International Journal of Advanced Smart Convergence Vol.13 No.3 205-213 (2024)
http://dx.doi.org/10.7236/IJASC.2024.13.3.205

IJASC 24-3-24

How Does Digital Transformation Improve the Quality of Life? Evidence from Korean Older Adults

Moon-Yong Kim

Professor, College of Business, Hankuk University of Foreign Studies, Seoul, Korea
E-mail: *moonyong@hufs.ac.kr*

Abstract

Digital transformation (DT) has gained global attention in various service industries, due to the pervasive nature and proliferation of recent digital technologies. Given that we live in an age of DT, the current research examines the factors influencing the older adults' quality of life due to DT. Specifically, we examine whether the older adults' digital skills (i.e., ability to use applications and self-efficacy in using digital devices) and motivational factors regarding DT (i.e., involvement in DT and need for cognition regarding DT) predict their quality of life due to DT. To answer the research question, we conducted a hierarchical multiple regression analysis using the elderly Korean adults aged 65 or older. The results indicate that the older adults' ability to use applications, self-efficacy in using digital devices, involvement in DT, and need for cognition regarding DT are positively associated with quality of life due to DT. The findings provide important implications to improve the elderly's quality of life due to DT.

Keywords: Digital Transformation, Older Adults, Digital Skill, Involvement, Need for Cognition, Quality of Life

1. Introduction

The increasing digitalization of economies has highlighted the importance of digital transformation and how it can help businesses stay competitive in the market [1]. As there is a global focus on researching and understanding digital transformation, prior studies strive to precisely define the digital transformation. For example, digital transformation (DT) is defined as a change in how a firm employs digital technologies, to develop a new digital business model that helps to create and appropriate more value for the firm [2, 3], while it also refers to the use of new digital technologies such as social media, mobile technology, analytics, or embedded devices to enable major business improvements including enhanced customer experiences, streamlined operations, or new business models [4]. Recent advances in DT, such as artificial intelligence, machine learning and big data, have not only influenced how consumers live but also changed how firms do business and interact with consumers, including retailing [5], business strategy [3, 6], service [7], and so on. In sum, DT is extensively perceived as a driver of change in all contexts, most notably in the context of business, and affecting all aspects of human life based on the use of digital technologies [1].

Manuscript Received: July. 26. 2024 / Revised: August. 2. 2024 / Accepted: August. 8 2024
Corresponding Author: moonyong@hufs.ac.kr (Moon-Yong Kim)
Tel: +82-2-2173-3157
Professor, College of Business, Hankuk University of Foreign Studies, Seoul, Korea

DT, driven by the twin engines of information technology and digitalization is changing society, and digital citizens are characterized by constant connectivity and a high degree of technology literacy. However exposed groups in society risk being excluded from this development, leading to digital exclusion, unless targeted measures are developed to increase digital inclusion. Digital exclusion disadvantages vulnerable groups—such as the elderly, here defined as people aged 65 and over. Thus, there is an increasing concern on how to improve elderly inclusion and well-being in the services discipline [8], particularly through the adoption of technology and internet services [9]. The COVID-19 pandemic, in particular, has highlighted the challenges for vulnerable elderly individuals who may lack access or skills to use internet services [10]. Issues around isolation and mental health in older adults might be exacerbated by the "digital divide," whereby older people make less use of information and communication technologies (ICTs), for reasons including lack of skills, confidence and accessibility issues [11]. The main barriers to technology adoption among the elderly are personal variables such as age, difficulty in following instructions, lack of knowledge and confidence, fear or skepticism about using technology, previous negative experiences and health-related problems [12, 13]. These barriers are largely due to the fact that people's cognitive and physical abilities diminish with age [14], which affects their confidence and attitude toward technology usage in their daily lives [15].

In recent years, scholars have begun to focus on how the digital divide affects quality of life (also called life satisfaction or happiness), which is a crucial indicator of measuring the level of individual subjective welfare [16]. In particular, there is a growing interest in how internet use impacts older adults' quality of life [17], and the reported findings have been mixed [18]. Despite older adults lagging behind younger adults regarding internet use [19] and being notably affected by the digital divide [20], studies have reported that the internet is increasingly becoming an essential medium for older people to connect with society and improve their quality of life [21]. As noted, the elderly, the most marginalized group affected by ICTs, have difficulty acquiring digital skills and thus risk being digitally excluded. Besides, their activities and daily life have become more difficult than ever during the pandemic [22]. In this research, therefore, we examine the factors affecting the older adults' quality of life due to DT. In particular, we mainly focus on the elderly's digital skills and motivational factors regarding DT. Specifically, we examine whether the older adults' digital skills (i.e., ability to use applications and self-efficacy in using digital devices) and motivational factors regarding DT (i.e., involvement in DT and need for cognition regarding DT) influence their quality of life due to DT.

2. Theoretical Background and Research Question

Today, technology has not only become critical to our well-being but the opportunities it presents to expanding the possibilities of having a good life have made it somehow a necessity. This is to the extent that, in many parts of the world, and many aspects of our life, our quality of life depends on it [23]. In particular, technological innovation and the constantly increasing use of the internet are creating unique opportunities to assist older adults' well-being [24]. Quality of life refers to the quality of a person's entire life, not just some parts [25]. Specifically, quality of life is defined as a person's perception or subjective evaluation of his or her overall life, similar to the meanings of happiness and life satisfaction [26]. Digital skills such as competency in specific computer programs or other technologies depict more narrowly the technical abilities to use the digital devices and services [27]. More specifically, digital skills include technical elements but also content creation and communication [28, 29]. Greater digital skills imply successful experiences using ICT devices and online services. Developing the digital capability of older adults is one of the key approaches to addressing the age-based digital divide at the root [30]. Positive experiences with up-to-date technology can form positive, optimistic attitudes to cognitive competence, and enhance self-efficacy and confidence. Self-efficacy is a judgment about confidence in performing a particular task [31]. Considering the characteristics of older adults,

their technological self-efficacy have the potential to influence their psychological and emotional well-being [32, 33]. According to previous studies, older adults who actively use the internet and other digital technologies are more likely to alleviate social isolation and lead active daily lives [34]. Given that ICTs impact the well-being of both individuals and the collective society, the aging of the earth's population means that more elderly people will be using ICTs to maintain their well-being [35]. ICT digital skills have been shown to improve the quality of life, well-being, mental health, and life satisfaction of older adults of older adults [36-38].

Involvement is a motivational state and the interest in a new skill or given situation or the value, relevance, and importance of a particular object [39]. Besides, the need for cognition is an intrinsically motivated cognitive endeavor [40]. In previous research, cognitive motivation such as involvement or need for cognition is vital to acquire and practice digital skills [41]. For instance, need for cognition has been identified as a predictor variable for ICT use or the adoption of ICT among older adults [42, 43]. Hence, building on the prior studies, we predict that the elderly's digital skills and motivational factors regarding DT will consequently influence their quality of life or happiness due to DT. Therefore, this research examines whether the older adults' digital skills (i.e., ability to use applications and self-efficacy in using digital devices) and motivational factors regarding DT (i.e., involvement in DT and need for cognition regarding DT) influence their quality of life due to DT, controlling for the effects of demographic variables.

3. Method

3.1 Data Collection

This research utilized data from the 2022 Digital Divide Survey (DDS), which was sponsored by the Ministry of Science and ICT and conducted by the National Information Society Agency (NIA) in South Korea. The DDS is a nationwide study of the Korean population aged 7 and older, which has been conducted every year since 2002 to investigate the digital information gap of vulnerable groups. The data are collected through a multi-stage stratified sampling method for general consumers in 16 metropolitan areas in South Korea. There are many discrepancies in determining the age above which people can be called the elderly. Some researchers call people aged 55 or over "senior", while others indicate that it is the age of 60 years and over, while, according to the United Nations suggestion, only people over 65 should be considered as seniors. This research chose an age cut off 65. Hence, among the data, the sample size of elderly people aged 65 or older was 1,170.

Specifically, the total sample (N = 1,170) was composed of 618 women (52.8%) and 552 men (47.2%) who ranged in age from 65 years and older (M = 71.33, SD = 5.048). The age profile was as follows: 65 to 69 years = 41.6%; 70 to 74 years = 32.9%; 75 to 79 years = 19.6%; 80 to 84 years = 4.0%; 85 to 89 years = 1.6%; and 90 years and older = 0.3%. Majority of the respondents had a high school education only (37.4%) or less than high school graduation (56.4%), and 6.2% with college/university degree or postgraduate degree. Regarding the monthly household income, 16.6% of the respondents reported income of less than $1,000; 26.8% fell within an income range of $1,000 to $1,990; 24.2% were in the $2,000 to $2,990 range; 14.7% were in the $3,000 to $3,990 range; 8.4% were in the $4,000 to $4,990 range; 4.8% were in the $5,000 to $5,990 range; 2.7% were in the $6,000 to $6,990 range; 0.9% were in the $7,000 to $7,990 range; 0.4% were in the $8,000 to $8,990 range; and only 0.6% reported income exceeding $9,000.

3.2 Measures

This research includes items relevant to respondents' digital skills and motivational factors regarding DT,

and quality of life due to DT (see Table 1). Specifically, regarding the respondents' digital skills, motivational factors regarding DT, and quality of life due to DT, all the variables are assessed with a 5-point Likert scale (1: strongly disagree, 5: strongly agree), except for one variable (i.e., self-efficacy in using digital devices) assessed with a 4-point Likert scale (1: strongly disagree, 4: strongly agree). Finally, demographics is measured. Gender is dummy coded (0 = male, 1 = female); age is assigned 1 for "65-74", "75-84" is assigned 2, and "above 85" is assigned 3; education level is measured using four categories: (1) less than middle school, (2) middle school, (3) high school, and (4) college/university or postgraduate; for monthly household income, 11 categories are provided: (1) less than $1,000 and (11) $10,000 or more.

3.3 Data Analysis

First, since all the data were collected through a single method, i.e., survey, from the same respondents at one point in time, the potential for common method biases thus needed to be addressed. This research employed the Harman's single factor test [44]. In this test, all the items used for this study were entered into a principal component analysis (PCA) with unrotated factor solution to identify if a single factor emerges or one general factor accounts for more than 50% of the covariation. The results under the condition of extracting one factor showed that the factor loadings explained only 49.005% of the variance and not the majority. This indicated that common method biases were not a likely contaminant of the results.

Next, to execute the exploratory factor analysis (EFA), this research conducted principal axis factoring (PAF) analysis with direct oblique (oblimin) rotation (Delta = 0) on all items to estimate empirically the number of factors extracted. For the items, the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) measure was .954, indicating that the sample was adequate for EFA. The Bartlett's test for sphericity was significant (19611.360, p = .000), indicating that EFA was appropriate. Based on the results, five factors were labelled as ability to use applications (7 items), self-efficacy in using digital devices (3 items), involvement in DT (4 items), need for cognition regarding DT (4 items), and quality of life due to DT (4 items). Factor loadings for all the items are shown in Table 1. Based on the results of EFAs, reliability (internal consistency) was assessed through Cronbach's alpha. The Cronbach's alphas exceeded a cut-off value of 0.70, supporting the reliability of the measurement items used for each variable. In sum, the results of EFAs and reliability analyses correspond to a theoretical definition of the items of each variable under investigation. Hence, factor scores were calculated for all the determined factors and utilized as independent and dependent variables for further analyses. Descriptive statistics, reliabilities, and correlations between the variables are shown in Table 2.

Table 1. Measurement scales and factor loadings for variables

Variable /items	Measurement scales	Factor loading
Ability to use applications		
Item1	I can use apps for tools such as calculators, schedulers, and address books on my smartphone.	.655
Item2	I can host/join meetings using face-to-face teleconferencing apps (e.g., Google Meet, Zoom, etc.).	.821
Item3	I can use smartwatches, smart refrigerators, and Internet of Things (IoT) devices that work with smartphones.	.855
Item4	I can convert existing video content such as dramas, animations, music videos, and movies to other formats such as videos and GIFs.	.850
Item5	I can use online collaboration programs (e.g., Google Docs) to work on assignments or tasks	.828

	with others.	
Item6	I can use online payments to buy things.	.787
Item7	I can find directions using navigation, online map services (e.g., Google Map) and traffic information.	.672
Self-efficacy in using digital devices		
Item1	I am confident in learning digital devices.	.885
Item2	I am confident in using digital devices.	.762
Item3	I can quickly figure out how to use new digital devices.	.874
Involvement in DT		
Item1	Digital technology has become more important in my life.	.557
Item2	I'm worried that my daily life will become difficult in the future if I lack digital skills.	.690
Item3	I knew about DT because I heard it.	.350
Item4	DT will bring many changes to my economic activities, including work and academic life.	.639
Need for cognition regarding DT		
Item1	I want to learn technologies closely related to DT.	.555
Item2	I want to get a job related to DT.	.598
Item3	The ability to understand and utilize digital technology well will determine my life in the future.	.485
Item4	If the government supports technical education related to DT, I'm willing to take the course.	.425
Quality of life due to DT		
Item1	Due to DT, opportunities for leisure activities have increased and become more enjoyable.	.750
Item2	DT has allowed me to learn new information and knowledge more quickly.	.774
Item3	With DT, there are more opportunities to share opinions or get to know new people.	.803
Item4	Work and study efficiency has increased due to remote work and mobile learning.	.780

Table 2. Reliabilities, descriptive statistics, correlations among the variables

	1	2	3	4	5
1. Ability to use applications	-				
2. Self-efficacy in using digital devices	.554	-			
3. Involvement in DT	.497	.534	-		
4. Need for cognition regarding DT	.504	.525	.662	-	
5. Quality of life due to DT	.544	.551	.653	.708	-
Mean	1.74	1.87	2.74	2.21	2.44
S.D.	0.81	0.70	0.78	0.88	0.88
Cronbach's α	.926	.890	.788	.907	.916

Note: $p < .001$ for all correlations.

4. Results

As stated, this research examines whether the elderly's digital skills and motivational factors regarding DT influence their quality of life due to DT, controlling for the effects of demographic variables. A hierarchical multiple regression analysis was performed to answer the research question. As noted, factor scores for each of the variables were used as independent and dependent variables in the regression equation. First, the control (demographic) variables were entered as the first block (Step 1). Then two independent variables regarding the digital skills (i.e., ability to use applications, self-efficacy in using digital devices) were entered as the second block (Step 2). For the third step (Step 3), the two independent variables concerning the motivational factors regarding DT (i.e., involvement in DT, need for cognition regarding DT) were included. All Variance Inflation Factors (VIFs) are lower than 3, suggesting that multicollinearity should not be a problem for this study.

Results from the hierarchical regression analysis are summarized in Table 3. In Step 1, control (demographic) variables alone explain 14.7% of variance ($F(4, 1165) = 50.249$, $p = .000$, $R^2 = .147$). Specifically, age, education, and monthly household income are significant predictors of quality of life due to DT. In Step 2 ($\triangle F(2, 1163) = 221.434$, $p = .000$, $\triangle R^2 = .235$), ability to use applications ($\beta = .294$, $p = .000$) and self-efficacy in using digital devices ($\beta = .356$, $p = .000$) are positively associated with quality of life due to DT. The full regression model in Step 3 ($\triangle F(2, 1161) = 321.138$, $p = .000$, $\triangle R^2 = .220$) shows that ability to use applications ($\beta = .115$, $p = .000$), self-efficacy in using digital devices ($\beta = .127$, $p = .000$), involvement in DT ($\beta = .281$, $p = .000$), and need for cognition regarding DT ($\beta = .393$, $p = .000$) are positively associated with quality of life due to DT. In addition, the results pertaining to the effects of control variables (i.e., age, education, and monthly household income) in Step 1 may be spurious, given that the effects of age, education, and monthly household income are lessened to non-significant (all *p*s > .10). In summary, for the elderly adults aged 65 and older, their ability to use applications, self-efficacy in using digital devices, involvement in DT, and need for cognition regarding DT are all positively associated with quality of life due to DT.

Table 3. Results of hierarchical regression analysis (N = 1,170)

	Dependent variable: quality of life due to DT					
Independent variables	Step 1 B	β	Step 2 B	β	Step 3 B	β
Gender (female)	-.063	-.033	.039	.021	.060	.031
Age	-.162**	-.082**	-.004	-.002	.033	.017
Education	.293***	.276***	.073*	.068*	.032	.030
Monthly household income	.063***	.113***	.017	.030	.001	.001
Ability to use applications			.291***	.294***	.114***	.115***
Self-efficacy in using digital devices			.360***	.356***	.129***	.127***
Involvement in DT					.297***	.281***
Need for cognition regarding DT					.394***	.393***
R^2	.147		.382		.602	
$\triangle R^2$	.147		.235		.220	
$\triangle F$	50.249***		221.434***		321.138***	

Note: B = unstandardized coefficients; β = standardized coefficients; *p < .05, **p < .01, ***p < .001.

5. Conclusion

In the present research, we investigate the factors impacting the older adults' quality of life due to DT. Specifically, we examine whether the elderly's digital skills (i.e., ability to use applications, self-efficacy in using digital devices) and motivational factors regarding DT (i.e., involvement in DT, need for cognition regarding DT) influence their quality of life due to DT, controlling for the effects of demographic variables. To answer the research question, a hierarchical multiple regression analysis was performed using the Korean elderly aged 65 or older. The results indicate that the older adults' ability to use applications, self-efficacy in using digital devices, involvement in DT, and need for cognition regarding DT are positively associated with quality of life due to DT. Unlike existing studies, we examine the dual effects of older adults' digital skills and motivational factors on their quality of life due to DT. The findings contribute to a comprehensive understanding of the factors affecting the elderly' quality of life, not only supplementing previous research but also providing a theoretical basis for systematic research on digital skills and motivational factors regarding

DT impacting the elderly's quality of life. Moreover, the research findings are expected to be of key essence to practitioners and policymakers, providing invaluable insight into improving the elderly's quality of life in an age of DT. First, it is necessary to teach older adults the digital skills through digital literacy training programs. Second, it is important to actively encourage and support the elderly to use ICT to improve their self-efficacy. Third, given that high involvement in DT as well as high need for cognition regarding DT leads to the enhanced quality of life, it is necessary to increase the elderly's motivation regarding DT.

Next, we present possible research directions for future studies. First, our study solely focused on the elderly aged 65 or older in Korea, which limits generalization of the results. Although the use of a random and representative sample of Korean older adults significantly improves the external validity of results, they are only generalizable within Korea. As such, replication of this work in various countries is recommended. Also, it would be interesting to add more countries and conduct a comparative analysis including samples from other countries to generalize the research findings. Second, as self-report surveys possess several limitations in terms of their reliability and validity, future research should use objective or direct observational measures and present a comparison of self-report and direct measurement results, which in turn increases precision and accuracy and validates the self-report measures. Third, future research could consider and measure the digital skills and motivational factors using other variables or constructs, which will provide more insights into the linkages between digital skills, motivational factors regarding DT, and quality of life. Finally, future research could investigate other factors affecting older adults' quality of life in an age of DT.

Acknowledgement

This work was supported by Hankuk University of Foreign Studies Research Fund of 2024.

References

[1] S. Kraus, P. Jones, N. Kailer, A. Weinmann, N. Chaparro-Banegas, and N. Roig-Tierno, "Digital Transformation: An Overview of the Current State of the Art of Research," *Sage Open*, Vol. 11, No. 3, 2021. DOI: https://doi.org/10.1177/21582440211047576

[2] D. Liu, S. Chen, and T. Chou, "Resource Fit in Digital Transformation: Lessons Learned from the CBC Bank Global E-Banking Project," *Management Decision*, Vol. 49, No. 10, pp. 1728-1742, 2011. DOI: https://doi.org/10.1108/00251741111183852

[3] P. C. Verhoef, T. Broekhuizen, Y. Bart, A. Bhattacharya, J. Q. Dong, N. Fabian, M. Haenlein, "Digital Transformation: A Multidisciplinary Reflection and Research Agenda," *Journal of Business Research*, Vol. 122, pp. 889-901, 2021. DOI: https://doi.org/10.1016/j.jbusres.2019.09.022

[4] M. Fitzgerald, N. Kruschwitz, D. Bonnet, and M. Welch, "Embracing Digital Technology: A New Strategic Imperative," *MIT Sloan Management Review*, Vol. 55, No. 2, pp. 1-12, 2014.

[5] W. Reinartz, N. Wiegand, and M. Imschloss, "The Impact of Digital Transformation on the Retailing Value Chain," *International Journal of Research in Marketing*, Vol. 36, No. 3, pp. 350-366, 2019. DOI: https://doi.org/10.1016/j.ijresmar.2018.12.002

[6] M. H. Huang and R. T. Rust, "A Strategic Framework for Artificial Intelligence in Marketing," *Journal of the Academy of Marketing Science*, Vol. 49, No. 1, pp. 30-50, 2021. DOI: https://doi.org/10.1007/s11747-020-00749-9

[7] M. Zaki, "Digital Transformation: Harnessing Digital Technologies for the Next Generation of Services," *Journal of Services Marketing*, Vol. 33, No. 4, pp. 429-435, 2019. DOI: https://doi.org/10.1108/JSM-01-2019-0034

[8] K. Feng, L. Altinay, and H. Olya, "Social Well-Being and Transformative Service Research: Evidence from China," *Journal of Services Marketing*, Vol. 33, No. 6, pp. 735-750, 2019. DOI: https://doi.org/10.1108/JSM-10-2018-0294

[9] H. Charmarkeh and M. Lagacé, "Guest Editorial: Seniors and Technology: Issues of Inclusion and Exclusion," *Canadian Journal of Communication*, Vol. 42, No. 2, pp. 189-194, 2017.

DOI: https://doi.org/10.22230/cjc.2017v42n2a3277

[10] A. Seifert, S. R. Cotten, and B. Xie, "A Double Burden of Exclusion? Digital and Social Exclusion of Older Adults in Times of COVID-19," *The Journals of Gerontology: Series B,* Vol, 76, No. 3, pp. 99-103, 2021. DOI: https://doi.org/10.1093/geronb/gbaa098

[11] E. A. Holmes, R. C. O'Connor, V. H. Perry, I. Tracey, S. Wessely, L. Arseneault, C. Ballard, H. Christensen, R. C. Silver, I. Everall, et al., "Multidisciplinary Research Priorities for the COVID-19 Pandemic: A Call for Action for Mental Health Science," *Lancet Psychiatry,* Vol. 7, No. 6, pp. 547-560, 2020. DOI: https://doi.org/10.1016/S2215-0366(20)30168-1

[12] E. Vaportzis, M. G. Clausen, and A. J. Gow, "Older Adults Perceptions of Technology and Barriers to Interacting with Tablet Computers: A Focus Group Study," *Frontiers in Psychology,* Vol. 8, pp. 1-11, 2017. DOI: https://doi.org/10.3389/ fpsyg.2017.01687

[13] K. G. Vroman, S. Arthanat, and C. Lysack, "Who Over 65 Is Online? Older Adults' Dispositions Toward Information Communication Technology," *Computers in Human Behavior,* Vol. 43, pp. 156-166, 2015. DOI: https://doi.org/10.1016/j. chb.2014.10.018

[14] L. Kourkouta, C. Iliadis, and A. Monios, "Psychosocial Issues in Elderly," *Progress in Health Science,* Vol. 5, No. 1, pp. 232-237, 2015.

[15] N. Wagner, K. Hassanein, and M. Head, "Computer Use by Older Adults: A Multi-Disciplinary Review," *Computers in Human Behavior,* Vol. 26, No. 5, pp. 870-882, 2010. DOI: https://doi.org/10.1016/j. chb.2010.03.029

[16] Z. Lu, P. Li, Q. Li, and H. Zhang, "To Be, or Not To Be, Happy? That's the Question: A Study on Three Levels of the Digital Divide and Individual Happiness in China," *Information Technology & People,* Vol. 37, No. 4, pp. 1802-1836, 2024. DOI: https://doi.org/10.1108/ITP-04-2022-0278

[17] H. Zhang, H. Wang, H. Yan, and X. Wang, "Impact of Internet Use on Mental Health among Elderly Individuals: A Difference-in-Differences Study Based on 2016–2018 CFPS Data," *International Journal of Environmental Research and Public Health,* Vol. 19, No. 101, 2022. DOI: https://doi.org/10.3390/ijerph19010101

[18] X. Cheng, T. Ge, and T. D. Cosco, "Internet Use and Life Satisfaction among Chinese Older Adults: The Mediating Effects of Social Interaction," *Current Psychology,* Vol. 43, pp. 717-724, 2024. DOI: https://doi.org/10.1007/s12144-023-04303-y

[19] B. Schehl, J. Leukel, and V. Sugumaran, "Understanding Differentiated Internet Use in Older Adults: A Study of Informational, Social, and Instrumental Online Activities," *Computers in Human Behavior,* Vol. 97, pp. 222-230, 2019. DOI: https://doi.org/10.1016/j. chb.2019.03.031

[20] E. Hargittai and K. Dobransky, "Old Dogs, New Clicks: Digital Inequality in Skills and Uses among Older Adults," *Canadian Journal of Communication,* Vol. 42, No. 2, pp. 195-212, 2017. DOI: https://doi.org/10.22230/ cjc.2017v42n2a3176

[21] S. M. Bae, "The Mediating Effect of Digital Literacy on the Relationship between Smartphone Use Motives and Life Satisfaction for Senior Citizens in Korea," *Iranian Journal of Public Health,* Vol. 51, No. 2, pp. 336-344, 2022. DOI: https://doi.org/10.18502/ijph.v51i2.8686

[22] H. Kong and H. Liu, "The Relationship between ICT Use and Perceived Life Satisfaction among Older People in Korea: The Mediating Effect of Social Capital," *Sustainability,* Vol. 15, 9353, 2023. DOI: https://doi.org/10.3390/su15129353

[23] M. D. Alhassan and I. O. Adam, "The Effects of Digital Inclusion and ICT Access on the Quality of Life: A Global Perspective," *Technology in Society,* Vol. 64, 101511, 2021. DOI: https://doi.org/10.1016/j.techsoc.2020.101511

[24] E. Vaportzis, C. M. Giatsi, and A. J. Gow, "Older Adults Perceptions of Technology and Barriers to Interacting with Tablet Computers: A Focus Group Study," *Frontiers in Psychology,* Vol. 8, 1687, 2017. DOI: https://doi.org/10.3389/fpsyg.2017.01687

[25] M. R. Hagerty, R. Cummins, A. L. Ferriss, A. C. Michalos, M. Peterson, and J. Vogel, "Quality of Life Indexes for National Policy: Review and Agenda for Research," *Social Indicators Research,* Vol. 55, No. 1, pp. 1-96, 2001. DOI: https://doi.org/10.1023/A:1010811312332

[26] H. Shan, Z. Ishak, and L. Fan, "The Higher The Life Satisfaction, The Better The Psychological Capital? Life Satisfaction and Psychological Capital: A Moderated Mediation Model," *Frontiers in Psychology,* Vol. 12, 772129,

2022. DOI: https://doi.org/10.3389/fpsyg.2021.772129

[27] E. van Laar, A. J. A. M. van Deursen, J. A. G. M. van Dijk, and J. de Haan, "The Relation Between 21st-Century Skills and Digital Skills: A Systematic Literature Review," *Computers in Human Behavior*, Vol. 72, pp. 577-588, 2017. DOI: https://doi.org/10.1016/j.chb.2017.03.010

[28] A. van Deursen and J. van Dijk, "Measuring Internet Skills," *International Journal of Human-Computer Interaction*, Vol. 26, No. 10, pp. 891-916, 2010. DOI: https://doi.org/10.1080/10447318.2010.496338

[29] C. Audrin and B. Audrin, "Key Factors in Digital Literacy in Learning and Education: A Systematic Literature Review Using Text Mining," *Education and Information Technologies*, Vol. 27, pp. 7395-7419, 2022. DOI: https://doi.org/10.1007/s10639-021-10832-5

[30] Y. Zhao, T. Zhang, R. K. Dasgupta, and R. Xia, "Narrowing the Age-Based Digital Divide: Developing Digital Capability through Social Activities," *Information Systems Journal*, Vol. 33, No. 2, 268-298, 2023. DOI: https://doi.org/10.1111/isj.12400

[31] Y. Zhu, Y. Zhou, C. Long, and C. Yi, "The Relationship between Internet Use and Health among Older Adults in China: The Mediating Role of Social Capital," *Healthcare*, Vol. 9, No. 5, 559, 2021. DOI: https://doi.org/10.3390/healthcare9050559

[32] J. Y. Lam and M. K. O. Lee, "Digital Inclusiveness: Longitudinal Study of Internet Adoption by Older Adults," *Journal of Management Information System*, Vol. 22, No. 4, pp. 177-206, 2006. DOI: https://doi.org/10.2753/MIS0742-1222220407

[33] R. Agarwal and E. Karahanna, "Time Flies When You're Having Fun: Cognitive Absorption and Beliefs about Information Technology Usage," *MIS Quarterly*, Vol. 24, No. 4, pp. 665-694, 2000. DOI: https://doi.org/10.2307/3250951

[34] A. Szabo, J. Allen, C. Stephens, and F. Alpass, "Longitudinal Analysis of the Relationship between Purposes of Internet Use and Well-Being among Older Adults," *Gerontologist*, Vol. 59, pp. 58-68, 2019. DOI: https://doi.org/10.1093/geront/gny036

[35] K. Kim, S. Y. Park, and H. C. Kang, "Smartphone Proficiency and Use, Loneliness, and Ego Integrity: An Examination of Older Adult Smartphone Users in South Korea," *Behaviour & Information Technology*, Vol. 40, No. 7, pp. 625-634, 2021. DOI: https://doi.org/10.1080/0144929X.2020.1713213

[36] J. Zhong, W. Wu, and F. Zhao, "The Impact of Internet Use on the Subjective Well-Being of Chinese Residents: From a Multi-Dimensional Perspective," *Frontiers in Psychology*, Vol. 13, 950287, 2022. DOI: https://doi.org/10.3389/fpsyg.2022.950287

[37] S. R. Cotten, G. Ford, S. Ford, and T. M. Hale, "Internet Use and Depression Among Older Adults," *Computers in Human Behavior*, Vol. 28, No. 2, pp. 496-499, 2012. DOI: https://doi.org/ 10.1016/j.chb.2011.10.021

[38] G. Kavetsos and P. Koutroumpis, "Technological Affluence and Subjective Well-Being," *Journal of Economic Psychology*, Vol. 32, No. 5, pp. 742-753, 2011. DOI: https://doi.org/10.1016/j. joep.2011.05.004

[39] J. L. Zaichkowsky, "The Personal Involvement Inventory: Reduction, Revision, and Application to Advertising," *Journal of Advertising*, Vol. 23, No. 4, pp. 59-70, 2013. DOI: https://doi.org/10.1080/00913367.1943.10673459

[40] J. T. Cacioppo, R. E. Petty, and C. F. Kao, "The Efficient Assessment of Need for Cognition," *Journal of Personality Assessment*, Vol. 48, No. 3, pp. 306-307, 1984. DOI: https://doi.org/10.1207/s15327752 jpa4803_13

[41] J. Oh and J. Kang, "Converting a Digital Minority into a Digital Beneficiary: Digital Skills to Improve the Need for Cognition Among Korean Older Adults," *Information Development*, Vol. 37, No. 1, pp. 21-31, 2021. DOI: https://doi.org/10.1177/0266666919888570

[42] Y. Amichai-Hamburger, O. Kaynar, and A. Fine, "The Effects of Need for Cognition on Internet Use," *Computers in Human Behavior*, Vol. 23, pp. 880-891, 2007. DOI: https://doi.org/10.1016/j.chb. 2006.03.002

[43] W. J. Chopik, R. V. Rikard, and S. R. Cotton, "Individual Difference Predictors of ICT Use in Older Adulthood: A Study of Candidate Characteristics," *Computers in Human Behavior*, Vol. 76, pp. 526-533, 2017. DOI: https://doi.org/10.1016/j.chb.2017.08.014

[44] P. M. Podsakoff, S. B. MacKenzie, J. -Y. Lee, and N. P. Podsakoff, "Common Method Biases in Behavioral Research: A Critical Review of the Literature and Recommended Remedies," *Journal of Applied Psychology*, Vol. 88, No. 5, pp. 879-903, 2003. DOI: https://doi.org/10.1037/0021-9010.88.5.879