

Structural Equation Model of Pain Management Based on Rumination, Positive and Negative Emotional Regulation Mediating Resilience In Women With Breast Cancer

Fatemeh Givi¹, Farahnaz Meschi^{2*}, Masoumeh Zhian Bagheri³, Dariush Farhood⁴

¹ Department of Psychology, Karaj Branch, Islamic Azad University, Karaj, Iran

² Department of Clinical Psychology, Faculty of Psychology and Educational Sciences, Karaj Branch, Islamic Azad University, Karaj, Iran

³ Department of Clinical Psychology, Faculty of Psychology and Educational Sciences, Karaj Branch, Islamic Azad University, Karaj, Iran

⁴ Department of Human Genetics, School of Public Health, Tehran University of Medical Sciences, Tehran, Iran

* **Corresponding author:** Farahnaz Meschi, Department of Clinical Psychology, Faculty of Psychology and Educational Sciences, Karaj Branch, Islamic Azad University, Karaj, Iran. Email: fa.meschi@kia.ac.ir

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Abstract

Background: Breast cancer is the second leading cause of cancer death in women, accounting for approximately 21% of all cancers worldwide.

Objective: The present study aimed to assess the pain management model based on rumination, as well as positive and negative emotional regulation, with the mediating role of resilience in women with breast cancer.

Method: The present study was conducted based on a correlational design (structural equation modeling). The statistical population of the present study was all women with breast cancer who were referred to medical centers (private and public hospitals and clinics) in Tehran in 2019. The sample size was calculated at 273 patients according to Morgan's table who were selected via simple random sampling. Rumination response questionnaires, positive and negative emotional regulation, resilience, and pain management were used to measure the variables of the study. The obtained data were analyzed in SPSS software and LISREL using Spearman correlation coefficient and path analysis.

Results: Based on the results, resilience had a mediating role in the indirect effect of positive emotional regulation on activity enhancement ($P < 0.01$). Nonetheless, resilience played no significant mediating role in the relationship between positive regulation. Moreover, the results pointed to the significant indirect effect of negative emotional regulation with the mediating role of resilience on activity enhancement ($P < 0.01$). However, resilience had no significant mediating role in the relationship between negative regulation.

Conclusion: As evidenced by the obtained results, it can be concluded that the pain management model based on rumination, as well as positive and negative emotional regulation, was fitted with the mediation of resilience in women with breast cancer.

Keywords: Breast neoplasms, Emotional regulation, Pain management, Resilience, Female

Introduction

Breast cancer is the second leading cause of cancer death in women, accounting for approximately 21% of all cancers worldwide. Clinical signs of this disease inflict patients with agonizing pain and suffering; moreover, the perceived stress among these patients leads to inadequate pain management. These patients generally go through chronic pain due to their physical problems, and sometimes their pain management is impaired owing to psychological reasons and rumination about the disease (1). Poor pain management in breast cancer patients can be associated with the rate of rumination which detracts the course of the disease and treatment. Rumination about uncontrollability and anxiety significantly predict low pain management. Rumination and intrusive thoughts bring about irrational consequences, such as a marked tendency for self-blame, helplessness, emotional irresponsibility, anxiety, avoidance of problems, dependence, and helplessness

in the face of change (2).

Patients with breast cancer experience rumination due to the suffering and challenge of the disease, threatening their mental health. This rumination causes disorders that affect a person's thinking style and adaptation and reinforces emotional responses (3). Although people resort to rumination to relieve anxiety, it makes them more anxious, worried, and usually sick. Unwanted or disturbing thoughts are the main problem of people with certain diseases since the feeling of threat and negative emotions have become permanent for them. From psychologists' point of view, this type of coping style is inefficient and incompatible since it does not help to solve problems and worsen the patients' mental conditions (4).

women with breast cancer are inflicted with emotional disorders, emotional disabilities due to the stressors of this disease, and disturbed emotional cognitive regulation. When people are emotionally

empowered, they can improve their mental health when faced with cognitive challenges. It can be stated that people sometimes experience emotional disorders due to life challenges that threaten their emotional health and self-esteem (5). Positive emotion regulation promotes self-esteem, self-efficacy, and individuality; moreover, it increases positive emotion and mitigates negative emotion. On the other hand, positive emotion regulation can lead to rumination, blame, reduced emotional repair, and lack of self-control (6).

On the other hand, resilience has a mediating role in the pain management model based on rumination, and this role is investigated in the present study. Resilience is an important element which can facilitate communication resilience and increases cognitive-emotional function (7). Resilience is the ability to cope with changes that disrupt daily life; that is to say, the maintenance of health and energy in the face of psychological and physical stress. Resilience acts as a source of resistance and a protective shield against threatening conditions. Given both the stressful situation and the innate ability of individuals to respond, resilience survives and grows normally in the presence of stressful situations as a promising and enjoyable solution since adversities and bad conditions can be potentially devastating (8).

The necessity of the present study lies in the effectiveness of familiarity with the pain management model in the reduction of physical and mental pains of these women concerning the role of rumination, positive-negative emotional regulation, resilience, and vitality in women with breast cancer. A thorough investigation of the breast cancer treatment process which is faced by numerous psychological problems, stress, and inflexibility, as well as the assessment of the mediating role of mediator factors, can improve the rate of pain management in these women to improve their quality of life. The examination of this pain management model can be positively effective in the enhancement of the quality of life of these patients and helps them and medical centers to improve rumination and emotional regulation in an attempt to mitigate pain and increase pain management. Furthermore, the identification of the role of resilience and vitality contributes greatly to the reduction of anxiety. Women with breast cancer are faced with various mood and cognitive disorders; therefore, the determination of the positive role of important mediator factors affecting pain management can be promising to improve the quality of life in these women. The results of the present study can be of great help to clinics and hospitals in the alleviation of the problems encountered by women with breast cancer. This highlights the necessity and importance of research in this field.

Objective

The present study aimed to assess the pain management model based on rumination, as well as positive and negative emotional regulation, with the mediating role of resilience in women with breast cancer.

Methods

The present study was conducted based on a correlational design (structural equation modeling). The statistical population of the present study was all women with breast cancer who were referred to medical centers (private and public hospitals and clinics) in Tehran in 2019. The sample size was calculated at 273 patients according to Morgan's table who were selected via simple random sampling. To this end, the medical centers for women with breast cancer were referred to, the necessary coordination was made with the authorities of the centers. Thereafter, the list of women with cancer who were in the treatment process and had not reached the stage of mastectomy (surgery to remove one or both breasts), and lacked retardation problems, as well as psychiatric (personality disorders) and psychotic diseases, were prepared. All patients with breast cancer referred to all medical centers in Tehran included 100,000 patients. In the next step, based on Morgan's table, 273 patients were randomly selected (i.e. all patients had an equal chance of being selected); nonetheless, the questionnaire was presented to 400 women with breast cancer for quality control. Morgan table was used to determine the sample size according to the whole society since there was neither the variance of the society nor the probability of success or failure of the information variable. The inclusion criteria were breast cancer patients (stage 2), lack of any other psychiatric and medical diseases, and no use of any drugs caused by these diseases, the age range of 25-45 years, and high school education. On the other hand, the exclusion criteria entailed cancellation of patients, failure to answer all questions of questionnaires, and patients who had a mastectomy.

The ethical considerations of this study were as follows: All participants received written information about the research and participated in the research if they wished. Participants were assured that their identity would remain anonymous and that all the discussions held would be confidential. Participants were assured that all information was confidential and would be only used for research. To respect privacy, the participants' names and surnames were not registered. This study was approved by the Ethics Committee of Islamic Azad University of Karaj (IAU. K.REC.1398.100).

Ruminant Answers Questionnaire

This questionnaire was developed by Hoxma and Murrow in 1991. This scale which evaluates negative adverse reactions consists of two subscales of

ruminant response and distraction response (11 items in each subscale). The items are rated on a four-point Likert scale ranging from 1 (never) to 4 (often) (9). Khoramniya et al. (10) obtained the concurrent validity of 0.65 for this questionnaire when compared with the Metacognitive Beliefs Questionnaire, signifying a high validity. Moreover, in their research, Khoramniya et al. (10) assessed the reliability coefficient of this questionnaire, rendering a Cronbach's alpha coefficient of 0.90 for the total questionnaire, as well as 0.92 and 0.89 for its dimensions. In the present study, the reliability of the questionnaire was calculated at 0.73 by Cronbach's alpha method.

Resilience Questionnaire:

Connor and Davidson in 2003 developed this questionnaire for the measurement of resilience. They believe that this questionnaire can well distinguish resilient individuals from non-resilient ones in clinical and non-clinical groups and be used in research and clinical situations. This 26-item questionnaire is scored based on a five-point Likert scale ranging from 0 (completely incorrect) and 4 (always correct) (11). The concurrent validity of the questionnaire was calculated at 0.64 when compared with Ahwaz Psychological Hardiness Scale at a significant level ($P < 0.01$), pointing to the relatively high validity of this questionnaire. Tyler (12) confirmed the reliability of the questionnaire, rendering a Cronbach's alpha of 0.81. In the present study, the reliability of the questionnaire was calculated at 0.71 using Cronbach's alpha method.

Positive and negative emotional regulation questionnaire

This multidimensional questionnaire was developed by Granefski et al. (2001) to identify individuals' cognitive coping strategies after experiencing negative events or situations. This 36- (using LISREL statistical software) were used.

item scale is a self-report tool comprising two subscales of positive emotion regulation (acceptance, positive refocusing, planning to refocus, positive reassessment, numerical importance) and negative emotion regulation (self-blame, rumination, catastrophe, other blame). The scale scores range from 1 (almost never) to 5 (almost always). The Positive Emotion Regulation Scale consists of 20 items, and the Negative Emotion Regulation Scale contains 16 items. The total score is obtained from the sum of subscales (13). In their study, Casagrande et al. (13) assessed the reliability and obtained Cronbach's alpha coefficients of 0.88-0.89. Based on Besharat (14), the Cronbach's alpha values of the subscales ranged from 0.77- 0.89. In the present study, the reliability of the questionnaire was measured at 0.75-0.76 by Cronbach's alpha method.

Pain Management Questionnaire

This 42-item questionnaire was developed by Ozenstein and Kiev in 1983 and consists of six strategies for coping with psychological pain, including return attention, pain reinterpretation, self-talk, ignoring pain, catastrophe, and hope, and strategy. Coping with behavioral pain involves increasing behavioral activity. Each strategy comprises six items which are rated on a seven-point Likert scale ranging from 0(never) to 6 (always) (15). The scores for the whole questionnaire range between 0 and 252 (15). The reliability of the questionnaire was obtained at 0.83 using Cronbach's alpha method. Kheshti et al. (16) also reported the reliability of 0.89 using Cronbach's alpha method. In the present study, the reliability of the questionnaire was obtained at 0.68-0.77 by Cronbach's alpha method.

In the inferential section, Spearman correlation coefficient tests (using SPSS software) and path analysis

Results

Table 1. Mean (standard deviation) of research variables

Variables	M	SD	Skewness	Kurtosis
Return attention	15.19	5.77	0.15	-0.42
Reinterpretation	14.54	5.46	0.07	0.82
Self-talking	20.46	6.89	-0.18	-0.25
Ignore	15.60	5.56	0.08	-0.20
Catastrophe	15.33	6.75	-0.44	-0.33
Hopefulness	19.47	6.93	0.19	0.17
Increased activity	18.95	6.71	0.04	-0.15
Ruminative response	38.19	6.01	-0.38	-0.12
Deviant response	37.11	5.84	0.11	-0.56
Positive emotion	60.27	12.09	0.13	-0.23
Negative emotion	44.13	8.93	-0.09	-5.56
Resilience	79.27	14.47	-0.03	0.55

The results of the Kolmogorov-Smirnov test demonstrated that in all variables of the study, K-S values were significant at the level of $P \leq 0.01$. Therefore, the difference between the distribution of the sample group and the normal distribution was

significant, and the distribution of variables was abnormal. Therefore, the default of using parametric statistics was not provided and non-parametric tests (Spearman correlation) were used.

Table 2. Correlation matrix of research variables

Variables	1	2	3	4	5	6	7	8	9	10	11	12
Return attention	1											
Reinterpretation	0.11*	1										
Self-talking	-0.13**	0.18**	1									
Ignore	0.12**	-0.16**	-0.11**	1								
Catastrophe	-0.18**	-0.15**	0.22**	0.17**	1							
Hopefulness	0.22**	0.19**	0.08*	0.23**	-0.23**	1						
Increased activity	0.24**	0.18**	-0.19**	0.25**	-0.17**	0.17**	1					
Ruminative response	0.08	0.02	0.23**	-0.09	0.11	0.32**	-0.02	1				
Deviant response	0.10	-0.13	0.10	-0.02	0.13	0.08	-0.10	0.27**	1			
Positive emotion	0.18**	0.20**	0.37**	0.12	-0.10	0.27**	0.33**	0.25**	0.26**	1		
Negative emotion	-0.09	0.21**	0.25**	0.05	0.31**	0.13	0.17**	0.21**	-0.31**	0.38**	1	
Resilience	0.15**	-0.06	0.11	0.05	-0.38**	0.23**	0.22**	-0.03	0.02	0.32**	0.43**	1

The assessment of the relationships between the variables illustrated that the relationship of all variables was significant at the level of $P < 0.05$, except for the strategies of returning attention and ignoring pain, and deviant responses. Based on findings,

ruminant responses had a direct effect on self-talk and hope. The indirect effects of rumination mediated by resilience variables on pain management were assessed to investigate the mediating role of resilience.

Table 3. Estimation of indirect effect coefficients

Indirect Effects	Standard estimation values	z sobel Value	P-value
Positive emotion regulation on catering through resilience	-0.05	-1.85	P>0.05
Positive emotional regulation on increased activity through resilience	0.09	3.23	P<0.05
Negative emotion regulation on catastrophizing through resilience	0.06	1.89	P>0.05
Negative emotional regulation on increased activity through resilience	-0.11	-3.71	P<0.05

Table 3 displays the indirect effect of emotional regulation on resilience-mediated pain management. To obtain the estimated coefficient, the effect of emotional regulation (a) on pain management with the mediating role of resilience (b) was multiplied. The obtained coefficient of Sobel z was used to assess the significance. Considering the cultivars reported in the table above, the indirect effect of positive emotional regulation on increasing resilience-mediated activity (estimated coefficient: 0.09) was significant at the level of $P \leq 0.05$. Nonetheless, resilience does not play a significant mediating role in the relationship between positive regulation and catastrophe. The indirect effect of negative emotional regulation on increasing resilience-mediated activity

(estimated coefficient: -0.11) was significant at the level of $P < 0.05$. However, resilience does not play a significant mediating role in the relationship between negative regulation and catastrophe. After the examination of the direct and indirect relationships between the model variables, it is necessary to assess the fitness indicators of the model.

Based on the results, since the value of χ^2 is equal to (1.76), which is less than the criterion value (2), this index indicates the suitability of the model. The obtained P-value was 0.19 and considering that it is higher than the criterion value (0.05), it can be concluded that the model has a good fit. The root mean square error of approximation (RMSEA) in the table (0.0001) is less than the criterion value (0.05);

therefore, it can be concluded that the model has a good fit. The Normed Fit Index (NFI) obtained in the table is (0.96) which is more than (0.95), illustrating a good fit. The comparative fit index (CFI) obtained from the model (0.96) is more than the criterion (0.9), indicating the appropriate fit of the model. The

goodness of fit index(GFI) is obtained from the model (0.97) and since it is more than the criterion (0.9), the model has a good fit. In general, the indicators related to the model fit signify that the fit of the final model are acceptable.

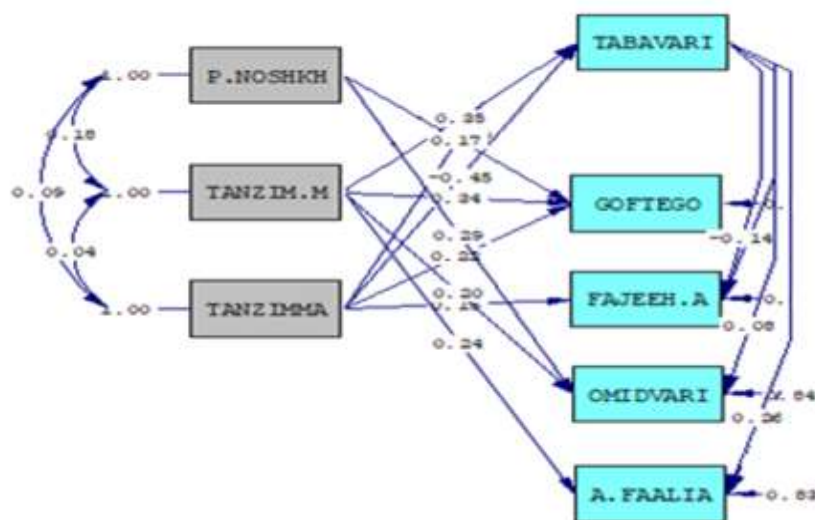


Figure 1. Final model based on standard estimation values

Based on the results, the obtained model is significant regarding the relationship between rumination responses and emotion regulation with pain management mediated by resilience.

Discussion

The present study aimed to explain the pain management model based on rumination, as well as positive and negative emotional regulation, with the mediation of resilience in women with breast cancer. The findings showed that rumination, as well as positive and negative emotional regulation, mediated by resilience is associated with pain management in women with breast cancer. The results of the current research

were in line with those reported by Li et.al (17), Vandekerckhove et.al (18), and Moksnes & Lazarewicz (19). On the other hand, no study yielded contradictory results.

This finding can be justified on the ground that despite the advances in medical science, cancer is still on the rise across the globe. Being diagnosed with cancer can be a disturbing experience for everyone and change people's perceptions of life. Numerous studies have indicated that there is a close relationship between cancer and psychological states. Although cancer causes many complications, it has recently been shown that stress has a profound effect on accelerating the progression and growth of various types of malignant tumors without actually causing them. Cancer brings about dramatic changes,

pressures, and effects on the life of patients and their families. The response to cancer depends on some factors, such as the patient and his/her psychological structure, family, and social environment, which affect all levels of patients' activities (5). Due to the nature of cancer and the subsequent consequences, the person suffers from negative thoughts and rumination which is a class of conscious thoughts that revolve around a specific axis and are repeated without dependence on environmental demands. This type of thinking is observed in some emotional disorders and leads to risk factors for psychological problems, decreased social support and optimism, as well as increased psychosis (7).

Regarding the relationship of positive and negative emotion regulation with resilience, it can be stated that the use of positive emotion regulation strategies (including positive reassessment) leads to a decrease in the experience of negative emotions. In this regard, we can also refer to the studies by Gross and Thompson who reported that the use of positive emotion regulation strategies modulates the effect of assessments and mental reactions of people in the face of stressful events and cognitive reactions (10). Since cancer patients struggle with negative and stressful experiences in their lives, their use of positive emotion regulation strategies can have a positive effect on their resilience. A positive view of the situation, along with positive evaluations and self-talk, will arouse positive emotions and control negative feelings. People with cancer put the blame

on themselves and thoughts related to the negative event (disease) race through their minds, intensifying the fear of disease. Since their perception transcends reality, they face severe anxiety that impairs patients' resilience to disease (11). Emotion regulation is similar to the way people cope with pain, and studies have pointed out that emotionally empowered people face life's challenges more easily. Different types of mental pathology and mental health problems can be considered a consequence of emotion regulation difficulties which can lead to poor interpersonal relationships, social dysfunction, mental health, as well as physical problems and illnesses, including cancer.

According to pain management theory, the input of descending and central pain neurons can be altered by positive and negative emotions. Negative emotions intensify pain and vice versa. Therefore, according to this theory, positive and negative emotions may indirectly play a role in pain management (6). Consequently, it can be concluded that ruminant responses are related to self-talk and hope. Positive emotion regulation has a significant effect on self-talk, hope, increased activity, resilience, and vitality of cancer patients. Moreover, negative emotional regulation exerts a significant effect on self-talk, disaster, resilience, and vitality. Positive emotional regulation had a significant indirect effect on the enhancement of activity through resilience and catastrophizing through vitality. Nevertheless, resilience does not play a significant mediating role in the relationship between positive regulation and catastrophe. The indirect effect of negative emotional regulation on increasing resilience-mediated activity was also significant. However, resilience does not play a significant mediating role in the relationship between negative regulation and catastrophe (20).

Among the notable limitations of the present study, we can refer to Covid-19 conditions which required strict adherence to health protocols and social distancing between patients. Moreover, environmental and familial factors were not controlled, such as family circumstances, as well as economic and social status. Another limitation was insufficient research in this field in our country which made the research process difficult. In this regard, experimental studies are suggested to assess the effect of teaching different methods on pain management, rumination, positive and negative emotional regulation, resilience, and vitality in women with breast cancer. Considering the role of pain management based on rumination, as well as positive and negative emotional regulation, of female patients with breast cancer, it is recommended that training plans be developed to improve pain management based on rumination, as well as positive and negative emotional regulation, in female patients with breast cancer. Furthermore, expert training by relevant organizations is effective in the

improvement of pain management, rumination, positive and negative emotional regulation, resilience, and vitality in women with breast cancer.

Conclusion

As evidenced by the obtained results, it can be concluded that the pain management model based on rumination, as well as positive and negative emotional regulation, was fitted with the mediation of resilience in women with breast cancer.

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