

# The Mediating Effect of Positive Illness Cognitions on Experiential Avoidance and Quality of Life in Breast Cancer Patients

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## ABSTRACT

**Objective:** Illness cognition plays an essential role during physical, psychological, and social adjustment among patients with cancer. The present study aims to explore the mediating effects of positive illness cognition on experiential avoidance and quality of life (QOL) in this population. **Methods:** Between August 2017 and June 2019, we recruited 312 patients with breast cancer in the treatment period from a general tertiary hospital's breast department using convenience sampling. We used the Illness Cognition Questionnaire, the Acceptance and Action Questionnaire II, and the Functional Assessment of Cancer Therapy-Breast Scale. **Results:** The mean score of QOL was 93.39 (SD: 18.60) for patients with breast cancer. Positive illness cognition was closely related to the QOL and experiential avoidance. Experiential avoidance significantly negatively

correlated with QOL ( $r = -0.59, P < 0.01$ ) and positive illness cognition ( $r = -0.60, P < 0.01$ ), while positive illness cognition significantly positively correlated with QOL ( $r = 0.82, P < 0.01$ ). Positive illness cognition had a mediating effect between experiential avoidance and QOL (effect size:  $-0.56$ ), accounting for 87.14% of the total effect. **Conclusions:** The QOL was low in Chinese patients with breast cancer. Positive illness cognition had a mediating effect between experiential avoidance and QOL. Caregivers should indirectly improve patients' QOL with breast cancer by improving their positive illness cognition levels.

**Key words:** Breast cancer, experiential avoidance, mediation effect, positive illness cognitions, quality of life

## Introduction

Breast cancer is the most prevalent cancer in females in both developed and developing countries.<sup>[1]</sup> According to the World Health Organization, there were 2,179,457 new cases of breast cancer worldwide in women in 2020, accounting for 24% of all new cancer diagnoses in women. The incidence of breast cancer worldwide is increasing at 2.2% per year. In China, 380,293 women were newly

diagnosed with breast cancer in 2020, accounting for 17.4% of the global total.<sup>[2]</sup> The average age of women with breast cancer ranged from 45 to 55 years in China, younger than women in developed countries, where the average age range was 60–65 years.<sup>[1]</sup> The 5-year relative survival rates from breast cancer were 83.2% in China.<sup>[3]</sup> Due to the occurrence of breast cancer at younger ages and the improvement in

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the survival rate, treatment time accounts for only a small proportion of survival time, and breast cancer has become a chronic disease that requires long-term treatment and rehabilitation.<sup>[4]</sup> There are many physical and psychosocial problems among patients with breast cancer, including sexual dysfunction,<sup>[5]</sup> distress,<sup>[6]</sup> and difficulties in returning to work.<sup>[7]</sup>

Illness cognition is a series of cognitive and psychological activities, including assessment, interpretation, and understanding, that an individual with a disease experiences in the context of their health status and treatment.<sup>[8]</sup> We divide illness cognitions into positive and negative illness types. Watson *et al.* found that positive illness cognition in patients with breast cancer had a long-term positive effect on psychological health; they predicted a reduction in psychological distress and significantly reduced negative emotions.<sup>[9]</sup> Jiang *et al.* found that negative illness cognition related to coping style and physical and mental recovery, including avoidant coping style, delaying medical treatment, and higher psychological pain levels.<sup>[10]</sup>

In Lazarus' transactional theory of stress and cognition, illness cognition is the stage of cognitive evaluation and reaction.<sup>[11]</sup> According to the model, breast cancer is a stressor. The disease's response depends on cognitive evaluation, which depends on a patient's psychological, cognitive characteristics, including psychological flexibility and illness cognition. Quality of life (QOL) is the result of cognition reaction and coping. One study suggested that cancer-related cognition was the strongest predictor of distress and lower QOL,<sup>[12]</sup> while another showed that psychological flexibility was strongly related to anxiety, depression, and QOL.<sup>[13]</sup> Experiential avoidance predicted anxiety and depressive symptoms in patients with breast cancer and negatively affected QOL.<sup>[14]</sup>

Illness cognitions were essential mediators between disease and health, and cognitive evaluations of illness substantially explained individual differences in physical and psychosocial health.<sup>[15]</sup> We hypothesized that positive illness cognition mediated experiential avoidance and QOL in patients with breast cancer. Therefore, this study aimed to determine the mediating effect of positive illness cognition in patients with breast cancer to improve outcomes.

## Methods

### Participants

We conducted the present study based on cross-sectional, convenient sampling in a breast center of a general hospital in Xuzhou, China. The breast center is the largest in the north area of Jiangsu Province, with 200 beds and an annual operation volume of 800 cases. We recruited patients with breast cancer from August 2018 to June 2019. The

inclusion criteria were as follows: diagnosis of breast cancer;  $\geq 18$  years of age; awareness of disease diagnosis; possession of basic reading and writing ability; and agreement to participate in the study. We excluded patients with breast cancer metastasis or recurrence, those suffering from other malignant tumors, and those with mental illness.

### Sample size

To ensure appropriate statistical power, we used the formula  $n = (Z_{\alpha}^2 \times \sigma^2) / \delta^2$  to calculate the sample size, where  $Z_{\alpha} = 1.96$ ,  $\delta = 0.5$ , and  $\sigma = 4.45$  (based on the standard deviation of positive illness cognition scores among breast cancer women in a preliminary study). Therefore, the calculated sample size was  $n = 305$ . We increased the sample size by a further 10%, and we recruited 336 participants.

### Instruments

We used a four-part questionnaire. The first part collected sociodemographic and clinical characteristics of patients, including nationality, age, religious beliefs, educational level, work status, disease course, tumor, node and metastasis stage, surgery type, family history of cancer, and comorbid chronic diseases.

The second part was the Illness Cognition Questionnaire (ICQ), which we used to measure positive illness cognition. We used the ICQ to assess illness cognition from both positive and negative perspectives; these consisted of three subscales: acceptance, helplessness, and perceived benefit.<sup>[16]</sup> ICQ is an 18-item questionnaire that uses a 4-point Likert scale (from 1 = "not at all" to 4 = "completely"). Each subscale contains six items (range: 6–24); higher scores indicate a higher level of acceptance, helplessness, or perceived benefit. Cronbach's alpha coefficient of ICQ ranged from 0.81 to 0.91.<sup>[17]</sup> The Chinese version of ICQ consisted of an original questionnaire, and Cronbach's alpha coefficients ranged from 0.86 to 0.88.<sup>[18]</sup> We used subscales of acceptance and perceived benefit to access the positive illness cognition (range: 12–48). The Cronbach's alpha of the positive ICQ was 0.81.

The third part was the Acceptance and Action Questionnaire II (AAQ-II), which we used to measure experiential avoidance. AAQ-II is a 7-item questionnaire using a 7-point Likert scale (from 1 = "never" to 7 = "always") representing the agreement of the item. The total scores ranged from 7 to 49, and higher scores meant a higher level of experiential avoidance that indicated lower psychological flexibility.<sup>[19]</sup> The Chinese version of the AAQ-II was consistent with the original questionnaire. The Cronbach's alpha coefficient was 0.88, and the test-retest reliability was 0.80.<sup>[20]</sup> The Cronbach's alpha of AAQ-II was 0.86.

The fourth part was the Functional Assessment of Cancer Therapy-Breast scale (FACT-B), which we used to measure

QOL. FACT-B is a 36-item questionnaire using a 5-point Likert scale (from 1 = “not at all” to 5 = “very much”). Higher scores indicate a better QOL (range: 36–180). FACT-B includes five subscales: physical well-being (seven items), social/family well-being (seven items), emotional well-being (six items), functional well-being (seven items), and additional well-being (nine items).<sup>[21]</sup> The Chinese FACT-B scale was consistent with the original FACT-B. The Cronbach’s alpha coefficients ranged from 0.61 to 0.84, and the test–retest reliability ranged from 0.82 to 0.86.<sup>[22]</sup> The Cronbach’s alpha of total FACT-B was 0.83.

### Data collection

We posted notices about the study in the breast cancer center. We invited participants to complete a 20-min questionnaire we uploaded to an online survey platform. Medical staff and managers of the breast center recommended patients for participation according to the inclusion criteria. Two researchers collected data in the breast cancer center. The participants completed the questionnaires individually on smartphones or tablets. For illiterate patients, researchers read the questionnaire and recorded responses. Participants who completed the entire questionnaire received a gift voucher.

### Statistical analysis

We analyzed the data using SPSS (China) version 23.0 and AMOS (China) version 23.0. We performed descriptive analysis involving percentages, means, and standard deviations to analyze the sociodemographic, clinical characteristics, and questionnaire scores. We used Pearson correlation analysis to analyze the relationships between variables. We performed a bootstrap test to determine the intermediate effect of the model. We drew a path model diagram. We used the bootstrap mediation effect for verification and defined  $P < 0.01$  as statistically significant. We set the bootstrap number at 5000. We determined the significance of each specific intermediary using the nonparametric percentile bootstrap method with deviation correction.

Due to the complexity of structural equation models, we reported detailed measures of model fitting indexes. The absolute fitting indexes included Chi-square/degrees of freedom ( $\chi^2/\text{df}$ ), goodness-of-fit index (GFI), adjusted goodness-of-fit index (AGFI), and root mean square error of approximation (RMSEA). The relative fitting indexes included comparative fit index (CFI), Tucker–Lewis index (TLI), normed fit index (NFI), incremental fit index (IFI), and parsimonious goodness-of-fit index (PGFI). A  $\chi^2/\text{df}$  value  $< 3$  indicates that the model is well fitted, and values between 3 and 5 suggest that it is acceptable. For RMSEA,  $< 0.1$  indicated a good fit,  $< 0.05$

indicated a better fit, and  $< 0.01$  indicated the best fit. The recommended criterion for PGFI was  $> 0.50$  and  $> 0.90$  was a greater value.

Studies showed that statisticians simulated these criteria based on data; however, psychology and other subjects were far more complicated than these simulation models and their intrinsic logic. We do not recommend strictly applying these criteria for acceptance or rejection of a particular model fit.<sup>[23]</sup>

### Ethical approval

We carried out this study following the Helsinki Declaration, and the institutional ethical committee of the research hospital approved the study (Approval No. XYFY2019-KL201-01). We described the purpose of the study to participants and provided assurances of confidentiality. All participants had the right to leave the study at any time, and we did not interrupt routine care and treatment. All participants signed consent forms before providing data.

## Results

### Participant characteristics

We initially asked 336 patients to participate in the study, of whom 312 completed the study questionnaires for a response rate of 92.9%. The mean age was  $51.03 \pm 8.91$  years (range: 31–72 years). The mean disease course was  $78.68 \pm 35.79$  days (range: 37–184 days). We display other sociodemographic and clinical characteristics, as shown in Table 1.

### Scale scores

The total scores of AAQ-II, FACT-B, and ICQ satisfied normal distribution. The mean score of AAQ-II was  $18.59 \pm 6.46$ , whereas for FACT-B (QOL), it was  $93.39 \pm 18.60$ , and the mean score of positive illness cognition was  $35.98 \pm 4.40$ .

### Pearson correlation analysis of each variable

The Pearson correlation analysis showed that positive illness cognition is closely related to QOL and experiential avoidance in patients with breast cancer. The total AAQ-II score significantly negatively correlated with the QOL score ( $r = -0.59$ ,  $P < 0.01$ ) and the positive illness cognition score ( $r = -0.60$ ,  $P < 0.01$ ); the positive illness cognition score significantly positively correlated with the QOL score ( $r = 0.82$ ,  $P < 0.01$ ). The multicollinearity analysis between the positive illness cognition and QOL showed that the variance inflation factor was 1, and the Condition Index was 10.69, which suggested that there was no multicollinearity between these two variables.



**Table 1: The sociodemographic and clinical characteristics data (n=312)**

Variable	n (%)
Nationality	
Han	300 (96.2)
Minority	12 (3.8)
Religious beliefs	
Yes	48 (15.4)
No	264 (84.6)
Educational level	
Low (9 <sup>th</sup> grade and below)	116 (37.2)
High (above 9 <sup>th</sup> grade)	196 (62.8)
Work status	
Retired	156 (50)
Working	36 (11.5)
Unemployed	120 (38.5)
TNM stage	
I	40 (12.8)
II	172 (55.1)
III	100 (32.1)
Surgery type	
Breast removal	212 (67.9)
Breast conservation	100 (32.1)
Family history of cancer	
Yes	24 (7.7)
No	288 (92.3)
Comorbid chronic disease	
Yes	84 (26.9)
No	228 (73.1)

TNM: Tumor, node and metastasis

### Test for mediation effect

Mackinnon *et al.* divided the mediating effects into three categories; we used a stepwise regression method to test the mediating effects and the percentile bootstrap method to correct for bias. These are more accurate tests for mediating effects.<sup>[24]</sup> We set the sample size  $k$  to 5000 times and set the confidence interval (CI) at 95%. The test steps were as follows: first, to test the predictive effect of experiential avoidance on positive disease cognition ( $P < 0.01$ ); second, to test the predictive effect of positive illness cognition on QOL ( $P < 0.01$ ); and third, to test the predictive effect of experiential avoidance on QOL ( $P = 0.09$ ). We found that the first two steps' factor load was  $< 0.01$ , which meant that the first- and second-step regression paths were significant, suggesting that the mediation effect holds. The result meant that the direct path did not hold, but the indirect path did [Table 2].

### Verification of the mediation effect

We established a structural equation model between experiential avoidance, positive illness cognition, and QOL [Figure 1]. This validated the mediating effect of positive illness cognitions. The model fitting results showed that  $\chi^2/df = 3.36$ , GFI = 0.95, AGFI = 0.91, RMSEA = 0.08, TLI = 0.96, IFI = 0.97, NFI = 0.96,

CFI = 0.97, and PGFI = 0.48. This indicates that the model fitting was within the acceptable range. Bootstrap results showed that the 95% CI of the direct effect of experiential avoidance on QOL (−0.16, 0.05) included 0, the 95% CI of the indirect effect (−0.70, −0.48) did not include 0, and the 95% CI of the total effect (−0.71, −0.56) did not include 0. These findings suggest that positive illness cognitions had a mediating effect between experiential avoidance and QOL.

### Direct effect, indirect effect, and the total effect

The direct effect of experiential avoidance on QOL was −0.08. The total effect was −0.64. The indirect effect was −0.56, which was the path coefficient of experiential avoidance for positive illness cognitions (−0.64) multiplied by the path coefficient of positive illness cognitions for QOL (0.87). We used the indirect effect ratio to the total effect for effect size, which was 87.14%.

## Discussion

We found that the mean score of QOL for patients with breast cancer was 93.39, lower than that found by Cheung *et al.* (103.01).<sup>[25]</sup> Given that the score of FACT-B ranged from 36 to 180, the QOL of patients with breast cancer in China was relatively low. The reasons might derive from differences in national conditions. The average age of patients with breast cancer in our study was 51.03 years. They assumed essential responsibilities in their families and society and were significant economic sources for their families. For these patients, treatment might lead to work interruption or unemployment, imposing economic burdens and damaging their QOL. Cheung conducted their survey in Singapore, which has a developed economy and a sound system of medical and social welfare; patients would experience little medical and economic pressure that might affect their QOL.

We found that the AAQ-II score negatively correlated with positive illness cognition and QOL scores in patients with breast cancer. Others used the AAQ-II scale to measure experiential avoidance and to evaluate individual psychological flexibility.<sup>[26]</sup> Higher degrees of experiential avoidance correlated with lower psychological flexibility. Aguirre-Camacho *et al.* found that experiential avoidance in the context of breast cancer predicted anxiety and depression symptoms and had a negative indirect effect on QOL.<sup>[27]</sup> Feros *et al.* used exploratory analysis and found that psychological flexibility predicted QOL, psychological distress, and emotional imbalance scores.<sup>[28]</sup> The literature suggests that psychological flexibility in patients with cancer is a significant predictor of their psychological status and QOL. However, these studies did not describe the mechanism of psychological flexibility on QOL.

In the present study, we found a mediating effect of positive illness cognition between experiential avoidance

Table 2: Mediation effect test of positive illness cognition in breast cancer patients

Path	Standardization coefficient	Unstandardized coefficient	Standard error	Critical ratio	P
Positive disease cognition← experiential avoidance	−0.64	−0.35	0.03	−13.30	<0.01
QOL					
Positive disease cognition	0.87	0.85	0.07	12.28	<0.01
Experiential avoidance	−0.08	−0.04	0.03	−1.26	0.09

QOL: Quality of life

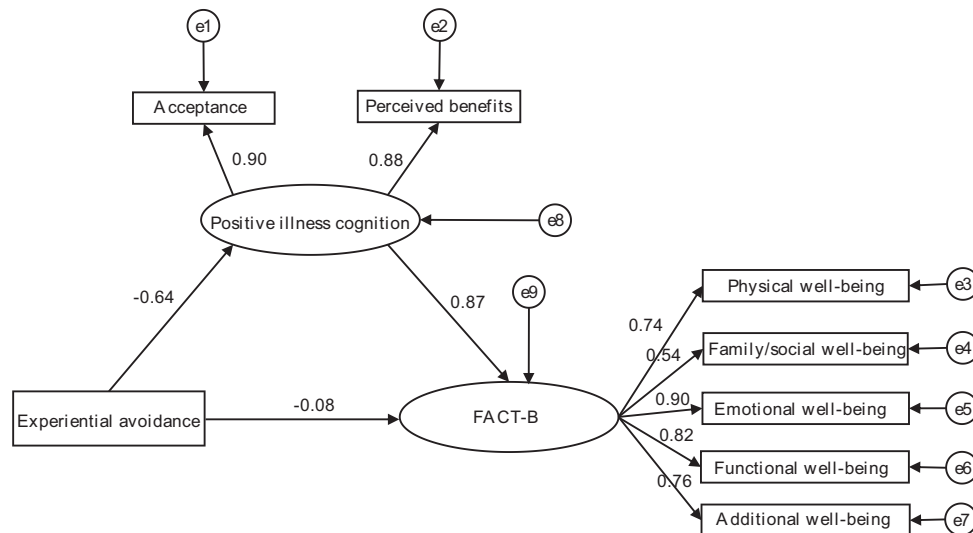


Figure 1: Positive illness cognitive mediator model

and QOL in patients with breast cancer. Positive illness cognition did not directly mediate between experiential avoidance and QOL in patients with breast cancer but rather played an indirect mediating role. This was consistent with previous findings. Liu *et al.* found that patients with androgenetic alopecia had negative illness cognitions, which affected their QOL and made them prone to anxiety and depression.<sup>[29]</sup> Petrie *et al.* found that maladaptive illness cognition led to positive changes such as improved symptoms, return to work, and sexual activity.<sup>[30]</sup> These findings suggest that caregivers should indirectly improve the QOL of patients with breast cancer by improving their positive illness cognition levels.

### Limitations

There are two limitations to this study. First, we used a convenience sampling method, and this may result in a heterogeneous sample. Second, we recruited participants from one breast center and during the active treatment period, limiting the representativeness of this study.

### Implications

We showed that positive illness cognition among patients with breast cancer acted as a mediator and indirectly affected QOL. This finding suggests that caregivers should implement targeted health education

and psychological interventions relevant to positive illness cognition for these patients. The intervention based on acceptance and commitment therapies, designed to decrease experiential avoidance and increase psychological flexibility, could help patients to accept negative changes associated with their illness and encourage them to seek the benefits of being ill that could improve QOL.<sup>[31]</sup> Patients with breast cancer would depend more on their families after diagnosis than before in Chinese culture; family support is an essential part of their psychosocial rehabilitation.<sup>[32]</sup> The implementation of family-centered intervention strategies could improve positive illness cognition and decrease experiential avoidance of patients with breast cancer and their family members, all of which could improve QOL.

### Conclusions

The QOL was low in Chinese patients with breast cancer. Positive illness cognition had a mediating effect between experiential avoidance and QOL in patients with breast cancer, and positive illness cognition positively affected QOL. To improve the QOL of patients with breast cancer, it is necessary to promote positive illness cognition. Caregivers could intervene with respect to illness cognition to improve the QOL of patients with breast cancer.

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### Conflicts of interest

There are no conflicts of interest.

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