive for using smartphones (23), recent studies have found that health care apps (24) and digital life service activities increase life satisfaction of the elderly(25). However, the number of studies examining the effect of different types of lifestyle apps on life satisfaction, such as online shopping, travel, and fitness apps, is still small. With the use of lifestyle apps becoming increasingly common, it is necessary to understand how they affect life satisfaction.

As digital technology-based services proliferate and online social participation expands, digital literacy is attracting attention as a factor affecting life satisfaction among the elderly. Digital literacy refers to the ability to acquire and utilize information through digital devices (26-28). According to the 2019 survey on Internet use, conducted by the National Information Society Agency (29), the rates of mobile Internet use among those in their 60s and over 70s were 88.6% and 37.9%, respectively. However, although the level of digital access for the elderly has increased, the level of digital use and competence is generally low, and there are large individual differences (30). According to the 2019 Report on the Digital Divide, the level of digital informatization among the elderly was 64.3%, and the information gap was found to be large when compared to other information-vulnerable groups, such as the disabled (75.2%), those with low-incomes (87.8%), and farmers and fishermen (70.6%) (31).

In the elderly, experiences such as decline in physical function, retirement, and spousal bereavement reduce social interactions and opportunities, resulting in depression and loneliness (32). Online activities can provide opportunities for elderly people to acquire various types of information and participate in society (33). According to Jeon (34), information literate elderly have higher life satisfaction than those without such literacy. The digital information activities of the elderly provide opportunities for self-realization, and can have a positive effect on improving self-esteem and life satisfaction (32, 35, 36). The use of information technology is related to increased social support, reduced loneliness, improved life satisfaction, and improved psychological health (37-39).

We aimed to verify the relationship between social relationships, smartphone use motives, digital literacy, and life satisfaction of the elderly after controlling for demographic variables such as gender, age, income, and education.

Methods

Participants and sampling procedure

This study used data from the 2019 survey on smart phone overdependence conducted by the National Information Society Agency (22). The survey was conducted on 28,592 smartphone (Internet) users aged 3 to 69 (who had used a smartphone at least once within the last one month before the study) in 10,000 households in 17 metropolitan cities and provinces nationwide between August and October 2019. For this survey, the survey zones (341,309) were established by the National Statistical Office's 2017 Population and Housing Census. The survey populations were established using apartment survey zones and ordinary survey zones, excluding island, dormitory facilities, and social facilities survey zones. After the population was established, the distribution of survey districts for each province, the first level, was allocated in proportion to the square root of the number of households in each province. The distribution of survey zones by detailed level in each city and province was allocated in proportion to the size of the survey zones in dong/eup-myeon. Thereafter, sampling was carried out using the method of probability proportional to size (PPS) sampling of the survey area, and the extraction of households was performed through the systematic sampling method. The survey was conducted using the household visit interview survey method, in which households randomly selected from a list were visited in person. This study also tried to verify the variables that affect life satisfaction by classifying people aged 50 and older as the elderly group by referring to previous studies (40-42). Since this study was for the elderly, only the data of 7,521 individuals aged 50–69 years (male: 3,812 [50.7%], female: 3,709 [49.3%]) among the data of 28,592 people aged 3-69 years were used for analysis. The average age was 58.23 years (SD =5.54), with 4,400 (58.5%) individuals in their 50s, and 3,121 (41.5%) in their 60s. The IRB (Institutional Review Board) approval was not adopted because using the public data and the

authors follow the general guidelines to keep privacy of data.

Measures

Demographic variables: Gender, age, education, and economic level (monthly income) were measured. Educational background was classified as follows: 1. Elementary school, 2. Middle school, 3. High school, 4. University (≥ 2 years), 5. Graduate school. The economic level (monthly income) was classified as follows: 1: less than 2 million won, 2: 2 to less than 4 million won, 3: 4 to less than 6 million won, 4: 6 to less than 8 million won, 5: 8 to less than 10 million won, and 6: 10 million won or more.

Smartphone use motives: smartphone use motives were classified into three types—leisure, communication, and lifestyle (23, 43-44). Leisure consisted of items such as games, movies/TV/videos, music, radio/podcasts, e-books/webtoons/web novels, adult content, and speculative games (sports betting, online gambling, etc.). Communication included four items —email, messenger (KakaoTalk, Facebook Messenger, Line, etc.), SNS (Facebook, Instagram, Naver Cafe, Band, Twitter, Daum Cafe, Kakao Story, etc.), and friendship/dating applications. Lastly, lifestyle consisted of items such as purchasing goods/services (including reservations), sale of goods/services (including used goods transactions), finance (Internet banking, stock trading, etc.), life management (household bookkeeping, calendar, goal management, diary, etc.), and health management (pedometer, exercise, diet, etc.). Sixteen items with 8-point Likert scale (0 = not used at all, 1 = rarely used, 7 = used very often) developed by National Information Society Agency were used to measure smartphone use motives (22). The Cronbach's alpha was 0.852.

Social capital: Three items with a four-point scale response (1 = not at all to 4 = strongly agree) developed by the National Information Society Agency were used to measure Social capital (22). The specific items are as follows: 1) My family gives me a lot of support, 2) I have many friends and acquaintances to help me when I am in trou-

ble, 3) Our society provides fair opportunities and benefits for all individuals. The higher the total score, the higher the social capital, and the Cronbach's alpha was 0.59.

Digital literacy: The digital use competency scale developed by the National Information Society Agency was used to measure the level of digital literacy (22). Digital literacy was measured using six items on a 4-point scale (1 = not at all to 4 = strongly agree). The items were as follows: 1) I can find the information and content I need online, 2) I can judge whether the information obtained online is reliable, 3) I am able to recognize and participate in social issues online. The higher the total score, the higher the digital literacy, and the Cronbach's alpha was 0.84.

Life satisfaction: Seven items with a four-point scale response ((1 = not at all to 4 = strongly agree) developed by the National Information Society Agency were used to measure life satisfaction (22). Life satisfaction consisted of human relationships, work/study, health, consumption activities, leisure, and achievements. The higher the total score, the higher the satisfaction with life, and the Cronbach's alpha was 0.74.

Analysis

Data analysis was performed using SPSS version 23 (IBM Corp., Armonk, NY, USA). First, a Pearson correlation analysis was conducted to verify the correlation between the variables. Next, a hierarchical multi-regression analysis was conducted to test the association between smartphone use motives, social capital, digital literacy, and the life satisfaction of individuals over 50. In the first stage, gender, age, income, and education were inserted, and in the second stage, sub-types of smartphone use motives (leisure, communication, and lifestyle) were inserted. In the third stage, social capital and digital literacy variables were inserted.

Results

Descriptive statistics

Descriptive statistics for the 7,521 respondents are presented in Table 1. Among the respondents, 3,812 were men (50.7%), and 3,709 were women (49.3%). With regard to respondents' age, 4,400 (58.5%) were in their 50s, and 3,121 (41.5%) in their 60s. See more details in Table 1.

Table 1: Demographic Characteristics (N=7,521)

Variable	Category	N	%
Gender	Male	3,812	50.7
	Female	3,709	49.3
Age(yr)	From 50 to 59	4,400	58.5
	From 60 to 69	3,121	41.5
Economic Level	< 200	586	7.8
	≥ 200 to < 400	2206	29.3
	≥ 400 to < 600	2902	38.6
	≥ 600 to < 800	1362	18.11
	≥ 800 to < 1000	372	4.9
	≥ 1000	93	1.2
	Elementary School	165	2.2
Education	Middle School	852	11.3
	High School	4489	59.7
	University	1982	26.4
	Graduate School	33	.4

Correlation analysis
Table 2 indicates description statistics and correlations between variables. Pearson's correlation analysis showed that leisure motive (r = 0.057, P <0.01), communication motive (r = 0.062, P <0.01), lifestyle motive (r = 0.040, P <0.01), social capital (r = 0.485, P <0.01), and digital literacy (r = 0.309, P <0.01) were positively correlated with the life satisfaction of adults over 50.

Table 2: Description statistics and correlations between variables

Variable	1	2	3	4	5	6
1. Entertainment						
2. Communication	.565**					
3. Life Style	.522**	.567**				
4. Social Capital	.067**	.102**	.116**			
5. Digital Literacy	.298**	.285**	.268**	.367**		
6. Life Satisfaction	.057**	.062**	.040**	.485**	.309**	
Mean	2.72	2.23	2.51	8.44	13.35	20.42
Standard deviation	1.75	1.01	1.71	1.53	3.62	2.93

*P<.05, **P<.01

Hierarchical multiple regression analysis results
The results are presented in Table 3. Gender and age did not have a significant effect on the life satisfaction of people over 50 years. On the other hand, income (β=0.062, P <0.01) and educational background (β=0.054, P <0.01) were positively related to life satisfaction. In other words, life satisfaction was higher in those with higher income and education. In terms of smartphone use motives, lifestyle was negatively related to life satisfaction (β=-0.069, P <0.01), while leisure and communication did not have a significant influence on life satisfaction. Finally, digital literacy (β=0.145, P <0.01) and social capital (β=0.425, P <0.01) were positively associated with life satisfaction. In other words, the higher the digital literacy and social capital, the higher the life satisfaction. Looking at the relative influence of each independent variable, social capital (t=39.681) was found to have the greatest influence on life satisfaction, followed by digital literacy and lifestyle-motivated use of smartphones.

Table 3: Hierarchical regression analysis

Independent variables	Final Model(Model 3)			
	B	SE	β	t
(constant)	9.806			18.697
Gender	.014	.006	.026	2.243
Age	.099	.061	.017	1.608
Economic level	.175	.030	.062	5.872***
Education	.233	.051	.054	4.573***
Entertainment	.026	.022	.015	1.193
Communication	-.003.	.038	-.001	-.083
Life style	-.117	.022	-.069	-5.298***
Digital Literacy	.118	.010	.145	12.221***
Social Capital	.814	.021	.425	39.681***
R^2		.265		
Adjusted R^2		.264		

*P<.05, ***P<.001

Discussion

This study examined the relationship between smartphone use motives, digital literacy, and life satisfaction after controlling for gender, age, and income. The main results of this study are as follows.

First, age and gender were not related to life satisfaction. This may be because this study was conducted only on adults in their 50s and 60s. On the other hand, education and income were positively related to life satisfaction, which is consistent with previous studies. Education influences income and employment, and can directly or indirectly influence life satisfaction (45). In addition, people with higher education levels are more likely to engage in social activities and trust others, resulting in higher life satisfaction (16). High income can also contribute to increasing life satisfaction in old age by supporting suitable social and leisure activities (46). People with lower socioeconomic status, including education and income, tend to be more exposed to stress, which can lead to lower life satisfaction (47).

Second, life satisfaction increased as social capital increased, which is also consistent with previous research. Social capital may allow people to experience a sense of belonging, resulting in elderly people with high social capital feeling less sad and lonely, and having fewer problems with sleep and eating habits (13). In addition, social capital, including social relationships, can help individuals in difficult situations. Friends and family often help resolve issues by providing useful information as well as material and emotional support in stressful situations, thereby increasing life satisfaction (48).

Third, among the smartphone use motives, only lifestyle-based motivation showed a negative relationship with life satisfaction in people over 50. Activities such as shopping through smartphones and searching for shopping-related information provide convenience, portability, and instantaneity, which can increase users' smartphone usage time, and their psychological dependence on smartphones (49). A study by No (50) found that

lifestyle use, such as online trading and life management, increases the level of control failure and prominence. In previous studies, only some types of applications, such as health management, financial management, and online shopping, were set as lifestyle-based uses of smartphones, but this study included various subtypes such as finance, online transactions, lifestyle management, and health management in the lifestyle category. It can be said that the relationship between lifestyle-based smartphone use and smartphone dependence has been more clearly identified.

The motives of leisure and communication were not related to life satisfaction. This finding deviates from past studies on adolescents and adults in their 20s and 30s, which found that leisure- and communication-based use is related to life satisfaction. These results indicate that the content usage rate in adults aged 50 to 60 years was lower than that of adolescents and adults aged 20 to 30 years (22). Furthermore, because of the limited digital literacy of people over 50, they are relatively less engaged in leisure and communication content (20). Since there are not enough relevant studies currently targeting individuals in the age group of 50–69, further studies on their smartphone use motives and life satisfaction are needed.

Fourth, seniors with high digital literacy can gain opportunities to participate in society through online activities, form new human relationships, and obtain information for problem solving. In other words, digital literacy in old age may reduce negative emotional experiences such as depressed mood and loneliness caused by deteriorating health and a decrease in social capital. By helping elderly people connect with others on online platforms (e.g., through messaging apps) and learn new information (e.g., on video-sharing platforms), digital literacy can help develop social capital, encourage self-realization, and improve self-esteem, resulting in increased life satisfaction.

The contributions of this study are as follows. In a situation where there is insufficient understanding of the effect of digital literacy on life satisfaction, the verification of the relationship between the aforementioned variables using a national

sample gave valuable insights into how the use of smartphones and digital activities are affecting their sense of happiness in life. In addition, while past studies only focused on communication- and leisure-based smartphone activities as factors influencing life satisfaction in adults in their 50s–60s, this study considered the effects of lifestyle-based apps as well, discovering that using lifestyle-based apps can decreases life satisfaction in people over 50. Therefore, this study suggests that it is necessary to manage properly the satisfaction of life for the elderly by educating them on how to use properly life-style applications or implementing an addiction prevention program.

The limitations of this study are as follows. First, since public data were used, there was a limit to the setting of the sample age. To understand the overall life satisfaction of the elderly population, it is necessary to re-validate the model of this study, including samples in their 70s or older, in a follow-up study. Second, since social capital was measured by a few items, there may be limitations in sufficiently reflecting the construct of social capital. In subsequent studies, it would be necessary to measure social capital using a validated scale.

Conclusion

The digital literacy and social capital may increase life satisfaction of elderly. Therefore, this study suggests the need for an intervention program that can improve the life satisfaction of the elderly through a digital literacy improvement program and application use education.

Journalism Ethical considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors

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