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Original Article

Coping strategies and psychological distress in postoperative recovery: A repeated-measures study in women undergoing breast-conserving surgery

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ABSTRACT

Objective: Breast-conserving surgery (BCS) is the standard treatment for early-stage breast cancer, yet patients often experience significant psychological distress and physical symptoms during recovery. This study aimed to explore the relationships between antecedents, physical symptoms (pain and nausea), psychological distress, and coping strategies utilized by women recovering from BCS to improve management of postoperative challenges.
Methods: This repeated-measures descriptive study involved 75 women who underwent BCS with sentinel lymph node biopsy at a National Cancer Institute-designated center. Participants completed the National Comprehensive Cancer Network (NCCN) Distress Thermometer and Ways of Coping Instrument on Postoperative Day 1 (POD1) and POD14. Bivariate analyses, multiple linear regression, and structural equation modeling were conducted to evaluate associations between antecedents, coping strategies, and distress. Open-ended responses were qualitatively analyzed for thematic content.
Results: Seeking social support (POD1 mean = 1.25; POD14 mean = 1.20) and planful problem-solving (POD1 mean = 1.19; POD14 mean = 1.04) were the most frequently used coping strategies, while accepting responsibility and confrontive coping were least utilized. Overall coping strategy use decreased between POD1 and POD14, likely reflecting recovery adaptation. Significant predictors of distress included escape-avoidance coping ($\beta = 0.415$, $P < 0.001$), social support ($\beta = 0.270$, $P = 0.02$), history of nausea ($\beta = 0.517$, $P < 0.001$), and age ($\beta = 0.293$, $P = 0.007$). Coping strategies did not mediate the relationship between antecedents and distress.
Conclusions: Adaptive coping strategies such as social support and planful problem-solving play a critical role in mitigating distress during BCS recovery. Interventions should emphasize fostering these strategies and addressing high-risk groups, such as younger patients and those with a history of nausea. Despite limitations, this study underscores the importance of supporting adaptive coping to improve postoperative outcomes and provides a basis for future research.

Introduction

Every year, over 300,000 women in the United States are diagnosed with breast cancer,[1] with one in eight likely to experience it in their lifetime.[2] Most cases are diagnosed at an early stage (Stages I or II), when surgery is the primary treatment.[3] Advances in breast cancer care have established breast-conserving surgery (BCS) combined with radiation therapy (RT) as the gold standard for early-stage breast cancer.[4] In 2020, 63% of women with Stage I or II disease underwent BCS, while only one-third chose mastectomy. BCS, also known as lumpectomy, removes the tumor and a margin of surrounding tissue while preserving the breast's appearance.[5] A meta-analysis of 30 studies (2010–2021), involving over 1.3 million patients worldwide, demonstrated improved survival rates for BCS compared to mastectomy.[4,6] Despite its less invasive nature, women recovering from BCS frequently endure significant physical and psychological challenges, including pain and distress.[7]

BCS often involves lymph node removal for pathology, providing critical diagnostic information within two weeks to guide subsequent treatment.[8,9] During this time, women must manage postoperative symptoms such as pain and postoperative nausea and vomiting (PONV) while coping with the psychological distress of awaiting pathology results—all exacerbated by the stress of a recent cancer diagnosis. The combination of anesthesia and surgical tissue damage contributes to these symptoms, heightening the need for effective coping strategies.[7]

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Although existing research highlights relationships among predictors, pain, nausea, and distress, the specific dynamics remain unclear, particularly for women undergoing BCS. Most studies focus on patients undergoing mastectomy, leaving a gap in understanding the experiences of BCS patients.[10–12] This gap underscores the importance of identifying how predictors, such as age and cultural background, interact with coping strategies to influence recovery outcomes.[13,14]

Coping strategies play a vital role in managing stress and include confronting coping, distancing, self-controlling, seeking social support, accepting responsibility, escape–avoidance, planful problem solving, and positive reappraisal.[15–17] Antecedents such as individual psychological characteristics also shape the selection and effectiveness of these strategies. Developing interventions tailored to these dynamics is critical for supporting breast cancer patients and improving their quality of life during recovery.

This study is grounded in Lazarus and Folkman's Transactional Model of Stress and Coping (TMSC), a well-established framework for understanding how individuals respond to stress.[18] The TMSC emphasizes the dynamic relationship between stress, appraisal, and coping, making it particularly applicable for evaluating the complex interplay of psychological and physical stressors (Fig. 1). Unlike traditional trait-based models, the TMSC recognizes the contextual adaptability of coping strategies, allowing for a nuanced understanding of patient experiences.[19,20]

Despite substantial research on the physical and psychological impacts of breast cancer treatment, limited attention has been given to how women cope during the diagnostic process and early recovery or how these coping strategies affect symptom severity. To address this gap, this study adapted the TMSC by incorporating time-sensitive surgical phases, specific antecedent factors (e.g., preoperative chemotherapy, employment, caregiving responsibilities), and a feedback loop between coping strategies and symptom progression. This approach provides a dynamic framework for understanding the interplay between antecedents, coping responses, and postoperative symptoms (e.g., pain, nausea, and distress) in women recovering from BCS. The study aimed to identify key predictors of postoperative symptom severity and examine how different coping strategies influence recovery, ultimately informing interventions to enhance physical and emotional well-being in this population.

Methods

Design

This study is based on a subset of data from a prospective repeated-measures study examining the relationships among antecedent factors, coping strategies, and postoperative symptom severity in women undergoing BCS. While the current manuscript focuses on how antecedents and coping strategies influence postoperative distress, pain, and nausea, a separate publication specifically examines the trajectory of distress and pain over time, highlighting their longitudinal patterns and predictors.[21]

Setting

Patients were consecutively recruited between August 15, 2020, and October 15, 2020, following outpatient surgery at an ambulatory surgical facility associated with a large cancer institution.

Participants

This study included women aged 18 years or older who underwent BCS with sentinel lymph node biopsy (SLNB) for early-stage (Stage I or II) primary breast cancer at a National Cancer Institute-designated comprehensive cancer center. Eligibility criteria required participants to be free of severe unrelated medical or psychological comorbidities, without a prior cancer diagnosis, and able to communicate in English. Patients transferred to another hospital for medical reasons or those who preferred to communicate in a language other than English were excluded.

Sample size calculation

Using G*Power (Version 3.3) software conFig.d for a general linear model, we calculated the required sample size to evaluate the effects of predictors and coping strategies on study outcomes.[22] The calculation considered multiple factors, including the anticipated effect size, desired statistical power (set at 0.80), the number of predictor variables, and the level of significance ($\alpha = 0.05$). Based on a comprehensive literature review and the study's conceptual framework, 10 potential predictor variables were identified: age, preoperative pain, preoperative distress, neoadjuvant chemotherapy status, smoking status, employment status, access to sick leave, perceived social support, the presence of children at home, and a history of postoperative nausea or vomiting (PONV). These variables were chosen for their established relevance in predicting psychological and physical outcomes in patients undergoing BCS.[8,10,12,16,23–26] This methodical approach ensured that the sample size was sufficiently powered to detect meaningful relationships among the predictors, coping strategies, and outcomes, providing robust and reliable results.

Measures

Psychological distress

Psychological distress was measured using the National Comprehensive Cancer Network (NCCN) Thermometer and Problem List (DT/PL), Version 2.2016. The DT assesses distress on a scale of 0 (no distress)

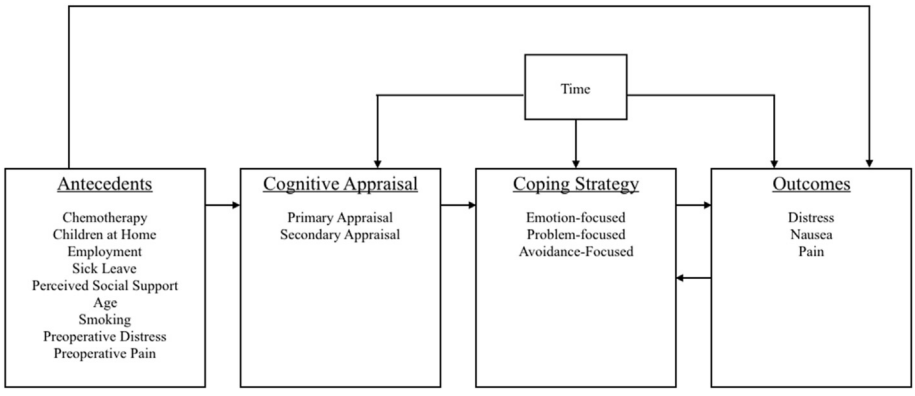

Fig. 1. Conceptual model of the process of coping used by women in the initial treatment period when undergoing breast-conserving therapy for early-stage breast cancer.

to 10 (extreme distress).[27] The instrument has demonstrated strong reliability and validity across diverse cancer populations and settings, with pooled sensitivity of 81% (95% CI: 0.79–0.82) and specificity of 72% (95% CI: 0.71–0.72) at a cutoff score of 4 for clinically significant distress.[28] A meta-analysis confirmed these psychometric properties and highlighted its utility compared to the Hospital Anxiety and Depression Scale (HADS), achieving a balanced sensitivity (0.82, 95% CI: 0.80–0.84) and specificity (0.73, 95% CI: 0.72–0.74).[29] In this study, a DT score of $\geq$ 4 was used to indicate moderate or clinically relevant distress. The Problem List component aids in identifying sources of distress across practical, family, physical, and emotional domains.

Coping strategies

Coping strategies were assessed using the 66-item Ways of Coping Instrument (WAYS), a validated measure based on the Transactional Model of Stress and Coping (TMSC).[20] The instrument evaluates coping processes through eight subscales: confrontive coping, distancing, self-controlling, seeking social support, accepting responsibility, escape–avoidance, planful problem-solving, and positive reappraisal. Participants rated their use of these strategies on a four-point Likert scale ranging from 0 (does not apply and not used) to 3 (used a great deal). Internal consistency reliability (Cronbach's alpha) for the subscales in this study ranged from 0.68 to 0.83, demonstrating acceptable to strong reliability.[20] By focusing on validated tools with established reliability and validity, these measures provided robust data to evaluate the relationships among distress, coping strategies, and related factors in this population.

Demographic data

Demographic and predictor data were systematically abstracted from electronic health records and included patient age, zip code, presence of children in the household, perceived social support, employment status, access to sick leave, smoking status, history of postoperative nausea and vomiting (PONV), and baseline scores on the NCCN Distress Thermometer. In the context of this study, antecedents are defined as demographic and clinical factors that are hypothesized to influence the selection and effectiveness of coping strategies, as well as subsequent postoperative outcomes. These antecedents include variables such as age, level of social support, and prior medical history, which may shape a patient's psychological and physiological response to the stress of surgery and recovery.

Outcomes refer to the dependent variables assessed in the study, specifically psychological distress (measured by the NCCN Distress Thermometer), as well as physical symptoms such as pain and nausea reported during the postoperative period. These outcomes were selected to comprehensively evaluate the impact of surgery and recovery on patients' physical and emotional well-being.

Data collection

The study was conducted in accordance with ethical standards and received approval from the Memorial Sloan Kettering Cancer Center Institutional Review Board (X20-042). Ethical approval was obtained prior to initiating any study activities, with the research team ensuring compliance with all IRB guidelines, including maintaining participant confidentiality and securely handling data. Participants were identified through electronic health records based on eligibility criteria, which included women over 18 years of age undergoing BCS with SLNB for early-stage (Stage I or II) primary breast cancer. On Postoperative Day 1 (POD1), all participants, who were outpatients, were contacted exclusively via email while they were at home and invited to participate in the study. No direct, in-person communication occurred before or after surgery, and all recruitment and consent processes were conducted electronically. The email included a detailed description of the study, an electronic consent form, and a link to complete the first survey through the secure Research Electronic Data Capture (REDCap) system.[30–32] Participants provided electronic informed consent before accessing the first survey, which outlined the study's purpose, procedures, risks, and benefits, along with their right to withdraw at any time without penalty. The initial survey, completed on POD1, included the NCCN Distress Thermometer (DT), and the Ways of Coping Instrument (WAYS).

Participants were also invited to provide open-ended responses to the prompt: “Is there anything else you would like to share with the researchers?” to capture additional insights into their experiences. Additionally, as part of the Distress Thermometer and Problem List (DT), participants had the opportunity to report “Other problems” not captured by the predefined categories.

On Postoperative Day 14 (POD14), participants received a follow-up email with a link to the second survey, which included the same instruments (DT and WAYS) to facilitate a repeated-measures analysis of distress and coping strategies over time (Fig. 2). Open-ended responses were again solicited to further explore participants' recovery experiences. To maximize response rates, automated email reminders were sent one and two days after the initial invitation to participants who had not yet completed the survey.

Data analysis

The statistical analyses conducted in this study were carefully designed to align with the research aims and hypotheses outlined at the conclusion of the introduction, thereby facilitating a comprehensive investigation of the relationships among antecedents, coping strategies, and outcomes of distress, pain, and nausea.

Bivariate analysis was performed to examine the associations between total coping scores, the eight subscales of the Ways of Coping (WAYS) questionnaire, and the outcomes of pain and distress. This analysis addressed the hypothesis that specific coping strategies, as well as their overall utilization, are associated with variations in distress and pain levels among participants. It provided foundational insights into the interplay between coping mechanisms and symptom severity.

Unpaired t-tests and one-way ANOVA were utilized to evaluate the relationships between key predictors (e.g., presence of children, employment status, smoking behavior, perceived social support, availability of sick leave, and history of postoperative nausea and vomiting [PONV]) and the outcomes of distress and pain. These analyses tested the hypothesis that individual demographic and clinical antecedents significantly contribute to variability in postoperative symptoms.

To further elucidate the combined effects of predictors and coping strategies on outcomes, three multiple linear regression models were developed. These models were aligned with the hypothesis that antecedents and coping strategies interact to explain the variability in distress, pain, and nausea. The regression approach allowed for a multivariable analysis, identifying the relative contributions of each factor while controlling for potential confounders.

Finally, structural equation modeling was employed to evaluate whether coping strategies mediated the relationship between antecedents and psychological distress. This analysis directly addressed the hypothesis that coping strategies act as intermediary mechanisms linking demographic and clinical predictors to distress outcomes. By exploring these pathways, the study provided a nuanced understanding of the dynamic interactions among antecedents, coping strategies, and postoperative experiences, advancing the overarching objective of improving symptom management in this population. All statistical analyses were performed using IBM SPSS Statistics (Version 25).

The open-ended responses were analyzed by a qualitative methods specialist and the primary investigator. The data was analyzed using a matrix analysis approach, where responses to each item were coded for primary themes and subthemes. This approach has been previously used to characterize key thematic content in open-ended survey responses.[33,34]

Missing data was managed using listwise deletion for the eight participants who did not complete surveys POD14. For single missing items,

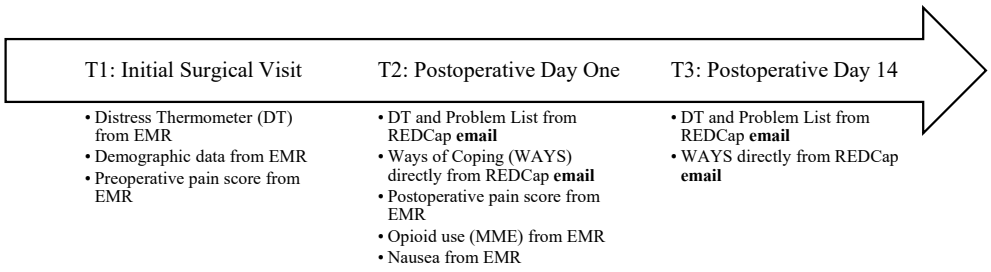

Fig. 2. Data collection time points. EMR, electronic medical record; MME, morphine milligram equivalents; REDCap, Electronic Data Capture.

mean imputation for continuous variables or mode imputation for categorical variables was selectively applied when appropriate. Patterns of missing data were assessed to ensure minimal impact on results, and sensitivity analyses were conducted to confirm the robustness of findings across different methods of handling missing data.

Results

The final study sample included 75 women, representing a 61.0% response rate from the 123 potential participants invited. The average age of participants was 58.7 years (SD = 9.51). Over half of the sample was employed (53.3%, $n = 40$), with 72.5% ($n = 29$) of those employed reporting access to sick leave. Comprehensive demographic and descriptive information for the study population is provided in Table 1.

On POD1, the most frequently used coping strategies were seeking social support and planful problem solving, with mean scores of 1.25 (SD = 0.75, range 0–2.83, α = 0.81) and 1.19 (SD = 0.68, range 0.38–3.30, α = 0.83), respectively. The least frequently used coping strategies on POD1 were accepting responsibility (mean = 0.27, SD = 0.55, α = 0.68) and confrontive coping (mean = 0.47, SD = 0.47, α = 0.78).

By POD14, seeking social support (mean = 1.20, SD = 0.74, α = 0.81) and planful problem solving (mean = 1.04, SD = 0.48, α = 0.83) remained the most used coping strategies. The use of all coping strategies decreased from POD1 to POD14, except for confrontive coping, which slightly increased to a mean of 0.56 (SD = 0.56, α = 0.78), and accepting responsibility, which increased to a mean of 0.36 (SD = 0.61, α = 0.68). The total coping score decreased from a mean of 6.16 (SD = 3.20) on POD1 to a mean of 5.79 (SD = 3.24).

A paired-samples *t*-test was conducted to compare the average scores of the WAYS questionnaire subscales between POD1 and POD14. The results indicated no significant differences in the average scores of any coping strategies between the two time points ($P > 0.05$ for all subscales). Descriptive statistics for the coping strategies are presented in Table 2.

To evaluate the effects of antecedents and coping strategies on distress, a general linear model was constructed. The results demonstrated a relationship between distress and the escape-avoidance coping strategy ($B = 2.601$, $SE = 0.691$, β = 0.415, $P < 0.001$), seeking social support coping strategy ($B = 1.018$, SE 0.416, β = 0.270, $P = 0.02$), history of nausea ($B = 3.547$, $SE = 0.231$, β = 0.517, $P < 0.001$), total coping score ($B = 0.32$, $SE = 0.109$, β = 0.32, $P < 0.003$), and age ($B = 0.086$, $SE = 0.031$, β = 0.293, $P = 0.007$). The model explained 39.4% of the variability in distress. This model explained 39.4% of the variability in distress. The escape-avoidance coping strategy emerged as the strongest predictor of distress, followed by seeking social support, history of nausea, total coping score, and age. Two additional general linear models were used to assess the relationships between specific antecedents and coping strategies with pain and nausea. The analyses indicated that none of the antecedents or coping strategies were significantly related to pain or nausea.

Structural equation modeling was employed to assess whether coping strategies mediated the relationship between antecedents and distress. Nausea was excluded from this analysis due to the low number of participants experiencing postoperative nausea (only two participants), and pain was excluded because there was no significant relationship between pain and any antecedent. The results of the structural equation modeling path analysis (Table 3) revealed that coping strategies did not significantly mediate the relationship between antecedents and distress on POD1 (Fig. 3). The model explained 4.7% of the variance in coping strategies and 1.9% of the variance in distress (Table 2).

Open-ended survey questions

A total of 29 patients provided responses to the open-ended survey questions. When asked to identify "other problems" contributing to

Table 1
Frequencies and percentages for study sample ($N = 75$).

Variable	*n*	%
Age, years		
18–39	2	2.7
40–49	12	16.0
50–69	53	70.7
≥ 70	8	10.7
Home state		
Connecticut	2	2.7
New Jersey	9	12.0
New York	63	84.0
Florida	1	1.3
Children at home		
Yes	5	6.7
No	70	93.3
Employed		
Yes	40	53.3
No	35	46.7
Sick leave (employed, $n = 40$)		
Yes	29	72.5
No	11	27.5
Social support		
Yes	67	89.3
No	8	10.7
Current smoker		
Yes	23	30.7
No	52	69.3
History of postoperative nausea and vomiting		
Yes	3	4.0
No	72	96.0

Table 2
Coping strategy utilization on postoperative day 1 and 14.

Coping strategy	Postoperative day 1		Postoperative day 14		*P*
	Mean	SD	Mean	SD	
Confrontive coping	0.47	0.47	0.56	0.56	0.40
Distancing	0.80	0.48	0.73	0.45	0.46
Self-control	0.79	0.62	0.72	0.55	0.37
Seeking social support	1.25	0.75	1.20	0.74	0.71
Accepting responsibility	0.27	0.55	0.36	0.61	0.36
Escape avoidance	0.53	0.47	0.47	0.52	0.55
Planful problem solving	1.19	0.68	1.04	0.68	0.12
Positive reappraisal	0.85	0.69	0.70	0.48	0.16
Total score	6.16	3.21	5.79	3.24	0.45

Table 3
Mediating effect of coping strategies on the relationship between antecedents and distress.

Predictor	*B*	*SE*	*T-statistics*	*P*
Age -> coping - > distress	−0.035	−0.016	0.520	0.603
Smoker -> coping - > distress[a]	0.001	−0.002	0.012	0.990
Social Support - > coping - > distress[a]	0.019	0.017	0.292	0.770
Sick leave - > coping - > distress[a]	−0.088	−0.087	0.867	0.386
Employed - > coping - > distress[a]	−0.001	−0.004	0.012	0.991

$R^2 = 0.047$.

[a] The "no" response was the reference, and the statistics given are for the "yes" response.

postoperative pain and distress and to share any additional information related to their survey responses, patients' comments fell into three main domains: contributing factors to pain and distress, factors contributing to improvement in pain and distress, and coping strategies. Coping strategies includes three themes: support from care team, adaptations for pain, and adaptations for health and wellness.

Patients emphasized that support from their care team significantly helped them cope with pain and distress. They noted that the attentiveness and reassurance provided by health care professionals alleviated their concerns and made them feel supported throughout the diagnosis and treatment process. Additionally, patients reported making various adaptations to manage pain. These included using extra pillows for sleep support, adding padding to bras for breast support, and applying ice packs and compression to alleviate pain at the biopsy site. One patient mentioned adjusting physical activity to avoid exacerbating breast pain. To further cope with pain and distress, patients adopted several health and wellness strategies such as increasing physical activity, practicing meditation, maintaining a healthy diet, quitting smoking, and employing sleep interventions like weighted blankets, relaxation techniques, and listening to binaural beats. Supporting quotations illustrating these themes can be found in Table 4.

Discussion

This study provides valuable insights into the coping strategies employed by women recovering from BCS and their relationship to postoperative distress. The findings not only corroborate existing literature but also offer new perspectives on the dynamics of coping in the context of cancer treatment.

Our results demonstrate that patients consistently utilized adaptive coping strategies, such as seeking social support and planful problem-solving, across both POD1 and POD14, with no statistically significant changes in their usage over time. This stability suggests that these strategies are integral to managing stress during the postoperative recovery period. Social support and planful problem-solving were the most frequently employed strategies, reflecting patients' proactive efforts to gather information, seek reassurance, and navigate the uncertainties associated with their diagnosis and treatment. These findings are consistent with other studies[13,15,16,35,36] showing that these strategies play a critical role in reducing distress and promoting a sense of control during early recovery.

Although the overall use of coping strategies decreased between POD1 and POD14, this reduction may indicate patients' adaptation to the recovery process, diminished intensity of stressors, or a shift toward more selective use of effective strategies. The continued reliance on social support and problem-solving highlights their enduring importance, even as the acute phase of recovery subsides.

Less frequently used strategies, such as confrontive coping and accepting responsibility, were employed at lower rates, consistent with their association with emotionally charged or less constructive responses. Future research should explore why certain patients adopt these

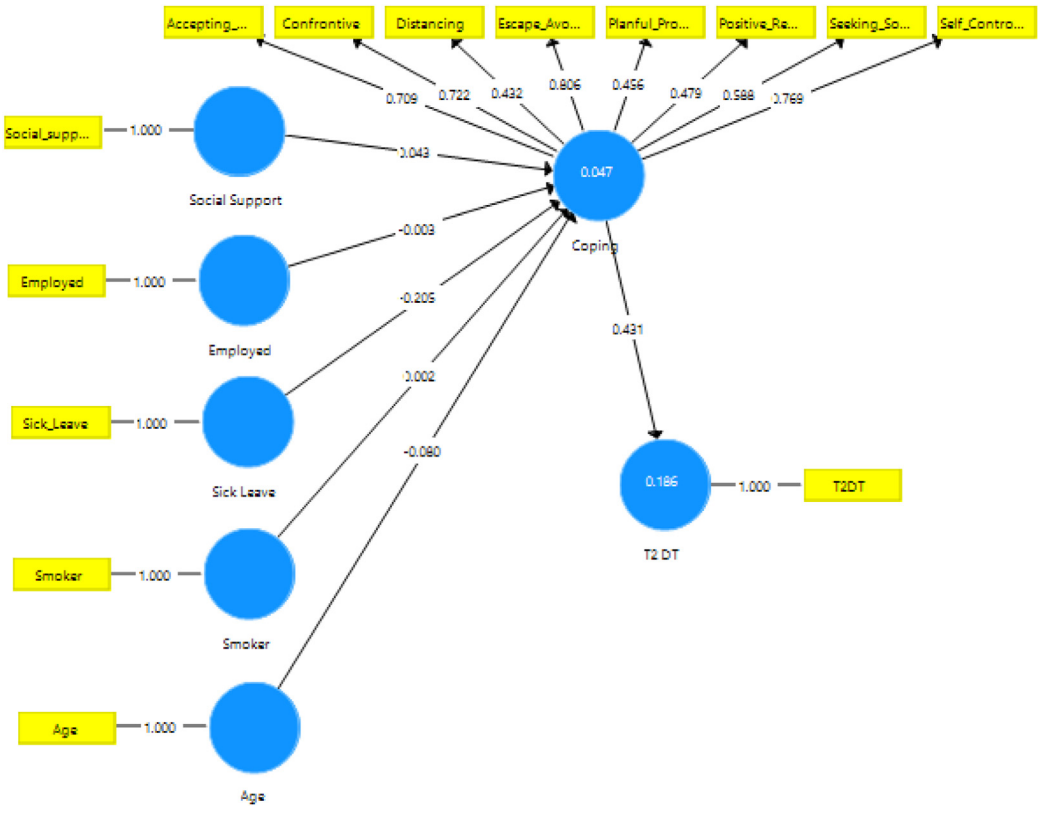

Fig. 3. Structural Equation Modeling Path Analysis Describing the Mediating Effect of Coping Strategies on the Relationship Between Antecedents and Distress
Note. The lines provide the path coefficient estimates for each relationship. Coping Strategy $R^2 = 0.047$, Distress $R^2 = 0.186$.

Table 4
Themes from open-ended survey questions.

Coping strategies	
Theme	Illustrative quotations
Support from care team	"I was nervous about the breast incision/scar but when I saw it, my surgeon did an amazing job. I couldn't have gotten a better doctor, and the whole team are just wonderful. I'm very thankful to everyone." – Patient 18
Adaptations for pain	"I have been using various small pillows to keep myself comfortable while sleeping and multiple gauze pads in my bra to prevent the breast from moving and irritating the incisions. I Am now wearing a regular bra on the last hook for comfort and support." – Patient 42
Adaptations for health and wellness	"I started meditating 4 weeks ago (at the time I was diagnosed) 2–3 times per day which completely reduced my anxiety. When not meditating I practice deep breathing. I'm also very athletic; I do some form of physical activity every day including yoga 3–4 times per week. Also, I eat a vegan diet." – Patient 74
	"Since my diagnosis I've felt like I'm just not connecting with it. But as each day goes by, I can feel it coming onto the surface. The feeling of it is deep and distressing. I Have quit smoking which was a [stressor] for me." – Patient 68

maladaptive strategies and whether targeted interventions can encourage a shift toward more adaptive behaviors. Health care providers play a pivotal role in promoting effective coping strategies. Encouraging patients to leverage social support networks and guiding them in structured problem-solving approaches can help mitigate distress during the recovery process.

Our findings align with existing literature emphasizing the critical role of social support and planful problem-solving in mitigating postoperative distress.[13,35,37] Previous studies have highlighted these strategies as integral to managing stress, particularly during the early stages of recovery, when patients are often overwhelmed by physical symptoms such as pain and nausea, coupled with psychological stress. Social support, whether from family, friends, or health care providers, consistently emerges as a highly beneficial strategy, offering both emotional relief and practical guidance during this vulnerable period. Encouraging patients to engage with their support networks may help ease their recovery journey significantly.[17]

Implications for nursing practice and research

This study reinforces the applicability of the Transactional Model of Stress and Coping (TMSC) as a theoretical framework for understanding how patients navigate distress during the postoperative period. Our data show that higher distress levels are associated with increased use of coping strategies, particularly escape-avoidance and seeking social support. While escape-avoidance, a disengagement strategy, is linked to higher distress, seeking social support consistently demonstrates its effectiveness in helping patients manage emotional challenges. These findings underscore the importance of fostering adaptive coping mechanisms to improve patient outcomes.

Additionally, our results highlight the impact of specific antecedents, such as age and a history of postoperative nausea and vomiting (PONV), on distress levels. Younger patients[26,38] and those with a history of PONV reported higher distress, indicating the need for targeted interventions for these high-risk groups.[23,39] Although only three of the 75 participants had a history of PONV, the psychological burden of PONV,[23,40,41] including heightened anxiety and fear of recurrence,[42] further emphasizes the importance early symptom management to improve recovery. [43–45]

Structural Equation Modeling Path Analysis revealed no significant mediation of coping strategies between antecedents and distress, diverging from some prior studies.[13,14] While coping strategies may not mediate these relationships directly, their role in distress management remains critical and warrants further investigation. Future research should explore the trajectory of coping strategies beyond 14 days post-surgery to understand long-term patterns and evaluate interventions designed to strengthen adaptive behaviors and mitigate maladaptive responses. By addressing these areas, we can better support women recovering from BCS and enhance their overall outcomes.

Future studies should examine the trajectory of coping strategies beyond POD14 to capture long-term dynamics and evaluate interventions tailored to reinforce adaptive strategies and reduce maladaptive behaviors. By addressing these areas, we can enhance recovery experiences and improve outcomes for women undergoing breast-conserving surgery.

Limitations

This study has several limitations that warrant consideration when interpreting the findings. First, the relatively small sample size (n = 75) may limit the generalizability of the results, particularly to populations beyond the study setting. The study was conducted at a single National Cancer Institute-designated comprehensive cancer center, which may not capture the experiences of women in diverse geographic locations or health care environments. Second, the recruitment process, conducted via email, may have introduced selection bias. Individuals with limited access to technology or lower levels of digital literacy may have been underrepresented, potentially skewing the sample toward participants with higher socioeconomic status or technological proficiency. Additionally, variability in the timing of survey completion due to automated email reminders may have influenced responses, particularly regarding symptom severity and coping strategies, as participants who responded later may have had different symptom experiences than those who completed the survey on time.

Additionally, the absence of data on race, ethnicity, and income restricts the ability to evaluate the diversity of the sample. This limitation impedes the assessment of how coping strategies and symptom severity may differ across various racial, ethnic, and socioeconomic groups. Consequently, the representativeness of the sample in relation to the broader population of women undergoing BCS remains unclear. Finally, the reliance on self-reported measures introduces the potential for response bias. Participants may have over- or under-reported their symptoms and coping strategies due to factors such as social desirability or recall inaccuracies.

Future research should aim to address these limitations by incorporating a larger, more geographically diverse sample and employing recruitment methods that ensure equitable access for individuals across varying levels of digital literacy. Additionally, the inclusion of demographic variables such as race, ethnicity, and income will enable a more comprehensive understanding of the diversity of coping experiences. The use of objective measures alongside self-reported data could also mitigate the impact of response bias, enhancing the robustness and applicability of the findings.

Conclusions

This study highlights the critical role of adaptive coping strategies, such as seeking social support and planful problem-solving, in mitigating psychological distress among women recovering from BCS. These strategies remained consistently utilized during the immediate postoperative period, reflecting their importance in managing stress and promoting resilience. While the overall reduction in coping strategy use may indicate recovery adaptation, persistent maladaptive behaviors warrant further exploration and targeted interventions. Younger age and a history of postoperative nausea and vomiting emerged as significant predictors of distress, emphasizing the need for tailored support in high-risk groups. Despite limitations, including a modest sample size and lack of demographic diversity, this study underscores the value of fostering adaptive coping mechanisms to enhance recovery outcomes in patients with

breast c and provides a foundation for future research to optimize post-operative care.

CRediT authorship contribution statement

Jennifer R. Majumdar: Conceptualization, Methodology, Formal analysis, Investigation, Writing – Original and Revised draft preparation, Project administration. **Margaret Barton-Burke:** Conceptualization, Methodology, Writing – Revised draft preparation, Supervision. **Jaime Gilliland:** Data curation, Formal analysis, Writing – Revised draft preparation, Final approval of the manuscript. **Nalini Jairath:** Conceptualization, Methodology, Writing – Revised draft preparation, Supervision. All authors had full access to all the data in the study, and the corresponding author had final responsibility for the decision to submit for publication. The corresponding author attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted.

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Ethics statement

The study was reviewed and approved by the Institutional Review Board (IRB) of Memorial Sloan Kettering Cancer Center (Approval No. X20-042) and was conducted in accordance with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. All participants provided written informed consent.

Data availability statement

The data that support the findings of this study are available from the corresponding author, Jennifer Ross Majumdar, upon reasonable request.

Declaration of generative AI and AI-assisted technologies in the writing process

No AI tools/services were used during the preparation of this work.

Declaration of competing interest

The authors declare no conflict of interest. The two authors, Jennifer Ross Majumdar and Margaret Barton-Burke, are editorial board members of *Asia–Pacific Journal of Oncology Nursing*. The article was subject to the journal's standard procedures, with peer review handled independently of Dr. Majumdar and Prof. Barton-Burke and their research groups.

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