Clinical Trial/Experimental Study

Medicine

OPEN

Effects of a mobile health coaching intervention on symptom experience, self-management, and quality of life in breast cancer survivors

A quasi-experimental study

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Abstract

Background: Patients diagnosed with breast cancer in South Korea have a longer post-diagnosis survival period compared to those in the United States and Europe. Therefore, it is essential to establish an effective posttreatment care system to enhance their quality of life (QOL). This study aimed to evaluate the effectiveness of a mobile health coaching intervention designed to improve symptom experience, self-management, and QOL in patients with breast cancer following the active phase of their treatment.

Methods: This study was a quasi-experimental, pre–post design conducted with breast cancer patients receiving treatment at a tertiary general hospital in Korea from July 2021 to June 2022. Participants were sequentially assigned to the control and intervention groups. Those in the intervention group participated in a 12-week mobile health coaching intervention comprising education sessions, peer support groups, and recording a health diary. The outcome variables were symptom experience, self-management, and QOL. Data were collected at baseline (T0), after the intervention (T1), and 3 months after the intervention (T2) and compared using repeated analysis of variance.

Results: Seventy-four participants (mean age 46.93 years) who had completed the active phase of cancer treatment were included. The intervention group showed a significant decrease in symptom experience, from 1.57 ± 0.46 (T0) to 1.03 ± 0.46 (T1) ($P = .006$), and a decrease in psychological symptoms from 1.71 ± 0.93 (T0) to 1.66 ± 0.69 (T2) ($P = .049$). Self-management scores significantly increased from 74.43 ± 10.72 (T0) to 76.90 ± 11.99 (T2) ($P = .028$). QOL improved from 95.83 ± 18.62 (T0) to 96.40 ± 15.35 (T2) ($P = .015$), and emotional well-being increased from 17.42 ± 4.91 (T0) to 17.50 ± 3.63 (T2) ($P < .001$), with all showing significant group × time interactions.

Conclusions: The 12-week mobile health coaching program significantly reduced symptoms, improved self-management, and enhanced overall QOL and emotional well-being in breast cancer survivors who had completed primary treatment. These findings highlight the program's potential to support posttreatment recovery. Further research is needed to assess its long-term effects across diverse patient populations and cancer types to validate its broader effectiveness.

Abbreviations: ANOVA = analysis of variance, FACT-B = Functional Assessment of Cancer Therapy-Breast, MSAS-SF = Memorial Symptom Assessment Scale-Short Form, PIH = partners in health, QOL = quality of life.

Keywords: breast cancer, mobile health, quality of life, self-management, symptom burden

1. Introduction

Breast cancer is the most common cancer among women worldwide, accounting for approximately 24.2% of all female cancers. In South Korea, 29,391 new cases of breast cancer were diagnosed in 2021, making it the leading cancer type among women.[1] The 5-year relative survival rate for

This work was supported by the National Research Foundation of Korea (NRF, website: www.nrf.re.kr/eng/index) and funded by the Korean government (MSIT; No. 2018R1A2B6004553). This award was received by JHP. The funders had no role in study design, data collection and analysis, decision to publish, or manuscript preparation.

The authors have no conflicts of interest to disclose.

The datasets generated during and/or analyzed during the current study are not publicly available, but are available from the corresponding author on reasonable request.

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How to cite this article: Park J-H, Bae SH, Jung YS, Hur MH, Kim JY, Jung SJ. Effects of a mobile health coaching intervention on symptom experience, self-management, and quality of life in breast cancer survivors: A quasi-experimental study. Medicine 2025;104:12(e41894).

Received: 13 April 2024 / Received in final form: 27 February 2025 / Accepted: 28 February 2025

http://dx.doi.org/10.1097/MD.0000000000041894

breast cancer in South Korea has improved to 94.3% due to early detection and active adjuvant therapy.[1] The incidence rate of breast cancer in the United States is highest among women aged 55 to 64 years, whereas in South Korea, the highest proportion of affected women is aged 40 to 49 years, accounting for approximately 10.5% of all cases.[1] These data indicate that patients diagnosed with breast cancer in South Korea have a longer post-diagnosis lifespan than those in the United States. Therefore, establishing a posttreatment recovery program for patients who survive treatment is important.[2]

Breast cancer survivors who have undergone primary treatments, including surgery and chemotherapy, can typically sustain their health and lead normal lives.[3–5] However, many patients with breast cancer encounter challenges, such as physical issues (e.g., tiredness, discomfort, and problems with sleep), psychological concerns (e.g., stress, depressive states, fear, and diminished self-esteem), and social obstacles (e.g., isolation and difficulties in returning to work) as a result of treatment.[6–8] These issues can significantly impact the adaptability and quality of life (QOL) of those navigating life post-diagnosis, impeding their recovery process.[2] In addition, patients with breast cancer have a higher risk of exposure to secondary cancer or other chronic diseases, such as cardiovascular disease, diabetes, and osteoporosis, than individuals without cancer; they also have a high recurrence rate. Accordingly, preventive measures are important to manage health issues that arise due to sequelae after primary treatment and maintain a healthy life.[9] A successful transition from being a patient with breast cancer to a breast cancer survivor requires support in overcoming the physical and psychological challenges during the transition period, helping patients perform adaptive functions and enabling them to overcome difficulties with positive strength.[10] This is crucial for improving long-term health and reducing the impact of residual treatment effects, stress, and emotional distress. Effective support can also mitigate the risk of mental health issues, such as anxiety and depression, enhance resilience, and increase QOL during the recovery phase.[10]

With the advancement of the internet over the past 2 decades, studies on mobile-based self-management programs for patients with cancer and other chronic diseases have increased.[11–15] Moreover, mobile-based intervention can be tailored to meet the individual needs of patients, improving patient engagement and facilitating self-management by providing access to information within a short period without any constraints.[13,16] Patients transitioning from being patients with cancer to survivors following the completion of primary treatment have ongoing needs for management and education. However, they cannot receive adequate services due to time and space constraints and a lack of awareness. Additionally, engaging in traditional in-person education or support groups offered by cancer centers becomes challenging for breast cancer survivors because of the need to resume their everyday lives and duties.[3,13] Mobile health programs offer continuous access to personalized health information, symptom tracking, medication reminders, and emotional support, enabling patients to manage their health more effectively, even after returning to their daily lives. By providing tailored advice and feedback, these apps help patients remain engaged in their recovery process, monitor potential health changes, and make informed decisions, enhancing their overall QOL posttreatment.[13,16]

In this study, we developed and applied a mobile health coaching program that facilitated self-management and quickly acquiring information with no time and space constraints. This study aimed to elucidate the effect of a mobile health coaching intervention to reduce symptom experience and improve self-management, and QOL in patients with breast cancer following the active treatment phase.

2. Methods

2.1. Study design

This study employed a quasi-experimental pretest–posttest design to evaluate the effects of a mobile health coaching intervention on symptom experience, self-management, and QOL in breast cancer survivors who had completed primary treatment.

2.2. Study setting

This study was conducted at a university-affiliated tertiary hospital with a specialized cancer center and more than 1000 beds. The role of the hospital as a tertiary care facility allowed for the efficient recruitment of participants from regional and national levels within a short timeframe while also offering an optimal setting for long-term follow-up.

2.3. Study participants

This study included patients diagnosed with breast cancer who had undergone mastectomy at a University Medical Center. The inclusion criteria were as follows: (1) adults aged 19 to 64 years with stage I, II, or III breast cancer; (2) individuals who had completed primary cancer treatments, including chemotherapy and radiotherapy (excluding hormone therapy), within the past month; (3) individuals who owned a mobile phone with app accessibility; and (4) those who could understand Korean written questionnaires and communicate effectively. The exclusion criteria were: (1) individuals with recurrent or metastatic cancer and (2) those with mental health conditions, such as depression or psychosis. Participants were recruited from the hospital's patient registry between July and December 2021, focusing on those who had completed adjuvant cancer therapy within the previous month. Eligible participants who provided written informed consent were matched based on their cancer stage and assigned sequentially to the groups. To prevent contamination of the intervention, participants registered between July and September 2021 were assigned to the control group, while those registered between October and December 2021 were assigned to the intervention group sequentially with a time gap.

2.4. Sample size

The sample size for each group was determined using Cohen formula based on statistical power analysis and planned statistical testing methods. The calculation was performed with a significance level (α) of.05, statistical power (1-β) of.80, and effect size (f) of .25, selected based on previous studies.[17,18] For repeated-measures analysis of variance (ANOVA) with 3 measurements, the required sample size was 56 participants. Considering a dropout rate of 30%, estimated from similar longitudinal studies, 74 participants were recruited, with 37 assigned to each group.

2.5. Measurements

2.5.1. Symptom experience. The Memorial Symptom Assessment Scale-Short Form (MSAS-SF)[19] was used to measure symptom experience. This is a patient-rated instrument in which patients rate symptom distress associated with 28 physical symptoms and the frequency of 4 psychological symptoms 7 days before the assessment. The number of symptoms was determined by screening for 32 symptoms during each interview. If a symptom was absent, a score of 0 was assigned. Physical symptom distress was rated on a Likert scale (not at all: 0.8; a little bit: 1.6; somewhat: 2.4; quite a bit: 3.2; and very much: 4.0). The frequency of psychological symptoms was scored as rare (1), occasional (2), frequent (3), or almost constant (4). The

overall score was calculated by averaging the responses to all 32 questions, with higher scores indicating greater distress caused by symptoms. The MSAS-SF had a Cronbach α value of 0.91 in a previous study[20] and 0.94 in this study.

2.5.2. Self-management. Self-management was assessed using the Korean version of the partners in health (PIH) questionnaire,[21] which consisted of 12 items rated on an 8-point scale. The total score ranged from 0 to 96, with higher scores indicating better self-management. When initially developed, the PIH scale had a Cronbach α score of 0.82,[21] which subsequently increased to 0.90.[22] In this study, the Cronbach α score was 0.86.

2.5.3. QOL. We measured QOL using the Functional Assessment of Cancer Therapy-Breast (FACT-B).[23] FACT-B is a breast cancer-specific health-related QOL instrument within the FACIT system. It consists of 37 items divided into 5 subscales: physical well-being (7 items), social/family well-being (7 items), emotional well-being (6 items), functional well-being (7 items), and breast cancer-specific concerns (10 items).[24] Each item is rated on a 5-point Likert scale ranging from 0 ("not at all") to 4 ("very much"). The total FACT-B score was obtained by summing the scores of all 5 subscales, with a possible score range of 0 to 148, where higher scores indicate better QOL. The Korean version of FACT-B had a Cronbach α of 0.67 to 0.90 at adoption[23] and 0.80 to 0.89 in this study.

2.6. Study procedure

2.6.1. Recruitment and pretest. A total of 91 patients were screened for eligibility at the outpatient clinic of the cancer center based on the inclusion criteria. Patients who met the criteria were provided with a detailed explanation of the study's purpose and procedures. Those who provided written informed consent were sequentially assigned to either the control or intervention group using a matching method based on cancer stage. Of the 91 patients, 17 declined to participate, and 74 were enrolled, with 37 patients assigned to each group. The pretest was conducted via a face-to-face questionnaire survey, in which participants self-reported their symptom experience, self-management, and QOL using the MSAS-SF, PIH, and FACT-B. Additionally, a research assistant reviewed medical records to collect data on disease and treatment characteristics.

2.6.2. Providing mobile health coaching intervention. Patients in the intervention group were invited to participate in a 12-week mobile health coaching intervention. They also received an individual education session on how to use the program. The intervention officially began when patients used the URL in the invitation email to register on the mobile application. The intervention was a 12-week cognitive-behavioral program to improve symptom experience, self-management, and QOL. The responsive design of the app allowed access across various devices and displays (including mobile phones, tablets, and computers), accommodating different screen sizes.[25] The purpose of this intervention was to help individuals return to daily life and adapt by improving symptom management strategies, preventing secondary cancer after primary treatment, and learning to cope with uncertainties about the future while living with cancer. The intervention comprised 3 sections The first section provided education and information on managing symptoms commonly experienced by breast cancer survivors and returning to healthy daily life. The second section involved communication for psychosocial support, providing access to a community with self-help groups and a team of health experts for consultation, including primary physicians, oncology nurses, exercise specialists, and dietitians. The third section comprised a health diary (self-monitoring) for personalized self-management, aimed at improving the self-management of patients with breast cancer.

2.6.2.1. Education. Education and information were provided for managing the symptoms and health issues that breast cancer survivors typically experience and helping them return to a healthy daily life. Symptom management education related to pain, lymphedema, chemotherapy-related amenorrhea, insomnia, cognitive decline, fatigue, and emotional stress, such as depression and anxiety, which most breast cancer survivors experience. For health management, the educational information related to nutrition and diet, exercise, bone health, weight management, breast cancer, sexual activity, and coping with recurrences. The third component entailed providing information to help the transition back to daily life, including information regarding follow-up tests after the completion of primary treatment, community-based programs, social welfare support systems, and other recent information.

2.6.2.2. Health coaching. This section included both communities for peer support and those featuring health professionals. The peer support section was designed to enable patients to adapt and return to daily life as they shared their experiences with others and to achieve psychological well-being as they searched for ways to cope with treatment sequelae or persistent symptoms. Community health experts offered personalized information, emotional support, and counseling to enhance knowledge and self-efficacy. They also motivated patients to implement sustained self-management.

2.6.2.3. Health diary. A health diary was created to help participants take control of their health by tracking their symptoms daily and setting goals to change lifestyle behaviors. Patients indicated how well they followed their daily health practices from a provided list of activities. Maintaining a health diary encourages patients to participate actively in their care and manage their health independently.

The entire intervention was delivered through a mobile application. Participants in the intervention group were instructed to engage with the education and health coaching components at least twice per week, where information was continuously updated to align with patient needs. They were also required to record their health diaries at least 3 times per week to monitor their self-management practices. To enhance user engagement, login frequency and usage duration were systematically tracked, and participants received regular feedback via text messages and emails to encourage consistent utilization of the program. To prevent contamination between study groups, access to the mobile health coaching program was restricted exclusively to the intervention group, requiring login credentials for secure access.

2.6.3. Management of control group. In the control group, education was provided via brochures during outpatient visits and routine care. Moreover, the control group was allowed to use the mobile health coaching intervention to receive education and consultation upon completing the follow-up survey.

2.6.4. Posttest and follow-up test. After the intervention program ended, data collection was conducted through a posttest survey by a research assistant who was blinded to the group allocation of participants (intervention or control group). Similarly, a follow-up test was conducted 3 months after the intervention, with data collection performed by a blinded research assistant to maintain objectivity.

Six patients in the control group and 4 in the intervention group withdrew for various reasons, including failure to complete the intervention (n = 4), unwillingness to continue participation (n = 4), and loss to follow-up (n = 2), resulting in

an 86.5% retention rate (intervention: 33/37, control: 31/37). However, all 37 participants in both the intervention and control groups were included in the data analysis using the intention-to-treat approach. The study flow is illustrated in Figure 1

2.7. Statistical analysis

All main analyses were intention-to-treat. Data were analyzed using IBM SPSS Statistics (version 25; IBM). Baseline differences were explored using *t* tests and χ^2 tests. Independent *t* tests were used to analyze differences in self-management, symptom experience, and QOL between the 2 groups at each time point after intervention completion. A repeated-measures ANOVA was conducted to examine trends in self-management, symptom experiences, and QOL between the 2 groups at various time intervals. If a significant interaction between time and group was observed, post hoc multiple comparisons were performed using Bonferroni adjustment. To evaluate the effect size of the intervention, Cohen d was determined following the protocol established for designing studies with pre- and post-intervention control groups. A value of 0.2 is considered a small effect, 0.5 is a medium effect, and 0.8 is a large effect.[26]

2.8. Ethical considerations

This study was conducted after obtaining approval from the Institutional Review Board of a university hospital in South Korea (IRB No. AJOUIRB-SUR-20190-453). The research was conducted in accordance with the Code of Ethics of the World Medical Association (Declaration of Helsinki). The purpose, procedures, and duration of the study were explained to participants in writing, and they were informed that they could withdraw at any time without repercussions. They were assured that the collected data would not be used for any purpose other than this research to protect their privacy. Participants who understood the guidelines and volunteered to participate were enrolled in this study. Written informed consent was also obtained from each participant after clarification of the study objectives and activities.

3. Results

3.1. Patient characteristics

A total of 74 patients with breast cancer were included in the analysis. Most participants were aged 40 to 49 (62.2%), had a college education or higher (58.1%), were unemployed (68.9%), and had a spouse (85.1%). The proportion of participants who felt they could afford treatment was 64.9%. Additionally, most patients were at stage 1 (48.6%), had no underlying diseases (75.7%), and did not receive chemotherapy (79.7%) or targeted therapy (78.4%). However, a high percentage of the participants had received adjuvant chemotherapy (58.1%), radiotherapy (89.2%), and hormone therapy (94.6%). Most patients had undergone breast-conserving surgery (64.9%). The data in this study showed no significant differences in demographic and disease-related characteristics between the control and intervention groups. Patient characteristics are shown in Table 1.

3.2. Homogeneity test of dependent variables

The pretest survey results confirmed the homogeneity between the intervention and control groups, with no significant differences in QOL (t = –0.38, *P* = .707), symptom experience (t = 0.34, *P* = .733), and self-management (t = 0.31, *P* = .758). Table 2 presents the homogeneity test results for the dependent variables.

At baseline, self-management scores were relatively high, with mean values of 74 in the intervention group and 73 in the control group (out of 100), indicating moderate to good self-management skills. Physical symptom distress was rated between "not at all" and "a little bit," suggesting mild distress.

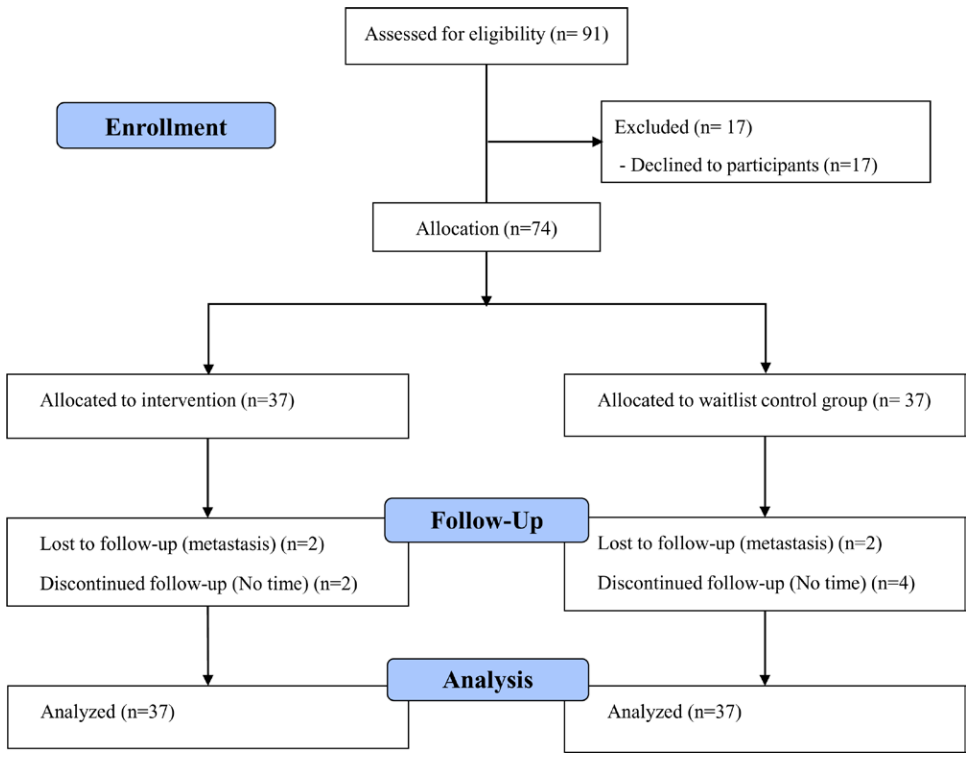

Figure 1. Flowchart of participants through the study.

Table 1

Homogeneity test of sociodemographic and disease-related characteristics between intervention and control groups among breast cancer survivors in Korea (N = 74).

Characteristics	All participants (n = 74)	Intervention group (n = 37)	Control group (n = 37)	χ^2 or t	*P*
		N (%) or mean ± SD			
Age (years)	46.93 ± 6.95	47.11 ± 5.80	46.76 ± 8.01	0.22	.830
< 40	9 (12.1)	4 (10.8)	5 (13.5)	2.93	.431*
40 ≦, <50	46 (62.2)	23 (62.2)	23 (62.2)		
50 ≦, < 60	14 (18.9)	9 (24.3)	5 (13.5)		
60 ≦	5 (6.8)	1 (2.7)	4 (10.8)		
Educational level					
High school or below	31 (41.9)	13 (35.1)	18 (48.6)	1.39	.239
College or higher	43 (58.1)	24 (64.9)	19 (51.4)		
Religion					
No	37 (50.0)	22 (59.5)	15 (40.5)	2.65	.104
Yes	37 (50.0)	15 (40.5)	22 (59.5)		
Employment status					
No	51 (68.9)	26 (70.3)	25 (67.6)	0.06	.802
Yes	23 (31.1)	11 (29.7)	12 (32.4)		
Spousal status					
No	11 (14.9)	4 (10.8)	7 (18.9)	0.96	.327
Yes	63 (85.1)	33 (89.2)	30 (81.1)		
Economic burden					
No pressure at all	19 (25.7)	10 (27.0)	9 (24.3)	1.38	.589*
Affordable	48 (64.9)	25 (67.6)	23 (62.2)		
A great deal of pressure	7 (9.4)	2 (5.4)	5 (13.5)		
Underlying diseases					
No	56 (75.7)	26 (70.3)	30 (81.1)	1.18	.278
Yes	18 (24.3)	11 (29.7)	7 (18.9)		
Neochemotherapy					
No	59 (79.7)	28 (75.7)	31 (83.8)	0.75	.386
Yes	15 (20.3)	9 (24.3)	6 (16.2)		
Adjuvant chemotherapy					
No	31 (41.9)	18 (48.6)	13 (35.1)	1.39	.239
Yes	43 (58.1)	19 (51.4)	24 (64.9)		
Targeted therapy					
No	58 (78.4)	31 (83.8)	27 (73.0)	1.28	.259
Yes	16 (21.6)	6 (16.2)	10 (27.0)		
Radiotherapy					
No	8 (10.8)	2 (5.4)	6 (16.2)		.261*
Yes	66 (89.2)	35 (94.6)	31 (83.8)		
Hormone therapy					
No	4 (5.4)	0 (0.0)	4 (10.8)		.115*
Yes	70 (94.6)	37 (100.0)	33 (89.2)		
Breast cancer stage					
Stage 1	36 (48.6)	17 (45.9)	19 (51.4)	0.59	.802*
Stage 2	29 (39.2)	16 (43.2)	13 (35.1)		
Stage 3	9 (12.2)	4 (10.8)	5 (13.5)		
Surgical method					
Mastectomy	26 (35.1)	9 (24.3)	17 (45.9)	3.80	.051
Breast conservative surgery	48 (64.9)	28 (75.7)	20 (54.1)		

* Fisher exact test.

In contrast, psychological symptoms occurred with a frequency between "occasionally" and "frequently," indicating a moderate psychological symptom burden. Additionally, QOL scores exceeded the midpoint, suggesting that participants had a relatively good QOL before the intervention.

3.3. Effects of mobile health coaching intervention

3.3.1. Symptom experience. The repeated-measures analysis revealed a significant interaction effect between group and time (F = 5.83, *P* = .006), indicating that outcome changes differed between the 2 groups over time. In the intervention group, symptom experience significantly decreased compared to the control group (F = 5.83, *P* = .006).

Psychological symptoms were also significantly reduced in the intervention group (F = 3.41, *P* = .049). However, no significant difference was observed between the groups in the reduction of physical symptoms.

Effect size analysis showed a moderate effect for symptom experience, increasing from 0.5 at T1 to 0.7 at T2. Similarly, the effect size for psychological symptoms increased from 0.1 at T1 to 0.5 at T2, indicating a moderate effect (Table 3).

3.3.2. Self-management. The repeated-measures analysis indicated a significant interaction effect between group and time on self-management scores (F = 4.01, *P* = .028), suggesting that changes differed between the 2 groups over time. The intervention group showed a continuous increase in self-management from pretest to posttest and the 3-month follow-up. In contrast, the control group experienced a steady decline over time. Effect size analysis indicated a moderate effect, increasing from 0.3 at T1 to 0.6 at T2, reflecting a greater improvement in the intervention group.

3.3.3. QOL. The repeated-measures ANOVA demonstrated a statistically significant interaction effect between group and time for overall QOL (F = 4.74, $P = .015$) and emotional well-being (F = 11.38, $P < .001$), while no significant interactions were observed for other QOL subdomains. In the intervention group, overall QOL and emotional well-being scores exhibited a slight decline at posttest but subsequently improved at follow-up, exceeding baseline levels. Conversely, the control group showed a continuous decline in overall QOL and emotional well-being across all time points. Effect size analysis indicated a moderate effect for overall QOL, increasing from 0.5 at T1 to 0.6 at T2, reflecting sustained improvement. Emotional well-being demonstrated a more pronounced effect, increasing from 0.6 at T1 to 0.9 at T2, suggesting a substantial impact of the intervention.

4. Discussion

In this study, we examined the effects of a mobile health coaching intervention on self-management, symptom experience, and QOL in patients with breast cancer following their primary treatment phase. The findings revealed that the intervention improved self-management skills, reduced the severity of symptoms experienced, and enhanced QOL in breast cancer survivors, aligning with previous studies[17,18] on mHealth self-management interventions for cancer survivors. Mobile app-based interventions help alleviate common cancer-related symptoms, including pain, fatigue, psychological distress, and sleep disturbances, by integrating self-management strategies that enhance patient engagement and adherence to care plans.[17,18] In this study, participants in the intervention group demonstrated significant reductions in overall symptom experience scores, with moderate effect sizes sustained for up to 3 months after the intervention. Psychological symptom scores increased in the control group. In contrast, they consistently decreased in the intervention group, underscoring the potential of targeted interventions in addressing psychological distress, a critical yet often unmet need for cancer survivors. This positive outcome may be partly attributed to the program's peer support component, which enabled participants to form in-app self-help groups, share experiences, and provide mutual emotional support. Similar findings from previous studies highlight the benefits of peer interaction in digital health interventions, as social support improves coping strategies and emotional well-being among patients with cancer.[16,18,27]

Survivors of breast cancer frequently experience persistent physical symptoms (e.g., pain, insomnia, and fatigue) and psychological challenges (e.g., anxiety, depression, and worry), which decrease their QOL.[16,28,29] The accessibility and flexibility of mobile self-management programs help address these challenges by allowing patients to engage with interventions at their convenience, thereby enhancing adherence and engagement.[30] Given these findings, future research should explore the long-term impact and optimal design features of mHealth interventions to maximize support for cancer survivors. Developing digital health programs that integrate tailored self-management tools, psychological support, and community engagement could further empower survivors to anticipate, manage, and cope more effectively with disease-related challenges, ultimately enhancing their QOL and long-term well-being.[31]

Second, the mobile health coaching intervention in this study effectively enhanced the self-management abilities of patients in the intervention group, with sustained moderate effect sizes even 3 months post-intervention. This aligns with previous studies indicating that mobile health interventions can improve self-management skills among patients with cancer, aiding health issue management and symptom alleviation. For instance, a systematic review by Shi et al.[32] identified self-monitoring as a commonly utilized component in mHealth app-based interventions, which significantly supports symptom self-management in this patient population. Similarly, Luo et al.[10] found that mobile health-based self-management interventions significantly improve self-management behaviors

Table 2

Pretest homogeneity of symptom experience, self-management, and quality of life scores between intervention and control groups among breast cancer survivors in Korea (N = 74).

	Intervention group (n = 37)	Control group (n = 37)		
Variables	Mean ± SD	Mean ± SD	t	*P*
Quality of life	95.83 ± 18.62	92.49 ± 20.60	-0.38	.707
Physical well-being	20.84 ± 4.57	20.89 ± 5.36	-0.05	.963
Social/family well-being	17.84 ± 6.12	17.41 ± 6.04	0.19	.853
Emotional well-being	17.42 ± 4.91	15.55 ± 4.58	-0.33	.743
Functional well-being	17.30 ± 4.96	16.08 ± 6.20	1.70	.094
Breast cancer specific	21.43 ± 5.65	22.57 ± 6.69	-0.79	.433
Symptom experience	1.57 ± 0.46	1.53 ± 0.43	0.34	.733
Physical symptom	1.46 ± 0.42	1.46 ± 0.45	0.02	.986
Psychological symptom	1.33 ± 0.96	1.73 ± 1.06	-1.70	.094
Self-management	74.43 ± 10.72	73.68 ± 10.35	0.31	.758

Quality of life: FACT-B score at pre-intervention.
Symptom experience: MSAS-SF score at pre-intervention.
Self- management: PIH score at pre-intervention.

Table 3

Effects of the mobile health coaching intervention on quality of life, symptom experience, and self-management among breast cancer survivors in Korea (N = 74).

	T1	T2	Intervention group (n = 37)			Control group (n = 37)			G * T
Variables	(*d*)	(*d*)	T0	T1	T2	T0	T1	T2	*F(p)*
Quality of life	0.5	0.6	95.83 ± 18.62	94.71 ± 19.93	96.40 ± 15.35	92.49 ± 20.60	90.61 ± 15.86	89.47 ± 17.85	4.74 (.015)*
Physical well-being	0.2	0.1	20.84 ± 4.57	21.46 ± 3.83	22.08 ± 3.74	20.89 ± 5.36	20.41 ± 5.02	21.35 ± 4.50	0.57 (.549)*
Social well-being	0.2	0.5	17.84 ± 6.12	17.51 ± 5.90	17.91 ± 4.94	17.41 ± 6.04	16.24 ± 5.06	14.98 ± 4.15	2.76 (.086)*
Emotional well-being	0.6	0.9	17.42 ± 4.91	17.30 ± 4.92	17.50 ± 3.63	15.55 ± 4.58	15.23 ± 5.14	14.48 ± 5.32	11.38 (<.001)*
Functional well-being	0.2	0.2	17.30 ± 4.96	17.11 ± 5.66	17.11 ± 5.66	16.08 ± 6.20	16.03 ± 5.42	16.02 ± 5.40	1.11 (.296)*
Breast cancer specific	0.0	0.1	21.43 ± 5.65	21.27 ± 6.67	22.01 ± 5.95	22.57 ± 6.69	22.70 ± 5.92	22.63 ± 5.29	0.22 (.765)*
Symptom experience	0.5	0.7	1.57 ± 0.46	1.05 ± 0.47	1.03 ± 0.46	1.53 ± 0.43	1.28 ± 0.45	1.34 ± 0.41	5.83 (.006)*
Physical symptoms	0.3	0.5	1.46 ± 0.42	1.01 ± 0.53	0.99 ± 0.41	1.46 ± 0.45	1.19 ± 0.62	1.25 ± 0.59	2.44 (.100)*
Psychological symptoms	0.1	0.5	1.71 ± 0.93	1.72 ± 0.86	1.66 ± 0.69	1.73 ± 1.06	1.87 ± 0.93	2.16 ± 0.71	3.41 (.049)*
Self-management	0.3	0.6	74.43 ± 10.72	74.93 ± 12.59	76.90 ± 11.99	73.68 ± 10.35	70.93 ± 13.43	68.55 ± 15.33	4.01 (.028)*

G = group; T = time.
* Greenhouse–Geiss.

and health-related QOL in patients with breast cancer. These studies corroborate our findings, underscoring the critical role of self-management skills in helping patients with breast cancer maintain daily functioning and mitigate treatment-related adverse effects.

Integrating a health diary, continuous monitoring, and real-time feedback from researchers was a pivotal component of our intervention. This strategy facilitated effective self-management among participants and empowered them to engage actively in their care. The real-time feedback mechanism provided personalized guidance, enabling participants to adjust their self-care practices promptly.[33] Unlike some mobile health programs that rely solely on automated feedback or periodic check-ins, our intervention incorporated direct, real-time monitoring by researchers, potentially enhancing its effectiveness.[34] This distinction underscores the importance of integrating personalized expert feedback into mobile health coaching interventions for survivors of breast cancer. By incorporating these elements, our intervention effectively supported participants in managing their health more proactively and efficiently.

Finally, the mobile health coaching intervention improved the QOL of patients with breast cancer. In particular, participants in the survivorship coaching program showed improvement in QOL immediately after the intervention and up to 3 months following its completion. For emotional well-being, a subdomain of QOL, the effect sizes at both post-intervention and 3-month follow-up assessments were moderate or higher. This positive outcome may be attributed to the psychological support provided through peer group interactions, stress management strategies included in the educational content, and the use of a health diary for self-reflection.[27,31,32] These findings are similar to those of previous studies on an applied 8-week mindfulness-based cognitive therapy program and a 12-week mobile app-based education and symptom management training program, which reported improved QOL in patients with breast cancer.[17,35,36] The decline in QOL and emotional well-being in the control group emphasized the need for monitoring and promotional plans to support the QOL of cancer survivors who must adapt and return to daily life. Patients with breast cancer face difficulties in maintaining their QOL due to various physical, psychological, social, and economic challenges during the disease.[32] Factors that influence QOL among patients with breast cancer include their capacity for self-management and experiences with symptoms.[5,37]

A key strength of this study was the development of a mobile health coaching program that addressed temporal and spatial limitations, enabling real-time education and intervention. The program supported health diary maintenance, self-monitoring, and motivation for adopting a healthy lifestyle. Additionally, unrestricted access to peer support and expert groups provided emotional support, helping to alleviate psychological symptoms. Conducted at a specialized cancer center within a tertiary general hospital, the study ensured clinical validity and demonstrated the program's potential for broader implementation in diverse cancer populations. The program effectively enhanced self-management and alleviated symptoms, ultimately improving patients' QOL. These findings highlight the need for multidimensional strategies in clinical practice to strengthen self-management and reduce symptom burden.

Nonetheless, the results of this study should be interpreted with caution due to the following limitations. First, this study assessed the effectiveness of the program only in patients with breast cancer recruited from a single university hospital, which limits the generalizability of our findings. The sample consisted of patients who had completed primary treatment, had access to mobile devices, and were able to participate in self-reported assessments, which may not fully represent individuals with more severe symptom burdens or those facing barriers to digital health interventions. Future research should aim to include a more diverse sample from multiple healthcare settings to enhance external validity. Second, the study sample consisted of relatively healthy participants with good baseline QOL and self-management skills. This may have resulted in an underestimation of the intervention's effectiveness, as participants likely already had the capacity to manage their symptoms, thereby reducing the magnitude of observed improvements. Moreover, variations in symptom burden, prior treatment history, and psychosocial factors may have influenced individual responses to the intervention. Future research should include a more diverse patient population, particularly those with greater symptom distress or lower self-management capacity, to better evaluate the intervention's effectiveness across different subgroups. Third, this study relied on self-reported questionnaires to evaluate improvements in QOL, symptom experience, and self-management ability. This method may introduce subjective biases, as responses may be influenced by participants' perceptions rather than objective measurements. To strengthen the validity of the findings, future research should incorporate additional assessment methods such as clinician evaluations, interviews, or physiological indicators. Despite these limitations, this study provides valuable insights into the potential benefits of mobile health coaching interventions in breast cancer survivorship care. Future research should aim to refine the intervention to address diverse patient needs and ensure its applicability to a wider population.

5. Conclusions

The 12-week mobile health coaching program led to a reduction in psychological symptoms and improvements in self-management skills, overall QOL, and emotional well-being among breast cancer survivors by facilitating peer interaction and providing real-time feedback tailored to user convenience. Based on these findings, healthcare providers should consider integrating mobile health coaching interventions into standard survivorship care to reduce symptom burden, enhance self-management, and improve QOL in patients with breast cancer. Future research should explore the long-term effects of such interventions across diverse patient demographics and cancer types while identifying the most effective program components. Policymakers should support the development and implementation of digital health interventions by providing funding, regulatory frameworks, and clinical guidelines to ensure accessibility, efficacy, and security. Strengthening digital health support for breast cancer survivors can ultimately lead to improved health outcomes and QOL.

Acknowledgments

We thank the participating patients and staff at the Department of Breast Cancer Surgery at Ajou University Hospital.

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