

# Psychosocial Adaptation in Breast Cancer Patients: A Mixed-Methods sequential Explanatory Study

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**Background:** Breast cancer is the leading cause of death among women. Breast cancer patients experience dynamic and heterogeneous psychosocial adaptation from diagnosis through treatment. However, knowledge of the levels of heterogeneity in psychosocial adaptation and its influencing factors in breast cancer patients is limited.

**Objective:** To examine the psychosocial adaptation trajectories of breast cancer patients from diagnosis to the chemotherapy phase and to explore the facilitators and barriers influencing their psychosocial adaptation.

**Methods:** Latent class growth modeling was used to analyze the latent classes of psychosocial adaptation trajectories. Colaizzi's seven-step method was used to analyze the qualitative data.

**Results:** Three distinct psychosocial adaptation trajectories were identified in breast cancer patients: high-stable, moderate-declining, and low-increasing adaptation groups. The individuals within the three psychosocial adaptation categories share identical growth trajectories but exhibit different growth patterns. Category 1, the "High-stable adaptation group", comprised 51 individuals (30.9% of the total sample), with an average intercept of 176.85 ( $P < 0.001$ ) and a slope of  $-0.032$  ( $P = 0.977$ ). Category 2, the "Moderate-declining adaptation group", included 54 individuals (32.7% of the total sample), with an average intercept of 142.77 ( $P < 0.001$ ) and a slope of  $-1.78$  ( $P = 0.381$ ). Category 3, the "Low-increasing adaptation group" consisted of 60 individuals (36.4% of the total sample), with an average intercept of 105.04 ( $P < 0.001$ ) and a slope of 13.13 ( $P < 0.001$ ). Predictive factors for different trajectory groups included monthly income, type of surgery, and pathological stage. Through semi-structured interviews, three themes were identified for facilitators and barriers. Facilitators included personal resources, social resources, and family resources, while barriers included complications and adverse drug reactions, heavy economic burden, and cognitive changes.

**Conclusion:** Breast cancer patients experience dynamic and heterogeneous psychosocial adaptation from diagnosis to chemotherapy. The trajectory predictors and barriers identified in this study can assist healthcare providers in offering personalized, targeted interventions and plans to promote psychosocial adaptation in breast cancer patients.

**Keywords:** breast cancer, psychosocial adaptation, ABC-X model of stress, latent class growth model

## Background

Breast cancer is the most common malignant tumor globally and the leading cause of cancer-related death among women.<sup>1</sup> Due to its large population, China ranks first in the world in terms of both the incidence and mortality rates of female breast cancer. Global cancer statistics show that in 2022, the most common malignant tumor in women worldwide is breast cancer (23.8%), and breast cancer accounts for 15.4% of female deaths. From 2018 to 2022, breast cancer has consistently been the most common and the deadliest malignant tumor among women.<sup>2</sup> Through radical mastectomy, which involves the removal of the entire breast, pectoralis major, minor muscles, and axillary lymph node dissection, the five-year survival rate of patients has reached 40%.<sup>3</sup> However, after radical mastectomy, patients often face the psychological distress caused by the loss of their breast and concerns about the potential for recurrence and metastasis.



These patients are usually under prominent psychological stress for extended periods. This state may lead to mental depression, low self-esteem, and lack of confidence and may result in delayed medical visits, self-isolation, and other reclusive behaviors.<sup>4</sup>

Psychosocial adaptation in breast cancer patients refers to their emotional responses, self-evaluations, and cognitive attitudes during the disease treatment process. This process involves adapting individual behaviors to various groups and aligning with social norms and customs.<sup>5</sup> Breast cancer patients may live with cancer for an extended period, and changes and challenges can affect their psychosocial adaptation abilities to varying degrees. Previous studies have shown that 20% to 45% of patients still exhibit poor psychosocial adaptation six months post-surgery.<sup>6</sup> This condition may persist throughout the entire course of treatment,<sup>6</sup> seriously affecting breast cancer patients' treatment adherence,<sup>7</sup> treatment outcomes, prognosis, recovery, and quality of life.<sup>8</sup> Breast cancer patients generally face challenges in psychosocial adaptation, manifested as anxiety, depression, reduced self-worth, and social withdrawal.<sup>9–12</sup> Current research on psychosocial adaptation in breast cancer primarily focuses on cross-sectional studies of postoperative patients.<sup>6,13</sup> Although existing longitudinal studies provide some insights,<sup>14–19</sup> there is a lack of systematic exploration into the psychosocial adaptation of patients at key medical events<sup>20</sup> (such as initial diagnosis, surgery, and chemotherapy), which may lead to missing critical changes in adaptation trajectories. Therefore, future research needs to explore the full scope of psychosocial adaptation in breast cancer patients and the potential heterogeneous trajectory changes to deepen healthcare providers' understanding of psychosocial adaptation in breast cancer patients and thus provide a foundation for improving psychosocial adaptation levels. Case management throughout the course of chemotherapy can significantly improve psychosocial adaptation among breast cancer patients and, consequently, enhance their quality of life.<sup>21</sup>

The ABC-X model is one of the most comprehensive family stress theory models and helps individuals develop positive cognitive patterns, integrate and utilize adequate resources to alleviate stress, and solve problems.<sup>22</sup> In this model, "A" represents stressors or risk factors, "B" represents coping resources, "C" represents individual cognition, and "X" denotes the impact of stress events. The risk factors, coping resources, and individual cognition influence how a stress event impacts an individual. Previous studies have shown that factors related to disease diagnosis and treatment, such as disease stage,<sup>6,23</sup> surgical methods,<sup>13</sup> and accompanying symptoms,<sup>24</sup> are risk factors affecting the psychosocial adaptation of breast cancer patients. However, there has been limited exploration of the individual's coping resources and cognitive aspects, and a comprehensive summary of the factors influencing psychosocial adaptation in breast cancer patients has not yet been achieved. Mixed methods research, combining both quantitative and qualitative approaches, has been used to explore the influencing factors of related indicators.<sup>25,26</sup> Therefore, it can assist researchers in exploring the influencing factors of psychosocial adaptation in breast cancer patients.

This study aims to analyze the psychosocial adaptation development trajectories of breast cancer patients from the diagnosis phase to the surgery phase to the chemotherapy phase, identify characteristics and periods of low adaptation levels, and combine qualitative research for such patients. This comprehensive analysis will explore the dynamic changes in psychosocial adaptation, the facilitators, and barriers during the diagnosis and treatment phases, providing clues and directions for future intervention research.

## Methods

### Study Objective

This study aims to examine the psychosocial adaptation levels of breast cancer patients and explore the barriers and facilitators that influence their psychosocial adaptation levels.

### Study Design

A mixed-methods sequential explanatory study design<sup>27</sup> was employed, consisting of a quantitative study followed by qualitative study.

### Setting and Recruitment

From January 2022 to October 2022, breast cancer patients who underwent surgery were conveniently recruited from the Department of Breast Surgery at a comprehensive hospital in southern China for the quantitative phase of the study.

Inclusion criteria: (1) Female patients aged  $\geq 18$  years; (2) Diagnosed with primary breast cancer according to the guidelines of the Chinese Anti-Cancer Association<sup>28</sup> and aware of their diagnosis; (3) Underwent breast cancer surgery; (4) Received chemotherapy post-surgery; (5) Able to read and understand the Chinese questionnaire and communicate verbally; (6) Voluntary participation with signed informed consent. Exclusion criteria: (1) Co-existing malignant tumors or a history of other cancer; (2) Severe physical conditions such as heart, lung, liver, or kidney diseases; (3) Cognitive impairment, mental disorders, or a history of psychological treatment; (4) Participation in similar studies within the last 30 days. Exclusion criteria: (1) Participants who did not complete the entire survey, such as those who relocated or became uncontactable; (2) Participants who answered all items on the questionnaire identically; (3) Participants who completed the questionnaire in less than 2 minutes. Participants who completed the quantitative phase were selected using maximum variation sampling for the qualitative phase. Semi-structured interviews were conducted after obtaining informed consent.

The sample size for the quantitative phase was estimated using the sample size table for a single-group repeated-measures design,<sup>29</sup> with each participant measured three times. A correlation coefficient ( $\gamma$ ) of 0.5, a weak effect size ( $r=0.14$ ), and an  $\alpha$  of 0.05 were used to ensure a power of  $1-\beta = 0.8$ , resulting in a sample size of 165. The sample size for the qualitative phase was based on data saturation.

## Data Collection

### Quantitative Research Data Collection

(1) General information questionnaire: This questionnaire was designed by the researchers based on a literature review, including demographic and social information (age, gender, marital status, living situation, etc.) and disease-related information (pathological stage, surgical methods, symptom burden, etc.).

(2) Psychosocial adaptation questionnaire for breast cancer: This questionnaire was developed by Chen et al<sup>30</sup> to measure the psychosocial adaptation levels of breast cancer patients during the post-surgery and chemotherapy phases.<sup>31</sup> The questionnaire consists of 5 dimensions with 44 items, which are: self-control and self-efficacy (9 items), sense of belonging (9 items), attitude (8 items), self-esteem and self-acceptance (10 items), and anxiety/depression (8 items). The items are scored on a Likert 5-point scale, with “1–5” representing “completely incorrect, mostly incorrect, uncertain, mostly correct, and completely correct,” respectively. There are 23 negatively scored items in the questionnaire. The total score ranges from 44 to 220, with higher scores indicating better psychosocial adaptation. The questionnaire’s overall Cronbach’s  $\alpha$  coefficient is 0.945, and the Cronbach’s  $\alpha$  coefficients for the 5 dimensions range from 0.743 to 0.818.

### Qualitative Research Data Collection

An interview question guide was initially drafted based on the ABC-X model of stress,<sup>22</sup> which was then refined through expert consultation and revisions. The final version of the question guide includes: (1) Can you describe your psychosocial experience in as much detail as possible since being diagnosed with breast cancer? (2) How was your life before being diagnosed with breast cancer? What changes have occurred since then? (3) What measures have you taken or are currently taking to adapt to life after breast cancer surgery? (4) What do you think could help alleviate your psychosocial stress?

## Data Collection Procedure

### Quantitative Research Collection Procedure

Researchers received standardized training before the study to minimize bias during the data collection. After obtaining informed consent from the patients, the survey was conducted. Participant assessments were performed at three time points: T1: Within three days of the patient’s diagnosis; T2: Within three days of the patient’s surgery; T3: Within three days of the patient’s second chemotherapy. At T1 (within three days of diagnosis), both the general information questionnaire and the psychosocial adaptation questionnaire for breast cancer were used for the survey. At T2 and T3, only the psychosocial adaptation level was assessed.

## Qualitative Research Collection Procedure

Semi-structured interviews were conducted in a quiet teaching room in the ward to ensure a calm environment during the interviews. Each interview lasted 30 to 60 minutes and was recorded using a voice recorder. Before the interview, the purpose of the research, the interview content, and the required time were explained to the participants. The confidentiality of their information was assured, and the recordings would only be used for research purposes. The researcher established a good rapport with the participants. During the interview, the researcher remained neutral, refraining from intervening or interrupting, and encouraged the participants to express their opinions and feelings fully. Facial expressions and non-verbal behaviors were noted during the process to ensure the authenticity and accuracy of the interview data.

## Data Analysis

Quantitative phase: SPSS 25 was used to describe and analyze the data. Continuous variables were expressed as means and standard deviations, while categorical data were presented as frequencies and percentages. Chi-square tests and analysis of variance (ANOVA) were used to statistically analyze the psychosocial adaptation levels of patients with different demographic characteristics. Data preprocessing was performed using SAS 9.4 software. For missing values, multiple imputation methods were applied to fill in the gaps. Mplus 7.0 was employed to conduct latent class growth modeling (LCGM), analyzing the latent classes of psychosocial adaptation trajectories in breast cancer patients. The analysis began with an initial model (assuming only one class for all samples) and progressively added more categories to the model, selecting the best-fitting model based on parameter information. Determining the number of latent classes is key to fitting the Latent Class Growth Model (LCGM). To select the most appropriate number of latent classes, model fit tests and information criteria are usually combined, along with consideration of practical significance. Common information criteria include the Akaike Information Criterion (AIC), the Bayesian Information Criterion (BIC), and the sample-corrected BIC (aBIC). Smaller values of these indicators indicate better fit of the corresponding LCGM. The Bootstrapped Likelihood Ratio Test (BLRT) and the Vuong-Lo-Mendell-Rubin Likelihood Ratio Test (VLRT) are commonly used model fit tests. When the P-value of BLRT or VLRT in an LCGM with  $c$  latent classes is less than 0.05, the  $c$ -class model is considered superior. If the P-value is greater than 0.05, the  $(c-1)$ -class model is deemed better. When determining the number of classes, VLRT is more sensitive than BLRT, providing more reliable results. The Entropy value indicates the accuracy of the model in correctly classifying individuals into their respective latent classes. An Entropy value greater than 0.8 is generally considered to reflect a better classification performance of the model. GraphPad Prism 10 was used to plot the trend graphs of psychosocial adaptation trajectories for  $N$  latent classes in the optimal model. The psychosocial adaptation development trajectory groupings obtained were used as the dependent variable in a multivariable logistic regression model. Variables with a P-value  $< 0.1$  from univariate analysis were included in multivariate analysis. Categorical variables were set as dummy variables, and forward stepwise regression was used to analyze independent factors affecting breast cancer patients' psychosocial adaptation development trajectory.

Qualitative phase: Within 24 hours after the interviews, the researchers listened to the recordings repeatedly and completed the transcription. The non-verbal actions were recorded during the interview. Two researchers assigned anonymous numbers in chronological order and independently analyzed the transcribed data using Colaizzi's seven-step method. Data were analyzed following Colaizzi's descriptive phenomenological method. The process began with the research team repeatedly reading the transcripts to achieve immersion and obtain a general sense of the data. Significant statements pertaining to the research phenomenon were then extracted. The subsequent steps involved formulating meanings from these statements, aggregating them into theme clusters, and developing an exhaustive description of the phenomenon. The themes were iteratively refined and validated through team discussions and member checking with participants to ensure the findings' trustworthiness. To maintain methodological rigor, researchers engaged in bracketing to mitigate potential biases. Furthermore, a rigorous forward and back-translation procedure was implemented for the English version of the findings to guarantee semantic equivalence with the original Chinese data.<sup>32</sup> Researchers carefully read the data, identified major barrier statements, coded recurring information, summarized viewpoints from the codes, wrote detailed and complete descriptions, identified patterns and synthesized meaningful concepts to form themes.

## Ethical Considerations

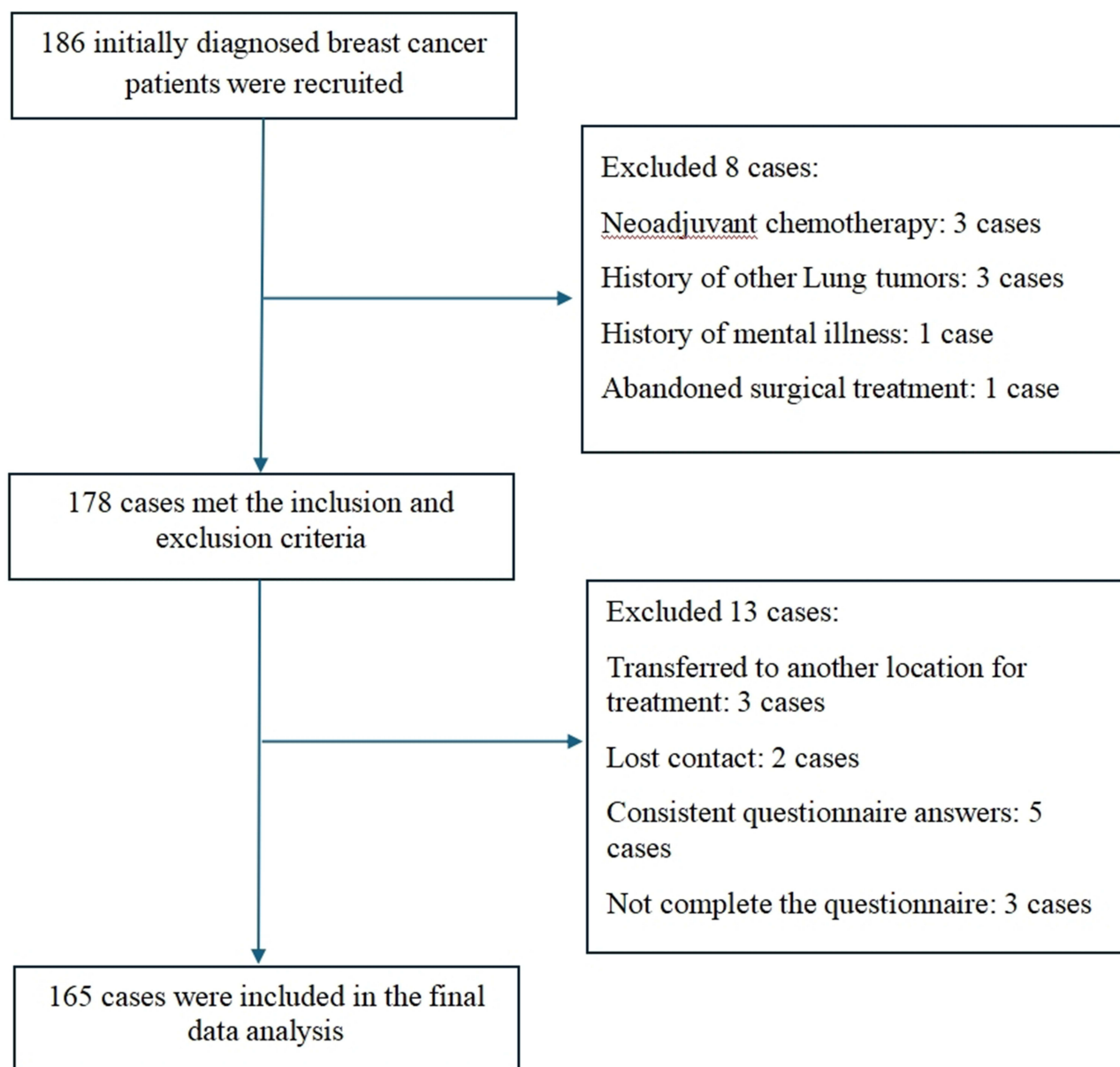
This study was approved by the institutional ethics committee (Ethical Review Number: 2022–03-005-K01). Researchers fully respected and sought the participants' opinions, and written informed consent was obtained. The study adhered to the principles outlined in the Declaration of Helsinki.

## Results

### Quantitative Phase

#### Participant Demographics

The recruitment process for the study is shown in [Figure 1](#). Among the 186 breast cancer patients recruited, 165 completed the quantitative survey. The average age of the participants was  $49.02 \pm 12.34$  years. Most participants were married (92.73%) and had an education level of junior high school or below (60.00%). Further details can be found in [Supplementary Table S1](#).



**Figure 1** Recruitment of the quantitative study participants.

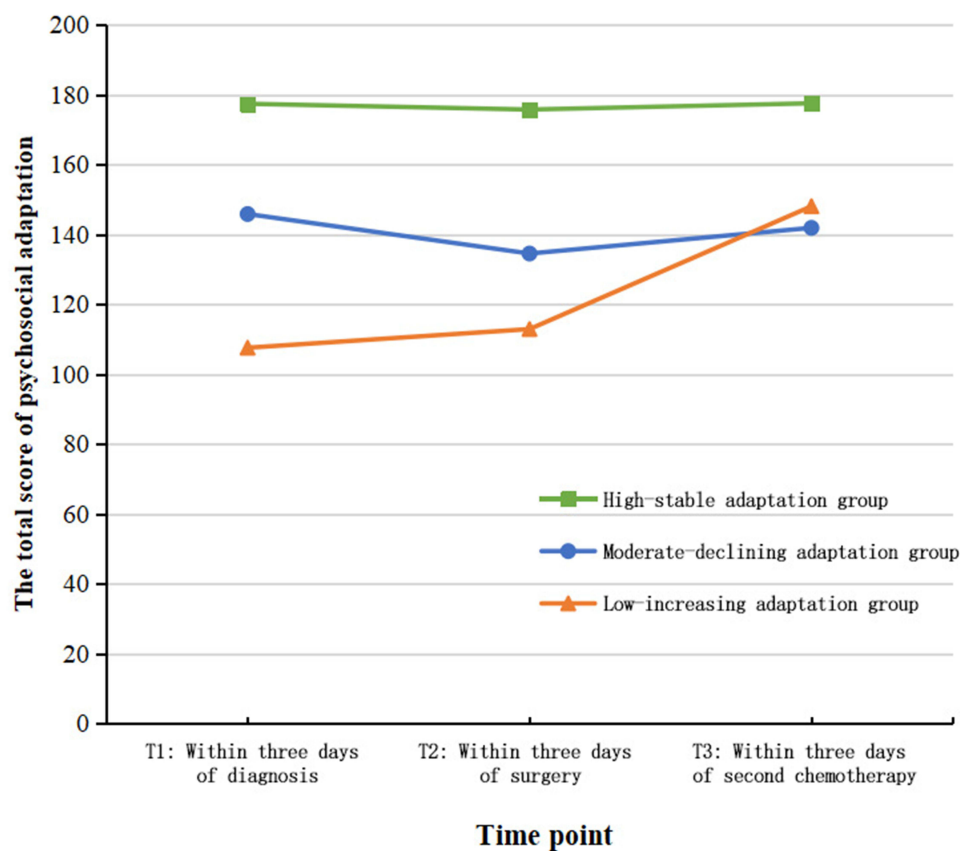
## Latent Class Analysis results

As shown in [Supplementary Table S2](#), the aBIC value was the smallest for the five-class model. However, the VLRT = 0.4087 suggested that the five-class model was not superior to the four-class model. Although the four-class model had a smaller aBIC and a higher Entropy than the three-class model, and the VLRT = 0.009 and BLRT < 0.001 also indicated that the four-class model was superior to the three-class model, the probability of the first class in the four-class model was only 0.11, with an n of 18, which is relatively small. Based on this comprehensive information, the three-class model was selected.

**Figure 2** shows the psychosocial adaptation trends for the three classes. Class 1, the “high- stable adaptation group,” accounted for 30.9%. The mean intercept and slope for this group were 176.85 ( $p < 0.001$ ) and  $-0.032$  ( $p = 0.977$ ), respectively. The psychosocial adaptation scores for this group were consistently above 176 and showed minimal fluctuation. Class 2, the “moderate-declining adaptation group,” accounted for 32.7%. The mean intercept and slope for this group were 142.77 ( $p < 0.001$ ) and  $-1.78$  ( $p = 0.381$ ), respectively. The psychosocial adaptation scores for this group ranged from 132 to 175, with a slow downward trend. Class 3, the “low-increasing adaptation group,” accounted for 36.4%. The mean intercept and slope for this group were 105.04 ( $p < 0.001$ ) and  $13.13$  ( $p < 0.001$ ), respectively. The psychosocial adaptation scores for this group were below 132 in the first two assessments but increased to between 132 and 175 in the third, showing an upward trend.

## Determinants of Psychosocial Adaptation in Participants

The results of the univariate analysis are shown in [Table 1](#). The multivariable logistic regression included factors with a P-value < 0.1 in the univariate analysis. The results showed that monthly income, pathological stage, and type of surgery were significant factors influencing the psychosocial adaptation trajectories of breast cancer patients. Specifically, compared with patients with a monthly income of 6000 RMB or less, those with a monthly income above 6000 RMB were less likely to fall into the moderate-declining adaptation trajectory (OR = 0.238, 95% CI: 0.072~0.786,  $P = 0.019$ ). Compared with patients



**Figure 2** LCGM (c=3) latent class growth trajectories.

**Table I** Relationship Between Psychosocial Adaptation Development Trajectories and General Demographic Characteristics in Breast Cancer Patients

Variable	Psychosocial Adaptation Development Trajectories			Statistical value	P-value
	High-Stable Adaptation Group (N=51)	Moderate-Declining Adaptation Group (N=54)	Low-Increasing Adaptation Group (N=60)		
<b>Age</b>	49.96 ± 12.78	50.56 ± 13.46	46.85 ± 10.69	1.5	0.225
<b>Marital status</b>				–	0.311*
Married	45 (88.24%)	52 (96.30%)	56 (93.33%)		
Unmarried/Divorced/Widowed	6 (11.76%)	2 (3.70%)	4 (6.67%)		
<b>Living situation</b>				0.11	0.947
Living alone	7 (13.73%)	7 (12.96%)	7 (11.67%)		
Not living alone	44 (86.27%)	47 (87.04%)	53 (88.33%)		
<b>Residence location</b>				–	0.622*
Urban	24 (47.06%)	20 (37.04%)	27 (45.00%)		
Town	22 (43.14%)	28 (51.85%)	31 (51.67%)		
Rural	4 (7.84%)	5 (9.26%)	2 (3.33%)		
Unfixed	1 (1.96%)	1 (1.85%)	0 (0.00%)		
<b>Education level</b>				8.89	0.012
Junior high school or below	25 (49.02%)	41 (75.93%)	33 (55.00%)		
High school or above	26 (50.98%)	13 (24.07%)	27 (45.00%)		
<b>Employment status</b>				0.5	0.778
Employed/Freelancer	23 (45.10%)	27 (50.00%)	31 (51.67%)		
Retired/Unemployed/Homemaker/Farmer	28 (54.90%)	27 (50.00%)	29 (48.33%)		
<b>Monthly income (RMB)</b>				10.24	0.006
≤6000	33 (64.71%)	49 (90.74%)	45 (75.00%)		
>6001	18 (35.29%)	5 (9.26%)	15 (25.00%)		
<b>Healthcare payment method</b>				–	0.287*
New rural cooperative medical scheme	9 (17.65%)	8 (14.81%)	5 (8.33%)		
Medical insurance	41 (80.39%)	46 (85.19%)	52 (86.67%)		
Self-payment	1 (1.96%)	0 (0.00%)	3 (5.00%)		
<b>Primary caregiver</b>				–	0.761*
Spouse	28 (54.90%)	32 (59.26%)	34 (56.67%)		
Children	14 (27.45%)	15 (27.78%)	20 (33.33%)		
Parents	6 (11.76%)	3 (5.56%)	2 (3.33%)		
Other relatives	3 (5.89%)	4 (7.41%)	4 (6.67%)		
<b>Fertility demand</b>				–	0.158*
Yes	6 (11.76%)	2 (3.70%)	2 (3.33%)		
No	45 (88.24%)	52 (96.30%)	58 (96.67%)		
<b>Religious belief</b>				1.27	0.529
Yes	7 (13.73%)	12 (22.22%)	11 (18.33%)		
No	44 (86.27%)	42 (77.78%)	49 (81.67%)		
<b>Spouse relationship</b>				–	0.718*
Very satisfied	12 (24.00%)	8 (14.81%)	9 (15.00%)		
Satisfied	22 (44.00%)	25 (46.30%)	25 (41.67%)		
Neutral	12 (24.00%)	18 (33.33%)	23 (38.33%)		
Unsatisfied	3 (6.00%)	3 (5.56%)	2 (3.33%)		
Very unsatisfied	1 (2.00%)	0 (0.00%)	1 (1.67%)		
<b>Pathological stage</b>				8.43	0.015
Stage 0/II	44 (86.27%)	39 (72.22%)	37 (61.67%)		
Stage III/IV	7 (13.73%)	15 (27.78%)	23 (38.33%)		
<b>Type of surgery</b>				24.414	<0.001
Radical mastectomy	17 (33.33%)	38 (70.37%)	33 (55.00%)		
Total mastectomy	18 (35.30%)	3 (5.56%)	15 (25.00%)		
Breast-conserving surgery	14 (27.45%)	7 (12.96%)	10 (16.67%)		
Tumor resection + reconstruction+ Extended mastectomy	2 (3.92%)	6 (11.11%)	2 (3.33%)		

(Continued)

**Table 1** (Continued).

Variable	Psychosocial Adaptation Development Trajectories			Statistical value	P-value
	High-Stable Adaptation Group (N=51)	Moderate-Declining Adaptation Group (N=54)	Low-Increasing Adaptation Group (N=60)		
<b>Symptom burden</b>				–	0.530*
No symptoms	9 (17.65%)	8 (14.81%)	3 (5.00%)		
Mild symptoms, no impact on life	15 (29.41%)	14 (25.93%)	18 (30.00%)		
Significant symptoms, impacting life	18 (35.29%)	20 (37.04%)	25 (41.67%)		
Severe symptoms, severely impacting life	9 (17.65%)	10 (18.52%)	13 (21.67%)		
Unbearable symptoms	0 (0.0%)	2 (3.70%)	1 (1.67%)		

**Note:** \*Represents Fisher's Exact Test.

in pathological stages 0/I/II, those in stages III/IV were more likely to fall into the low-increasing adaptation trajectory (OR = 0.264, 95% CI: 0.098~0.713, P = 0.091). Compared with patients who underwent radical mastectomy, those who underwent total mastectomy were less likely to fall into the moderate-declining adaptation trajectory (OR = 0.703, 95% CI: 0.230 ~2.151, P = 0.009). The details can be found in [Table 2](#).

## Qualitative Data

### Participant Demographics

Of the 165 patients who completed the quantitative survey, 12 participated in the semi-structured interviews. [Table 3](#) contains information about the participants' demographics and the interview duration.

### Theme

The interview data from participants identified facilitators and barriers to psychosocial adaptation in breast cancer patients. Both promoting factors and barriers were classified into three themes. Further details are shown in [Table 4](#).

### Facilitators

**Theme 1: Activating Personal Resources.** Breast cancer patients experience changes in their physical appearance, such as partial or total removal of the breast after surgery and hair loss due to chemotherapy, which can impact their body image. Most patients expressed that they use measures such as wearing prosthetic breasts, wigs, or hats to conceal these physical

**Table 2** Multivariate Analysis of Factors Influencing Psychosocial Adaptation Development Trajectories in Breast Cancer Patients

Variable	Moderate-Declining Adaptation Group OR (95% CI)	P-value	Low-Increasing Adaptation Group OR (95% CI)	P-value
<b>Monthly income (RMB)</b>				
≤6000	*Reference group (1.00)		*Reference group (1.00)	
>6001	0.238 (0.072 ~0.786)	0.019	1.118 (0.461 ~2.711)	0.537
<b>Pathological stage</b>				
0/I/II	*Reference group (1.00)		*Reference group (1.00)	
III/IV	0.442 (0.185 ~1.054)	0.805	0.264 (0.098 ~0.713)	0.091
<b>Surgical method</b>				
Radical mastectomy	*Reference group (1.00)		*Reference group (1.00)	
Total mastectomy	0.188 (0.049 ~0.719)	0.072	2.168 (0.851 ~5.523)	0.057
Breast-conserving surgery	0.703 (0.230 ~2.151)	0.009	2.459 (0.867 ~6.970)	0.105
Tumor resection + reconstruction+ Extended mastectomy	5.359 (0.862 ~33.311)	0.066	2.866 (0.330 ~24.923)	0.015

**Note:** \*Represents the reference group: high-stable adaptation group +represents the word "and".

**Table 3** General Demographic Characteristics of Interview Participants (n=12)

ID	Gender	Age (Years)	Education Level	Marital Status	Ethnic-ity	Religious Belief	Occupation	Interview Duration
P1	Female	54	Junior high	Married	Han	Buddhism	Flexible employment	56 min
P2	Female	51	Primary school	Married	Han	Buddhism	Catering	15 min
P3	Female	42	High school	Divorced	Han	None	Self-employed	60 min
P4	Female	49	Primary school	Married	Han	None	Unemployed	15 min
P5	Female	47	University	Married	Han	None	On leave	35 min
P6	Female	44	University	Married	Han	None	Office worker	15 min
P7	Female	65	Junior high	Married	Han	None	Worker	25 min
P8	Female	58	Primary school	Married	Han	None	Retired	30 min
P9	Female	50	High school	Married	Han	None	Retired	30 min
P10	Female	39	University	Married	Han	Christianity	Office worker	20 min
P11	Female	59	Junior high	Married	Han	Buddhism	Retired	30 min
P12	Female	60	University	Married	Han	None	Retired	30 min

**Table 4** Thematic Analysis of Psychosocial Adaptation in Breast Cancer Patients

Facilitators			Barriers		
Personal resources	Social resources	Family resources	Complications and adverse drug reactions	Heavy economic burden	Cognitive changes
Modifying appearance Psychological adjustment Changing lifestyle	Peer support Community support Company support Healthcare provider support	Disease management and treatment Emotional support Life support	Rotator cuff injury Neuropathic pain Chemotherapy reactions		Body image Social isolation Stigma

changes and promote their psychosocial adaptation. Participant P5: “I don’t wear [prosthetic breasts] at home, but I always wear them when I go out shopping.” Participant P6: “I bought several hats before I shaved my head. If I don’t wear a hat, I wear a wig.” Similarly, participant P9: “I bought many wigs and all kinds of hats.”

After experiencing the traumatic impact of breast cancer, participants often activate their internal psychological resources to help regulate their mental state and adapt to the changes brought about by the disease. Participant P3:

Sometimes, I comfort myself by thinking. Thank goodness it’s breast cancer. Now, there are effective treatments that can help me survive, and I can still get economic support through work. I am very grateful inside.

Participant P5:

People around me say I am very positive and cheerful daily. I think the most important thing now is to have a positive mindset. I’ve already made it through to this point (chemotherapy), and I need to continue persisting.

Breast cancer patients who participated in the interview also described changes in their lifestyles, such as physical exercise and dietary habits, which helped them better manage their illness and adapt to the psychosocial changes caused by the disease. Participant P1:

I now pay much attention to a healthy diet. I need to keep my nutrition up to recover better, including having a balanced diet, focusing on the intake of vegetables, fruits, and high-protein foods, and avoiding fast food and processed foods.

Participant P3: “I try to overcome difficulties by engaging in physical activities and exercise. Whenever I have free time, I walk or jog.”

**Theme 2: Accessing Social Resources.** Support from peers helped participants get through many difficult times. Participant P1:

Sometimes when there's no one to talk to, I chat with other patients. We discuss individual experiences in disease management and share how we cope with the burdens the disease brings into our lives. We encourage each other to continue with treatment.

In addition, the community pays attention to people with illnesses, providing participants with comfort and care. Participant P5:

Once, I created a disease file in the community, and after that, I would regularly receive phone calls asking about my family situation and if I had any difficulties or needed help. They would call me every year.

Some participants mentioned that their workplaces provided convenience with leave, making it easier for them to attend medical appointments and treatment. Participant P6: "Because I'm working now, I've returned to my unit and usually take leave on chemotherapy days. If I rest well, I go back to work." Participant P10: "I take leave, usually half a day. My workplace is quite supportive. After working there for over ten years, I take leave about twice a month."

The care and support provided by healthcare professionals make the treatment, care, and recovery of breast cancer patients smoother. Participants expressed that healthcare professionals offered important support during treatment and recovery, helping to alleviate financial stress. Participant P5:

I told them my family's financial situation wasn't very good, with elderly parents and young children. My husband has been supporting us alone for over ten years, and it's not enough. Then the director said that our hospital had a new drug, and he suggested I get checked to see if I qualified for the program.

**Theme 3: Family Resources.** Support from family members helped participants through important moments during their illness.

Participants mentioned that family members shared the burden of medical visits and treatment. Participant P1:

Now when I do some housework, I feel exhausted. My cousin, who is retired, stayed with me during my hospitalization and surgery, took care of me, and helped me with various tasks at the hospital. My brother also did the same thing.

Participants also described receiving a lot of emotional support from their families, which helped their psychosocial adaptation to the illness. Participant P4: "My family has always been very supportive and understanding." Participant P12:

My family's support has been strong. They comfort me and encourage me. After the surgery, I felt down and negative for a while, and they helped me through that time.

Family members also shared household responsibilities, reducing the patient's domestic workload and helping them conserve energy for psychosocial adaptation. Participant P3: "My children, especially my son and daughter, are well-behaved. I don't have to worry about their studies, so I don't have that burden." Participant P8:

My husband has always been with me. He has been very supportive. I don't do housework now, and my husband takes care of them if things don't get done. I don't do anything because I'm afraid of swelling in my arm. When it swells, it's uncomfortable, and I can't lift heavy things or do heavy work.

Participant P9:

They take good care of me. My son comes to the hospital in the morning and evening. My daughter-in-law makes sure the meals are ready for lunch and dinner. My husband's support is also huge-he's always with me.

## Barriers

**Theme 1: Inevitable Complications and Adverse Drug Reactions.** Rotator cuff injury affects the patients' physical activities, increasing the difficulty of daily life and causing prominent physical discomfort. Participant P1:

Later, I didn't take good care of my arm, and I had a rotator cuff injury for a few months. After the surgery, it was probably because I didn't exercise properly. But there were a lot of side effects, and it was painful, very painful.

Neuropathy is unbearable for patients and affects their quality of life. Participant P5:

At that time, the medication side effects were quite severe-vomiting, diarrhea, and some liver function indicators were quite abnormal. I often felt pain in my legs; it wasn't very severe, and it was tolerable. But as I continued working, the pain gradually worsened.

Participant P6: "There is some neuropathic pain in this area. I don't have any other symptoms. Sometimes, if I sit for too long, it feels a bit stiff."

Chemotherapy adverse reactions. Participant P7: "There was some vomiting, and I couldn't keep anything down. As soon as the chemotherapy drip started, I felt the urge to throw up." Participant P8:

During the fourth chemotherapy, my platelets dropped, and I was very weak. My hemoglobin was below 57. My hand can't be used with force now because of the risk of swelling. Chemotherapy just makes you weak.

Participant P9: "After chemotherapy, I felt sore and stiff." Participant P10: "A week after the treatment, I felt a bit of nausea, but I didn't throw up."

## Theme 2: Heavy Economic Burden

The heavy economic burden increases the financial strain on patients' families and affects family relationships. Participant P3:

I'm doing okay; I managed to get through it. Luckily, the insurance reimbursement in Kunshan is better. I feel like Kunshan has given me a second chance at life. I'm very grateful for the benefits I receive. Just think, no matter how many houses you sell, it wouldn't be enough to pay for the treatment without the medical insurance for severe illnesses, right?

Participant P11: "These clothes are all old, nothing new. My husband gets upset, and he doesn't help me. I've used up so much money; of course, he feels bad."

## Theme 3: Cognitive Changes

Patients experience a lack of self-identity and a strong sense of inferiority.

Surgery and chemotherapy have altered the patients' physical appearance. Participant P1: "Wearing a bra is uncomfortable, and the scar feels very tight." Participant P4: "Psychologically, there was some change. I was young then, and with small children, I felt a bit reluctant to go out." Participant P6:

My hair fell out after the first chemotherapy in about 15 days. I didn't even realize it at first. After shaving it off, I still couldn't accept it. It was tough to accept. I felt embarrassed.

The disease leads to social isolation for patients. Participant P8:

I used to work outside, but once I was diagnosed, I stopped working and stayed at home all day. I rest, play on my phone, and walk around at home. That's all I do, nothing else.

Participant P11: "With this disease, I'm too afraid to work."

The stigma of illness makes patients fearful of contact with others and avoid discussions about their illness. Participant P1:

I wear a big hat in the winter. I don't want others to know that I have breast cancer, I'm afraid they will treat me like a virus and think it can infect them.

## Participant P6:

Only my husband knows at home. My family doesn't know, because I don't want to worry them. My parents are in their 70s, and I don't want them to worry.

Participant P8: "I don't talk about it with relatives or friends."

## Discussion

Due to the various challenges breast cancer patients face during diagnosis and treatment—such as mastectomy, hair loss after chemotherapy, and symptoms similar to menopause, such as pigmentation—patients experience varying degrees of disease-related distress throughout their extended survival period. This leads to difficulties in psychosocial adaptation, which in turn affects their quality of life. To the best of our knowledge, this study is the first to use a mixed methods approach to analyze the changes in psychosocial adaptation levels and trajectories of breast cancer patients from diagnosis to chemotherapy. It also explores the promoting factors and barriers influencing their psychosocial adaptation. This study identified distinct categories in the psychosocial adaptation of breast cancer patients, presenting three qualitatively different category models: high-stable, moderate-declining, and low-increasing adaptation groups. The qualitative research revealed two primary themes, facilitators and barriers for psychosocial adaptation in breast cancer patients, and three secondary themes.

30.9% of participants were categorized in the high-stable adaptation group, whose psychosocial adaptation levels remained relatively high throughout the follow-up period and were significantly higher than those in the moderate-declining adaptation group and the low-increasing adaptation group. This indicates that patients in this group have strong self-regulation abilities, can rationally face the sudden diagnosis of cancer, and can quickly adjust themselves to achieve a higher level of psychosocial adaptation. Future research should explore the facilitators for psychosocial adaptation in this group—such as education level, monthly income, pathological stage, and body image—in greater depth to clarify the internal mechanisms of their high psychosocial adaptation. Approximately one-third of patients in this study belonged to the moderate-declining adaptation group. These patients exhibited moderate psychosocial adaptation levels when first diagnosed with breast cancer, which gradually declined, especially after surgery. Although there was a slow recovery between the postoperative and post-chemotherapy phases, their psychosocial adaptation levels remained below those at the time of initial diagnosis. The analysis revealed that, compared to the high-stable adaptation group, patients with lower income levels and those who underwent total mastectomy were more likely to belong to the moderate-declining adaptation group. The low-increasing adaptation group accounted for 36.4% of all participants. This group had the lowest initial psychosocial adaptation levels, which gradually improved over time, with a prominent upward trend observed after surgery. Patients in this group had a higher pathological stage at the time of initial diagnosis, which caused considerable trauma, resulting in their low levels of psychosocial adaptation. Healthcare providers should focus on effective communication methods and help these patients build confidence in treatment and recovery.

There are differences in monthly income (in RMB), pathological stage, and surgical method across different psychosocial adaptation trajectories in breast cancer patients. Higher monthly income is more beneficial for breast cancer patients to be in the "High-Stable Adaptation Group." In China, annual medical expenses caused by cancer exceed 220 billion RMB.<sup>33</sup> Under a unified deductible, low-income populations are far more likely to incur catastrophic health expenditures compared to high-income groups, often leading to the phenomena of "poverty due to illness" and "reversal of poverty due to illness." High medical costs and decreased work capacity during the recovery period contribute to reduced income, thus increasing the economic burden on patients.<sup>34</sup> Nurses should focus on low-income breast cancer patients for targeted interventions. To enhance the psychosocial resilience of breast cancer patients and alleviate cancer treatment-related symptoms using non-pharmacological methods, future development plans are designed with psychological adjustment as the primary intervention strategy. The goal is to provide more effective comprehensive treatment while reducing the patients' economic burden. A lower pathological stage is more beneficial for patients to be in the "High-Stable Adaptation Group." A higher disease stage indicates a greater spread of cancer cells, a larger tumor size, and a higher likelihood of recurrence, leading patients to lose confidence in treatment. Advanced breast cancer patients often experience fear of the imminent end of life, resulting in immense psychological pressure. In contrast, early-stage

patients have a lighter condition, greater confidence in recovery, and a positive psychological state.<sup>35</sup> Therefore, clinical work should place more emphasis on the initial diagnosis of advanced patients and provide personalized nursing interventions for late-stage cancer patients, continuing health education to improve patients' negative moods. The smaller the scope of breast tissue removal during breast cancer surgery, the more beneficial it is for patients to be in the "High-Stable Adaptation Group." The need for removing a woman's characteristic organ may lead to feelings of discrimination, alienation, devaluation, and lack of understanding and acceptance, resulting in a sense of disease stigma, unwillingness to communicate, and significantly impacting their psychosocial adaptation level. For patients undergoing breast-conserving surgery or immediate breast reconstruction after mastectomy, they do not experience the distress caused by breast loss, and their physical appearance is less affected. Patients undergoing breast-conserving surgery are typically diagnosed with early-stage cancer, which generally results in a good prognosis and relatively high long-term survival rates.<sup>36</sup> Therefore, such patients can be encouraged to strengthen their self-rehabilitation confidence, reduce the gap between self-expectations and reality, and thereby improve their psychosocial adaptation levels. This suggests that clinical staff should pay attention to breast cancer patients with large surgical excisions who are unable to undergo breast reconstruction and provide feasible advice for improving their appearance while offering psychological counseling to shift the patient's focus to positively face long-term treatment plans.

The qualitative research provides unique insights into the factors influencing the psychosocial adaptation trajectories of breast cancer patients, broadening the scope of the results. In our study, from diagnosis to the chemotherapy phase, breast cancer patients expressed how personal, family, and social resources contributed to promoting their psychosocial adaptation. These findings are consistent with previous research.<sup>37–39</sup> However, further research is needed to explore how these facilitators enhance patients' psychosocial adaptation.

Postoperative complications and side effects of medication may inevitably hinder the psychosocial adaptation of patients. Research indicates<sup>40</sup> that breast cancer patients with rotator cuff injuries and neuropathic pain experience poorer psychosocial adaptation. Rotator cuff injuries and neuropathic pain are common postoperative complications of breast cancer, and these symptoms may include musculoskeletal pain, drug-induced neuropathic pain, radiation-induced pain, and chronic persistent pain. These pain issues not only limit patients' daily activities but may also lead to psychological problems such as anxiety and depression, resulting in poor psychosocial adaptation. The adverse effects of chemotherapy prominently impact the psychosocial adaptation of breast cancer patients. While chemotherapy drugs inhibit the growth of cancer cells, they may also affect the metabolism of normal cells, leading to a range of toxic side effects. These side effects can include changes in physical function and a decline in quality of life. Depression and anxiety, commonly observed during chemotherapy, are closely associated with the adverse events caused by chemotherapy, further exacerbating the psychological burden on patients.<sup>41</sup> Therefore, it is crucial to pay timely attention to postoperative complications and adverse effects of chemotherapy in breast cancer patients, provide appropriate guidance, help alleviate discomfort, and improve their psychosocial adaptation.

This study found that the heavy economic burden caused by treatment hindered the psychosocial adaptation of breast cancer patients. Previous studies have shown that the average household expenditure for breast cancer patients is \$990.40, of which \$789.78 is for medical expenses, and the occurrence of complications further exacerbates their financial burden.<sup>42</sup> Therefore, seeking external support to alleviate their economic burden can promote the psychosocial adaptation of breast cancer patients. A study in China found that treatment costs covered by medical insurance are relatively lower, while treatment costs at private hospitals are higher.<sup>43</sup> Therefore, expanding the coverage of medical insurance, especially by including more private hospitals in the designated medical insurance hospital list, can reduce the treatment costs at public hospitals and alleviate the economic burden of breast cancer patients.

In this study, cognitive changes brought about by breast cancer were found to hinder the psychosocial adaptation process of patients. Surgery is the primary treatment for breast cancer, and 93.1% of breast cancer survivors achieve survival through surgical treatment.<sup>44</sup> As the breast is a secondary sexual characteristic of women, the loss of a breast due to treatment makes patients feel they have lost a symbol of femininity. They worry about reduced personal attractiveness, avoid looking at their bodies, and struggle to accept changes in their physical appearance. Additionally, patients fear being rejected by their spouses, which can easily lead to feelings of inferiority.<sup>45</sup> Regardless of the chemotherapy regimen, chemotherapy causes physical damage, with hair loss being a common side effect.<sup>46</sup> The process of losing hair

further exacerbates the psychological stress for patients. Changes or loss in physical appearance may lead to altered perceptions, negatively impacting the physical and mental health of breast cancer patients. A strong sense of stigma associated with the illness makes it difficult for patients to engage in regular social interactions, gradually reducing their social functioning and worsening their psychosocial adaptation abilities.<sup>47</sup> Social support plays a critical role in breast cancer management, including family support, psychosocial support, and social networks. Research has shown that social support can alleviate the burden of illness, prevent depression, improve quality of life, and even influence survival rates.<sup>48</sup> Therefore, providing appropriate psychological support and interventions during breast cancer treatment is essential for improving patients' mental health, increasing social engagement, and promoting their psychosocial adaptation.

## Clinical Implications

The findings of this study offer valuable insights for clinical care in breast cancer. They highlight the diverse population characteristics observed at key treatment milestones—such as initial diagnosis, surgery, and chemotherapy—and emphasize the varying trajectories of psychosocial adaptation that correspond with these characteristics. Tailored support strategies can be employed to assist patients at critical points in their treatment, based on the changes in their psychosocial adaptation. Both societal, familial, and individual resources play a crucial role in helping patients navigate these pivotal stages of treatment. Nurses and healthcare providers should focus on activating and mobilizing resources around patients to enhance their psychosocial adaptation. By fostering a supportive environment, patients can be encouraged to better cooperate with treatment plans, improve their mental health, and ultimately increase their quality of life throughout extended survival periods.

## Limitation

Although this study provides valuable insights into the psychosocial adaptation trajectories and barriers faced by breast cancer patients from diagnosis to chemotherapy, several limitations should be acknowledged. First, the sample was from a single center in southern China, and the generalizability of the findings may be limited due to medical resource availability and cultural differences. Future research should involve multiple centers and samples from different cultural backgrounds for validation. Second, patients were divided into three psychosocial adaptation trajectory groups of different proportions. Third, the qualitative sampling may have selection bias, as those willing to participate in interviews may not fully represent all patients. Fourth, in research practice, in addition to using growth models to depict the individual development process, other factors influencing this process and the outcome variables affected by it should also be considered. The estimation accuracy of the LCGM model is influenced by various factors, such as the number of measurement points (indicators), sample size, the distance between categories (the distance between category groups), and the proportion of missing data. An imbalance in the number of patients across different surgical types may also affect statistical results. Fifth, the study only followed up until the second chemotherapy cycle, and the psychosocial adaptation trajectory of patients was not observed over a longer period. However, limited evidence indicates the degree to which similar trajectory groups may emerge in different samples. Additionally, this study is subject to inherent limitations related to residual confounding from unmeasured covariates, such as genetic background.

## Conclusion

This study identified three categories of psychosocial adaptation trajectories among breast cancer patients from diagnosis to post-chemotherapy. Monthly income, type of surgery, and pathological stage were independent factors that influenced different trajectories. The qualitative component explained the facilitators for psychosocial adaptation (personal, family, and social resources) and the barriers (complications and adverse reactions to chemotherapy, heavy economic burden, and cognitive changes). Developing personalized support and intervention strategies to address these barriers is crucial for enhancing the psychosocial adaptation of breast cancer patients. Based on the trajectory characteristics, such as surgical method and income status, the psychosocial adaptation trajectory of the patient can be predicted. During the low-adaptation phase, with the patient's consent, interventions may include peer support, pain management, and professional

psychological counseling, ultimately enhancing the patient's psychosocial adaptation during the diagnosis and treatment period.

## Data Sharing Statement

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

## Ethics Approval

The study was approved by the Ethics and Deontology Committee of Kunshan First People's Hospital. All procedures adhered to the tenets of the Declaration of Helsinki. All participants in this study provided informed consent and agreed to the use of anonymized direct quotations from the study for publication.

## Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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## Disclosure

Qing Li and Juan Song are co-first authors for this study. The authors declare no competing interests in this work.

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