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Mobile Applications to Promote Mental Health among Breast Cancer Patients: A Rapid Review

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ABSTRACT

Background: The use of mobile services for health promotion is rapidly increasing. The purpose of this paper is to review studies on using cell phone applications as an intervention to improve mental health in breast cancer patients and to provide an overview of their effectiveness.

Methods: A systematic search in PubMed, Scopus, Web of Science and PsycINFO was performed to retrieve relevant studies published from 2010 to 2020. The criteria for inclusion were any study conducted on breast cancer, written in English and on mental health. The meta-synthesis of the articles was conducted based on a predefined classification. Then from the selected studies, the following information was extracted: authors, publication date, study objectives, study population, study design, interventions, and results.

Results: Overall, 81 papers were retrieved from databases, 46 articles were reviewed, and finally 7 articles were selected for analysis. We identified 7 RCT studies that utilized a mental health application as a mental health intervention in breast cancer patients. The results showed the effectiveness of mobile apps on stress, depression, anxiety, self-efficacy, social support, resiliency and coping with breast cancer in all the studies which were analyzed.

Conclusion: This study demonstrated the important role of mobile apps in promoting mental wellness of breast cancer patients. Mobile app interventions can be implemented to decrease depression through positive impacts on stress management, self-efficacy, resilience and breast cancer adaptation. We recommend that the role of mobile apps for the prevention and rehabilitation of mental health aspects in breast cancer patients should be examined through a blended delivery management approach in future studies.

INTRODUCTION

Diagnosis and subsequent treatment of cancer often involves physical and psychosocial challenges and side effects such as fatigue, malaise, aches, stress, distress, anxiety, neurosis, and depression.[1,2]

Numerous studies have shown that people who survive life threatening diseases, especially health conditions which exclusively affect women (i.e., breast and gynecologic malignancies), need special psychological care and social support[3] which are most

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commonly neglected or not sufficiently provided.[4] About half of the women diagnosed with breast cancer experience significant levels of depression or anxiety, especially in the first year of cancer diagnosis[5,6] and the untreated symptoms may lead to poor quality of life.[7,8] Research shows evidence for incremental increase in the risk of depression, anxiety, suicide, neurocognitive and sexual dysfunction in those surviving breast cancer compared to women with no history of cancer.[9,10] Untreated stress may also result in a decrease in treatment adherence, poor quality of life[11] and increasing healthcare costs.[12]

Studies have shown that psychosocial care such as cognitive-behavioral therapy[13] and acceptance-based treatment[14,15] can reduce the psychological symptoms of breast cancer patients.[16] Mindfulness techniques have been shown to effectively reduce anxiety symptoms in individuals who have survived cancer[17] and also reduce the symptoms of depression in patients who are in their early stages of breast cancer.[18] Nevertheless, face-to-face communications in conventional mental health services raise a number of barriers such as high financial costs[19] and social stigma.[20] In fact, face-to-face mental health care models are not sufficient to respond to the growing demand on mental health resources required for the cancer population. Although mental health and support applications can solve significant medical gaps, few studies have investigated the impact of mental health applications on people with cancer.[21]

According to the literature, distress intervention to relieve stress by mobile technology remains an important necessity in cancer patients.[21] Healthcare organizations and communities are significant providers of supportive services to cancer patients as well as caregivers and most of them have started providing services through virtual tools such as phone or the internet.[22]

Other investigations have shown that digital interventions aimed at improving individualization and coping skills are most likely to have a positive effect on cancer survivors, and that expert interventions are more efficacious than self-guided interventions.[23] Mobile health (m-health) is the most common type of cancer-related application for breast cancer patients.[21]

Numerous studies have showed the effectiveness of app-based intervention to reduce feeling-related symptoms in the general population.[23,24] For instance, app-based mediation minimizes the obstacles in traditional face-to-face interventions for cancer survivors, as it is less costly, and eliminates logistics issues such as travel and planning, as well as being easier to use. In other words, the treatment can be started earlier and patients with varying paces can still benefit from the program. Moreover, the issue of distance between patients and the available and eligible therapists can be diminished.[25] Randomized-controlled trials have illustrated the effectiveness of app-based interventions to reduce symptoms of anxiety and depression.[25,26]

In the meantime, there have been some systematic reviews demonstrating the significant role of mental health apps in monitoring and management of mental health symptoms and disorders.[27,28] M health-based interventions provide benefits by ameliorating the quality of life and reducing stress among patients. Yet, the information available on the impacts of m Health apps on psychological aspects is not conclusive.[29,30] Considering the current controversial evidence, it seems difficult to deduce the effectiveness of mobile application in mental health. Therefore, this paper aims to provide a review of interventional studies examining the use of mobile applications to promote mental health among breast cancer patients.

METHODS

A range of different databases, as described below, were used to retrieve studies using mental health applications for women with breast cancer. The study included development of a search strategy, identifying and selecting studies, and reviewing studies to extracted information followed by summarizing results and recommendations. The extracted information (whenever available) included the author(s), date of publication, the country where the study was conducted, objective(s), research design, number of participants, mean age, stage of disease, treatment modality, assessment scale, app name, sample size in the intervention group, duration of intervention, and findings.

Search strategy

A comprehensive search was performed to retrieve published papers on app-based mental health interventions in breast cancer between January 2010 and 2020. Databases used in this study included PubMed, Scopus, PsycINFO and Web of Science. The search was based on English keywords including “m-health”, “mobile health”, “mobile app” and “mental health*”, “mental health treatment” and “program” “stress*”, “depress*”, “depression”, “depressive disorder”, “general * anxiety disorders”, “well-being” “wellbeing”, “emotional labor” , and “resilience”. Keywords used in the search strategy were extracted from preliminary searches according to the purpose of the investigation. Those keywords were validated and additional keywords were added by checking the terms used in the articles identified in preliminary searches.

Inclusion and exclusion criteria for study selection

Studies were included if they met the following criteria: 1) The focus of the study was on the women with breast cancer, 2) They were limited to those published in English. 3) RCT methods that involved mobile use for the purpose of mental health promotion 4) Only the articles on using m-health 4) All the interventional and original studies were published from 2010 to 2020.

Articles were excluded if they met the following criteria: 1) Studies without app interventions 2) Studies without research outcomes 3) Non-English papers 4) Studies that did not involve original research and RCT were excluded.

Data extraction phase

A preliminary search was conducted through the keywords entered in the respective databases, and 81 papers were retrieved from the following databases: 13 from PubMed, 34 from Scopus, and 34 from Web of Science. Overall, 35 articles overlapped in the initial search, leaving 46 articles for the review. The titles and abstracts of 46 articles were reviewed, and 18 of them met the selection criteria; based on the accessibility of the application, nine articles were selected after further exclusion of studiess in which the authors presented only the research design or preliminary report of their studies. Finally, seven articles were selected for analysis (Figure 1).

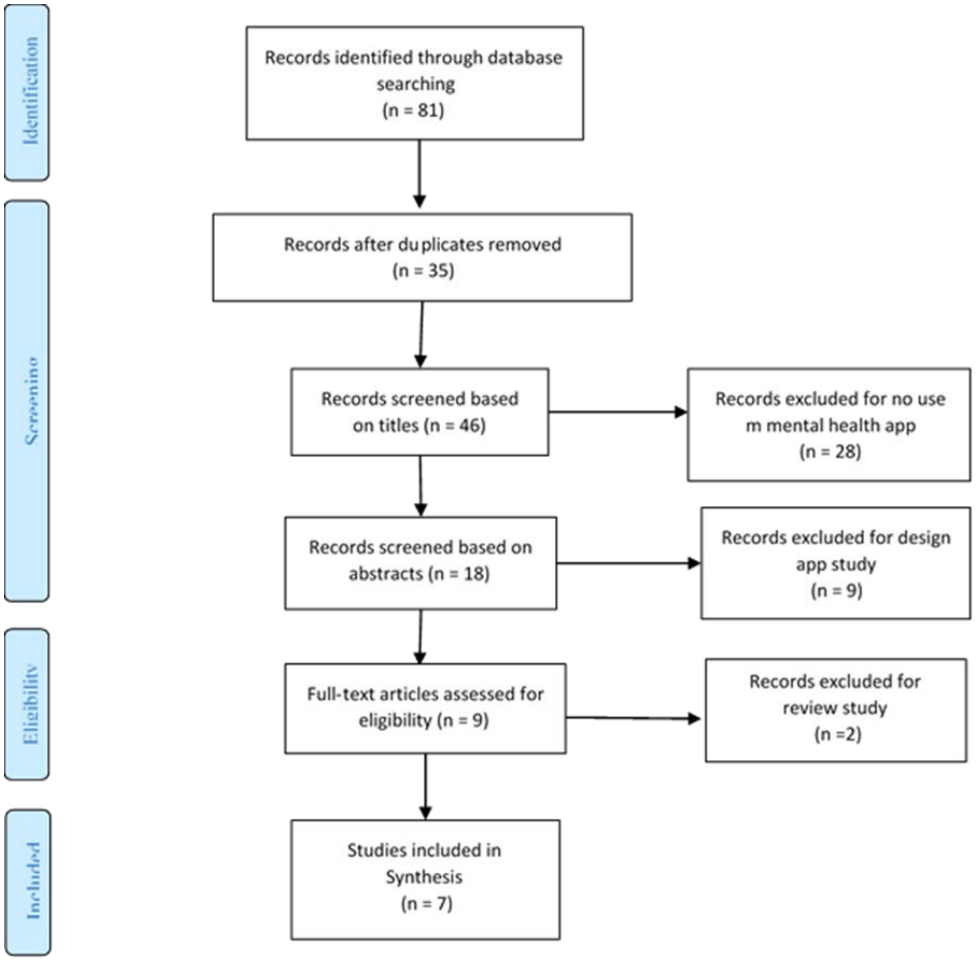

Figure 1. Flow diagram of identification, screening, eligibility, and inclusion of studies.

RESULTS

As shown in Table 1, the participants in the included studies were 44-59 years old women with breast cancer, were diagnosed with stage 1, 2 or 3 breast cancers for the first time, and completed cancer treatments such as surgery, chemotherapy or radiotherapy.

The outcome variables of the mobile application efficacy measurement were as follows: three articles on stress[31-33], seven articles on depression[34,35], five articles on anxiety[31,32,36], one article on quality of life[33], self-efficacy[32], social support[32,37], resiliency[29,36], and adjustment with cancer.[32,37] The intervention duration was also different, ranging between 6 and 24 weeks. More specifically, there were one 6-week study[32], one 7-week study[31], three 12-week studies[32,37], one three-month study[33], and one six-month study.[35]

Breast Cancer Electronic Support Program (BCS) (which is an Interactive Information Platform (IIP))[37],

Stress Proffen[33], and WeChat (available on mobile phones)[36], Vida (Vida Health) (a mobile health guidance application)[35], iCanThrive[32] and IntelliCare application[32] were some of mobile applications used in the included papers. Among these 7 articles, one of them was based on Bandura's theory of self-efficacy and social exchange theory[37], one was used in a study of the cognitive behavioral stress management module[33], and one study used cognitive-behavioral therapy and acceptance-based therapy[31], two studies[31,36] used Bandura's theory of self-efficacy and social exchange theory in the design of psychoeducation programs to optimize patient health outcomes; in one study[36], the Roy Adaptation Model (RAM) was used to train women with breast cancer for mental resilience.

One of the applications is e support for Breast Cancer Program (BCS)[37] which is an IIP mobile application (App) for Chinese women with breast cancer experiencing chemotherapy. BCS aims to improve women's self-efficacy and social support to improve their ability to control symptoms related to breast cancer diagnosis and chemotherapy, thereby improving their quality of life and mental health. The BCS program is a multi-component intervention, including learning forums, discussion forums, consulting forums, and personal story forums. BCS has four modules including a learning forum, an AsktheExpert forum and a personal story forum.

StressProffen[33] is an evidence-based cognitive-behavioral distress/stress management intervention. It also describes the 10 modules of StressProffen including the explanation of the nature of stress; some comments about quality of life and planning; thoughts, feelings, self-care; mindfulness, rational substitution of thought and guiding images; stress and coping; social support, humor, and meditation; anger management and conflict style awareness; decision and communication; healthy behavior and goal setting; and eventually review and summary. Participants can choose to read and listen to the program at any time. The program is optimized for smartphones and tablets.

Vida (Vida Health)[35] is a unique platform mobile health training application that focuses on improving wellbeing and health outcomes by connecting users with well-trained health coaches who use smartphones. After a one-month subscription, they can call, email and connect with their consultants every day. The goal is to provide affordable personalized health plans, real-time health support, and recommendations related to weight loss, improved nutrition, fitness, stress reduction, or management of other chronic health conditions. Coaches regularly hold video/phone consultations and provide daily motivation through information. Patients can track their medications, diet, exercise, sleep, and weight through the app and their coaches can provide feedback based on these data.

The iCanThrive app[26] was designed for clinical intervention to teach techniques to deal with pain, help patients and survivors of cancer to promote strengths and reduce their mental stresses. iCanThrive helps patients to learn techniques for emotional regulation, with additional facilities of self-reported sleep disorders and emotional self-efficacy. The main features of the app consist of eight practice modules. Each module focuses on specific aspects of mental health and well-being derived in the basic principles of cognitive-behavioral therapy (CBT), acceptance-based therapy and positive psychology.

IntelliCare[28] is an application focusing on the practice of new skills through psycho-educational or curriculum approaches. In Most IntelliCare apps, practical skills are prioritized over theory content and knowledge acquisition. Therefore, the user's practical skills can be promoted as soon as the interaction between the user and the app begins. This application is fundamentally a behavioral and psychological strategy app based on current evidence. The IntelliCare consists of 14 apps and includes 13 clinical apps designed to improve symptoms of depression and anxiety using effective treatment strategies and a "Hub" app that coordinates the user. The coach instructed patients to focus on the relevant issues and keep them from engaging in traditional counseling with the participants. The first coaching call that is about 30 minutes long is designed to construct a trusting relationship, instructing participants to download and use the app, setting expectations for the coach's role, and evaluating how the application would meet participants' needs. Participants can contact the mentors when they have any related question.

The iCanThrive application[34] was designed for clinical interpositions to teach skills to overcome pain and help patients and cancer survivors to improve their strength and relieve mental tension. IcanThrive can be a beneficial tool for patients in order to learn the skills of emotional adjustment, and has been evaluated as a complimentary facility for reporting sleep disturbances by patients as well as emotional impressions. The main function of the application is composed of eight practical modules. Each module focuses on a defined aspect of mental health and well-being that stems from the foundations of Cognitive Behavioral Therapy (CBT) acceptance-based therapy and positive psychology.

IntelliCare[32] is a program that focuses on the practice of new skills by means of a psychoeducational or curriculum approach.

Table 1. Characteristics of the included studies published on m-health between 2010 and 2020

Characteristics of study	**[32]**	**[31]**	**[32]**	**[36]**
Aim	evaluate the acceptability and preliminary efficacy of a novel app-based intervention with phone coaching in a women's cancer	Determine the effectiveness of an app-based breast cancer e-support program to women's self-efficacy, social support, symptom distress, quality of life, anxiety, and depression.	Evaluate the feasibility of mental health apps (IntelliCare) with phone coaching on psychosocial distress symptoms in patients recently diagnosed with breast cancer	Examine the effects of the cyclic adjustment training (CAT) CAT on psychological resilience, anxiety, and depression in women with breast cancer
Author (Year)	Philip I Chow, 2020	Jiemin Zhu, 2018	Philip I Chow, 2020	Kaina Zhou et al. /2019
Country of study	United States	China	United States	China
Research Design	single-group, pre-post study	Randomized Controlled Trial	Single-group, pre-post study	randomized controlled trial was
number of participants mean age ± SD (y)	28 survivors of women's cancer 59.6±10.5	104 breast cancer patients 54.7±131.4	40 breast cancer patients 56.8±11.6	66 patients 44.56±7.11
Stage of disease and methods of treatment	diagnosis of stage 1, 2, or 3 breast treatment: surgery, chemotherapy, or radiation	diagnosis of stage 1, 2, or 3 breast treatment: surgery and mastectomy, chemotherapy	diagnosis of stage 1, 2, or 3 breast	Treatment: Surgery, radical mastectomy and chemotherapy
Assessment-scale	● Depression Scale 10-item version ● Patient-Reported Outcomes Measurement Information ● Self-Efficacy for Managing Emotions and Sleep Disturbance.	● Stanford Inventory of Cancer Patient Adjustment ● Perceived Social Support ● Symptom distress with Anderson Symptom ● QoL Cancer Treatment-B ● Hospital Anxiety and Depression Scale	● General Psychological Distress (PHQ-4) ● Symptoms of Depression and Anxiety	● Connor-Davidson Resilience Scale ● Anxiety Scale Self-Rating Depression Scale
App name	iCanThrive	breast cancer e-support program	IntelliCare apps	WeChat
Intervention Group (N)	28 survivors of women's cancer used iCanThrive, which taught skills for coping with stress and enhancing well-being, with added phone coaching.	The breast cancer e-support program supported women for 12 weeks covering 4 cycles of chemotherapy.	7-week pre-post study of patients with breast cancer that used a 7-week IntelliCare apps and coaching.	Intervention group receiving CAT plus routine nursing care for 12 weeks
Period	6-week period	12 weeks	7-week	12 weeks
Result	There were significant decreases in symptoms of depression and sleep disruption. The iCanThrive app was launched a median of 20.5 times over the intervention period. Of the individuals who initiated the intervention, 87%	During the 12-week intervention, the log-in frequency ranged from 0 to 774 times, and the total usage duration ranged from 0 to 9371 min. Participants had significant better health outcomes at 3 months regarding self-efficacy, symptom interference, and quality of life but	There was a significant decrease in general distress symptoms, as well as symptoms of depression and anxiety. Participants reported high levels of ease of app use and learning. Scores for app usefulness and satisfaction were reinforced by some qualitative feedback	The CAT had positive effects on improving psychological resilience and reducing the symptoms of anxiety and depression, supporting its use as an effective psychological management and intervention strategy in the early stages of long-

	(20/23) completed the 6-week intervention.	not regarding social support, symptom severity, anxiety, and depression compared with care as usual participants	suggesting that tailoring the apps more for patients with breast cancer could enhance engagement.	term rehabilitation of post-surgical women with breast cancer.

characteristics of study	**[37]**	**[33]**	**[35]**
Aim	Determine the effectiveness of Breast Cancer e-Support to promote women's self-efficacy, social support and psychological well-being.	Evaluated the preliminary efficacy of StressProffen for stress-management in breast cancer patients.	Evaluated the efficacy of Vida on healthier lifestyle habits for breast cancer survivors.
Author/(Year)	Jiemin Zhu et al /2017	Elin Børøsund et al. /2020	Jamie Cairo et al. /2020
Country of study	China	Norway	US
Research Design	single-blinded, pre and repeated post	RCT	A nonrandomized 2-group control study design with pre-post repeated measures
Number of participants	n = 108	N = 172	N=127
Mean age ± SD (y)	56.7 ±9.8	52±11.2	56.7 years
Stage of disease and Methods of treatment	diagnosis of stage 1, 2, or 3 breast treatment: chemotherapy	Operation + Chemotherapy	Curative-intent (stage 0–III) breast cancer
Assessment-scale	Stanford Inventory of Cancer Patient Adjustment Perceived Social Support Anderson symptom Inventory Functional Assessment of cancer treatment-B Hospital anxiety and depression scale (HADS)	Comorbidity Questionnaire (SCQ-19) Perceived Stress Scale (PSS-14), Anxiety and Depression Scale (HADS) Health-related quality of life	Patient Health Questionnaire (PHQ-2) depression tool Godin-Shephard Leisure-Time Physical Activity Questionnaire
App name	Breast Cancer e-Support program	StressProffen	Vida
Intervention Group (N)	Allocated to intervention group in BCS + routine care and allocated to control group in r zaoutine care	Cancer survivors, maximum 1-year post treatment were randomized to StressProffen or a usual care control group.	An intervention group received a survivorship care plan and enrolled in a 6-month subscription to the health app and control group received the same information in a self-guided toolkit.
Period	12 weeks	30 minutes per day at 3 months	6-month
Result	The results provided a better understanding of the role of self-efficacy and social support in reducing symptom distress and of the credibility of using a theoretical framework to develop internet-based interventions.	App-based distress- and stress-management interventions such as StressProffen have the potential to significantly improve well-being for cancer survivors, especially when delivered within a blended care delivery model.	A live health-coaching app that provides wellness coaching can offer motivated breast cancer survivors. Mobile wellness coaching app with tailored individual and emotional support can be improvements in overall health and wellness habits.

Most IntelliCare apps prioritize practical skills over theoretical content and knowledge acquisition. Accordingly, as soon as the interaction between the user and the app begins, the user's practical ability can be improved. This application is an application of current evidence-based behavioral regarding the aspect of psychological strategy. IntelliCare consists of 14 apps and is composed 13 clinical apps designed to improve symptoms of depression and anxiety using effective treatment strategies as well as another app as a "Hub" to coordinate users. The coach teaches the users not to focus on irrelevant issues and keeps them from participating in conventional counseling with other participants. The 30-minute first coaching call is designed to build a trusting relationship, set expectations for the coach's role, evaluate how the application meets the participant's needs and help participants to download and use the application. When participants have any question about the application, they can contact the coach. A review of seven articles showed that mobile mental health apps have important effects on improving mental health. In the RCT conducted by Zhu *et al.*[37], Breast Cancer e Support program was used as a mobile app that provided patients with individually tailored information and support groups. The results showed that the app reduced symptoms such as pain and provided a better understanding of the role of social support and self-efficacy. In other words, this tool can provide patients with a reliable context for applying interventions based on the internet.

StressProffen was used in a blended delivery care model in a face-to-face introduction session by Børøsundeatl's *et al.*[33] implementing 10 application-based cognitive-behavioral stress management modules for 3 months with significant effects: reduction of stress and improvement of HRQoL. However, no significant changes were observed in anxiety and depression. The authors concluded that digitally based cancer stress management measures, such as the StressProffen, could provide easily accessible and effective psychosocial support for patients who have survived cancer.

Cairo *et al.*[35] suggested that periodic coordinated training (CAT) measures delivered via mobile devices improved psychological resilience and reduce symptoms of depression and anxiety in a female population after breast cancer surgery. CAT has had positive effects on improving psychological resilience and supporting the use of effective psychological management and intervention strategies in the early stages of long-term rehabilitation of women after breast cancer surgery.

Chow *et al.*[32] showed that the VIDA app allowed breast cancer survivors to access a health trainer which was more beneficial than a set of self-guided trainings. Online health sessions could help survivors reach significant goals such as reducing depression and maintaining a healthy lifestyle. The results showed that a direct health training application, which resulted in the boosted health care, could offer survivors a better mood. In another study, Chow *et al.*[34] showed that survivors who used Icanthrive showed significantly reduced depression symptoms and sleep disorders. The modular structure of the ICanthrive application and telephone coaching could help a large population of breast cancer survivors.

Zhu *et al.*[31] showed that breast cancer e support + care compared to treatment as usual showed significantly better health results in terms of self-efficacy and quality of life, but in terms of social support, anxiety and depression, it had no obvious impacts on participants during chemotherapy.

In the study by Zhou *et al.*[36], patients in the CAT group (WeChat) showed significantly improved psychological resilience, anxiety, and depression scores, compared to the control group. CAT had positive effects on improving psychological resilience and alleviating symptoms of anxiety or depression, supporting the early stages of long-term rehabilitation of women after breast cancer surgery.

Chow *et al.*[34] showed that interventions through mental health app (IntelliCare) dealing with telephone coaching, decreased psychosocial distress symptoms in patients recently diagnosed with breast cancer. The results of this study demonstrated how to support breast cancer patients using a scalable cell phone transfer program that provided additional phone support.

DISCUSSION

According to recently published data, about half of breast cancer patients already use the Internet for obtaining information[38], so Internet-based medical care can be beneficial in this field. Studies have shown that telemedicine interventions are superior to conventional treatment in breast cancer patients for improvement of QOL and self-efficacy, and relieving depression and distress.[39,40]

According to an analysis of the literature, programs including theory of Bandura's self-efficacy, cognitive behavior, acceptance-based therapy, positive psychology, psychological educations, RAM (Roy Adaptation Model), CAT (Cyclic Adjustment Training), and meditation techniques such as mindfulness can have a positive effect on patients and are vastly used in mental health app interventions and programs used on mobile apps.

These apps reduce stress, anxiety and depression, improve women’s self-efficacy, psychological resilience, quality of life, self-assertion and communication, and stress coping abilities. This is an

important issue in research on the mechanism of mobile apps. For example, e Support apps, which are designed for learning, Ask-the-Expert, telling personal stories and discussing, can be effective in decreasing depression and anxiety. The Learning Forum provides basic information and community support services for patients with breast cancer. Discussion forums and Ask Expert forums offer women with social networking facilities to discuss symptom management topics, share information and experiences, and, like other studies, patient's self-efficacy, thus increaseing self-efficacy and reducing stress and anxiety.[41,42]

StressProffen is another mobile app designed based on cognitive behavioral therapy, which aims to suggest solutions to control pain and stress, by actions such as mindfulness, social support, humor and meditation. These supports are delivered in a blended health care service model. Studies have shown that this method is a significant and efficient tool for relieving stress and anxiety among breast cancer patients.[43,44] Alternatively, the IntelliCare platform offers a series of technology-focused applications that are frequently and easily used with help features and educational and technical content and may reduce symptoms of depression and anxiety.[24]

Studies have shown that the Mental Health e-coaching is a system that generally aims to provide customized activities and, by the use of multimedia content, to assess the condition of patients, and promote good mental health for them.[45] For example, iCanThrive is an e-coaching app that provides a structure to coach calls and Vida is a mobile health-coaching app with a platform that focuses on improving health and wellness by offering regular videos, phone consultations as well as providing daily motivations through messaging.

Studies have shown that some of mobile apps are developed and designed to provide interventions, consultation services and education for improving mental health of breast cancer patients. For example, Breast Cancer e-Support program has a Learning forum, a discussion forum, an Ask-the-Expert forum, and a Personal Stories forum. The StressProffen has multiple modules like phone consulting sessions with trained coaches, motivating messages and so on. Similarly, IntelliCare has skills-based psychoeducational approaches that present mental and behavior therapies as well as social supports. iCanThrive app is composed of 8 exercise modules which allow users to learn more about the psychological construction and let them connect with other iCanThrive users through an anonymous discussion board, and phone coaching.

Studies have shown that mixed therapies are of great value for the improvement of well-being, optimized financial outcomes and routine mental health care.[46,47] Through real-time monitoring of patients' conditions, the programs send notifications of scheduled activities and can lead to an optimized compliance. The apps can trace patients' mood changes, participation in treatment, and treatment-related homework and customize the treatment for each patient which contributes to better interventions.[47] Generally, therapists have a positive view about blended therapies. In other words, they believe combinations of internet-based components together with face-to-face sessions are more beneficial compared to pure internet-based sessions.[48]

We limited the scope of the research by looking at specific databases and imposing a time on publications. These methodological choices resulted in the ability to perform an appropriate and structured study selection, data extraction and critical appraisal. Despite our best efforts, we may have missed some publications because we have searched PubMed, Scopus, PsycINFO and Web of Science, but not EMBASE, OVID and other electronic databases. Moreover, we did not assess the overlapping of primary studies in the included reviews. Although we rigorously followed the guidance for the conduct of rapid reviews, results from this study should be interpreted with caution. In addition, this analysis reviewed those apps which are in English, and may have missed apps developed for non-English speaking populations.

Almost all discussed mobile mental health applications were applied as a primary preventive intervention for mental health promotion in patients already diagnosed with cancer, not for patients diagnosed with mental illnesses. In the future, professional health care experts or health care organizations may develop mobile applications to diagnose mental health issues and treat them by psychotherapy approaches. In addition, we noticed a gap in publications on self-care mental health app interventions for women with breast cancer. We recommended developing a mental health app with different functions (e.g., education, communication, intervention and evaluation) for breast cancer patients.

Available evidence suggests that mental health interventions could be effective and provide an alternative to face-to-face psychological sessions to prevent and manage mental health problems in women with breast cancer. Few evidence-based interventions are available in the literature, and therefore, there is a need for good-quality clinical studies to guide future implementations.

CONCLUSION

The results indicate that app-based interventions are new trend tools for improving mental health and quality of life for women with breast cancer. The most important mechanism for this matter is using learning forums for providing basic information about breast cancer and community support services in mobile app-based interventions. Participants considered mobile phones effective, simple, and immediate tools in the learning process, and a new experience with learner-oriented features and flexibility in time, rate, and environment. Moreover, Mental Health E-coaching tries to provide customized activities and other mechanisms for supporting breast cancer patients with mental health. Wellness coaching is a novel patient-centered approach which can improve motivation and offer the needed support to help breast cancer survivors to achieve and sustain behavioral changes, leading to improved long-term outcomes. Mobile systems can be employed to raise patient levels of access to psychological support and remotely perform psychological interventions when patients are vulnerable. It is recommended to expand the use of telehealth programs, which can save time and cost. These programs are accessible and easily applicable by nurses. Finally, the literature showed that blended therapy is the main approach to deliver mental health services for women with breast cancer.

CONFLICT OF INTERESTS

The authors have no conflict of interest to declare.

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