Digital Maladjustment and Mental Health: The Mediating Role of Social Relationships

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Introduction

Digital technology has shown rapid and extensive development over the past several decades, causing discussions about the problems of the digital divide (Cullen, 2001; Van Dijk, 2012; Lythreatis et al, 2022). The digital divide was seen as a gap between groups with and without a specific ability to use digital technology (Molebash & Fisher, 2003; Warshauer, 2011). This perspective has shifted over time. Recent studies now argue that the capability to utilize digital technology is not just an 'ability' but a fundamental condition necessary for daily functioning (Lee & Lee, 2020; Sepulveda-Loyola et al., 2020). Recent studies indicate that the failure to adapt to digital technology not only poses a substantial barrier to daily living (Lee & Lee, 2020) but also significantly affects social interaction and personal well-being (Sepulveda-Loyola et al., 2020). Particularly, digitalization has accelerated in various aspects of daily life, becoming integral to everyday consumption (Lee & Lee, 2020; Sepulveda-Loyola et al., 2020).

The COVID-19 pandemic has compelled the widespread adaptation of digitalization for non-contact interactions over the past three years, leading to a profound transformation in how we engage with digital technology across many facets of our lives (Grinin, Grinin & Korotayev, 2022). Policies like physical distancing have greatly restricted in-person interactions during the pandemic, emphasizing the challenge of social isolation among individuals who struggle to adapt (Grinin, Grinin & Korotayev, 2022; Mulati et al., 2022). In addition, governments and public institutions have shifted to online platforms for sharing information and gathering public opinion, which has led to disenfranchisement for those who are unfamiliar with digital technologies (Cuevas-Parra, 2021). Consequently, there are growing concerns regarding the well-being of vulnerable groups (Mulati et al., 2022). For instance, the seniors who are unfamiliar with digital technology have faced obstacles in accessing basic services such as purchasing daily necessities or booking vaccination appointments (NIA, 2022). Similarly, individuals with disabilities have experienced disruptions in ongoing treatment or difficulty obtaining necessary information and services due to their inability to adapt to digital transitions (Cho & Kim, 2022). Furthermore, these difficulties contribute to decreased self-efficacy and social isolation (Mulati et al., 2022). Even though the restrictions due to the COVID-19 pandemic have largely mitigated, digital transformation is still favored due to its cost-saving and convenience-enhancing benefits (Al-Qudah et al., 2022).

Similar to social maladjustment, “digital maladjustment” can be defined as the inability to adapt to the digital society due to a lack of essential digital abilities expected in modern society (Törestad & Magnusson, 1996). Digital maladjustment, considering its wide-ranging impact, extends beyond functional limitations and significantly affects people's quality of life on a daily basis. Furthermore, social isolation has been shown to contribute significantly to mental health conditions such as anxiety

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and depression (Evans & Fisher, 2021). Considering that digital maladjustment leads to social isolation in modern society (Cho & Kim, 2022; Mulati et al., 2022; NIA, 2022), it is reasonable to assume that mental health is profoundly affected by it. Because the mental health, such as depression, perceived lack of control, and stress, surrogate indicators of individual's well-being (Andresen, Rothenberg., & Kaplan., 1988; Fuller-Iglesias, 2015), being able to use these technologies and adapt to a digital infrastructure is no longer simply about the convenience but rather consumers' overall quality of life. This implicates that digital maladjustment is a significant issue in modern society that deserves attentive consideration.

Measuring digital maladjustment should consider the varying levels of digitalization within each society, with a focus on understanding the challenges experienced in relation to the pace and extent of digital transformation in that society. Europe has been identified as leading in the level of ICT infrastructure development, followed by North America, South America, Asia, Oceania, and Africa, showing the disparity in ICT infrastructure levels among continents (Hanafizadeh, Saghaei & Hanafizadeh, 2009). In developing regions like Africa and Latin America, only one out of five residents uses the internet, whereas in developed nations like China and the United States, four out of five people are internet users (UNCTAD 2019). Adaptation to digital devices is also hindered by socio-cultural factors such as gender discrimination and cultural barriers (Ashraf et al. 2009), resulting in a reported usage rate of digital devices among women in Pakistan that is more than twice as low as that of men (Vimalkumar, Singh & Sharma, 2021). Therefore, instead of uniformly applying solutions to digital exclusion without considering the circumstances of each country, we need a systemic and context-aware approach (Peng & Yu, 2022). Moreover, focusing on individual capability levels is essential when examining exclusion problems that may arise after the initial adoption of digital technology (Sen, 1979; Alkire, 2005).

Our study sheds light on digital maladjustment in the context of rapid technological changes, by focusing on South Korean cases in particular. Despite the country's high internet and smartphone penetration rates (Achangwa et al., 2022), there emerges a distinctive phenomenon in South Korea - the persistence of digital maladjustment issues even amidst extensive digital infrastructure.

Thus, examining digital maladjustment in South Korea, a country equipped with robust digital infrastructure, not only provides meaningful insights for nations with advanced technological frameworks but also offers valuable considerations for countries in the developmental stages, highlighting critical aspects to address during their technological advancement process.

This study examines the effects of digital maladjustment on mental health in South Korean society. Recognizing the insights gained from previous research, we aim to further understand the relationship between digital maladjustment, social relationship, and mental health. In this context, we offer the following hypotheses for our research:

H1: Digital maladjustment will have a direct and negative effect on individuals' mental health.

H2: Digital maladjustment will have an indirect effect on individuals' mental health via social relationships.

H2a. Digital maladjustment will have a negative effect on the quality of social relationships.

H2b. The quality of social relationships will have a negative effect on the adverse mental health outcomes.

Through this research, we aim to highlight the need for continued observation and understanding of digital maladjustment, an area that has received comparatively less attention in existing literature, underscoring its profound impact on daily life. Furthermore, it emphasizes the imperative for equitable access to digital resources, advocating for societal benefits that extend to each individual. This inclusive approach not only helps mitigate the risks associated with digital maladjustment but also promotes overall societal well-being. We assert the necessity for increased academic and governmental engagement to address this pressing societal issue, calling for comprehensive strategies that ensure everyone can safely and effectively navigate the digital world.

Method

Analysis Procedures

This study was analyzed by the following procedure. Initially, data collected online in South Korea in February 2023 were utilized, with a total of 525 responses included in the analysis. Subsequently, the collected survey data were subjected to statistical analysis using SPSS 27.0 and the SPSS Process Macro (by Andrew F. Hayes). First, exploratory factor analysis (EFA) was

conducted to assess the validity of the measurement instruments employed in this study. Next, SPSS Process Macro Model 4 was used to test the mediating effect of social interaction on the relationship between digital maladjustment and negative mental health. For the control variable, we used gender, age and monthly income. To verify the significance of the mediating effect, 5,000 bootstrap samples were drawn, and a confidence interval (CI) of 95% was applied in the analysis.

Sample and Measurement

This study aims to examine the impact of digital maladjustment among modern consumers in the context of the prolonged digital transformation resulting from the COVID-19 pandemic. We have developed measurement tools based on previous research and conducted a survey among adult consumers aged 18 to 69 in South Korea.

Digital Maladjustment

The concept of digital maladjustment is rooted in the concept of digital alienation, which involves a variety of aspects of being alienated from the digital environment due to gaps in digital technology usage, including exclusion, unfamiliarity, and helplessness (Dainnow, 2016). According to the digital alienation scale used in previous studies, digital maladjustment refers to content that experiences restrictions on life due to an inability to adapt to the digital environment. To measure digital maladjustment in this study, three items were utilized, each rated on a 5-point scale. Higher scores indicate a higher level of digital maladjustment.

Negative Mental Health

This study encompasses negative mental health concepts, including anxiety, depression, stress, helplessness (Panova & Lieras, 2016). We measured negative mental health using a total of nine items. These items are rated on a 5-point scale, with higher scores indicating more negative mental health.

Social Relationships

Social relationship related items were developed by referencing interpersonal relationships, emotional support, and emotional communication items used in previous research (Olson et al, 1979). A total of four items were measured on a 5-point scale, with higher scores indicating more satisfactory social relationships.

Reliability and Validity Verification through Exploratory Factor Analysis

Exploratory factor analysis (EFA) was conducted to validate the reliability and validity of the measured items. For the analysis, a total of nine items were utilized, comprising seven items measuring ‘Negative Mental Health’ and two items assessing positive emotions, which were reverse-coded. Additionally, four items measuring ‘Social Relationship’ and three items assessing ‘Digital Maladjustment’ were used for the analysis.

The results of the factor analysis are presented in Table 1 (reproduced in Appendix). The Kaiser-Meyer-Olkin (KMO) value exceeded 0.8, confirming the suitability of the method for factor analysis (Kaiser, 1970), and the Bartlett's Test also supported its suitability. Among orthogonal rotation techniques, a Principal Component Analysis (PCA) was conducted using the Varimax method. The results of the analysis showed that all factor loadings were above 0.4, and with Eigenvalues exceeding 1, the reliability and validity of the variables were secured (Fabrigar et al., 1999).

Result

General Characteristics

The sociodemographic characteristics of the survey participants in this study are as shown in Table 2 (in Appendix). The gender distribution was nearly even, with males comprising 50.1% and females 49.9% of the population. The age distribution was also evenly distributed, ranging from 18 to 69. Regarding the level of education, those who have attended College/University represented 66.5%, which is more than half of the total participants. This figure reflects the characteristics of Korean society, where 52.8% of the population aged between 25 and 64 have completed higher education (OECD, 2022). The average monthly income was reported to be approximately 4,508,000 KRW.

The Direct and Indirect Impact of Digital Maladjustment on Negative Mental Health

This study utilized the SPSS Process Macro Model 4 to examine whether social relationship mediates the relationship between digital maladjustment and negative mental health, as well as

whether digital maladjustment has a direct impact on negative mental health.

According to Table 3 (in Appendix), it appears that digital maladjustment exerts a significant negative impact on social relationships (B = -0.180, $p < .001$). Further, the social relationships are identified as having an adverse impact on negative mental health (B = -0.463, $p < .001$), as opposed to digital maladjustment, which positively impacted (B = 0.233, $p < .001$).

Thus, digital maladjustment negatively impacts social relationships, and social relationships negatively impact negative mental health. Therefore, it is apparent that digital maladjustment indirectly influences negative mental health. Consequently, individuals who do not adapt well to digital contexts experience a decline in their social connections, which contributes to deterioration of their mental health.

Furthermore, digital maladjustment not only exhibits an indirect impact on negative mental health through social relationships, but also exhibits a significant direct impact. It highlights the crucial role of digital maladjustment as a factor that contributes to the immediate decline in mental health, particularly among individuals with limited adaptation to digital environments.

Table 4 and Table 5 summarizes the results of the significance of each direct and indirect effect of this study (see Appendix). In Table 4, since the confidence interval (CI) does not include zero, the direct effect appears to be significant. Therefore, it can be confirmed that digital maladjustment can directly affect negative mental health. Same for the result in Table 5, it has been confirmed that social relationship has a positive mediating effect in the relationship between digital maladjustment and negative mental health.

Discussion and Conclusions

The main purpose of this study was to examine the impact of adapting to a digital environment on individuals' well-being as society transitions towards a digital era and suggest that the digital adaptation level should be considered when examining multidimensional deprivation and poverty among consumers. Therefore, the research analyzed the effect of digital adaptation on mental health, along with social relationship levels, through a survey of 525 Korean adult consumers. This study was conducted within the unique Korean context, where the widespread availability of digital devices and extensive internet connectivity stands out compared to other countries (Nam & Lee, 2023). Such a setting allows the research to delve into personal challenges associated with digital adaptation beyond economic constraints, a common focus in existing literature, directing attention to individual usage capacity (Lee, 2016).

Discussion

As a result of the analyses, two major findings were identified. First, digital maladjustment has a significant impact on mental health problems through the level of individual's social relationships. This phenomenon may be attributed to the prolonged COVID-19 crisis and the government's enforcement of physical distancing, which has pushed most social interactions online (Cho & Kim, 2022). Although the survey was conducted after physical distance mandates were lifted, approximately three years of pandemic had conditioned many consumers to use digital social interactions (Chang et al, 2023). The lack of adaptation to the digital environment in contemporary society results in a lack of social interaction (Evans & Fisher, 2021). This consequently leads to issues such as depression and anxiety, which are linked to a lack of social engagement (Evans & Fisher, 2021).

Secondly, the results revealed that digital maladjustment also directly influences negative mental health outcomes. This finding can be explained within the context of transitions in Korean society, in particular as the COVID-19 outbreak continues and decreasing job opportunities induced by minimum wage increases, where numerous services are shifting from in-person formats to digital platforms (Cho & Kim, 2022). Numerous offline stores are now operated through kiosks or app orders in Korean society, complicating even routine tasks for consumers not familiar with digital technology (Cho & Kim, 2022). It is important to note that digital services these days could present barriers both online and offline. It is possible for digital maladjustment to negatively impact a person's mental health by impairing their self-confidence and self-efficacy, which result in negative emotions, such as feelings of helplessness and incompetence (Kasar & Karaman, 2021).

As a result of these findings, given that social relationships mediate the effects between digital maladjustment and negative mental health outcomes, it is posited that providing opportunities to enhance social interaction skills in digital technology learning contexts may reduce the severity of mental health issues. In addition, the direct influence of digital maladjustment on negative mental health underscores the criticality of digital maladjustment as a significant determinant in psychological

well-being, particularly in societies undergoing rapid transitions from analog to digital platforms.

Limitations and Future Direction

This study acknowledges a limitation that future research should address. Since the research was based on online sample, it may not capture the full spectrum of experiences, particularly of individuals without accessibility to digital devices. Although this study focused on the effects of individual maladjustment in environments with nearly fully equipped digital infrastructures, extending these findings to underdeveloped countries lacking such conditions necessitates offline surveys as well.

For future research, it becomes essential to consider the continuous evolution of digital technology. In this study, we validated the effects of digital maladjustment on individual mental health. Based on these results, a deeper examination of the moderating effects of various related variables, such as physical health levels and disability status, should be conducted. It is also expected that minimum competency levels regarded in society as a sign of digital maladjustment will incessantly change as the digital environment continues to evolve. Therefore, it is necessary to develop metrics by tracking individual digital maladjustment levels consistently. This approach will ensure that the research keeps pace with the ongoing digital transition, providing a comprehensive understanding of its impact on individuals and society.

Appendix

Table 1. Result of Exploratory Factor Analysis

Construct	Item	FL	EV	CV
Negative Mental Health	I felt anxious or restless.	0.820	4.845	30.280
	I felt discouraged and depressed.	0.809		
	There are times when I feel insecure about my abilities to do things.	0.765		
	I felt angry.	0.751		
	I feel like I lack the ability to handle almost all the problems that come up in life.	0.748		
	The daily tasks I have to do are burdensome.	0.739		
	I'm just living day by day and don't think much about the future.	0.669		
	It felt calm and peaceful. (R)	0.524		
	I felt energetic. (R)	0.529		
Social Relationship	In the past year, how often have you received emotional support from friends?	0.883	2.669	46.964
	In the past year, how often have you engaged in emotional communication with friends?	0.844		
	Considering everything, how satisfied are you with your relationships with neighbors?	0.602		
	Considering everything, how satisfied are you with your family relationships?	0.467		
Digital Maladjustment	Due to limited digital skills, I find it challenging to voice my opinions.	0.901	2.546	62.875
	I have trouble adapting well to online services (e.g., finance, shopping, government, welfare) offered digitally.	0.879		
	When using digital devices, I often find it difficult to understand or encounter problems, which makes me uncomfortable in daily life.	0.869		
Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy			0.873	
Bartlett's Test of Sphericity	Approx. Chi-Square		4481.291***	
	Degree of freedom (df)		120	

Notes: FL = Factor Loading, EV = Eigenvalue, CV = Cumulative percentage of Variance

Table 2. Sample characteristics (N=525)

Variables		N (%)	Mean (SD)
Gender	Female	263(50.1%)	
	Male	262(49.9%)	
Age	18–29	102(19.4%)	
	30–39	103(19.6%)	
	40–49	105(20%)	
	50–59	109(20.8%)	
	60–69	106(20.2%)	
Education	Less than high school	9(1.7%)	
	High school	111(21.1%)	
	College/University	349(66.5%)	
	Master's or higher	56(10.7%)	
Monthly Income (KRW)			450.80[a] (240.61)

Notes. [a] 1 USD = 1,356 KRW, The unit is 10,000 KRW

Table 3. Result of Process Macro Model4 (*N* = 525)

	Social Relationship		Negative Mental Health	
	B	S.E	B	S.E
Social Relationship			-0.463***	0.041
Digital Maladjustment	-0.180***	0.037	0.233***	0.035
Gender (1 = Male)	0.011	0.058	-0.084	0.054
Age	0.006**	0.002	-0.011***	0.002
Income	0.000	0.000	-0.000	0.000
Constant	3.444***	0.128	4.372***	0.185
R^2	0.056		0.328	

*p < .05, **p < .01, ***p < .001

Table 4. Direct Effects on Negative Mental Health by Bootstrapping

Path	Effect	S.E	95% CI	
			Lower	Upper
Digital Maladjustment →Negative Mental Health	0.231	0.022	0.164	0.302

Notes: Based on 5,000 bootstrap samples. CI = confidence interval. *p < .05, **p < .01, ***p < .001

Table 5. Indirect Effects on Negative Mental Health by Bootstrapping

Path	Effect	Boot S.E	95% CI	
			Lower	Upper
Digital Maladjustment→Social Relationship→Negative Mental Health	0.087	0.022	0.049	0.133

Notes: Based on 5,000 bootstrap samples. CI = confidence interval. *p < .05, **p < .01, ***p < .001

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