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Effects of Digital Health Technology Literacy, Health Empowerment, and Self-efficacy on Health-promoting Behaviors among Adults in South Korea

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Abstract

While previous research focused on digital device usage in eHealth services, this study examined the relationships between digital health technology literacy, health empowerment, and self-efficacy in predicting health-promoting behaviors. Participants (1086 adults) completed an online questionnaire. Descriptive statistics, t-tests, analyses of variance with Scheffé's test, Pearson's correlation coefficients, and multiple regression analyses were performed. Findings showed that age, economic status, religion, smoking, health empowerment, and self-efficacy affected health-promoting behaviors (35.6% explanatory power). However, digital health technology literacy was not a significant factor. Higher health empowerment and self-efficacy were associated with more health-promoting behaviors, with high economic status having the greatest influence. Factors influencing health-promoting behaviors did not differ significantly among the general adult population, individuals with specific diseases, or specific classes. Since digital health technology literacy did not significantly affect outcomes in the study population, further studies are needed on individuals with specific health conditions and the older adult population.

Keywords: *Digital Health Technology Literacy, Health Empowerment, Self-Efficacy, Health-Promoting Behavior.*

Introduction

The Internet usage rate in South Korea has increased steadily from 83.7% in 2010 to 96.5% in 2020 (Korean Statistical Information Service, 2022), while the smartphone usage rate among South Korean adults remained constant at 93% between 2017 and 2020 (Gallup Korea, 2024). Internet use has become an essential part of modern life with the growing popularity of various information devices such as smartphones and wearable devices. The number of Internet users searching for and using health and other information is consistently increasing worldwide (Liobikienė & Bernatonienė, 2018).

The ability to search for health information and services on the Internet and understand and evaluate the information to recognize one's health issues and make decisions is referred to as eHealth literacy or digital health literacy (Bodie & Dutta, 2008; Norman & Skinner, 2006). Studies on digital health literacy have primarily focused on digital devices, such as eHealth services, social media, mobile health, artificial intelligence, and wearable devices, as well as participants' literacy levels. However, with the paradigm shift in the Fourth Industrial

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Revolution, there is a need to examine how digital health literacy can be used for health promotion (Hwang & Park, 2021). Additionally, in recent years, various terms such as eHealth literacy, digital health technology literacy (DHTL), Internet health information understanding ability, and digital literacy have been used interchangeably (Griebel et al., 2018). Previous research has explored digital health literacy and assessed participants' literacy levels (Hwang & Park, 2021); however, tools have recently been developed to define and measure DHTL, expanding digital health literacy to using various devices such as smartphones, Bluetooth, and wearable devices (Yoon et al., 2022). DHTL is a social determinant of health and a component of digital healthcare that can perpetuate health disparities and inequalities, emphasizing its importance when attempting digital innovation in health-promotion services (Park et al., 2022).

Health promotion is the process of enhancing an individual's ability to control and improve their health (World Health Organization, 1986). Health-promoting behaviors encompass various practices, such as diet, exercise, personal hygiene, and stress management, aimed at maintaining and managing health (Pender, 1996). Health-promoting behaviors refer to efforts and actions taken to actively improve lifestyle habits and enhance health (Kim, 2009). Although research on health-promoting behaviors has been extensive in the older adult population, studies on other age groups are insufficient. Factors influencing health-promoting behaviors include age (Kim & Hur, 2010; Park & Kim, 2016), education level (Kim & Hur, 2010; Lee, 2017), cohabitation with family members (Lee, 2017), economic status (Lee, 2017), subjective health status (Kim & Hur, 2010), social support (Kim & Hur, 2010; Park & Kim, 2016; Shin & Kang, 2015), health literacy (Chen et al., 2014; Jeong & Kim, 2014; Lee, 2017), self-efficacy (Jang & Shin, 2020; Kiajamali et al., 2017; Lee et al., 2016), and health empowerment (Jeong et al., 2022).

Health empowerment integrates health behavior compliance and empowerment, indicating individuals' willingness and ability to change their health behaviors to manage and prevent diseases (Jeong et al., 2022). In essence, it is a new approach that actively engages individuals in taking responsibility for their health and promotes self-initiated behavioral changes (Brørs et al., 2020; Jeong et al., 2022).

Self-efficacy refers to the belief that one can successfully perform the necessary behaviors to achieve desirable outcomes (Jang & Shin, 2020). Higher self-efficacy is associated with a higher health-related quality of life, underscoring the importance of enhancing self-efficacy through effective health-promotion practices (Lee et al., 2016). Conversely, low self-efficacy may lead to indifference and inertia toward oneself, acting as a barrier to maintaining health-promoting behaviors (Kiajamali et al., 2017).

Therefore, this study aimed to identify DHTL, health empowerment, self-efficacy, and health-promoting behaviors among South Korean adults and examine the effects of DHTL, health empowerment, and self-efficacy on health-promoting behaviors. This study aimed to provide a basis for effective intervention strategies for health-promoting behaviors among South Korean adults.

Materials and Methods

Study Design and Participants

An online survey, conducted from March 8–14, 2022, targeted adult men and women aged 20–65 years who resided in South Korea. Embrain Co., Ltd. employed a stratified sampling method (stratified random sampling) based on the sex and age composition ratio of the residential areas. In total, 1333 men and 650 women participated. This study focused on 1086 participants after

excluding those with missing data.

Participants who expressed interest voluntarily accessed the survey URL after receiving an email explaining this study. Participants were informed of the study purpose and procedures, assured of confidentiality of personal information, and guaranteed that the findings would not be used for purposes other than this study. They were also assured that they could withdraw from this study at any time without any negative consequences and that those who completed the survey would receive cash points worth approximately 1,000 KRW. Statistical analyses were performed using the survey data prepared in an anonymous format without adding personal information.

Measures

DHTL was measured using the DHTL Assessment Questionnaire (Yoon et al., 2022), which contains 34 items in four categories: ICT terms, including basic terms to understand mobile devices; ICT icons, including basic icons; digital functional literacy, such as advanced skills to use mobile apps effectively; and digital critical literacy, such as cognitive skills to critically evaluate the reliability and relevance of health information and effectively use it to make health-related decisions. The maximum score was 34 points, with higher scores indicating higher DHTL. Overall Cronbach's α for the original scale was .95, and .87–.94 for the subscales (Yoon et al., 2022). In this study, Cronbach α was .91, and .69–.91 for the subscales.

Health empowerment refers to an individual's willingness to change their health behaviors to manage and prevent diseases. It was measured using the Korean version of the 8-item Health Empowerment Scale (Park & Park, 2013), which is based on the Diabetes Empowerment Scale-Short Form (Anderson et al., 2003). Responses were rated on a five-point Likert scale, with higher scores indicating greater health empowerment. Cronbach's α for the original scale was .84 (Anderson et al., 2003), and .80 in the Korean version (Park & Park, 2013). In this study, Cronbach's α was .89.

Self-efficacy refers to the belief that one can successfully perform behaviors necessary to achieve desirable outcomes; it was assessed using the Korean version of the General Self-Efficacy Scale (Lee et al., 1993; Schwarzer & Jerusalem, 1992). The scale contains 10 questions, with higher scores indicating higher self-efficacy. Responses were rated on a four-point Likert scale. Cronbach's α for the original scale was .75, and .88 in this study.

Health-promoting behaviors were measured using a modified and supplemented tool (Song et al., 2021) based on the Health Lifestyle Profile (Walker et al., 1987). This tool contains 25 questions in five sub-areas: health responsibility, eating habits, exercise habits, stress management, and smoking habits. Responses were rated on a four-point Likert scale (1 = 'never'; 4 = 'always'). The total score ranges from 25 to 100, with a higher score indicating a higher health-promoting lifestyle. Cronbach's α for the modified scale was .92 (Walker et al., 1987), and that for the original scale was .80 (Song et al., 2021). In this study, Cronbach's α was .88.

Statistical Analysis

Data were analyzed using SPSS/WIN 25.0; IBM, Armonk, NY, USA. Statistics for DHTL, health empowerment, self-efficacy, and health-promoting behaviors were calculated as means and standard deviations. DHTL, health empowerment, self-efficacy, and health-promoting behaviors based on participants' general characteristics were analyzed using t-tests and analysis of variance. A post-hoc test was conducted. The relationships between DHTL, health

empowerment, self-efficacy, and health-promoting behaviors were analyzed using Pearson's correlation coefficients. Multiple regression analyses were performed to identify the factors affecting DHTL, health empowerment, self-efficacy, and health-promoting behaviors.

Ethical Considerations

This study was approved by the Institutional Review Board of C University (No. 1041078-20221118-HR-015). During data collection, personal information was limited to essential details needed for this study, such as age, sex, work experience, and educational level. Data collected through the surveys were recorded and stored in a manner that did not allow for the identification of participants, and measures were taken to prevent data leakage. Data were encrypted and stored in files on the researcher's computer and were accessible only to the researcher through locked drawers. Research-related materials will be securely disposed of by completely deleting the files using safe methods, as stipulated in Article 15 of the Enforcement Rules of the Bioethics and Safety Act (Legislative Research Institute, 2021), three years after this study.

Results

Participants' DHTL, health empowerment, self-efficacy, and health-promoting behaviors.

Table 1 shows participants' DHTL, health empowerment, self-efficacy, and health-promoting behaviors.

Variable	Range	M ± SD	Min	Max
DHTL-AQ(Assessment Questionnaire)	0–34	29.67 ± 4.99	6	34
ICT terms (Information and Communications Technology)	0–11	9.47 ± 2.36	1	11
ICT icons	0–9	8.71 ± 1.17	0	9
Digital functional literacy	0–9	7.73 ± 1.97	0	9
Digital critical literacy	0–5	3.76 ± 1.43	0	5
Health empowerment	8–40	28.94 ± 5.17	9	40
Self-efficacy	10–40	27.63 ± 4.17	14	40
Health-promoting behaviors	25–100	64.12 ± 10.65	36	98
Health responsibility	6–24	14.62 ± 3.03	6	24
Physical activity	4–16	9.45 ± 2.66	4	16
Nutrition	7–28	17.99 ± 3.96	7	28
Stress management	5–20	12.41 ± 2.72	5	20
Smoking	3–12	9.65 ± 2.30	3	12

Table 1. Levels Of DHTL, Health Empowerment, Self-Efficacy, And Health-Promoting Behaviors.

DHTL, health empowerment, self-efficacy, and health-promoting behaviors according to participants' general characteristics

Table 2-1 and 2-2 show DHTL, health empowerment, self-efficacy, and health-promoting behaviors based on participants' general characteristics. DHTL levels were significantly different depending on age, economic status, residential area, educational status, employment

type, government subsidies, depressive mood, and suicidal ideation. Health empowerment showed significant differences according to economic status, educational status, religion, depressive mood, and suicidal ideation. Self-efficacy differed significantly based on sex, age, economic status, employment type, academic status, depressive mood, and suicidal ideation. Further, health-promoting behaviors differed significantly according to age, economic status, educational status, religion, smoking status, high-risk drinking, depressive mood, and suicidal ideation.

Variable	Classification	Total	DHTL		Health empowerment	
		n (%)	M ± SD	t/F (*p*) Scheffé	M ± SD	t/F (*p*) Scheffé
Sex	Men	556 (51.2)	29.91 ± 5.29	1.567 (.117)	29.02 ± 5.05	0.514 (.608)
	Women	530 (48.8)	29.43 ± 4.65		28.86 ± 5.31	
Age (years)	20–29	203 (18.7)	29.96 ± 5.23	9.246 (< .001) a, b, c > d b > e	29.44 ± 5.77	1.745 (.139)
	30–39	211 (19.4)	30.87 ± 4.06		29.30 ± 5.04	
	40–49	267 (24.6)	30.17 ± 4.55		28.28 ± 5.50	
	50–59	271 (25.0)	28.44 ± 5.58		28.82 ± 4.62	
	60–64	134 (12.3)	28.88 ± 4.94		29.16 ± 4.75	
Economic status	High	72 (6.6)	30.85 ± 3.88	6.741 (.002) a > b, c	31.63 ± 5.27	26.258 (< .001) a > b, c b > c
	Medium	805 (74.2)	29.82 ± 4.92		29.20 ± 5.04	
	Low	209 (19.2)	28.71 ± 5.44		27.02 ± 5.04	
Marital status	Single	405 (37.3)	29.99 ± 4.91	2.456 (.086)	29.16 ± 5.40	0.730 (.482)
	Married	631 (58.1)	29.57 ± 4.98		28.84 ± 5.03	
	Other	50 (4.6)	28.46 ± 5.61		28.42 ± 5.23	
Region	Seoul	192 (17.7)	30.59 ± 3.97	4.501 (.005) a > b, c	29.13 ± 5.58	1.338 (.261)
	Metropolitan city	335 (30.8)	29.24 ± 5.79		29.04 ± 5.20	
	Special self-governing city	21 (1.9)	27.14 ± 7.34		26.81 ± 5.73	
	Do province	538 (49.6)	29.72 ± 4.60		28.89 ± 4.98	
Current economic activity	No	318(29.3)	29.42 ± 5.03	1.161 (.281)	28.97 ± 5.19	0.012 (.915)
	Yes	768 (70.7)	29.78 ± 4.98		28.93 ± 5.17	
Type of employment	Not applicable	318 (29.3)	29.42 ± 5.03	2.587 (.036)	28.97 ± 5.19	0.205 (.936)
	Regular worker	532 (49.0)	30.08 ± 4.89		29.02 ± 5.06	
	Indefinite contractor	41 (3.8)	28.66 ± 6.41		29.10 ± 6.15	
	Non-regular worker	80 (7.3)	28.51 ± 5.28		28.55 ± 4.92	
	Self-employed and	115 (10.6)	29.70 ± 4.43		28.72 ± 5.50	

Variable	Classification	Total	DHTL		Health empowerment	
		n (%)	M ± SD	t/F (*p*) Scheffé	M ± SD	t/F (*p*) Scheffé
	freelance					
Education	Primary school	14 (1.3)	25.93 ± 5.92	18.232 (< .001) d > a, b c > a, b	26.64 ± 3.63	7.249 (< .001) d > a, b, c
	High school	182 (16.8)	27.10 ± 5.88		27.92 ± 5.20	
	University	809 (74.5)	30.19 ± 4.61		29.01 ± 5.20	
	Master's degree or higher	81 (7.4)	30.98 ± 4.18		30.88 ± 4.47	
Religion	No	675 (62.2)	29.74 ± 4.95	0.569 (.569)	28.61 ± 5.27	2.704 (.007)
	Yes	411 (37.8)	29.56 ± 5.06		29.48 ± 4.97	
Basic livelihood recipient	Yes	44 (4.1)	27.16 ± 7.37	2.339 (.024)	28.09 ± 6.46	0.896 (.375)
	No	1042 (95.9)	29.78 ± 4.84		28.98 ± 5.11	
Smoking	Non-smoker	665 (61.2)	29.64 ± 4.85	2.341 (.097)	28.98 ± 5.26	1.570 (.208)
	Ex-smoker	177 (16.3)	30.34 ± 462		29.40 ± 4.55	
	Current smoker	244 (22.5)	29.29 ± 5.57		28.50 ± 5.34	
High-risk drinking	Yes	133 (12.3)	30.05 ± 4.38	0.932 (.352)	29.21 ± 5.05	0.645 (.519)
	No	953 (87.7)	29.62 ± 5.07		28.90 ± 5.19	
Number of chronic diseases	No	687 (63.2)	29.99 ± 4.79	2.573 (.053)	29.10 ± 5.23	0.873 (.455)
	1	293 (27.0)	29.14 ± 5.34		28.81 ± 5.08	
	2	79 (7.3)	28.96 ± 5.31		28.33 ± 4.76	
	≥ 3	25 (2.5)	29.70 ± 4.82		28.11 ± 6.00	
Depressive mood	Yes	174 (16.0)	28.53 ± 5.20	3.305 (.001)	27.58 ± 5.38	3.803 (< .001)
	No	912 (84.0)	29.89 ± 4.92		29.20 ± 5.10	
Suicidal ideation	Yes	209 (19.2)	29.00 ± 5.23	2.164 (.031)	28.04 ± 5.16	2.795 (.005)
	No	877 (80.8)	29.83 ± 4.92		29.15 ± 5.16	

Table 2-1. Differences In DHTL And Health Empowerment.

Variable	Classification	Total	Self-efficacy		Health-promoting behavior	
		n (%)	M ± SD	t/F (*p*) Scheffé	M ± SD	t/F (*p*) Scheffé
Sex	Men	556 (51.2)	27.95 ± 4.17	2.544 (.011)	63.79 ± 10.84	1.044 (.297)
	Women	530 (48.8)	27.31 ± 4.15		64.47 ± 10.44	
Age (years)	20–29	203 (18.7)	28.59 ± 4.88	5.121	64.22 ± 10.69	8.122

Variable	Classification	Total	Self-efficacy		Health-promoting behavior	
		n (%)	M ± SD	t/F (*p*) Scheffé	M ± SD	t/F (*p*) Scheffé
	30–39	211 (19.4)	28.14 ± 4.17	(< .001) a > c, d	62.00 ± 10.32	(< .001) e > a, b, c
	40–49	267 (24.6)	27.04 ± 4.05		62.98 ± 10.19	
	50–59	271 (25.0)	27.17 ± 3.62		64.87 ± 10.60	
	60–64	134 (12.3)	27.51 ± 3.97		68.11 ± 10.96	
Economic status	High	72 (6.6)	29.86 ± 3.66	30.854 (< .001) a > b, c b > c	71.13 ± 11.38	40.49 (< .001) a > b, c b > c
	Medium	805 (74.2)	27.90 ± 3.95		64.73 ± 10.11	
	Low	209 (19.2)	25.85 ± 4.53		59.37 ± 10.51	
Marital status	Single	405 (37.3)	27.83 ± 4.62	1.700 (.183)	63.22 ± 10.35	2.615 (.074)
	Married	631 (58.1)	27.58 ± 3.85		64.75 ± 10.81	
	Other	50 (4.6)	26.72 ± 4.17		63.56 ± 10.64	
Region	Seoul	192 (17.7)	28.26 ± 3.99	2.067 (.103)	64.78 ± 10.70	1.213 (.304)
	Metropolitan city	335 (30.8)	27.56 ± 4.18		64.16 ± 11.11	
	Special self-governing city	21 (1.9)	26.62 ± 4.27		60.19 ± 9.26	
	Do province	538 (49.6)	27.50 ± 4.21		64.03 ± 10.37	
Current economic activity	No	318(29.3)	27.34 ± 4.38	2.204 (.138)	64.19 ± 9.85	0.022 (.883)
	Yes	768 (70.7)	27.76 ± 4.08		64.10 ± 10.96	
Type of employment	Not applicable	318 (29.3)	27.34 ± 4.38	4.677 (.001)	64.19 ± 9.85	0.260 (.901)
	Regular worker	532 (49.0)	28.16 ± 4.09		64.22 ± 10.94	
	Indefinite contractor	41 (3.8)	26.63 ± 3.48		64.12 ± 10.51	
	Non-regular worker	80 (7.3)	26.78 ± 3.93		64.54 ± 12.25	
	Self-employed and freelance	115 (10.6)	26.98 ± 4.03		63.20 ± 10.35	
Education	Primary school	14 (1.3)	25.79 ± 4.63	7.001 (< .001) c, d > b	64.00 ± 10.30	3.227 (.022) d > b
	High school	182 (16.8)	26.67 ± 4.35		62.50 ± 10.51	
	University	809 (74.5)	27.76 ± 4.12		64.22 ± 10.65	
	Master's degree or higher	81 (7.4)	28.90 ± 3.62		66.85 ± 10.49	
Religion	No	675 (62.2)	27.51 ± 4.09	1.265 (.206)	62.75 ± 10.42	5.540 (< .001)
	Yes	411 (37.8)	27.84 ± 4.30		66.39 ± 10.64	
Basic	Yes	44 (4.1)	27.18 ± 4.46	0.735	63.93 ± 7.89	0.162

Variable	Classification	Total	Self-efficacy		Health-promoting behavior	
		n (%)	M ± SD	t/F (*p*) Scheffé	M ± SD	t/F (*p*) Scheffé
livelihood recipient	No	1042 (95.9)	27.65 ± 4.16	(.462)	64.13 ± 10.75	(.872)
Smoking	Non-smoker	665 (61.2)	27.50 ± 4.15	0.944 (.390)	65.11 ± 10.32	19.790 (< .001) a, b > c
	Ex-smoker	177 (16.3)	27.84 ± 4.06		65.51 ± 10.76	
	Current smoker	244 (22.5)	27.86 ± 4.31		60.42 ± 10.64	
High-risk drinking	Yes	133 (12.3)	28.19 ± 3.95	1.636 (.102)	61.69 ± 9.57	2.822 (.005)
	No	953 (87.7)	27.56 ± 4.19		64.46 ± 10.75	
Number of chronic diseases	No	687 (63.2)	27.83 ± 4.10	2.376 (.069)	63.69 ± 10.98	1.035 (.376)
	1	293 (27.0)	27.46 ± 4.23		64.84 ± 9.59	
	2	79 (7.3)	26.57 ± 4.33		65.04 ± 10.65	
	≥ 3	25 (2.5)	27.74 ± 4.52		64.67 ± 12.66	
Depressive mood	Yes	174 (16.0)	25.99 ± 4.39	5.746 (< .001)	60.21 ± 10.25	5.356 (< .001)
	No	912 (84.0)	27.95 ± 4.05		64.87 ± 10.56	
Suicidal ideation	Yes	209 (19.2)	26.22 ± 4.36	5.513 (< .001)	61.28 ± 10.09	4.330 (< .001)
	No	877 (80.8)	27.97 ± 4.05		64.80 ± 10.67	

Table 2-2. Differences In Self-Efficacy, And Health-Promoting Behavior.

Correlations Between DHTL, Health Empowerment, Self-Efficacy, And Health-Promoting Behaviors

Table 3 shows the correlations between DHTL, health empowerment, self-efficacy, and health-promoting behaviors.

	Digital health technology literacy r (*p*)	Health empowerment r (*p*)	Self-efficacy r (*p*)	Health-promoting behaviors r (*p*)
DHTL	1			
Health empowerment	.391 (< .001)	1		
Self-efficacy	.326 (< .001)	.505 (< .001)	1	
Health-promoting behaviors	.184 (< .001)	.490 (< .001)	.422 (< .001)	1

Table 3. Correlations Between DHTL, Health Empowerment, Self-Efficacy, And Health-Promoting Behaviors.

Factors Influencing Health-Promoting Behaviors

Table 4 shows the results of the multiple regression analysis that sequentially input general characteristics, DHTL, health empowerment, and self-efficacy, which showed significant differences. The regression analysis assumption was made by dividing it into a multicollinearity diagnosis, residuals, and specific values. Testing the assumption using regression analysis revealed that the Durbin–Watson statistic was 1.951, which was not self-correlated. The tolerance was 0.78–0.93, and the variance inflation factor was not more than 10 (1.07–1.30), indicating that the multicollinearity problem was not present. Residual analysis revealed that the assumptions of model linearity, normality of the error term, and equal variance were satisfied. Cook's distance value was not more than 1.0, indicating that the regression analysis results were valid.

Variable		Model 1			Model 2		
		β	**B**	***p***	***β***	**B**	***p***
Control	Age	0.070	0.060	.020	0.127	0.108	< .001
	Economic status						
	High	0.183	10.400	< .001	.125	5.339	< .001
	Medium	0.243	4.436	< .001	0.090	2.191	.002
	Low		1			1	
	Education						
	Primary school		1			1	
	High school	-0.058	-1.657	.548	-0.075	-2.149	.367
	University	-0.044	-1.067	.693	-0.086	-2.089	.372
	Master's degree or higher	-0.011	-0.445	.878	-0.075	-3.018	.230
	Religion						
	No		1			1	
	Yes	0.133	2.928	< .001	0.089	1.959	< .001
	Smoking						
	Non-smoker	0.163	3.566	< .001	0.175	3.819	< .001
	Ex-smoker	0.144	4.159	< .001	0.123	3.532	< .001
	Current smoker		1			1	
	High-risk drinking						
	Yes		1			1	
	No	0.025	0.821	.394	0.055	1.772	.034
	Depressive mood						
	Yes		1			1	
	No	0.108	3.143	< .001	0.048	1.388	.085
	Suicidal ideation						

Variable		Model 1			Model 2		
		β	**B**	***p***	***β***	**B**	***p***
	Yes		1			1	
	No	.043	1.161	.178	0.016	0.439	.556
Independent	DHTL				-0.029	-0.063	0.291
	Health empowerment				0.343	0.706	< .001
	Self-efficacy				0.242	0.619	< .001
Constant		57.601		< .001	20.952		< .001
F (*p*)		15.190			40.980		
Adjusted R^2		.136			.356		
Durbin–Watson		1.911			1.951		

Table 4. Factors Influencing Health-Promoting Behaviors.

The regression model of the factors affecting health-promoting behaviors was significant (F = 40.98, P < .001), explaining 35.6% of the health-promoting behaviors. Age, economic status, religion, smoking status, health empowerment, and self-efficacy had significant effects on health-promoting behaviors. Multiple regression analysis revealed that health-promoting behaviors increased with age (P < .001). DHTL did not affect health-promoting behaviors, whereas health empowerment and self-efficacy had significant positive effects. High economic status had the greatest influence on health-promoting behaviors.

Discussion

This study examined the effects of DHTL, health empowerment, and self-efficacy on health-promoting behaviors in South Korean adults using a recently developed DHTL tool. Age, economic status, religion, smoking, health empowerment, and self-efficacy affected health-promoting behaviors, with an explanatory power of 35.6%. However, DHTL did not influence health-promoting behaviors. Higher health empowerment and self-efficacy were associated with more health-promoting behaviors. Moreover, high economic status had the greatest influence on health-promoting behaviors.

The average health empowerment score (28.9) was higher than that in a previous study that used the same tool with older adults (24.58) (Ko, 2017) and moderately higher than that in studies with different tools (Jeong et al., 2022; Park & Park, 2013; Thakur, 2017). The average self-efficacy score (27.6) was also higher than that in a previous study using the same tool (Lee & Schwarzer, 1993). Moreover, the average health-promoting behavior score (64.1) was higher than that reported in a previous study (Jeong et al., 2022). However, these studies included participants who were chronically ill or older adults, whereas this study included the general adult population that had experienced the COVID-19 pandemic and had an increased interest in health and health-related behaviors.

The average DHTL score (29.7) was higher than the average. However, it is difficult to directly compare scores of digital health literacy in previous studies using the newly developed tool,

especially since previous studies have not focused on the general adult population. Moreover, the score in our study was higher than that in Yoon et al. (2022), which divided participants with average scores of 22 or more and less than 22 into high and low groups, respectively. The score may be higher because the online survey covered the entire population. In addition, the DHTL scores may be high because this study focused on the general adult population with high accessibility to digital devices, such as computers and smartphones. As previous studies did not investigate the general adult population, the current findings can be used as comparative data for subsequent DHTL studies.

DHTL was higher among participants aged 20–49 years than among those aged 50–64 years. Participants with a high economic status had higher DHTL than those with a medium or low economic status. These results indicate the need to improve DHTL among vulnerable groups, including older adults and low-income households, and are consistent with the findings of Park et al. (2022). DHTL scores were higher in Seoul among full-time employees, participants with a university or higher educational background, participants who did not receive medical benefits, and participants without depressive mood or suicidal ideation. The current findings may be used as a basis to establish target groups for national health policy, strengthen the digital health literacy of the entire population, and prevent the expansion of populations vulnerable to digital technology. Target groups should include individuals in rural areas, temporary employees, individuals with limited education and low income, and individuals with depressive mood and suicidal ideation.

Among the general characteristics, health empowerment, self-efficacy, and health-promoting behaviors were significantly higher among participants with high economic status, graduate degrees, and no depressive mood or suicidal ideation. This aligns with previous studies showing that economic status and education level are correlated with health empowerment, self-efficacy, and health-promoting behaviors (Chen et al., 2014; Jang & Shin, 2020; Jeong et al., 2022; Kiajamali et al., 2017; Kim, 2009; Park & Kim, 2016). Men had significantly higher self-efficacy than women, and participants in their 20s had significantly higher self-efficacy than those in their 40s and 50s. Full-time employees had the highest self-efficacy, indicating that self-efficacy—the belief that one can successfully perform the necessary behaviors to achieve a desired outcome (Bandura, 1989)—begins with stable employment. Individuals aged 60–64 years exhibited significantly higher health-promoting behaviors than those in the other groups. In addition, lifelong nonsmokers, former smokers, and participants without high-risk drinking habits exhibited significantly more health-promoting behaviors. Health-promoting behaviors were higher in age groups that were more likely to have health-related problems.

Finally, this study revealed that age, economic status, religion, smoking status, health empowerment, and self-efficacy affected health-promoting behaviors. Health-promoting behaviors increase with age. Moreover, it was significantly higher in the high economic status, religious, and non-smoking groups, which aligns with prior results. The effects of health empowerment and self-efficacy on health-promoting behaviors have also been observed in previous studies of older adults and individuals with diseases. Our findings can be used as comparative data in subsequent studies involving all age groups. This study demonstrated that the factors affecting health-promoting behaviors of the general adult population during the COVID-19 pandemic did not differ from those affecting people with certain diseases.

Limitations

DHTL did not affect health-promoting behaviors, likely because this study used an online

survey, which may have created a bias toward participants with easy access to computers, smartphones, and the knowledge and acceptance of digital technology. Furthermore, as digital device use is common in everyday life in South Korea—a country where the Internet penetration rate is higher than that in other countries—digital technology use is not likely to be a key challenge for most adults. Therefore, future studies should focus on the following aspects. First, DHTL should be addressed through in-person visits and telephone surveys, targeting participants with limited access to digital devices. Second, studies should be conducted that target vulnerable groups such as low-income individuals, older adults, and people with disabilities. Third, research is needed to investigate whether DHTL, health empowerment, and self-efficacy are associated with health-promoting behaviors across different age groups or income levels and whether they act as mediating variables. Paradoxically, the current results underscore the need for national health policies aimed at reducing health inequalities among vulnerable groups, as the DHTL and health-promoting behavior scores of adults in South Korean society with high Internet penetration were higher than expected. This provides essential evidence on how vulnerable populations can be approached more effectively when developing such policies.

Conclusion

Age, economic status, religion, smoking, health empowerment, and self-efficacy influenced health-promoting behaviors among South Korean adults. Moreover, the factors influencing health-promoting behaviors did not differ significantly between the general adult population and individuals with specific diseases or specific populations. However, DHTL did not impact health-promoting behaviors, likely because the current focus was on conducting an online survey targeting the general adult population in a society with high Internet penetration rates.

Future research should involve in-person visits and telephone surveys to include participants with limited access to digital devices. Additionally, all age groups and vulnerable populations such as low-income groups, older adults, and people with disabilities should be included. The current findings confirm that health empowerment and self-efficacy are relevant factors that enhance health-promoting behaviors among adults. Further, this study informs national health policy strategies to integrate DHTL and address health inequalities.

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