

# The Mediating Role of Physical Health in the Correlation Between Distress Tolerance and Meta-emotion in Women with Breast Cancer: A Structural Equation Modeling Approach

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## Abstract

**Background:** Breast cancer can cause significant emotional and psychological challenges for women and their families. The stress and anxiety associated with a cancer diagnosis can pave the way for the development of a variety of psychological disorders. This study investigated the potential mediating role of physical health in the association between distress tolerance and meta-emotional awareness in women diagnosed with breast cancer.

**Methods:** This study employed a descriptive correlational design, enrolling a convenience sample of women diagnosed with breast cancer who were receiving treatment at the hematology department of Shafa Hospital in Ahvaz City, Iran, between March and August 2023. A sample of 207 patients was selected using convenience sampling method. Distress Tolerance Scale, Meta-Emotion Scale, and Physical Health Questionnaire were used to collect data. The hypothesized model was assessed using structural equation modeling (SEM) with maximum likelihood estimation. Data analysis was performed using the SPSS version 27 and Amos version 25.

**Results:** The results showed a significant correlation between physical health and distress tolerance in women with breast cancer ( $P < 0.001$ ). The correlation between meta-emotion and distress tolerance was not significant ( $P < 0.001$ ). Moreover, the indirect correlation of meta-emotion to distress tolerance through the mediating role of physical health was significant ( $P = 0.009$ ).

**Conclusion:** In women with breast cancer, physical health was significantly correlated with distress tolerance, while meta-emotion had an indirect correlation mediated by physical health. These findings suggested that physical health is a crucial factor for distress tolerance, and warrants further investigation to better understand how meta-emotion and distress tolerance are connected through the pathway of physical health.

**Keywords:** Breast cancer, Emotion, Distress, Health, Women

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## 1. Introduction

In recent decades, the global incidence of cancer has been on the rise, with it being considered the third leading cause of death. In women, breast cancer accounts for one out of every four cancer cases and one out of every six cancer-related deaths (1). Cancer and its associated psychosocial factors are closely interlinked. The disease leads to deep emotional and affective challenges in both patients and their families, as mental impacts associated with a cancer diagnosis can pave the way for the development of a variety of psychological disorders. The spectrum of these disorders ranges from depression, anxiety, and maladjustment to emotional disturbances and fear of cancer recurrence and death (2, 3). The diagnosis of life-threatening diseases such as cancer profoundly impacts one's quality of life, introducing high

levels of anxiety and psychological pressure, which in turn can give rise to psychological issues in patients. One of the psychological issues faced by cancer patients is distress tolerance (4).

Distress tolerance is a psychological construct that measures an individual's expectations regarding their ability to tolerate negative emotions, their assessment of the emotional situation in terms of acceptability, personal regulation of emotions, and the degree of attention to negative emotions (5). Distress tolerance impacts the evaluation and consequences of experiences involving stress and negative emotions, as individuals with lower distress tolerance demonstrate more intense and negative reactions to stress (6). Additionally, individuals with low distress tolerance tend to engage in maladaptive coping behaviors and seek relief through negative behaviors such as substance

use as a means of emotional pain mitigation (7). Distress tolerance plays a crucial role in promoting psychological well-being, encompassing the capacity for tolerance, evaluation, acceptance of emotional states, emotional regulation, and the degree of attention to negative emotions (8). Larrazabal and colleagues (9) reported that distress tolerance, a key factor influencing psychological well-being, refers to an individual's capacity to manage and endure negative emotions. Slabbert and colleagues (10) reported that distress tolerance multifaceted construct encompasses several abilities: tolerating the unpleasantness of emotions, evaluating their intensity and validity, accepting them as part of the experience, regulating emotional responses, and managing the focus on negative emotional states. One of the influential factors in distress tolerance is meta-emotion (11).

The concept of meta-emotion was introduced by Gottman and co-workers (12). They defined meta-emotion as "the organization of a set of thoughts and feelings about emotions". In other words, individuals' emotional reactions to the emotions they experience are referred to as meta-emotion. The concept of meta-emotion is used to describe an individual's emotions and their arousal in relation to them (13). Meta-emotions are emotions that occur in response to other emotions, for example, feeling guilty about anger (14). Emotions can impact a range of cognitive processes including attentional bias, memory, judgments, and decision-making (15). When faced with a situation, feeling good and optimistic alone is not sufficient to control one's emotions. It is essential for individuals to have optimal cognitive functioning in these moments to regulate their emotions (13). In this regard, Honarvar and co-workers (16) and Milam and Judah (17) reported a significant correlation between meta-emotion and distress tolerance.

One factor that appears to be influential in the distress tolerance of patients with breast cancer is physical health (18). Health is a multi-dimensional construct that, according to the World Health Organization (WHO), encompasses complete physical, social, and mental well-being and is not simply the absence of disease or disability (19). In other words, health is not merely the absence of physical illness or disabilities but also includes factors such as self-satisfaction, hope, and social well-being. In this definition, physical health has been emphasized as one of the main dimensions

of health and well-being (20). Individuals with low distress tolerance struggle to avoid negative emotional experiences. When avoidance is not possible, they resort to unhealthy coping mechanisms, which are likely to diminish their energy and ultimately disrupt their physical, mental, and social functions (21). Non-acceptance of the illness, hypersensitivity to signs of illness, and the possibility of physical complications lead to distress among affected individuals (22). Karami and colleagues (23) demonstrated a significant negative correlation between loneliness and self-disability with distress tolerance.

Given the psychological factors alongside physiological factors appears to be essential in the treatment of breast cancer patients. Despite the existing studies addressing the psychological factors of cancer patients, particularly in Iran, few studies have primarily focused on the quality of life of patients, symptoms of depression, anxiety, and stress (3, 8). Therefore, given the necessity of considering the influential psychological factors in the treatment process of cancer patients on one hand, and the need to fill the theoretical gap on the other, this study was conducted. Accordingly, the present study aimed to investigate the potential mediating role of physical health in the correlation between distress tolerance and meta-emotional awareness in women diagnosed with breast cancer. A visual representation of the hypothesized model is presented in Figure 1.

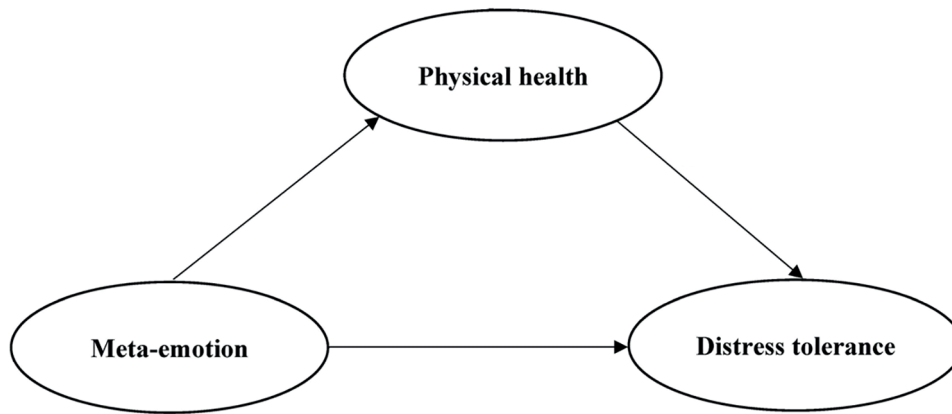
## 2. Methods

### 2.1. Design

This study employed a correlational design using structural equation modeling (SEM).

### 2.2. Participants

The target population for this study comprised all women diagnosed with breast cancer who received treatment at Shafa Hospital in Ahvaz City, Iran, during 2023. A convenience sample was employed, with the sample size determined based on a power analysis considering the number of research variables and complexity of the hypothesized SEM. In SEM, the required sample size is typically calculated based on the number of estimated parameters, which includes direct paths, exogenous variables, and error variances.



**Figure 1:** The figure shows the conceptual model of this study.

Following the recommendations of Loehlin and Beaujean (24) and considering the number of research paths and variables, a sample of 200 participants was deemed sufficient for testing the proposed model and research hypotheses. However, in predicting participant attrition, 220 individuals were selected using convenience sampling. Subsequently, 207 participants filled out the questionnaires and were included in the study. The inclusion criteria were: having completed at least a middle school education, 20-50 years of age, and a diagnosis of breast cancer. The exclusion criteria were: acute psychiatric disorders and incomplete questionnaire responses.

### 2.3. Procedure

After obtaining the Ethics Committee approval, the researcher visited Shafa Hospital in Ahvaz City to select the samples, and discussed about how to carry out the research project. A list of female patients with breast cancer was obtained, and the importance and process of the research were explained to the patients. Those who provided a written informed consent to participate in the study and met the inclusion criteria were invited, and the questionnaires were distributed by the researcher. The necessary explanations for completing the questionnaires were also provided. Finally, the completed questionnaires were analyzed, and the participants were thanked for their cooperation.

### 2.4. Measurement Tools

**Distress Tolerance Scale (DTS):** Developed by Simons and Gaher (25), this 15-item self-report measure assesses emotional distress tolerance. DTS comprises four subscales: Tolerance, Appraisal, Absorption, and Regulation. Each item is rated

on a 5-point Likert scale ranging from “strongly agree” (1) to “strongly disagree” (5), with higher scores reflecting greater distress tolerance (possible range: 15-75). Mousavi and colleagues (5) reported good construct validity (CVI=0.96, CVR=0.93) and acceptable internal consistency (Cronbach’s alpha=0.77) for DTS. In the present study, the instrument demonstrated good internal consistency with a Cronbach’s alpha coefficient of 0.84.

**Meta-Emotion Questionnaire (MES):** This questionnaire was developed by Mitmansgruber and co-workers (26). It consists of 28 items, and each respondent answers the items using a 5-point Likert scale (ranging from completely wrong to completely correct). MES encompasses six components: compassionate care, interest, and tough control (as positive meta-emotion), and anger, contempt/shame, and suppression (as negative meta-emotion). The score range is between 28 and 140, with lower scores being suitable for the subscales of anger, contempt/shame, and suppression, and higher scores being suitable for the other components. Based on the work of Behbahani and colleagues (27) who reported acceptable internal consistency (Cronbach’s alpha=0.79) and good construct validity (CVI=0.91, CVR=0.85) for the Meta-Emotion Questionnaire (MEQ), the present study found similar reliability with a Cronbach’s alpha coefficient of 0.87.

**Physical Health Questionnaire (PHQ):** PHQ was designed by Schat and colleagues (28) and comprises 14 questions focusing on four dimensions of physical health, including headaches, sleep disturbances, gastrointestinal problems, and respiratory illness. Responses are provided on a 7-point Likert scale, with a score range of 14 to 98. Consequently, lower scores

indicate better physical health. Abasi and co-workers (29) established satisfactory construct validity (CVI=0.82, CVR=0.88) for PHQ. The instrument also demonstrated acceptable internal consistency with a Cronbach's alpha coefficient of 0.81 (29). In the present study, the Cronbach's alpha coefficient was used to establish the reliability of PHQ, resulting in a value of 0.81.

2.5. Statistical Analyses

Data analysis employed descriptive statistics (mean and standard deviation) to characterize the study variables. Pearson correlation coefficients assessed the bivariate correlations between the constructs. The normality of the data distribution was evaluated using skewness and kurtosis measures. Subsequently, structural equation modeling (SEM) was implemented to examine the hypothesized correlations within the proposed model. Analyses were conducted using SPSS version 27 for data preparation and AMOS version 25 for SEM estimation.

3. Results

The results related to demographic variables showed that 171 (72.61%) patients were married, while 36 (17.39%) were single. In terms of

education, 41 (19.80%) individuals had a middle school diploma, 77 (37.20%) had a high school diploma, and 89 (43.0%) had a university degree. A total number of 169 (81.64%) participants had been diagnosed with breast cancer for over 3 years, and 38 (18.36%) had been diagnosed for less than 3 years. Descriptive statistics (mean and standard deviation) and bivariate correlations among the study variables are presented in Table 1. Notably, a significant positive correlation was observed between meta-emotional awareness and distress tolerance in women with breast cancer ( $r=0.54$ ). Additionally, there was a significant correlation between physical health and distress tolerance ( $r=-0.69$ ). Consistent with the results, a significant correlation was found between physical health and meta-emotion in women with breast cancer ( $r=-0.66$ ). An initial proposed model for explaining distress tolerance based on meta-emotion and physical health was developed, as presented in Figure 2.

Based on the fit indices of the model, The Root Mean Square Error of Approximation (RMSEA) value of 0.081 indicated that the initial model required modification (Table 2). After removing the non-significant path (meta-emotion to distress tolerance), the final model is depicted in Figure 3. In the final model, the RMSEA value of 0.030 indicated a good fit of the model.

Table 1: Mean, standard deviation (SD), and Pearson correlation coefficients of the research variables

Variables	Mean±SD	Distress tolerance	Meta-emotion	Physical health
Distress tolerance	44.75±8.01	1		
Meta-emotion	84.30±16.95	0.54**	1	
Physical health	55.06±14.47	-0.69**	-0.66**	1

\*\*P<0.01

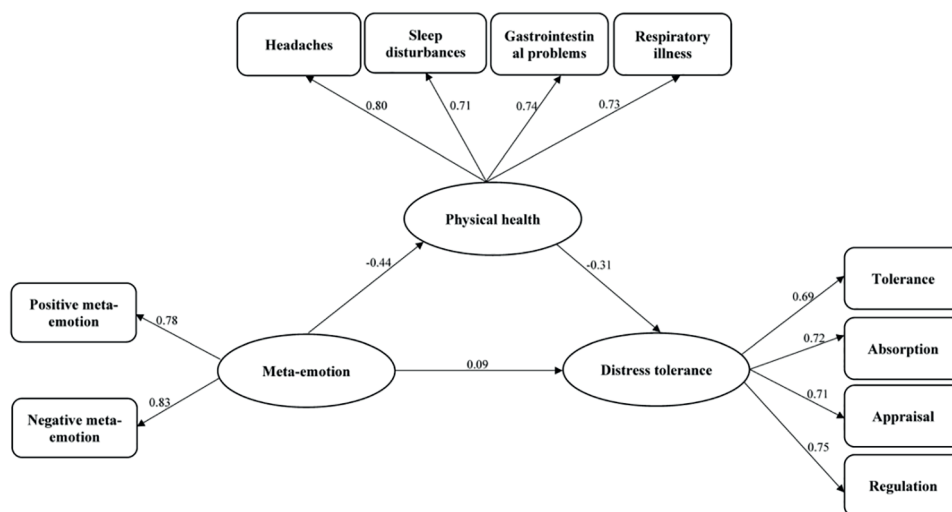
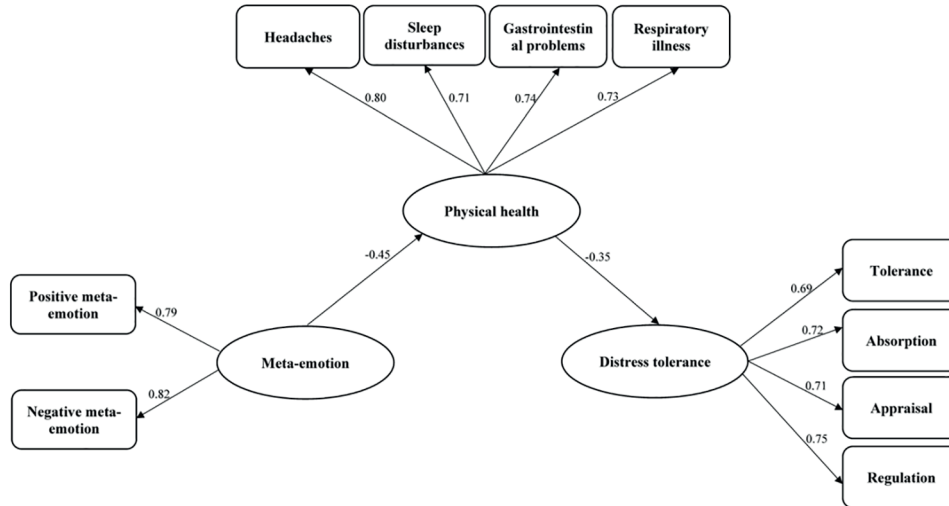


Figure 2: The figure shows the initial model of the research in standard mode

**Table 2:** Fit indicators of the initial and final models

Fit indicators	$\chi^2$	df	( $\chi^2/df$ )	IFI	RFI	TLI	CFI	NFI	RMSEA
Initial model	38.29	32	1.19	0.98	0.90	0.67	0.95	0.91	0.081
Final model	39.07	33	1.18	0.99	0.93	0.99	0.99	0.95	0.030

IFI: Incremental Fit Index; RFI: Relative Fit Index; TLI: Tucker–Lewis index; CFI: Comparative Fit Index; NFI: Normed Fit Index; RMSEA: Root Mean Square Error of Approximation

**Figure 3:** The figure shows the final model of the research in standard mode.**Table 3:** The standardized path coefficients for the hypothesized model and the final model

Path	Initial model		Final model	
	$\beta$	P	$\beta$	P
Meta-emotion to distress tolerance	0.09	0.373	-	-
Meta-emotion to physical health	-0.44	0.001	-0.45	0.001
Physical health to distress tolerance	-0.31	0.002	-0.35	0.001
Meta-emotion to distress tolerance through physical health	0.03	0.017	0.03	0.009

Path analysis revealed significant direct correlations between meta-emotion and physical health ( $P < 0.001$ ) and between physical health and distress tolerance ( $P < 0.001$ ) in women with breast cancer. Interestingly, the direct correlation between meta-emotion and distress tolerance was not significant. However, the indirect effect model suggested a significant indirect path from meta-emotion to distress tolerance, mediated by physical health ( $P = 0.009$ ) (Table 3).

#### 4. Discussion

The present study aimed to investigate the intermediary effect of physical health on the association between distress tolerance and meta-emotion among women with breast cancer. The results revealed that there was no significant correlation between meta-emotion and distress tolerance in women with breast cancer. This

finding contradicts the findings of studies by Milam and Judah (17) and Zaorska and colleagues (30). In previous studies, the correlation between meta-emotion and distress tolerance was examined using correlation and regression analyses, and this correlation was found to be significant (17, 30). However, in the present study, the hypotheses were investigated using structural equations. In this study, the correlation between meta-emotion and distress tolerance was found to be significant in Pearson correlation test, but in the model, due to the presence of a mediating variable, the entire effect of the meta-emotion variable on distress tolerance was explained through the mediating variables, or in other words, through an indirect correlation. In this model, the meta-emotion variable also had an indirect impact on distress tolerance in women with breast cancer. It can be argued that distress tolerance is an important skill that can be very beneficial for women with breast cancer (31).

Research showed that having good and healthy correlations with others, the ability to express emotions, and the ability to manage emotions can significantly improve distress tolerance in women with breast cancer (32, 33).

Meta-emotion is one of the important factors in distress tolerance among women with breast cancer. This concept implies that meta-emotion, as an individual's ability to cope with stress and maintain a positive outlook on life, can have a significant impact on the treatment and recovery of the patient (14). Women with breast cancer who have better distress tolerance are likely to improve their treatment process and cope better with the physical and psychological challenges that often accompany cancer treatment. Therefore, meta-emotion and distress tolerance are closely related in women with breast cancer. Individuals who are able to effectively interact with their spouse, family, and friends, and who can express their emotions and understand their feelings, often exhibit the best performance in dealing with stress and maintaining a positive outlook towards the illness (34). Meta-emotion refers to an individual's ability to manage and control their emotions and reactions. This ability can have a significant impact on an individual's distress tolerance. Patients who can regulate their emotions typically find the best possible solutions to cope with stress and distress. More precisely, individuals with emotional regulation skills are adept at identifying the causes of stress when it arises and implementing appropriate solutions to reduce it (35).

The second finding demonstrated a direct correlation between the physical health of women with breast cancer and distress tolerance. This finding is consistent with the results of the studies by Habibi and Rahimian Boogar (36). In explaining this finding, it can be stated that breast cancer is one of the most common types of cancer in women, often seen in women over the age of 40, but it can also occur at younger ages (37). This disease is associated with a decline in physical health and distress tolerance in patients. Patients with cancer may face challenges in distress tolerance that can have a negative impact on their mood and quality of life. These challenges include feelings of fatigue, stress, anxiety, depression, physical pain, and irritability. In general, distress tolerance refers to an individual's ability to cope with stressors, negative attitudes, and life problems. Research indicated that

distress tolerance is positively related to improved physical health (38). Individuals who can cope with stressors generally have a better lifestyle and better physical health. By finding appropriate solutions to cope with distress tolerance issues, cancer patients will be able to face the beginning and process of their treatment in the best possible way.

Furthermore, the findings suggested that physical health acts as a mediator in the correlation between meta-emotion and distress tolerance among women with breast cancer. While direct links did not reveal a significant association between emotion regulation and distress tolerance, an indirect path was identified where emotion regulation influences distress tolerance by initially enhancing patients' physical health, leading to improved distress tolerance. Therefore, it is evident that physical health serves as a crucial intermediary in the correlation between meta-emotion and distress tolerance. Overall, distress tolerance is a key element in upholding physical well-being, particularly in women with breast cancer. Meta-emotion, characterized by the capacity to adjust and thrive in difficult situations, also plays a vital role in enhancing the overall quality of life and physical health among women with breast cancer. Given the high levels of stress experienced by women with breast cancer, which can adversely impact their mood and physical well-being, meta-emotion emerges as a significant determinant in maintaining their physical health.

#### *4.1. Limitations*

This study was conducted with certain limitations. The study population included female breast cancer patients in the city of Ahvaz, Iran. Thus, the results obtained may be generalizable to other breast cancer patients and individuals with other chronic diseases in different regions with different cultural and personality characteristics.

## **5. Conclusions**

In conclusion, the findings of this study suggested that physical health plays a crucial role in distress tolerance among women with breast cancer. The significant correlation between physical health and distress tolerance highlighted the importance of maintaining good physical health in improving the ability to cope with distress in this population. While the direct correlation between meta-

emotion and distress tolerance was not significant, the indirect correlation through the mediating role of physical health was found to be significant. This underscores the complex interplay between emotional regulation, physical health, and distress tolerance in individuals with breast cancer. These results emphasized the need for interventions that focus on enhancing physical health as a means to improve distress tolerance and overall well-being in women with breast cancer. Further research is warranted to explore the mechanisms underlying these correlations and to develop targeted interventions to support individuals facing the challenges of breast cancer.

### Ethical Approval

This study was conducted with the approval of Ethics Committee of Islamic Azad University-Ahvaz Branch with the code of IR.IAU.AHVAZ.REC.1401.011. Also, written informed consent was obtained from the participants.

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### Authors' Contribution

Mahbobeh Azarnia: Substantial contributions to the conception and design of the work, and the acquisition, analysis, and interpretation of data for the work, reviewing the work critically for important intellectual content. Farah Naderi: Substantial contributions to the conception and design of the work, and the acquisition, analysis, and interpretation of data for the work, reviewing the work critically for important intellectual content. Behnam Makvandi: Substantial contributions to the conception of the work, drafting the work, and reviewing it critically for important intellectual content. All authors have read and approved the final manuscript and agree to be accountable for all aspects of the work, such as the questions related to the accuracy or integrity of any part of the work.

**Conflict of Interest:** None declared.

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