The interventions for resilience of breast cancer patients: a systematic review and meta-analysis

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Abstract

Background

Breast cancer has now overtaken lung cancer as the world's mostly commonly-diagnosed cancer. With the increasing prevalence of breast cancer, the psychological problems of breast cancer patients have also received more and more attention from scholars. The aim of our study was to synthesis the available research evidence on the effectiveness of interventions designed to promote or enhance the resilience of breast cancer patients.

Methods

We performed a systematic and comprehensive search of 12 databases from inception to February 4,2021: Web of Science, PubMed, Embase, MEDLINE, Scopus, Cochrane Library, CINAHL, PsycINFO, Chinese National Knowledge Infrastructure (CNKI), China Biology Medicine disc (CBM), WanFang and VIP. We conducted a comprehensive qualification screening of the retrieved records and analysed all the included data using Review Manager Version 5.3 and STATA/SE Version 15.1.

Results

A total of 23 RCTs involving 2,002 women with stage I-III breast cancer met the eligibility criteria and 15 of them were included in the meta-analysis. The results showed that the effectiveness of resilience training program (SMD = 0.89; 95% CI 0.54, 1.24; $p < 0.00001$), health education delivered via mobile devices (SMD = 1.84; 95% CI 0.86, 2.82; $p = 0.0002$) and peer support (SMD = 2.62; 95% CI 0.61, 4.63; $p = 0.01$) in the experimental groups was better than that of the control groups. Furthermore, there were seven other kind of interventions which might contribute to improve resilience but with very few evidences available.

Conclusion

Our findings suggest that resilience training program, health education delivered via mobile devices and peer support are more effective than that of the routine nursing care in improving the resilience of breast cancer patients. In addition, this study cannot draw definitive conclusions regarding the effectiveness of other seven kind of interventions because the sample size in the included is small and cannot be conducted in the meta-analysis. More studies are needed in the future to clarify the effectiveness of these interventions.

Introduction

Breast cancer is the leading cause of cancer death in women worldwide [1]. It has now overtaken lung cancer as the world's most commonly-diagnosed cancer, according to statistics released by the International Agency for Research on Cancer (IARC) in December 2020 [2]. In 2018, there were an estimated 2.1 million new cases of breast cancer and 627,000 deaths from breast cancer worldwide [3]. Breast cancer patients faced with high level of pressure in psychological and social respects. Also, both

patients and their family undertook heavy economic and psychological burdens due to the painful and long process of disease diagnosis, treatment and rehabilitation. Breast cancer has adverse effects on patients' self-image, behavior, attitude towards life and quality of life [4]. Studies indicated that up to 50% of breast cancer patients suffered from significant psychosocial distress [5], and more than one-third of which developed anxiety (33.6%) and/or depression (58.6%) [6]. However, breast cancer still has a high chance of cure if diagnosed early and treated appropriately [2]. With the change of the social medicine model, the psychological problems of breast cancer patients have also received more and more attention from scholars.

Not everyone copes adversities in the negative way, many breast cancer patients may also develop resilience and produce positive psychological changes in the face of illness [7, 8]. Resilience, which is also known as psychological resilience, was proposed by American psychologist Anthony in the 1970s, and the American Psychological Society defines resilience as a process of 'bouncing back' from difficult experiences and 'adapting well in the face of adversity, trauma, tragedy, threats or significant sources of stress' [9]. In healthcare area, resilience were defined as "the capacity to adapt to challenges and changes at different system levels, to maintain high quality care" [10]. Resilience is a dynamic developmental process that promotes a successful adaptation to cancer-related adversity [8, 11]. Studies showed that psychological distress was the variable that most frequently linked to reductions in resilience, and there is a bidirectional relationship between them [8, 12, 13]. A survey study showed that breast cancer patients with poor resilience may have poor body images and suffer more severe adverse effects of systemic therapy, such as arm symptoms and breast symptoms, and hair loss [13]. Resilience is related to many factors such as sociodemographic, clinical, psychosocial and physiological aspects in women with breast cancer [8]. Resilience it not solely a quality within individuals; it also can be enhanced by the external support from others [14]. The evidence showed that the resilience of breast cancer patients is at a moderate or lower level currently [15–17]. Thus, resilience-promoting interventions should be obtained to improve breast cancer patients' psychological well-being.

Various psychosocial interventions to enhance resilience were found recently, such as mindfulness meditation, yoga exercises, a healthy diet, peer support, group meetings and group counseling [12]. However, there is no clearly evidence to summarize the specific effect of intervention measures for resilience of breast cancer patients, and overview of the quantitative studies on the interventions still lacks. In this study, we conducted a systematic review and meta-analysis using data from randomized controlled trials (RCTs). The aim of our study was to synthesis the available research evidence on the effectiveness of interventions designed to promote or enhance the resilience of breast cancer patients.

Methods

This review was adhered to the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) guidelines [18] (see Additional file 1).

Inclusion and exclusion criteria

We included published studies meeting the following criteria: (1) Participants: Women with breast cancer; (2) Intervention: Interventions which aim to improve psychological resilience; (3) Control: Routine/Basic nursing care, wait-list or no intervention; (4) Outcomes: Psychological resilience score; and (5) Study design: RCTs.

Studies were excluded if they met the following criteria: (1) Studies in which full-text were not available; (3) Studies which reported unextractable or unrelated raw data; (4) Studies were not published in English or Chinese; and (5) Studies where types were reviews/ editorials/ books/ theses/ case reports/ news etc.

Search strategy

We performed a systematic and comprehensive search of 12 databases from inception to February 4, 2021: Web of Science, PubMed, Embase, MEDLINE, Scopus, Cochrane Library, CINAHL, PsycINFO, Chinese National Knowledge Infrastructure (CNKI), China Biology Medicine disc (CBM), WanFang and VIP. Keywords or medical subject headings used in the search were as following: ["resilience" OR "mental resilience" OR "psychological resilience" OR "Mental Elasticity"] AND ["breast cancer" OR "breast carcinoma" OR "mammary cancer" OR "Breast Neoplasm" OR "Breast Tumor"] AND ["randomized controlled trial*" OR "randomized clinical trial*" OR "RCT" OR "randomized"]. In addition, the references in the articles were manually tracked for relevant studies. All articles were managed by EndNote X9 software. Two reviewers searched the databases and screened of the literature searches independently based on the agreed-on criteria. Any disagreements were resolved by discussion or referred to a senior reviewer. Detailed search strategies were listed in Additional file 2.

Data extraction and synthesis

All relevant published data from the studies were extracted and recorded on a standardized data extraction form using Microsoft Excel. The extraction included author, year, origin, sample size, age, stage of cancer, study object, intervention description and outcome measurement. All the data were extracted by two authors independently and checked by a third reviewer.

Quality assessment

Two investigators evaluated the risk of bias of each article independently using the RoB 2.0, which is the latest tool, developed by the Cochrane Handbook for Systematic Reviews of Interventions (Version 6, 2019) [19]. RoB 2.0 includes five domains and there are a series of "signalling questions" for each domain [19, 20]. The authors should reach a judgement after these questions were answered and assign one of three levels ("low risk of bias", "some concerns", "high risk of bias") to each domain. The overall judgement for the articles were mapped from the results within domains. Any disagreements or uncertainty was resolved through discussion or consulted a senior reviewer.

Statistical analysis

The meta-analysis was performed by using the Cochrane Collaboration Review Manager Version 5.3 and STATA/SE Version 15.1 (StataCorp, College Station, TX, USA). ALL the outcome data were presented as the mean $\pm$ standard deviation (SD) and were expressed as mean difference (MD), standard mean difference (SMD), weighted mean difference (WMD) and 95% confidence interval (CI) because they were all continuous variables. Tests for heterogeneity were assessed statistically by using the standard chi-squared test (χ^2 , or Cochran's Q test) and the I^2 statistic, with $p \leq 0.10$ or $I^2 > 50\%$ indicating significant heterogeneity. A random-effects model was selected to pool the effect of the interventions on resilience of breast cancer patients because of the heterogeneity of interventions used and timing of outcome measurements [21]. Subgroup analysis was performed to identify the sources of heterogeneity and assess the effects of covariates on the pooled estimates[22, 23]. Egger's linear regression test was performed to detect the publication bias [24]. For the data of which could not undertake meta-analyses, we synthesized the results and presented the evidence in a narrative form.

Results

Search results

Initially, a total of 337 publications were identified from the 12 databases. Then, 101 duplicate records were excluded by automation tools and 24 duplicate records were excluded by a human. 212 records were screened based on title and abstract. 87 studies were sought for retrieval and 82 reports were assessed for eligibility. Following full texts screening, 59 studies were excluded. Finally, 23 studies met the eligibility criteria, of which 16 studies were included in the meta-analysis. We searched studies via other methods, but did not find any additional studies that met the inclusion criteria. The flowchart details the literature selection process using the PRISMA 2020 flow diagram [18] (Fig. 1).

Study characteristics

The characteristics of the included studies are shown in Table 1. A total of 23 RCTs involving 2,002 women with stage I–II breast cancer met the eligibility criteria and 16 of them were included in the meta-analysis. Data accrue mainly from China ($n = 20$), Taiwan ($n = 1$), United States of America ($n = 1$) and Spain ($n = 1$). The publication date of the included studies ranges from 2011 to 2020. The intervention time lasted from 1 week to 6 months. The 25-item Connor-Davidson Resilience Scale (CD-RISC-25) was the primary outcome measurement for most studies ($n = 20$) [25-44], and there were only 3 studies [45-47] used the Resilience Scale for Adults (RSA). Further details of the studies' interventions were summarized in Table 2. The 16 studies for meta-analysis were divided into three groups: resilience training program ($n = 8$) [25-28, 38, 43, 45, 46], health education delivered via mobile devices ($n = 5$) [34, 36, 37, 42, 44] and peer support ($n = 3$) [31-33] based on the intervention measures. For the remaining 7 studies [29, 30, 35, 39-41, 47] that cannot be classified or meta-analyzed, we presented in a narrative form only.

Risk of bias assessment

Summary of quality assessments of all included RCT studies is shown in Fig. 2. With regard to the judgement of all the domains and signalling questions, twelve studies (78.3%) were judged to have low risk of bias, four studies (21.7%) were judged to raise some concerns, and none (0%) were judged to have high risk of bias for their outcomes. In general, the quality of the included studies was from moderate to high quality.

Synthesis of results

Resilience training program

Eight studies [25-28, 38, 43, 45, 46], with a total of 649 breast cancer women, reported data on the resilience training program. There was substantial heterogeneity among the studies ($\chi^2 = 65.83$, $p = 0.000$, $I^2 = 89.4\%$) according to the heterogeneity test. Therefore, we performed sensitivity analysis and found that Zhou K's study [26] substantially influence the results. The heterogeneity has decreased significantly ($\chi^2 = 19.25$, $p = 0.004$, $I^2 = 69\%$) after removing the study. Therefore, the random effects model was utilized for the meta-analysis. The results showed that the resilience training program intervention was more effective than routine nursing care intervention in improving the resilience of breast cancer patients (SMD = 0.89; 95% CI 0.54, 1.24; $p < 0.00001$) (Fig. 3a).

Health education delivered via mobile devices

Five studies [34, 36, 37, 42, 44] provided information on the intervention of health education delivered via a mobile device, and these studies included 495 breast cancer women. There was substantial heterogeneity ($\chi^2 = 80.74$, $p < 0.00001$, $I^2 = 95\%$) according to the results of the heterogeneity test for these studies. Therefore, we used the random effects model to analyze these data, which confirmed that the intervention of health education delivered via a mobile device was more effective than routine nursing care in improving the resilience of breast cancer patients (SMD = 1.84; 95% CI 0.86, 2.82; $p = 0.0002$) (Fig. 3b).

Peer support

Three studies [31-33], with a total of 240 breast cancer women, reported data on the peer support. The results showed that the heterogeneity between the two groups was very significant ($\chi^2 = 127.50$, $p < 0.00001$, $I^2 = 98\%$), and we utilized a random effects model for the meta-analysis. The results showed that peer support was more effective than routine nursing care in improving the resilience of breast cancer patients (SMD = 2.62; 95% CI 0.61, 4.63; $p = 0.01$) (Fig. 3c).

Other kind of interventions

Seven studies [29, 30, 35, 39-41, 47], with a total of 617 breast cancer women, reported seven other kind of interventions which may contribute to improve resilience: 1) trinity nursing intervention, 2) nursing of family affection and psychological counseling, 3) synchronous stage cognitive therapy of family

members combined with psychological intervention, 4) supportive psychological nursing, 5) psychological phased change nursing intervention, 6) admission and commitment therapy, and 7) collaboration care model. However, meta-analysis was abandoned and the evidence was presented in a narrative form because there was significant heterogeneity within the implemented interventions and the data cannot be classified and integrated. Further details about the summary of all the included studies' interventions of all the included studies are shown in Table 2.

Subgroup analysis

Two subgroup analyses were undertaken based on the intervention time of resilience training program. The p -value for interaction was 0.85, which suggests that there was no interaction, in other words, the intervention time was not a source of heterogeneity. The results for the intervention times showed that the difference was not significant among the three subgroups: the intervention time was less than 12 weeks (SMD = 1.00; 95%CI 0.26, 1.74), the intervention time was 12 weeks (SMD = 1.19; 95%CI 0.10, 2.28), and the intervention time was more than 12 weeks (SMD = 0.88; 95%CI 0.57, 1.19). Overall, the results of the subgroup analysis showed that the resilience training program was more effective than the routine nursing care intervention, indicating the results of resilience training program had no change (Fig. 4).

Publication bias

We used Egger's linear regression test to detect the publication bias caused by the influencing factors quantitatively. The results for the resilience training program (95% CI -11.37, 9.41; $p = 0.825$) and the intervention of health education delivered via a mobile device (95% CI -10.38, 33.46; $p = 0.192$) showed that there was no significant publication bias among the included studies. However, the p -value for peer support (95% CI 3.81, 29.78; $p = 0.039$) was less than 0.05 and the results reversed significantly after the data were analysed by the trim and fill method, which indicated that there was significant publication bias.

Discussion

This systematic review and meta-analysis estimated the effect of the interventions for resilience of breast cancer patients. These interventions included resilience training program, health education delivered via mobile devices, peer support, and seven other kind of interventions. The effectiveness of the interventions included in the meta-analysis was examined through the assessment of resilience score. The measurement of the outcome for most studies were CD-RISC-25 and RSA.

Resilience training program is helpful to improving the psychological resilience of breast cancer patients. In recent years, more and more researches suggest that resilience training may play a pivotal role in the realm of public health and prevention [48], and it also has a great number of wider benefits such as enhanced psychosocial functioning and improved performance [49]. There was considerable variation in the type of resilience training program provided in this study, although most involved Acceptance and Commitment Therapy (ACT), Cognitive Behavioral Therapy (CBT), Mindfulness-Based techniques [9, 48].

Our meta-analysis showed that the resilience training program was more effective than the routine nursing care intervention (SMD = 0.89; 95% CI 0.54, 1.24; $p < 0.00001$). This result is consistent with the study of resilience training programmes and interventions in adults, reflecting a moderate positive effect (SMD = 0.44; 95% CI 0.23, 0.64) in favor of the resilience training program group [9]. It may be because psychological resilience training program helps patients control their emotions, cope with setbacks and adapt to adversity. The influence of psychological training on future functions depends heavily on the type of measurement results and the setting of the training [50]. Therefore, further researches about the effect of the resilience training should be conducted for a more definitive conclusion due to the difference in content, delivery and length.

Health education delivered via mobile devices is a new and effective healthcare method [51], and the included studies about it were all conducted in China. WeChat is a free communication application, which is the most widely and extensively used mobile social networking App in China. Mobile health (mHealth) or WeChat-based intervention programs have become a popular health service model in China [26]. Our meta-analysis showed that the intervention of health education delivered via mobile devices was more effective than the routine nursing care intervention (SMD = 1.84; 95% CI 0.86, 2.82; $p = 0.0002$). This result is consistent with a study of people living with schizophrenia (PLS), which reported that WeChat-based intervention was related to a series of positive health outcomes, including decreased symptoms and depression, as well as improved functioning, recovery, quality of life and mental well-being [52]. It may be because that the online delivery of resilience training has the potential of delivering effective training in a more flexible, personalized, and cost-effective way [53]. This new method can hold great promise for mental health care by extending the reach of services and supplementing existing models of care [54]. Therefore, health education delivered via mobile devices is worthy of clinical promotion for breast cancer patients.

Peer support was more effective than routine nursing care in improving the resilience of breast cancer patients. Peer support refers to the approach whereby individuals with the same disease or condition meet in order to exchange information, share experiences, and provide emotional/appraisal/informational assistance [55, 56]. The results of this study showed that peer support was more effective than routine nursing care in improving the resilience of breast cancer patients (SMD = 2.62; 95% CI 0.61, 4.63; $p = 0.01$), which was similar to the results of a systematic review [56]. However, this conclusion should be treated with caution because only three trials [31–33], were included. In addition, the small sample size and publication bias may also lead to false negative results. Peer support was underutilised amongst women with breast cancer in recent years [57, 58]. Future studies with better design/execution and larger sample size are needed to investigate the effectiveness of peer support on breast cancer patients.

There were seven other kind of interventions included which may be favorably associated with the breast cancer women's resilience [29, 30, 35, 39–41, 47]. However, at present, these studies on resilience interventions for breast cancer patients had many limitations such as scattered research content and low quality of some researches, all of which bring difficulties to data integration. These studies were not

included in the meta-analysis due to the inability to classify and integrate the data, so our study cannot draw definitive conclusions regarding the effectiveness of them. Thus, there is no clearly evidence to summarize the effect of these intervention measures for resilience of breast cancer patients. Further studies are needed to clarify the effectiveness of these interventions, respectively.

Although the existing interventions seem to be effective for promoting resilience of breast cancer patients, the current evidences are still in the preliminary research stage and the quality of them were not high. Recently, more and more studies have shown that in addition to social and psychological factors, biological mechanisms such as the amygdala, hippocampus, ventral striatum and frontal-associated regions of the brain are related to resilience strength [11, 59]. An improved understanding of the biological mechanisms-based intervention could reveal novel therapeutic targets and help clarifying which psychosocial interventions can improve the psychological elasticity of breast cancer patients [60]. Therefore, we should formulate a staged, personalized and reasonable intervention plan from physiological, psychological social dimensions and influencing factors in the future.

One of the advantages of this study is that we performed a systematic and comprehensive search of 12 databases. Another major strength of our review and meta-analysis is that all the included studies are RCTs. We used the latest tool RoB 2.0 to assess the risk of bias, and the quality of the included studies was moderate to high quality. This review was adhered to the PRISMA 2020 checklist and PRISMA 2020 flow diagram, which are the latest versions of PRISMA.

There were several limitations in our study. First, we considered RCTs published in English and Chinese only. Second, the included studies were exclusively conducted in the USA, Spain or China, which limit generalizability across other countries. Third, the small sample size (ranges from 20 to 175) might have decreased the reliability and could cause bias. Furthermore, this study performed meta-analysis on two interventions only due to data limitations and more RCTs are needed for data integration and analysis of other interventions.

Conclusions

It has been found in this study that the resilience training program, health education delivered via mobile devices and peer support are more effective than that of the routine nursing care. However, the heterogeneities between the studies were obvious and the sample sizes were not large. In addition, this study cannot draw definitive conclusions regarding the effectiveness of other seven kind of interventions included in the systematic review because the sample size of these studies is small and cannot be conducted in the meta-analysis as there is only one study included regarding each kind of intervention. More studies are needed in the future to clarify the effectiveness of these interventions.

Declarations

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Conflicts of interest/Competing interests

All authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript.

Availability of data and material

The data sets analyzed during the current study will be available upon reasonable request of the corresponding author.

Code availability

Not applicable.

Authors' contributions

Study concept and design: Zhi Wang, Qiu-Yue Liu, Xiao-Rong Mao and Li-Hua Min; Strategy searching: Zhi Wang and Qiu-Yue Liu; Selection of studies: Yu-Lei Zhao, Xin-Yi Xu and Yan Chen; Quality assessment: Zhi Wang and Qiu-Yue Liu; Data extraction and organization: Wen-Juan Cao, Yan Chen and Cai-Hong Li; Data checking: Li-Hua Min and Yan Chen; Data analysis and chart production: Zhi Wang, Qiu-Yue Liu and Xiao-Rong Mao; Drafting the manuscript: Zhi Wang, Qiu-Yue Liu, Yu-Lei Zhao and Xin-Yi Xu. Revision and appraisal of the manuscript: Xiao-Rong Mao and Li-Hua Min; Proofreading the manuscript: Wen-Juan Cao and Cai-Hong Li. All authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Ethics approval

Not applicable.

Consent to participate

Not applicable.

Consent for publication

Not applicable.

References

1. Wild CP, Weiderpass E, Stewart BW (2020) World Cancer Report: Cancer Research for Cancer Prevention. Lyon, France: International Agency for Research on Cancer. Available from: <https://publications.iarc.fr/586>. Licence: CC BY-NC-ND 3.0 IGO. p382-383. Accessed 19 February 2021
2. World Health Organization (2021) Breast cancer now most common form of cancer: WHO taking action. Available from: <https://www.who.int/news/item/03-02-2021-breast-cancer-now-most-common-form-of-cancer-who-taking-action>. Accessed 18 February 2021
3. Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA, Jemal A (2018) Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *Cancer J Clin* 68(6):394–424. <https://doi.org/10.3322/caac.21492>
4. Sebri V, Triberti S, Pravettoni G (2020) Injured Self: Autobiographical Memory, Self-Concept, and Mental Health Risk in Breast Cancer Survivors. *Front Psychol* 11. <https://doi.org/10.3389/fpsyg.2020.607514>
5. Ng CG, Mohamed S, Kaur K, Sulaiman AH, Zainal NZ, Taib NA et al (2017) Perceived distress and its association with depression and anxiety in breast cancer patients. *PLoS ONE* 12(3):e0172975. <https://doi.org/10.1371/journal.pone.0172975>
6. Naik H, Leung B, Laskin J, McDonald M, Srikanthan A, Wu J, Bates A, Ho C (2020) Emotional distress and psychosocial needs in patients with breast cancer in British Columbia: younger versus older adults. *Breast cancer research treatment* 179(2):471–477. <https://doi.org/10.1007/s10549-019-05468-6>
7. Guil R, Ruiz-González P, Merchán-Clavellino A, Morales-Sánchez L, Zayas A, Gómez-Molinero R (2020) Breast Cancer and Resilience: The Controversial Role of Perceived Emotional Intelligence. *Front Psychol* 11:3604. <https://doi.org/10.3389/fpsyg.2020.595713>
8. Aizpurua-Perez I, Perez-Tejada J (2020) Resilience in women with breast cancer: A systematic review. *European Journal of Oncology Nursing* 101854. <https://doi.org/10.1016/j.ejon.2020.101854>
9. Joyce S, Shand F, Tighe J, Laurent SJ, Bryant RA, Harvey SB (2018) Road to resilience: a systematic review and meta-analysis of resilience training programmes and interventions. *BMJ open* 8(6). <http://dx.doi.org/10.1136/bmjopen-2017-017858>
10. Wiig S, Aase K, Billett S, Canfield C, Røise O, Njå O, Guise L, Haraldseid-Driftland C, Ree E, Anderson JE, Macrae C, RiH-team (2020) Defining the boundaries and operational concepts of resilience in the resilience in healthcare research program. *BMC Health Serv Res* 20:1–9. <https://doi.org/10.1186/s12913-020-05224-3>
11. Holz NE, Tost H, Meyer-Lindenberg A (2020) Resilience and the brain: a key role for regulatory circuits linked to social stress and support. *Molecular psychiatry* 25(2):379–396. <https://doi.org/10.1038/s41380-019-0551-9>
12. Ristevska-Dimitrovska G, Stefanovski P, Smichkoska S, Raleva M, Dejanova B (2015) Depression and resilience in breast cancer patients. *Open Access Macedonian Journal of Medical Sciences* 3(4):661. <https://doi.org/10.3889/oamjms.2015.119>

13. Ristevska-Dimitrovska G, Filov I, Rajchanovska D, Stefanovski P, Dejanova B (2015) Resilience and quality of life in breast cancer patients. Open access Macedonian journal of medical sciences 3(4):727. <https://doi.org/10.3889/oamjms.2015.128>
14. Ungar M, Theron L (2020) Resilience and mental health: How multisystemic processes contribute to positive outcomes. The Lancet Psychiatry 7(5):441–448. [https://doi.org/10.1016/S2215-0366\(19\)30434-1](https://doi.org/10.1016/S2215-0366(19)30434-1)
15. Wu ZJ, Liu Y, Li XL, Li XH (2016) Resilience and associated factors among mainland Chinese women newly diagnosed with breast cancer. PLoS One 11(12):e0167976. <https://doi.org/10.1371/journal.pone.0167976>
16. Fradelos EC, Papathanasiou IV, Veneti A, Daglas A, Christodoulou E, Zyga S, Kourakos M (2017) Psychological distress and resilience in women diagnosed with breast cancer in Greece. Asian Pacific journal of cancer prevention APJCP 18(9):2545. <https://doi.org/10.22034/apjcp.2017.18.9.2545>
17. Alizadeh S, Khanahmadi S, Vedadhir A, Barjasteh S (2018) The relationship between resilience with self-compassion, social support and sense of belonging in women with breast cancer. Asian Pacific journal of cancer prevention APJCP 19(9):2469. <https://doi.org/10.22034/apjcp.2018.19.9.2469>
18. Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD et al (2021) The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 372:n71. <https://doi.org/10.1136/bmj.n71>
19. Higgins JPT, Savović J, Page MJ, Elbers RG, Sterne JAC (2019) Chap. 8: Assessing risk of bias in a randomized trial. In: Higgins JPT, Thomas J, Chandler J, Cumpston M, Li T, Page MJ, Welch VA (editors). *Cochrane Handbook for Systematic Reviews of Interventions* version 6.0 (updated July 2019). Cochrane. Available from: <https://training.cochrane.org/handbook/current/chapter-06>. Accessed 10 February 2021
20. Yang ZR, Sun F, Zhan SY (2017) Risk on bias assessment: (2) Revised Cochrane risk of bias tool for individually randomized, parallel group trials (RoB2. 0). Chinese Journal of Epidemiology 38(9):1285–1291. <https://doi.org/10.3760/cma.j.issn.0254-6450.2017.09.028>
21. Koenig C, Schneider C, Morgan JE, Ammann RA, Sung L, Phillips B (2019) Interventions aiming to reduce time to antibiotics (TTA) in patients with fever and neutropenia during chemotherapy for cancer (FN), a systematic review. Supportive care in cancer 28:2369–2380. <https://doi.org/10.1007/s00520-019-05056-w>
22. Thongprayoon C, Khoury NJ, Bathini T, Bathini T, Aeddula NR, Boonpheng B, Leeaphorn N, Ungprasert P, Bruminhent J, Lertjitbanjong P, Watthanasuntorn K, Chesdachai S, Mao MA, Cheungpasitporn W (2019) BK polyomavirus genotypes in renal transplant recipients in the United States: A meta-analysis. Journal of Evidence-Based Medicine 12(4):291–299. <https://doi.org/10.1111/jebm.12366>
23. Zhang SH (2016) Subgroup analysis and sensitive analysis should be set up reasonably in meta-analysis. Chinese Journal of Contemporary Neurology Neurosurgery 16(1):1. <https://doi.org/10.3969/j.issn.1672-6731.2016.01.001>

24. Zwetsloot PP, Van Der Naald M, Sena ES, Howels DW, Int'Hout J, De Groot AH, Chamuleau JAJ, Macleod S, Wever MR KE (2017) Standardized mean differences cause funnel plot distortion in publication bias assessments. *eLife* 6:e24260. <https://doi.org/10.7554/eLife.24260.001>
25. Wu PH, Chen SW, Huang WT, Chang SC, Hsu MC (2018) Effects of a psychoeducational intervention in patients with breast cancer undergoing chemotherapy. *Journal of Nursing Research* 26(4):266–279. <https://doi.org/10.1097/jnr.0000000000000252>
26. Zhou KN, Li J, Li XM (2019) Effects of cyclic adjustment training delivered via a mobile device on psychological resilience, depression, and anxiety in Chinese post-surgical breast cancer patients. *Breast cancer research treatment* 178(1):95–103. <https://doi.org/10.1007/s10549-019-05368-9>
27. Cerezo MV, Ortiz-Tallo M, Cardenal V, De La Torre-Luque A (2014) Positive psychology group intervention for breast cancer patients: a randomised trial. *Psychol Rep* 115(1):44–64. <https://doi.org/10.2466/15.20.PR0.115c17z7>
28. Loprinzi CE, Prasad K, Schroeder DR, Sood A (2011) Stress Management and Resilience Training (SMART) program to decrease stress and enhance resilience among breast cancer survivors: a pilot randomized clinical trial. *Clin Breast Cancer* 11(6):364–368. <https://doi.org/10.1016/j.clbc.2011.06.008>
29. Luo H, Lin J, Zhao XF (2019) Influence of Family Psychological Counselling on Postoperative Psychological Pressure and Quality of Life of Patients with Modified Radical Mastectomy for Breast Cancer. *Journal of Qilu Nursing* 25(22):44–47. <https://doi.org/10.3969/j.issn.1006-7256.2019.22.014>
30. Lu J, Shi TY, Liu QG, Yin AC, Song CL, Li H, Li YJ (2015) Effect of the collaboration care model on posttraumatic growth and resilience in patients with breast cancer. *Chinese Journal of Practical Nursing* 31(18):1353–1356. <https://doi.org/10.3760/cma.j.issn.1672-7088.2015.18.008>
31. Liu CC, Sun X, Zhao LP, Xu LL (2019) Effect of peer support on psychological resilience of breast cancer patients undergoing post-operative chemotherapy. *Chinese Evidence-based Nursing* 5(4):309–313. <https://doi.org/10.12102/j.issn.2095-8668.2019.04.004>
32. Xie XL (2019) The influence of peer support education on the psychological resilience of breast cancer patients. *Healthmust-Readmagazine* 25:283
33. Chen ZY (2018) Research on the Influence of Peer Support Education on the Psychological Resilience Level of Breast Cancer Patients. *Jilin Medical Journal* 39(3):580–582. <https://doi.org/10.3969/j.issn.1004-0412.2018.03.083>
34. Shen YY, Sheng LL, Yan M (2020) The impact of continuous care intervention based on WeChat platform on breast cancer patients. *Journal of Qilu Nursing* 26(09):61–63. <https://doi.org/10.3969/j.issn.1006-7256.2020.09.018>
35. Li HB, Qing X, Wang XQ, Zhang SP, Liu Q (2019) Effects of synchronous stage cognitive therapy of family members combined with psychological intervention on family function, hope level, sense of coherence and quality of life in patients with breast cancer. *China Journal of Health Psychology* 27(11):1729–1733. <https://doi.org/10.13342/j.cnki.cjhp.2019.11.032>

36. Zhou L, Kong HW (2019) Effect of continuous nursing intervention based on WeChat platform on post-operative psychological elasticity and shame of breast cancer patients. *Chinese Journal of General Practice* 17(10):1773–1776. <https://doi.org/10.16766/j.cnki.issn.1674-4152.001052>
37. Wang XY, Wang XJ (2020) Effect of WeChat-based symptom assessment and self-intervention on adverse reactions, mental state and quality of life in patients with breast cancer during chemotherapy. *Chinese Journal of General Practice* 18(01):94–97. <https://doi.org/10.16766/j.cnki.issn.1674-4152.001177>
38. Zhao WW, Zhang AH (2015) Study on influence of mental awareness training on psychological resilience of patients with breast cancer. *Chinese Nursing Research* 29(26):3286–3288. <https://doi.org/10.3969/j.issn.1009-6493.2015.26.029>
39. Liu AH (2018) The Effect of Psychological Phased Change Nursing on Rehabilitation of Breast Cancer Patients After Operation. *China Continuing Medical Education* 10(36):180–182. <https://doi.org/10.3969/j.issn.1674-9308.2018.36.076>
40. Ou LC, Guo XP, Meng YZ (2017) Effect of admission and commitment therapy on psychological resilience and disease awareness in patients with breast cancer surgery. *Modern Clinical Nursing* 16(02):14–18. <https://doi.org/10.3969/j.issn.1671-8283.2017.02.004>
41. Hou LJ, Zhang LQ (2019) The influence of supportive psychological nursing combined with rapid rehabilitation surgery theory on the psychological resilience score and compliance of patients with modified radical mastectomy. *Journal of Clinical Research* 36(12):2495–2496. <https://doi.org/10.3969/j.issn.1671-7171.2019.12.075>
42. Yuan P (2017) Influence of aerobic exercise combined with continuity of care on post-traumatic growth and psychological resilience of breast cancer patients. *Chinese Nursing Research* 31(21):2617–2619. <https://doi.org/10.3969/j.issn.1009-6493.2017.21.016>
43. Cui Y, Wang XH, Liu YX (2020) Effect of mindfulness decompression training on psychological flexibility, self-efficacy and quality of life in postoperative patients with breast cancer. *International Journal of Nursing* 39(21):3847–3851. <https://doi.org/10.3760/cma.j.cn221370-20190718-01181>
44. Shen XM (2020) Influence of "in-hospital-out-hospital" continuous nursing model on the psychological resilience of chemotherapy patients after radical mastectomy. *Chinese Baby* (2):176
45. Xu MR, Wei XH, Wu GL, Dai LJ (2015) The effect of resilience training on the mental health of breast cancer patients. *Modern Journal of Integrated Traditional Chinese western medicine* 24(08):896–898. <https://doi.org/10.3969/j.issn.1008-8849.2015.08.040>
46. Zhao XF, Chen MS, Yang HW, Rong W (2016) Effect of psychological flexibility training on the mental status of patients with breast cancer after simplified radical mastectomy. *Journal of International Psychiatry* 43(02):350–353. <https://doi.org/10.13479/j.cnki.jip.2016.02.048>
47. Wang LM (2020) Effect of Trinity Nursing Intervention on Psychological Elasticity and Family Adaptability of Patients with Breast Cancer Radiotherapy. *Journal of Clinic Nursing's Practicality* 5(49):9

48. Joyce S, Shand F, Bryant RA, Lal TJ, Harvey SB (2018) Mindfulness-Based Resilience Training in the Workplace: Pilot Study of the Internet-Based Resilience@Work (RAW) Mindfulness Program. *J Med Internet Res* 20(9):e10326. <https://doi.org/10.2196/10326>
49. Robertson IT, Cooper CL, Sarkar M, Curran T (2015) Resilience training in the workplace from 2003 to 2014: A systematic review. *Journal of occupational organizational psychology* 88(3):533–562. <https://doi.org/10.1111/joop.12120>
50. Forbes S, Fikretoglu D (2018) Building resilience: The conceptual basis and research evidence for resilience training programs. *Review of General Psychology* 22(4):452–468. <https://doi.org/10.1037/gpr0000152>
51. Zhang XT, Wen D, Liang J, Lei JB (2017) How the public uses social media wechat to obtain health information in china: a survey study. *BMC Med Inf Decis Mak* 17(2):71–79. <https://doi.org/10.1186/s12911-017-0470-0>
52. Yu Y, Li YL, Li TX, Xi SJ, Xiao X, Xiao SY, Tebes JK (2020) New Path to Recovery and Well-Being: Cross-Sectional Study on WeChat Use and Endorsement of WeChat-Based mHealth Among People Living With Schizophrenia in China. *Journal of Medical Internet Research* 22(9):e18663. <https://doi.org/10.2196/18663>
53. Smith B, Shatté A, Perlman A, Siers M, Lynch WD (2018) Improvements in resilience, stress, and somatic symptoms following online resilience training: A dose–response effect. *Journal of occupational environmental medicine* 60(1):1. <https://doi.org/10.1097/JOM.0000000000001142>
54. Firth J, Cotter J, Torous J, Bucci S, Firth JA, Yung AR (2016) Mobile phone ownership and endorsement of “mHealth” among people with psychosis: a meta-analysis of cross-sectional studies. *Schizophr Bull* 42(2):448–455. <https://doi.org/10.1093/schbul/sbv132>
55. Huang RR, Yan CL, Tian YM, Lei BM, Yang DQ, Liu D, Lei J (2020) Effectiveness of peer support intervention on perinatal depression: A systematic review and meta-analysis. *J Affect Disord*. <https://doi.org/10.1016/j.jad.2020.06.048>
56. Hu JM, Wang X, Guo SN, Chen FF, Wu YY, Ji FJ, Fang XD (2019) Peer support interventions for breast cancer patients: a systematic review. *Breast cancer research treatment* 174(2):325–341. <https://doi.org/10.1007/s10549-018-5033-2>
57. Legg M, Occhipinti S, Youl P, Dunn J, Chambers SK (2017) Needy or resilient? How women with breast cancer think about peer support. *Psycho-Oncology* 26(12):2307–2310. <https://doi.org/10.1002/pon.4401>
58. Legg M, Hyde MK, Occhipinti S, Youl PH, Dunn J, Chambers SK (2019) A prospective and population-based inquiry on the use and acceptability of peer support for women newly diagnosed with breast cancer. *Support Care Cancer* 27(2):677–685. <https://doi.org/10.1007/s00520-018-4358-z>
59. Hsieh S, Yao ZF, Yang MH (2021) Multimodal Imaging Analysis Reveals Frontal-Associated Networks in Relation to Individual Resilience Strength. *Int J Environ Res Public Health* 18(3):1123. <https://doi.org/10.3390/ijerph18031123>

60. Borgi M, Collacchi B, Ortona E, Cirulli F (2020) Stress and coping in women with breast cancer: unravelling the mechanisms to improve resilience. *Neurosci Biobehav Rev* 119:406–421. <https://doi.org/10.1016/j.neubiorev.2020.10.011>

Tables

Table 1 Characteristics of the studies included

Author (year)	Origin	Sample size(<i>n</i>)		Age in years (Mean $\pm$ SD)		Cancer Stage	Outcome measurement
		E	C	E	C		
Shen (2020) [44]	Shanghai, China	37	36	NR	NR	NR	CD-RISC-25
Shen et al. (2020) [34]	Jiangsu, China	40	40	50.23 $\pm$ 14.35	50.87 $\pm$ 14.41	I-III	CD-RISC-25
Wang (2020) [47]	Guangdong, China	42	42	45.5 $\pm$ 7.0	44.5 $\pm$ 6.5	NR	RSA
Wang et al. (2020) [37]	Zhejiang, China	73	73	52.79 $\pm$ 4.58	51.45 $\pm$ 4.32	I-IV	CD-RISC-25
Cui et al. (2020) [43]	Henan, China	40	40	45.48 $\pm$ 6.09	45.56 $\pm$ 6.17	I-III	CD-RISC-25
Zhou K et al. (2019) [26]	Shanxi, China	66	66	44.62 $\pm$ 7.89	44.37 $\pm$ 7.32	I-III	CD-RISC-25
Zhou L et al. (2019) [36]	Zhejiang, China	30	30	48.87 $\pm$ 14.41	48.76 $\pm$ 12.25	I-III	CD-RISC-25
Luo et al. (2019) [29]	Guangdong, China	40	40	33.48 $\pm$ 5.69	33.56 $\pm$ 5.23	I-III	CD-RISC-25
Li et al. (2019) [35]	Sichuan, China	65	65	43.25 $\pm$ 4.31	42.38 $\pm$ 3.52	I-II	CD-RISC-25
Hou et al. (2019) [41]	Neimenggu, China	52	52	42.04 $\pm$ 6.45	41.76 $\pm$ 6.38	I-IV	CD-RISC-25
Xie (2019) [32]	Sichuan, China	38	38	NR	NR	NR	CD-RISC-25
Liu et al. (2019) [31]	Hunan, China	38	38	45.92 $\pm$ 8.27	46.53 $\pm$ 8.37	NR	CD-RISC-25
Chen (2018) [33]	Guangdong, China	45	44	NR	NR	I-III	CD-RISC-25
Wu et al. (2018) [25]	Southern, Taiwan	20	20	51.2 $\pm$ 9.18	51.2 $\pm$ 10.71	I-IV	CD-RISC-25
Liu (2018) [39]	Jiangsu, China	38	38	48.92 $\pm$ 6.40	49.41 $\pm$ 6.18	I-II	CD-RISC-25
Yuan (2017) [42]	Hubei, China	68	68	49.6 $\pm$ 9.4	50.5 $\pm$ 10.3	I-IV	CD-RISC-25
Ou et al. (2017) [40]	Guangxi, China	41	39	39.8 $\pm$ 4.3	40.5 $\pm$ 4.8	NR	CD-RISC-25
Zhao et al. (2016) [46]	Sichuan, China	37	37	51.39 $\pm$ 8.73	51.92 $\pm$ 8.05	NR	RSA

Lu et al. (2015) [30]	Liaoning, China	32	31	50.47 ± 9.51	NR	NR	CD-RISC-25
Zhao et al. (2015) [38]	Shandong, China	36	38	42.47 ± 8.51	42.63 ± 7.40	I-III	CD-RISC-25
Xu et al. (2015) [45]	Hubei, China	30	24	NR	NR	NR	RSA
Cerezo et al. (2014) [27]	Minnesota, United States	87	88	50.71 ± 9.44	49.35 ± 9.85	I-III	CD-RISC-25
Loprinzi et al. (2011) [28]	Malaga, Spain	12	8	61 ± NR	61 ± NR	I-III	CD-RISC-25

E: experimental group, C: control group, SD: standard deviation, NR: Not Reported, h: hour, d: day, w: week, m: month

Table 2 The summary of studies' interventions

Approaches of the intervention	Author (year)	Delivery of the intervention	Follow-up point	Theory	Content of the intervention
Resilience training program	Cui et al. (2020) [43]	Nurse	6w	Mindfulness decompression	<p>Experimental Group: Mindfulness decompression training combined with routine nursing care. Mindfulness decompression training includes mindful body scanning training, mindfulness meditation training, mindfulness walking training, mindfulness breathing training and mindfulness yoga training.</p> <p>Control Group: Routine nursing care.</p>
	Zhou K et al. (2019) [26]	Nurse	4w, 8w and 12w	Roy Adaptation Model (RAM)	<p>Experimental Group: Cyclic adjustment training (CAT) delivered via a device combined with routine nursing care. The CAT using WeChat included 4 steps: Confront, pre-introspect, adjust and re-introspect.</p> <p>Control Group: Routine nursing care. The control group patients received only routine nursing care, including health instruction, vital signs and post-surgery complications monitoring, and post-surgery and drainage tube care.</p>
	Wu et al. (2018) [25]	Nurse	2w	Stress and Coping Model	<p>Experimental Group: Psychoeducational interventions (PEIs). The PEI included interaction between healthcare professionals and patients, use of a self-directed videotape, educational information and materials, and an educational manual.</p> <p>Control Group: The traditional pamphlet education. Participants in the control group were exposed only to the traditional pamphlet education approach</p>

					(consultation from nurses and information sheets) in the outpatient department.
Zhao et al. (2016) [46]	Nurse	12w	Kumpfer's Psychological Resilience Framework Theory	<p>Experimental Group: Psychological flexibility training combined with routine nursing care. Based on Kumpfer's related psychological resilience framework theory, each patient in the observation group was given a set of DVDs for learning breathing meditation and relaxation. Use methods such as case analysis, discussion, sharing, and theme games for patients in the observation group, and use 5 major links (warm-up, interaction, cohesion, sharing, and end) as a fixed activity program for each training. Psychological training takes place every Tuesday, 1.5 hours each time.</p> <p>Control Group: Routine nursing care. The control group was given routine care for 12 weeks, including maintaining a comfortable ward environment, monitoring patient vital signs, ward rounds, diet and medication guidance, etc.</p>	
Zhao et al. (2015) [38]	Doctor and nurse	8w	Mental awareness	<p>Experimental Group: Mental awareness training combined with routine nursing care. Nurses teach the patients the basic principles and methods of mental awareness in the first to third weeks, the body awareness in the fourth to sixth weeks, and the meditation exercises in the seventh to eighth weeks. Once a week, 40 to 50 minutes each time, meditation music is played during each intervention, so that the patients can adopt the most comfortable posture.</p>	

					Control Group: Routine nursing care.
Xu et al. (2015) [45]	Nurse	12w	Kumpfer's Psychological Resilience Framework Theory	Experimental Group: Mental flexibility(resilience) training combined with routine nursing care. Based on Kumpfer's related psychological resilience framework theory, each patient in the observation group was given a set of DVDs for learning breathing meditation and relaxation. Use methods such as case analysis, discussion, sharing, and theme games for patients in the observation group, and use 5 major links (warm-up, interaction, cohesion, sharing, and end) as a fixed activity program for each training. Psychological training takes place every Tuesday, 1.5 hours each time. Control Group: Routine nursing care.	
Cerezo et al. (2014) [27]	Psychologists	14w	Positive psychology	Experimental Group: A psychological group intervention based on positive psychology. The psychological intervention was applied during 14 two-hour sessions (3 modules: Self-knowledge, Positive psychology-related skills, and Positive psychology-related skills), once per week, to groups of 10 to 15 women. Control Group: Wait-list Group. The waitlist group was administered the psychological intervention for the same amount of time as the experimental group, which was followed by a post-test assessment.	
Loprinzi et al. (2011) [28]	Physician	12w	SMART program	Experimental Group: Stress Management and Resilience Training (SMART) program. The study intervention consisted of 3 parts: The	

					<p>program consisted of two 90-minute group training sessions (paced breathing meditation), a brief individual session (practice deep diaphragmatic breathing at 5 breaths per minute for 5 or 15 minutes, once or twice a day), and 3 follow-up telephone calls (30-60 minutes).</p> <p>Control Group: Wait-list Group. Intervention for the wait-list control arm was delayed by 12 weeks compared with the active arm. The participants completed the written baseline surveys during an initial meeting and at the end of the 12-week intervention.</p>
Health education delivered via mobile devices	Shen (2020) [44]	Nurse	NR	NR	<p>Experimental Group: "In-hospital and out-hospital" continued nursing combined with routine nursing care and discharge guidance. In-hospital nursing mode: Distribute health knowledge manuals, face-to-face education, broadcast education videos, and situational drills to teach patients and their families related health knowledge. Out-of-hospital continued nursing: After the patient is discharged from the hospital, a health record is established for the patient, and full-time nurses conduct popular science knowledge and health information education using phone and WeChat, and regularly organize patient symposiums and small lectures.</p> <p>Control Group: Routine nursing care and discharge guidance.</p>
	Shen et al. (2020) [34]	Doctor and nurse	1m, 3m and 6m	NR	<p>Experimental Group: Continuous care based on WeChat platform combined with routine</p>

					<p>nursing care. The intervention includes registering a dedicated WeChat official account and WeChat group chat, establishing a continuous nursing team. Meantime, nurses conduct health education and problem guidance and carry out prize-winning contests to promote patients' knowledge.</p> <p>Control Group: Routine nursing care.</p>
	Wang et al. (2020) [37]	Doctor and nurse	6m	NR	<p>Experimental Group: WeChat-based symptom assessment and self-intervention combined with routine outpatient guidance. Based on the WeChat platform, the experimental group established a remote service group to give patients relevant guidance.</p> <p>Control Group: Routine outpatient guidance. Nurses provide relevant guidance on the precautions of chemotherapy after chemotherapy, and conduct telephone follow-up at half a month and one month after chemotherapy.</p>
	Zhou L et al. (2019) [36]	Doctor and nurse	1m, 3m and 6m	NR	<p>Experimental Group: Continuous nursing intervention based on WeChat platform combined with routine outpatient guidance. The intervention includes registering a dedicated WeChat official account and WeChat group chat, establishing a continuous nursing team. After discharge from the hospital, the experimental group received continuation care from the continuous nursing team.</p> <p>Control Group: Routine outpatient guidance. The control group used telephone follow-up for</p>

					continuous care at 1 week, 1 month, 3 months and 6 months After discharge from the hospital.
	Yuan (2017) [42]	Nurse	1w and 6m	NR	Experimental Group: Aerobic exercise combined with continuity of care on post. Nurses conduct in-depth interviews psychological interventions, post-operative health education and rehabilitation exercise guidance with patients and their families. The follow-up intervention is conducted using QQ or WeChat platforms every Friday and the follow-up time is 6 months. Control Group: Routine nursing care.
Peer support	Xie (2019) [32]	Nurse	NR	NR	Experimental Group: Peer support education combined with routine nursing care. Nursing staff screen the peer support educators and divide them into different groups, each with 3 members. The peers provide positive emotional support and strengthen communication with the patient and their family members, and provide at least 6 hours of support education per week. Control Group: Routine nursing care.
	Liu et al. (2019) [31]	Doctor and nurse	NR	NR	Experimental Group: Peer support combined with routine health education. Intervention measures include face-to-face guidance (postoperative functional exercise guidance, diet guidance, medication guidance, infection prevention and upper limb edema guidance, psychological adjustment guidance), telephone supervision (companion volunteers are responsible for telephone supervision of the same group of patients for

					<p>disease self-management, the frequency is every Once a week, each talk time> 10 minutes) has been group activities (volunteers organize at least one group activity in each patient's inpatient chemotherapy cycle to summarize self-management experience and lessons).</p> <p>Control Group: Routine health education on chemotherapy after breast cancer operation.</p>
	Chen (2018) [33]	Doctor, nurse and psychologist	NR	NR	<p>Experimental Group: Peer support combined with routine nursing education. Companion volunteers provide health education and positive emotional guidance to patients based on personal experience or other patients' successful anti-cancer experience, and complete at least 3 peer support education before the patient's surgery, early postoperative period, and before discharge from the hospital. Depending on the patient's personal psychological cognition and family status, the number of interventions can be flexibly increased by 1-3 times.</p> <p>Control Group: Routine nursing education.</p>
Other kind of special interventions	Wang (2020) [47]	Doctor and nurse	NR	NR	<p>Experimental Group: Trinity nursing intervention combined with routine nursing care. It includes psychological intervention and the establishment of a family nursing team, and cooperate with patients to complete psychological and physical management and guidance.</p> <p>Control Group: Routine nursing care.</p>
	Luo et al.	Nurse	1m	NR	<p>Experimental Group: Nursing of family affection and</p>

	(2019) [29]				psychological counseling combined with routine perioperative care. When the patient is conscious and stable, the family members are required to accompany the patient for about 8 hours a day, and participate in simple nursing interventions according to the patient's own wishes, so as to encourage the family members to build a good bridge between the nurse and the patient and satisfy the patient a sense of need for family support. Control Group: Routine perioperative care.
	Li et al. (2019) [35]	Nurse	NR	NR	Experimental Group: Synchronous stage cognitive therapy of family members combined with psychological intervention. The CAT using WeChat included 4 steps, cognitive intervention and rehabilitation guidance were given to patients and their families one day before admission, one day before surgery, three days after surgery, and one day before discharge. Control Group: Routine and psychological intervention.
	Hou et al. (2019) [41]	Nurse	1w	Fast-track surgery (FTS) theory	Experimental Group: Supportive psychological nursing combined with nursing intervention based on Fast-track surgery (FTS) theory. Supportive psychological care includes four aspects: understanding mental state, cognitive intervention, information support and family support. Control Group: Nursing intervention based on FTS theory.
	Liu (2018)	Doctor and nurse	NR	NR	Experimental Group: Peer support combined with

[39]

routine health education. Intervention measures include face-to-face guidance (postoperative functional exercise guidance, diet guidance, medication guidance, infection prevention and upper limb edema guidance, psychological adjustment guidance), telephone supervision (companion volunteers are responsible for telephone supervision of the same group of patients for disease self-management, the frequency is every Once a week, each talk time> 10 minutes) has been group activities (volunteers organize at least one group activity in each patient's inpatient chemotherapy cycle to summarize self-management experience and lessons).
Control Group: Routine health education on chemotherapy after breast cancer operation.

Ou et al.
(2017)
[40]

Nurse

2w

NR

Experimental Group: Admission and commitment therapy combined with routine nursing care. The intervention content includes acceptance, cognitive isolation, experience of the present, self-awareness, clarification of values, and committed actions. The intervention time is 2 weeks from the second day after the patient's operation. A total of 5 to 6 times, 30 to 40 minutes each time, once every 2 days.
Control Group: Routine nursing care.

Lu et al.
(2015)
[30]

Nurse

3m

Collaboration-
care-mode
(CCM)

Experimental Group: Collaboration care model combined with routine nursing care. Intervention started after diagnosis and

lasted 3 months, the measures include establishing a good nurse-patient relationship, guiding patients to cope with bad emotions, lifestyle guidance (functional exercise, functional exercise, diet), and disease-related knowledge guidance.
Control Group: Routine nursing care.

NR: Not Reported, h: hour, d: day, w: week, m: month

Figures

Figure 1

PRISMA 2020 flow diagram of the literature search and study selection. *Records identified through database searching (n = 337): Web of Science (n = 44), PubMed (n = 24), Embase (n = 25), PsycINFO (n = 5), MEDLINE (n=24), Scopus (n = 0), Cochrane Library (n = 44), CINAHL (n = 12), CNKI (n = 21), CBM (n = 25), WanFang (n = 113), VIP (n = 0)

Figure 2

Risk of bias assessment of the RCTs: judgments about the risk of bias item presented in all included studies (a) and for each included study (b)

Figure 3

Forest plots of the effectiveness for the intervention group versus the routine nursing care group. a Forest plot for the effectiveness the resilience training program. b Forest plot for the effectiveness of the intervention of health education delivered via a mobile device. c Forest plot for the effectiveness of peer support.

Figure 4

Subgroup analysis of the resilience training’s intervention time for resilience of breast cancer patients

Supplementary Files

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- [Additionalfile1PRISMA2020checklist.docx](#)
- [Additionalfile2Searchstrategies.docx](#)