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Influence of Digital Literacy on Digital Health Usage Intention Among Patients With Cancer and Healthcare Providers

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ABSTRACT

Background: Digital health has revolutionized oncology care by offering educational content for informed decisions, facilitating health monitoring, and enhancing access to psychological support. Understanding digital literacy and the requirements of patients with cancer and healthcare providers (HCPs) are essential for developing effective digital health services. We explored the awareness of and demand for digital health and the factors influencing usage intention among patients with cancer and HCPs, focusing on digital literacy.

Methods: This cross-sectional study used data from the “Digital Health Awareness and Demand Survey,” conducted between October 2023 and February 2024, involving 200 patients with cancer and 204 HCPs. We assessed digital health usage intention, awareness, understanding, and literacy. Digital literacy was measured using a self-assessment tool for Digital Literacy Competence (DLC). Hierarchical linear regression analysis determined the factors affecting digital health usage intentions.

Results: Both patients with cancer and HCPs exhibited strong willingness to use digital health services, scoring 4.03 ± 0.90 and 3.98 ± 0.67 , respectively, on a 1–5 Likert scale. High digital literacy was positively associated with the intention to use digital health (DH-Intention to use), especially DLC-Value among patients with cancer ($B = 0.09$, $P = 0.002$), and DLC-Value ($B = 0.06$, $P = 0.004$) and DLC-Affect ($B = 0.03$, $P = 0.009$) among all participants. A better understanding of digital health was correlated with increased DH-Intention to use among HCPs ($B = 0.17$, $P = 0.029$) and all participants ($B = 0.12$, $P = 0.041$). Patients with cancer reported the highest need for “family and social support” and “transportation and cost assistance service,” while HCPs reported the highest need for “information and education” and “communication issues.” The patient group reported a significantly greater need for “psychological issues,” “family and social support,” “hospital facilities and services,” and “transportation and cost-assistance services.”

Conclusion: Digital literacy and understanding of digital health significantly affected the participants’ willingness to use these services. Promoting digital literacy may encourage patients with cancer to adopt digital health, and its usefulness should be highlighted. HCPs can benefit from comprehensive education and training by integrating digital health into their specialties and practices.

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Author Contributions

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Keywords: Digital Health; Cancer; Healthcare Providers; Literacy; Health Services Needs; Education

INTRODUCTION

Digital health refers to applying information and communication technologies in healthcare, including eHealth, medical informatics, health informatics, telehealth, telemedicine, mobile health, and precision medicine based on digital platforms.^{1,2} Digital health is gaining attention for enhancing accessibility to and availability of medical care, supporting treatment, prevention, and rehabilitation, and providing patient-centered care.^{2,3}

As cancer survival rates increase, patient needs extend beyond treatment to survival, encompassing the psychological, social, and physical dimensions of well-being. However, healthcare resources remain limited, leading to unmet needs in traditional care settings. In a systematic review, over 60% of cancer survivors reported unmet needs,⁴ the most common being psychological support, information and education, physical health, financial guidance, self-control, and daily functioning.⁴⁻⁷ Integrating digital health into cancer care is a promising alternative to address these needs across temporal, spatial, and staffing limitations.

In oncology, digital health is revolutionizing care through extensive educational resources for informed patient decision-making, remote health monitoring, and easier access to psychological support.⁸ Key implementations include remote monitoring, telemedicine for safe and convenient consultations, and mobile health applications for lifestyle and symptom management.⁸ Meta-analyses have shown that digital health interventions positively impacted outcomes like life quality, depression, anxiety, self-efficacy, physical activity, and screening in patients with cancer.⁹ Additionally, they also enhance workforce efficiency, clinical management, service delivery, and access to care.¹⁰

However, while digital tools improve care in medical services, they may worsen health disparities between individuals with high and low digital literacy.¹¹ Digital literacy refers to the ability to locate, evaluate, use, and communicate information through digital technologies. Digital health literacy, which integrates digital competencies with health knowledge, enables individuals to make informed decisions using digital tools.¹² In healthcare, digital literacy plays a critical role in shaping equitable access and patient engagement by influencing how individuals interact with digital health technologies.^{13,14} Several studies show that low digital literacy among patients and healthcare providers (HCPs) is a key barrier to effectively adopting and benefiting from digital health services.¹⁵⁻¹⁹

Although understanding the needs and digital literacy of patients with cancer and HCPs is crucial for effective service development, research remains limited. Therefore, this study aimed to explore digital health awareness (DH-Awareness) levels, usage intentions, and demand areas among patients with cancer and HCPs. Additionally, it examines their digital literacy and identifies factors influencing their willingness to use digital health services. We hypothesized that digital literacy would be positively associated with the use of digital health services in patients with cancer and HCPs. Furthermore, digital health knowledge, including awareness and understanding, significantly influenced the DH-Intention to use services in both groups.

METHODS

Participants

We analyzed data from the “Digital Health Awareness and Demand Survey” conducted from October 2023 to February 2024 by the Digital Cancer Center at Chung-Ang University Hospital, Seoul, South Korea. This anonymous online survey did not focus on any specific digital health program. Instead, it examined participants’ awareness and needs regarding the general concept of digital health applicable to various purposes and aimed to provide insights for improving clinical care, research, and digital health systems. Patients with cancer were recruited through hospital bulletin boards and cancer support group websites. HCPs involved in cancer care or research participated via announcements from professional societies. A total of 408 responses were received, with 404 valid responses (response rate: 99.0%)—200 patients with cancer and 204 from HCPs.

A power analysis indicated that with a medium effect size of 0.15, $\alpha = 0.05$, power = 0.95, and 10 predictors, the required sample size for a regression analysis was 172. Assuming a 15% data loss due to poor response quality (e.g., short completion times or uniform answers), 202 participants per group were targeted.

Measures

Dependent variables

DH-Intention to use was assessed by asking “How interested are you in using digital health for patients with cancer? (1 = not at all; 5 = very much so).” To ensure participants had a basic understanding of digital health, we presented them with a 20-second description of digital health before assessing their willingness to use it (**Supplementary Data 1**). Thus, digital health knowledge was assessed before the presentation of the question, whereas willingness to use and demand for each topic were measured after presenting the description.

Independent variables

The demographic factors included as independent variables were gender, age, years of education, income, and marital status.

DH-Awareness was assessed by the question, “Have you heard of digital health for patients with cancer? (yes or no).” Digital health understanding (DH-Understanding) was assessed by asking, “Do you understand what digital health for patients with cancer means? (1 = I have no idea; 4 = I have a very good idea).”

Digital literacy was measured using a self-assessment tool, Digital Literacy Competence (DLC), which is a self-administered questionnaire consisting of three subfactors from the awareness domain: DLC-Value, DLC-Self-efficacy, and DLC-Affect.²⁰ DLC-Value assesses the perceived usefulness of learning through Internet activities (e.g., for education or leisure). The DLC-Self-efficacy assesses an individual’s proficiency in online activities (e.g., reading, writing, searching for information, and communication). The DLC-Affect assesses the enjoyment from online activities and interactions, like preferences for reading/writing online and comfort with online communication. All 15 items are rated on a 4-point Likert scale ranging from 1 to 4. The awareness domain showed high reliability, with Cronbach’s $\alpha = 0.89$. Cronbach’s α for DLC-Value, DLC-Self-efficacy, and DLC-Affect were 0.72, 0.83, and 0.89, respectively.²⁰

Demand for digital health topics

To determine cancer patients' need for digital health topics, we asked, "If you were to use digital health, how much would you need the following topics? (1 = not necessary at all; 5 = very necessary)." Participants were presented with seven topics based on previous research^{5,21}; information and education, psychological issues, communication issues, physical symptom issues, family and social support, hospital facilities and services, and transportation and cost assistance services.

Statistical analysis

Before regression analysis, Pearson's correlation and multicollinearity diagnostics confirmed no multicollinearity among continuous variables. To examine the influence of digital literacy and digital health knowledge on DH-Intention to use, hierarchical linear regression analyses were conducted using DH-Intention to use as the dependent variable. Model 1 tested the association between demographic factors and DH-Intention to use. Factors related to digital health knowledge were added to Model 2 to test the effects of digital health knowledge beyond the demographic factors. Model 3 included DLC sub-factor scores to evaluate the additional impact of digital literacy. Analyses were conducted separately for patients with cancer, HCPs working with cancer patients, and all participants. Statistical significance was set at $\alpha = 0.05$ (two-sided). All analyses were conducted using the SPSS version 28 (IBM Corp., Armonk, NY, USA).

Ethics statement

The study protocol was approved by the Institutional Review Board (IRB) of Chung-Ang University (IRB No. 1041078-20240416-HR-083), which waived informed consent as only de-identified survey data were used. The study adhered to the Declaration of Helsinki.

RESULTS

Participant characteristics

Table 1 summarizes the participants' demographic factors, digital health knowledge, DLC scores, and demands for each topic. The patient sample was predominantly composed of individuals with breast and thyroid cancer, while the HCP sample primarily included physicians and nurses working in tertiary general hospitals (**Supplementary Table 1**).

Only 32.5% of patients with cancer had previously heard of digital health, and only 25.5% had a moderate understanding of it (scored 3 or higher on a 1–4 Likert scale). Among the HCPs, 66.7% were aware of digital health, and 51.0% had moderate knowledge; however, nearly half (49.0%) reported limited knowledge. Both patients with cancer and HCPs showed a strong willingness to use digital health, scoring 4.03 ± 0.90 and 3.98 ± 0.67 , respectively, on a 1–5 Likert scale.

Regarding the demand for each topic, patients with cancer reported the highest need for "family and social support" and "transportation and cost assistance service," while HCPs reported the highest need for "communication issues" and "information and education." Compared with the HCPs, the cancer patient group reported a significantly higher need for digital health for "psychological issues," "family and social support," "hospital facilities and services," and "transportation and cost assistance services."

Table 1. Participants' demographic and DH-related factors (N = 404)

Variables	Total (N = 404)	Patients (n = 200)	Healthcare providers (n = 204)	Statistics	
				t/χ^2	P
Gender (female)	314 (77.7)	172 (86.0)	142 (69.6)	15.67	< 0.001***
Age, yr	44.61 ± 11.19 (22–73)	49.89 ± 11.56 (22–73)	39.44 ± 7.95 (24–63)	10.57	< 0.001***
Years of education, yr	16.35 ± 2.68	14.71 ± 2.49	17.97 ± 1.70	–15.35	< 0.001***
Income (> 40,000 USD/year) ^a	224 (55.4)	73 (36.5)	151 (74.0)	57.55	< 0.001***
Marital status (living with a partner)	260 (64.4)	136 (68.0)	124 (60.8)	2.29	0.130
DH-Awareness (yes)	201 (49.8)	65 (32.5)	136 (66.7)	47.16	< 0.001***
DH-Understanding, score	2.23 ± 0.84	1.94 ± 0.80	2.51 ± 0.79	–7.28	< 0.001***
DH-Intention to use, score	4.00 ± 0.74	4.03 ± 0.80	3.98 ± 0.67	0.60	0.546
DLC, score					
DLC-Value	16.36 ± 2.15	16.42 ± 2.31	16.29 ± 1.98	0.59	0.557
DLC-Self-efficacy	16.13 ± 2.50	16.16 ± 2.80	16.10 ± 2.18	0.23	0.819
DLC-Affect	12.38 ± 3.80	13.15 ± 4.00	11.62 ± 3.44	4.11	< 0.001***
DLC-Total	44.87 ± 6.73	45.73 ± 7.59	44.02 ± 5.66	2.56	0.011*
Demand for each topic					
Information and education	4.23 ± 0.70	4.21 ± 0.72	4.25 ± 0.69	–0.50	0.616
Psychological issues	4.25 ± 0.77	4.38 ± 0.71	4.14 ± 0.81	3.14	0.002**
Communication issues	4.31 ± 0.71	4.37 ± 0.70	4.26 ± 0.72	1.42	0.156
Physical symptom issues	4.27 ± 0.76	4.34 ± 0.77	4.22 ± 0.74	1.59	0.113
Family and social support	4.31 ± 0.77	4.42 ± 0.75	4.20 ± 0.76	2.84	0.002**
Hospital facilities and services	4.30 ± 0.75	4.39 ± 0.73	4.21 ± 0.77	2.40	0.017*
Transportation and cost assistance services	4.31 ± 0.72	4.42 ± 0.69	4.20 ± 0.73	3.17	0.002**

Values are presented as number (%) or mean ± standard deviation (range).

DH = digital health, DLC = Digital Literacy Competence.

^aIncome was categorized as below or above 40,000 USD per year based on the nominal median annual household income in South Korea in 2024.

*P < 0.05, **P < 0.01, ***P < 0.001.

Results from hierarchical linear regression analyses

Hierarchical regression results are summarized in **Table 2** (patients with cancer), **Table 3** (HCPs), and **Table 4** (total sample). Only the final models (Model 3) are presented here, as they best reflect the integrated influence of demographic factors, digital health knowledge, and digital literacy on DH-Intention to use. Detailed results from Models 1 and 2 for each group are provided in **Supplementary Data 2**.

Table 2. Hierarchical linear regression analysis of intention to use DH among patients with cancer (N = 200)

Independent variables	Model 1				Model 2				Model 3			
	B	Beta	t	P	B	Beta	t	P	B	Beta	t	P
Demographic factors												
Gender (female)	–0.03	–0.01	–0.21	0.833	–0.08	–0.04	–0.53	0.599	–0.13	–0.05	–0.82	0.410
Age, yr	0.00	–0.04	–0.44	0.659	0.00	–0.04	–0.53	0.595	0.00	0.07	0.88	0.381
Years of education, yr	0.05	0.17	2.14	0.033*	0.05	0.15	1.89	0.060	0.03	0.09	1.15	0.250
Income (> 40,000 USD/year)	0.23	0.14	1.91	0.057	0.21	0.13	1.72	0.086	0.13	0.08	1.16	0.249
Marital status (living with a partner)	–0.27	–0.16	–2.15	0.033*	–0.27	–0.16	–2.11	0.036*	–0.28	–0.16	–2.31	0.022*
DH knowledge												
DH-Awareness (yes)					0.13	0.07	0.82	0.413	0.04	0.03	0.30	0.762
DH-Understanding, score					0.13	0.12	1.35	0.178	0.11	0.11	1.25	0.215
Digital literacy												
DLC-Value									0.09	0.25	3.11	0.002**
DLC-Self-efficacy									0.03	0.11	1.27	0.207
DLC-Affect									0.02	0.11	1.41	0.161
Statistics of the model	F = 3.775**, R ² = 0.089				F = 3.767**, R ² = 0.121, F Change = 3.504*, R ² Change = 0.032				F = 6.180***, R ² = 0.246, F Change = 10.505***, R ² Change = 0.126			

DH = digital health, DLC = Digital Literacy Competence.

*P < 0.05, **P < 0.01, ***P < 0.001.

Table 3. Hierarchical linear regression analysis of intention to use DH among healthcare providers (N = 204)

Independent variables	Model 1				Model 2				Model 3			
	B	Beta	t	P	B	Beta	t	P	B	Beta	t	P
Demographic factors												
Gender (female)	0.27	0.18	2.56	0.011*	0.25	0.17	2.44	0.016*	0.26	0.18	2.56	0.011*
Age, yr	0.00	0.03	0.37	0.715	0.00	0.00	0.01	0.990	0.00	0.00	0.03	0.976
Years of education, yr	0.02	0.05	0.54	0.589	0.00	-0.01	-0.12	0.904	0.00	-0.01	-0.11	0.915
Income (> 40,000 USD/year)	0.06	0.04	0.51	0.611	0.02	0.02	0.19	0.852	-0.01	-0.004	-0.05	0.959
Marital status (living with a partner)	0.11	0.08	0.90	0.367	0.11	0.08	0.89	0.374	0.14	0.10	1.17	0.245
DH knowledge												
DH-Awareness (yes)					-0.02	-0.01	-0.16	0.875	0.04	0.03	0.33	0.743
DH-Understanding, score					0.22	0.25	2.83	0.005**	0.17	0.20	2.21	0.029*
Digital literacy												
DLC-Value									0.02	0.06	0.73	0.466
DLC-Self-efficacy									0.04	0.11	1.37	0.173
DLC-Affect									0.01	0.07	1.00	0.317
Statistics of the model	F = 1.988, R ² = 0.048				F = 3.084**, R ² = 0.099, F Change = 5.594**, R ² Change = 0.051				F = 2.943**, R ² = 0.132, F Change = 2.453, R ² Change = 0.033			

DH = digital health, DLC = Digital Literacy Competence.

*P < 0.05, **P < 0.01.

Table 4. Hierarchical linear regression analysis of intention to use DH among all participants (N = 404)

Independent variables	Model 1				Model 2				Model 3			
	B	Beta	t	P	B	Beta	t	P	B	Beta	t	P
Demographic factors												
Gender (female)	0.20	0.11	2.30	0.022*	0.19	0.11	2.20	0.028*	0.14	0.08	1.73	0.085
Age, yr	0.00	0.02	0.38	0.708	0.00	0.01	0.18	0.860	0.00	0.06	1.10	0.272
Years of education, yr	0.03	0.11	1.78	0.076	0.01	0.04	0.69	0.488	0.01	0.03	0.58	0.564
Income (> 40,000 USD/year)	0.13	0.09	1.47	0.142	0.09	0.06	1.06	0.288	0.06	0.04	0.69	0.487
Marital status (living with a partner)	-0.09	-0.06	-1.02	0.311	-0.09	-0.06	-1.01	0.311	-0.08	-0.05	-0.99	0.325
DH knowledge												
DH-Awareness (yes)					0.02	0.01	0.19	0.847	0.06	0.04	0.64	0.521
DH-Understanding, score					0.15	0.17	2.48	0.013*	0.12	0.13	2.05	0.041*
Digital literacy												
DLC-Value									0.06	0.16	2.93	0.004**
DLC-Self-efficacy									0.03	0.11	1.79	0.074
DLC-Affect									0.03	0.14	2.61	0.009**
Statistics of the model	F = 2.729*, R ² = 0.033				F = 3.630**, R ² = 0.060, F Change = 5.721**, R ² Change = 0.027				F = 7.484***, R ² = 0.160, F Change = 15.544***, R ² Change = 0.100			

DH = digital health, DLC = Digital Literacy Competence.

*P < 0.05, **P < 0.01, ***P < 0.001.

Among patients with cancer

Digital literacy explained an additional 12.6% of variance in DH-Intention to use, beyond the effects of demographic factors and digital health knowledge. DLC-Value was positively associated with the DH-Intention to use ($P = 0.002$). Additionally, living with a partner was negatively associated with DH-Intention to use ($P = 0.022$). This model explained 24.6% of variance in DH-Intention to use. Further, the relative influence of the significant variables was defined as the magnitude of the absolute value of the standardized coefficient β . Comparisons showed that the variables influenced DH-Intention to use in the following order: DLC-Value ($\beta = 0.25$) and living with a partner ($\beta = -0.16$).

Among HCPs

Digital literacy explained an additional 3.3% of variance in DH-Intention to use, beyond the effects of demographic factors and digital health knowledge. None of the DLC subfactors were significantly associated with DH-Intention to use. Additionally, female gender ($P =$

0.011) and DH-Understanding ($P = 0.029$) continued to be positively associated with DH-Intention to use. This model explained 13.2% of variance in DH-Intention to use. Comparisons showed that the variables influenced DH-Intention to use in the following order: DH-Understanding ($\beta = 0.20$) and female gender ($\beta = 0.18$).

Among the total participants

Digital literacy explained an additional 10.0% of variance in DH-Intention to use, beyond the effects of demographic factors and digital health knowledge. The DLC-Value ($P = 0.004$) and DLC Affect scores ($P = 0.009$) were positively associated with DH-Intention to use. Additionally, DH-Understanding remained positively associated with DH-Intention to use ($P = 0.041$). Female gender was not statistically significant in Model 3. This model explained 16.0% of variance in DH-Intention to use. Comparisons showed that the variables influenced DH-Intention to use in the following order: DLC-Value ($\beta = 0.16$), DLC-Affect ($\beta = 0.14$), and DH-Understanding ($\beta = 0.13$).

DISCUSSION

Both patients with cancer and HCPs showed strong willingness to use digital health services. A significant positive association existed between high digital literacy and the DH-Intention to use, particularly DLC-Value among patients, and DLC-Value and DLC-Affect among all participants. Furthermore, higher DH-Understanding was associated with increased DH-Intention to use among HCPs and all participants. Awareness of digital health was lower in patients with cancer than in HCPs. Interestingly, the total DLC score was higher for patients with cancer than for HCPs, suggesting that those comfortable with digital services may lack specific digital health knowledge. Patients reported the highest need for family and social support, and transportation and cost assistance, while HCPs prioritized information, education, and communication issues. Patients also expressed significantly higher needs in psychological support, hospital services, and accessibility.

Systematic reviews report unmet needs in patients with cancer, especially for psychological support, education, and physical well-being.^{5,6} A Korean multicenter study similarly found needs in symptom education, coping, and financial guidance.¹⁸ Compared to other samples, this study showed lower demand for information and education but higher needs in social support, cost, and accessibility—likely due to patient characteristics such as region, education, cancer type, and income. Most patients were recruited from university hospitals in Seoul, where participants had higher education and digital literacy, possibly reducing unmet informational needs.²² Instead, they may seek digital health solutions in areas like social support, transportation, and financial help. Korean studies have found that patients with advanced cancer or those undergoing multiple treatments report a greater need for social and psychological supportive services.^{21,23} Although this study did not directly assess cancer stage owing to self-reported inaccuracy, the university hospital setting likely included patients with advanced disease, who typically require greater psychological, financial, and transportation support. Prior research also shows that women and younger patients report higher psychosocial needs, while lower-income patients have greater cost and accessibility needs and challenges.²¹ In this study, 63.5% of participants had incomes at or below the median, and 86% were female (mostly with breast cancer), which may explain the heightened demand for financial support, psychosocial care, and practical assistance such as transportation and childcare.²⁴

The topics with the highest demand among the HCPs were information, education, and patient communication. Physicians (60.3% of HCPs) recognized the importance of accurate information, but faced time and resource constraints. Prior studies have shown that poor-quality online health information can mislead patients, causing confusion and encouraging harmful self-diagnosis.^{25,26} These constraints contribute to the strong demand for digital health solutions that support more effective information sharing, education, and communication with the patients.^{18,26,27}

Among the patients with cancer, linear regression analysis indicated that digital literacy (Model 3) explained the greatest variance in digital health usage intention. This finding aligns with studies showing higher digital health literacy scores among users compared to nonusers and that digital literacy and ongoing therapy are key drivers of digital health engagement.^{16,18,28} Other research studies suggest that patient engagement in digital health is a combination of individual motivation, personal values, patient involvement strategies, and intervention effectiveness, with increased digital literacy strengthening personal values and thereby boosting engagement.¹⁹

Furthermore, there were significant positive associations between high digital literacy and digital health usage intention, particularly the DLC-Value subfactors among patients with cancer, and DLC-Value and DLC-Affect among all participants. Notably, DLC-Value was positively associated with cancer patients' intentions to use digital health, suggesting that they value the convenience and usefulness of obtaining information and learning from the Internet rather than their own proficiency in online tasks (measured by DLC-Self-efficacy) or the pleasure derived from interacting online (measured by DLC-Affect). Unlike when analyzing the patient and HCP groups separately, both DLC-Value and DLC-Affect were significantly associated with digital health usage intentions when analyzing all participants. Analysis of the demand for each topic across all participants revealed a high demand for communication problems and family and social support. The DLC-Affect scale assesses pleasure derived from being online and interacting on the Internet, reflecting the need to use digital health to enhance communication and social interaction among patients, HCPs, and caregivers.²⁹

In the patient group, digital literacy was significantly associated with digital health usage intention, whereas among the HCPs, understanding digital health played a more crucial role than digital literacy. These findings suggest that promotional strategies should differ by group. For patients, especially older adults and those in rural areas, tailored services and broader inclusion are needed.¹⁷ Infrastructure improvements, including affordable and reliable Internet access, are essential.¹⁷ Education and training in community settings can further enhance engagement.¹⁷ While improving digital literacy is important for patients, providing HCPs with in-depth knowledge and training may be more effective. Addressing their concerns, clarifying benefits, and offering hands-on experience can facilitate adoption.¹⁰ Involving HCPs in development and offering stakeholder incentives may also support uptake.¹⁵

Among demographic characteristics, not having a partner was associated with higher willingness to use digital health among patients. Studies found that divorced, single, or separated individuals had greater unmet needs in areas like access to HCPs, education, and psychological support compared to married patients.³⁰⁻³² This suggests that partners provide important psychological and informational support during cancer treatment, which may lead patients without partners to seek these needs through digital health services. Among

the HCPs, female participants showed a higher willingness to use digital health. However, since almost all the medical staff, except doctors, were female in this study, this trend may reflect occupational rather than sex-related differences. Supporting this interpretation, a national survey found that 84.7% of nurses expressed the need for digital health compared to only 59% of the doctors.³³ These findings indicate that future studies should analyze willingness by occupation to clarify whether such differences are driven primarily by gender or professional roles.

The findings revealed that digital literacy and understanding of digital health significantly affected participants' willingness to use these services and highlighted the key limitations of current digital health approaches. The mismatch between patient needs (social support, cost assistance, and transportation) and HCP priorities (information and education) suggests that existing one-size-fits-all programs may fail to effectively address diverse user requirements. Additionally, the finding that DLC-Value is more important than DLC-Self-efficacy among patients with cancer indicates that current platforms may over emphasize technical proficiency rather than demonstrating practical value and convenience.

Based on these results, future digital health models should adopt differentiated, user-centered approaches. For patients, platforms should prioritize features that enhance social connectivity peer support networks, and practical assistance tools (cost guidance and transportation) while also ensuring clear communication of convenience and usefulness, rather than requiring advanced technical skills. For HCPs, systems should focus on tools that facilitate effective information delivery and patient education along with efficient patient communication systems. Implementation strategies should include tailored digital literacy programs and comprehensive HCP training that not only demonstrate practical benefits but also facilitate and integrate digital tools into the clinical workflow.

This study has certain limitations. First, most participants were from Seoul, a large city with high access to information, thereby limiting generalizability. Second, the sample was dominated by breast cancer patients, limiting insight into other cancer types. Third, many physicians among the HCPs, and other medical professions were underrepresented; thus, occupational influence. Fourth, reliance on self-reported data introduces a potential reporting bias. Fifth, we did not examine the actual users of digital health programs (e.g., patients, family members, or caregivers), which may affect the feasibility and acceptability. Future studies should include more diverse samples across geographical regions, cancer types, and healthcare professionals and assess differences in perceptions and needs according to user type. In addition, large-scale surveys of patients with cancer and HCPs with direct digital health experiences can be warranted to evaluate satisfaction, the intent to continue use, and secure desired improvements.

Digital literacy and understanding of digital health significantly affected participants' willingness to use these services. To promote the adoption of digital health among patients with cancer, it is essential to enhance digital literacy, provide services that align with patient needs, and clearly communicate the usefulness and benefits of such services. HCPs can benefit from comprehensive education and training by integrating digital health into their specialties and practices.

SUPPLEMENTARY MATERIALS

Supplementary Data 1

Digital healthcare description

Supplementary Data 2

Hierarchical regression – Model 1 and 2 details

Supplementary Table 1

Types of cancer among patients and occupation/workplace characteristics of healthcare providers

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