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# Influencing factors of posttraumatic growth in breast cancer patients

A descriptive literature review

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# 1 Introduction

## 1.1 Background of breast cancer and posttraumatic growth

WHO(2015) claimed that breast cancer is the most common cancer among women in developed and less developed countries. The number of women diagnosed is much higher in high-income countries like developed countries than in low- and middle-income countries like developing countries, in part because early detection programs are better in developed countries than in developing countries, and because developing countries lack health care resources and infrastructure, which makes breast cancer treatment a challenge(Taurin & Alkhalifa, 2020). International Agency for Research on Cancer (IARC) (2021) data show that in 2020 female breast cancer has become the most common type of cancer in the world, accounting for more than 10% of all new cancer cases, with 2.3 million diagnosed, for the first time surpassing the number of new cases of lung cancer, and has become the most common cause of cancer death in women. The incidence of breast cancer differs significantly between men and women, with men's rates being nearly 100 times lower than women's, and the incidence and mortality of breast cancer in women is largely related to geographic location and socioeconomic(Taurin & Alkhalifa, 2020).Breast cancer is usually prevented through early detection and treated through the use of raloxifene or other anti-estrogens, targeted therapy, radiation therapy, surgery and chemotherapy.(Akram et al., 2017).

The loss of breasts can lead to asexual feelings and loss of self-image, which can lead to depression in most women, as well as psychosocial distortions(Akram et al., 2017). PTG can provide patients with a positive perspective, help victims transform pain into positive psychology, so as to improve their quality of life and promote the prognosis of breast cancer patients. Therefore, PTG also plays an important role in the treatment of breast cancer.

In general, PTG offers hope for adverse events and a potentially positive perspective (Tedeschi & Calhoun, 2004).Helping trauma event survivors to transform pain into positive psychology can effectively reduce sadness in cancer patients and help patients identify and develop positive emotions, thus improving their quality of life. However, at present, the domestic research on PTG is still in its infancy, mainly focused on cancer. In the last decade, some reviews described the factors of PTG in cancer, there have been almost few reviews on the factors associated with PTG in breast cancer patients. This kind of research is benefit for nurses to provide more individual nursing intervention, so as to promote the health of breast cancer patients. Therefore, it is of importance to explore the influencing factors of PTG in them.

## **1.2 Definition**

### **1.2.1 Breast cancer- definition**

Breast cancer is a disease in which the epithelial cells of the breast proliferate uncontrollably under the action of various carcinogenic factors. It may cause clinical symptoms such as breast pain, weight loss, fatigue, nipple discharge, breast lumps, enlarged ancillary lymph nodes, skin abnormalities around the breast, breast deformities, etc. (Akram et al., 2017). According to site, it is divided into invasive and noninvasive breast cancers. Noninvasive breast cancers. It is a type of cancer that does not extend from the lobules or ducts and is usually treated conservatively. In contrast, invasive breast cancers refer to abnormal cells in the lobules or ducts that divide and spread to surrounding tissues or even to the whole body, and surgery is usually recommended(Akram et al., 2017).

### **1.2.2 Posttraumatic growth- definition**

Posttraumatic growth(PTG) refers to an individual's ability to cope with highly challenging life situations or adverse events that result in positive changes in self-perception, etc. It is considered a process and an outcome (Tedeschi& Calhoun ,1996 ; Dursun&Söylemez, 2020). PTG offers hope for adverse events and a potentially positive perspective(Tedeschi & Calhoun, 2004).Cancer can take a toll on physical integrity and mental health, but people say that in addition to the negative effects, some people will grow positively from the painful experience(Zhai, Newton, & Copnell, 2019).

## **1.3 Literature review**

Compared with previous studies, we found that endocrine therapy,anti-HER2 targeting,and chemotherapy are still the main treatment strategy for the prognosis of breast cancer(Nadia&Michael ,2017). However, drug chemotherapy has significant side effects and relying solely on drugs cannot make a good prognosis. Therefore, it is generally not recommended to treat and relieve the postoperative symptoms of breast cancer patients only by drugs, but also pay attention to the psychological intervention of patients, such as helping breast cancer patients achieve posttraumatic growth, which has a positive impact on the prognosis of breast cancer(King et al.,2023).

At present, there are few articles studying the posttraumatic growth of breast cancer, so the author wrote this review to further understand the influencing factors of posttraumatic growth of breast cancer.

## **1.4 A model of Posttraumatic growth**

This review chose a model of posttraumatic growth to aid in the analysis of PTG in breast cancer patients. Posttraumatic growth is caused by seismic event, and this crisis is a serious challenge for the individual. Next, Tedeschi & Calhoun (2004) mentioned that reducing individuals' involvement in self-disclosure and emotions regarding their perceptions of the crisis can play a role in growth. They describe the cognitive process of traumatic events, especially rumination influenced to growth. They argue that the way of coping with crisis plays a crucial role in posttraumatic growth. Rumination and social support can influence the reductions of emotional distress management of automatic rumination disengagement from goals and rumination more deliberate schema change narrative development, thus further affecting PTG. Finally, Tedeschi & Calhoun (2004) suggested that posttraumatic growth can be linked to wisdom and enduring distress.

## **1.5 Problem statement**

Breast cancer is a disease of physical and mental impairment, in the past, people focused only on the physical damage and pain of breast cancer patients, but ignored the psychological needs of patients (Xin Fu et al., 2022). With the continuous development of positive psychology, some scholars have found positive psychological changes in cancer patients, which was called post-traumatic growth (PTG), and the positive significance of PTG in improving the quality of life of breast cancer patients (King et al., 2023).

PTG offers hope for adverse events and a potentially positive perspective (Tedeschi & Calhoun, 2004). Helping trauma event survivors to transform pain into positive psychology can effectively reduce sadness in cancer patients and help patients identify and develop positive emotions, thus improving their quality of life. However, in the last decade, some reviews described the factors of PTG in cancer (Fiona, Nurul, Ben & Linda Sharp, 2021) and the related factors of PTG in breast cancer patients (Philippa, Fotios, & Annivas Tsikkinis, 2014), there have been almost few reviews on the influencing factors of PTG in breast cancer patients. Although the existing treatments can have treated or alleviate breast cancer, the psychological impact on patients cannot be ignored (Xin Fu et al., 2022). This kind of research is conducive to strengthening nurses' attention to the psychological response of patients with breast cancer, helping to provide more individualized nursing interventions, and has certain value to help patients cope with the disease, return to society, reshape a positive and healthy life, and improve the quality of life.

It is of importance to explore the influencing factors of PTG in them. Understanding the scale that measures PTG helps nurses get a more specific understanding of post-traumatic changes in breast cancer patients, as well as the level of post-traumatic growth in breast cancer patients.

## 1.6 Aim and research questions

The aim of the literature review was to describe the influencing factors of posttraumatic growth in breast cancer patients.

Research question :

What are the influencing factors that affect the posttraumatic growth of breast cancer patients?

What are the scales for measuring posttraumatic growth in breast cancer patients?

What is the posttraumatic growth level of breast cancer patients?

## 2 Method

### 2.1 Design

A descriptive literature review was conducted for this article.

### 2.2 Search strategy

The Articles used in the study were searched through PubMed and CINAHL databases, with limitations: 10 years English. The search terms were used “Breast Cancer” and “Posttraumatic Growth”, one by one and in different combinations with each other. The Boolean term AND was used to connect search terms. Indexed search terms were obtained from MeSH headings. The authors skimmed the titles and abstracts of the 83 articles to determine if they met the purpose and research questions of the literature review and to discuss them. Inclusion criteria for this study included that it had to be an empirical study involving women with breast cancer and that the study had to be conducted between 2012 and 2022. Non-breast cancer cancers were excluded, as well as articles examining the etiology, diagnosis, treatment and prognosis of the disease and improving clinical care, see **Table 1**.

### 2.3 Selection process

Inclusion criteria for this study included that it had to be an empirical study involving women with breast cancer and that the study had to be conducted between 2012 and 2022. Non-breast cancer cancers were excluded, as well as articles examining the etiology, diagnosis, treatment and prognosis of the disease and improving clinical care, the search strategy is shown in **Table 1**.

The authors firstly conducted an initial search in PubMed and CINAHL databases, resulting in a total of 83 search results. Then selected the title and abstract of the article, and after screening, selected 77 articles. By reading the entire text more carefully and checking if its content were purposive, 2 articles were excluded because they could not be downloaded, 3 reviews were excluded, and 1 was reports not retrieved, moreover, 4 articles were excluded because they were empirical studies, 13 articles were excluded

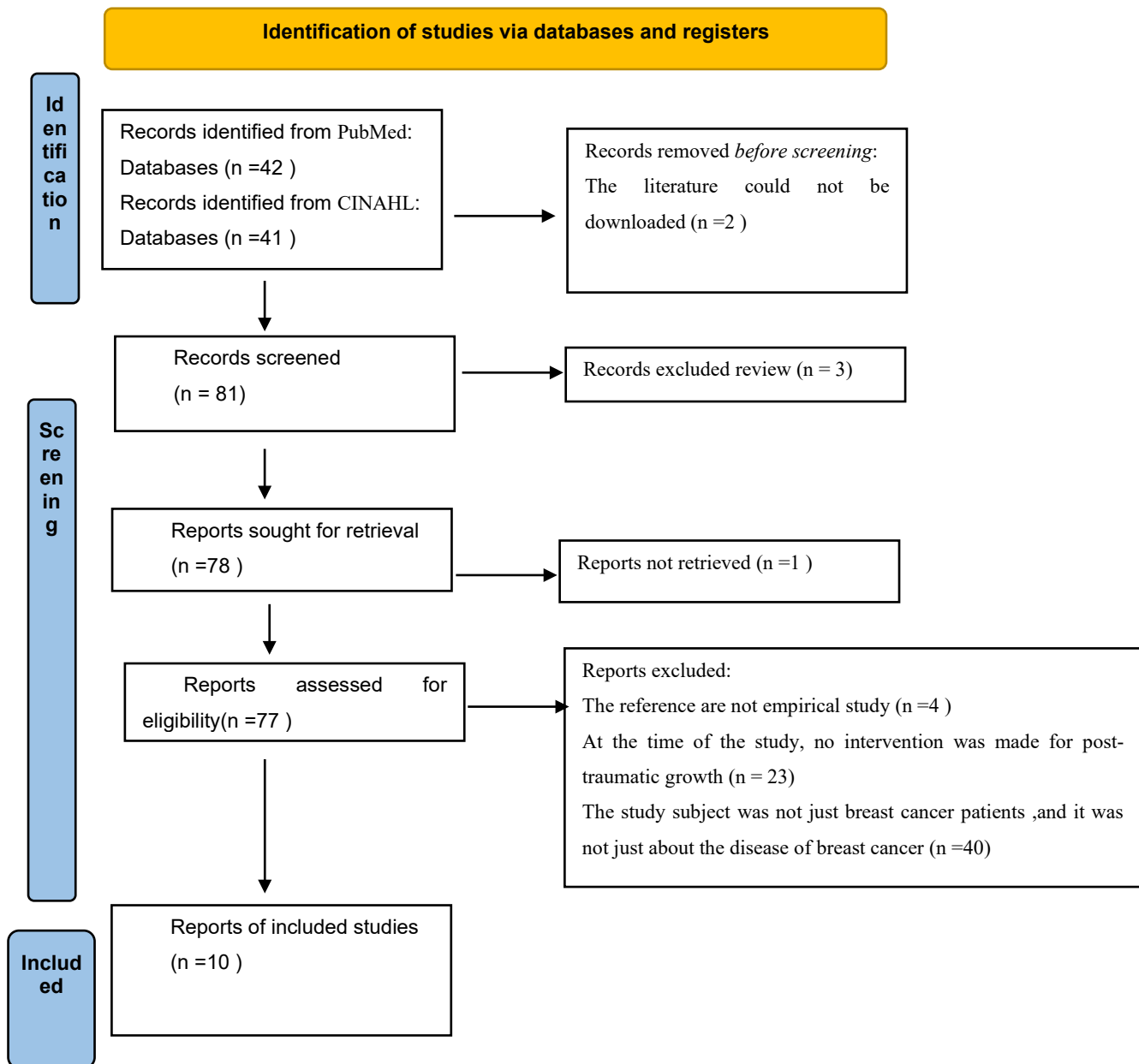


because they did not intervene in posttraumatic growth, 27 articles were excluded because they did not only study breast cancer but also included other cancers and the exclusion criteria of this review, 10 articles were excluded because they only wrote about related factors, and finally, 10 articles were selected according to the inclusion and exclusion criteria and were considered to be of potential interest to the literature review, see **Figure 1.**(Page, M. J., et al. (2021).

The two authors collated these ten articles, summarized the similarities, and finally came to a conclusion.

**Table 1 Literature search Strategy**

<b>Database</b>	<b>Limits and search date</b>	<b>Search terms</b>	<b>Number of hits</b>
Medline via PubMed	10 years, English Adult:19+years, 2022-05-01	("Breast Neoplasms"[Mesh]) OR "Breast Cancer "[free text]	193721
	10 years, English, Adult:19+years, 2022-05-01	"Posttraumatic Growth, Psychological"[Mesh]	503
	10 years, English, Adult:19+years, 2022-05-01	("Breast Neoplasms"[Mesh]) OR "Breast Cancer "[free text] AND"Posttraumatic Growth, Psychological"[Mesh]	42
Medline via CINAHL	10 years, English, Adult:19+years, 2022-05-01	(Breast Neoplasms) OR (Breast Cancer)	25519
	10 years, English, Adult:19+years, 2022-05-01	Posttraumatic Growth	524
	10 years, English, Adult:19+years, 2022-05-01	(Breast Neoplasms OR Breast Cancer )AND(Posttraumatic Growth)	41
<b>TOTAL</b>			<b>83</b>



**Figure 1 Literature screening process (Page, M. J., et al. 2021. )**

## **2.4 Data analysis**

The authors first identified the keywords and searched them for combinations. These articles were selected for analysis and integration based on the purpose of this review, the title and content of the cited literature. First, the authors analyzed and extracted their title, design, participants, data collection methods, data analysis methods and tabulated them. The authors then re-read the content to identify, analyze, compare, and classify it, the results sections of the articles were read and carefully processed, and marked the parts related to the aim in order to identify the influencing factors of posttraumatic growth in breast cancer patients after mastering the general idea of this part. A category is a short description that combines two or more similar concepts or content and summarizes key concepts, while a subcategory is another category within an established category that provides additional information about its parent category (Joanna Briggs Institute, 2014). The authors compared and categorized the labeled sections, grouping similar concepts and contents into a category to understand the factors influencing breast cancer's post-traumatic growth. Polit & Beck (2017) indicated that literature reviews typically use a table to organize information. When collecting references focus on the reliability and validity of the literature to make sure the article is usable and credible. The results sections of the articles were read and carefully processed in order to identify the influencing factors of posttraumatic growth in breast cancer patients. Finally, the findings were structured according to emergent categories and presented under the corresponding category, and summarized as an outcome table.

## **2.5 Ethical considerations**

These articles were read, reviewed and summarized objectively and were not influenced by the author's own wishes. The results of the research were presented in the author's own words in entirety and the degree program were free of plagiarism.

# **3 Results**

## **3.1 Instruments for measuring the Posttraumatic growth**

There were 10 articles in total, all articles use Posttraumatic growth inventory (PTGI) to measure post-traumatic growth in breast cancer patients, 5 of which used the original PTGI (Hamama-Ral et al., 2019; Li et al., 2020; Danhauer et al., 2013; Soo et al., 2015; Hasson-Ohayon et al., 2016), 2 were translated version (Guil et al., 2022; Villanova Quiroga et al., 2020), and 3 were revised version (Villanova Quiroga et al., 2020; Silva et al., 2012; Michalczyk et al., 2022). Those were assessed using the PTGI assessment tool, separately or in association with other similar instruments.

The Posttraumatic growth inventory (PTGI) (Tedeschi & Calhoun, 1996) is a 21-item self-report scale that examines the extent of positive changes that occur after trauma. The inventory consists of five subscales

reflecting different aspects of PTG: relationships with others (seven items), new possibilities (five items), personal strength (four items), spiritual change (two items) and appreciation of life (three items). Each item is rated on a 6-point Likert-type scale (0 = "I did not experience this change because of my illness" to 5 = "I experienced it to a large extent because of my illness"). The scale is scored on five subscales, with higher scores indicating higher levels of each particular dimension of PTG (total possible scores from 0 to 105).

In addition, the scale has been translated by Wess & Berger into a Spanish version called Spanish Version of the Posttraumatic Growth Inventory and the Brazilian version of the Posttraumatic Growth Inventory (PTGI) (Silva, Donat, Gauer & Kristensen, 2016) which was used in was only modified the language and no content changes. However, the Polish version of the scale which was revised by Ogińska-Bulik and Juczyński (2010) and divided into four subscales: changes in self-perception, changes in relating with others, greater appreciation of life, spiritual change. The Portuguese version of the Posttraumatic Growth Inventory (PTGI) (Silva, Moreira, Pinto, & Canavarro, 2009), four independent dimensions: personal resources and skills (six items), new possibilities and life appreciation (six items), strengthening of social relationships (six items) and spiritual development (three items). The scoring methods and total scores for all translated and revised PTGI's remain unchanged. The scale has good reliability ( $\alpha = 0.93$ ) and validity.

The internal reliability (Cronbach's  $\alpha$ ) of the total scores and subscales in this study ranged from 0.54 to 0.94 according to the statistics.

**See Table 2.**

**Table2 Instruments for measuring the PTG**

Author& year	Instrument	Original	Subscale	Scale score	Scoring formula	Reliability
Hamama-Ral et al., 2019	Posttraumatic growth inventory (PTGI) (Tedeschi & Calhoun, 1996)	Posttraumatic growth inventory (PTGI) (Tedeschi & Calhoun, 1996)	relationship with others(7 items) new possibilities(5 items) personal strength(4 items) spiritual change(2 items ) life appreciation(3 items) Total: 21items	105	0 (I did not experience this change as a result of my crisis) to 5 (I experienced this change to a very great degree as a result of my crisis)	T1:0.92; T2:0.93; T3:0.90
Li et al.,2020						0.926
Danhauer et al., 2013						0.90
Soo et al.,2015						0.86
Hasson-Ohayon et al.,2016						0.54~0.89
Guil et al.,2022	Spanish Version of the Posttraumatic Growth Inventory(Weiss & Berger,2006)	Posttraumatic growth inventory (PTGI) (Tedeschi & Calhoun, 1996)	Personal resources and skills (6 items), New possibilities and life appreciation (6 items) , Strengthening of social relationships (6 items) , Spiritual development (3 items) Total :21 items	105	The higher the score, the higher the PTG level.	0.90
Villanova Quiroga et al., 2020	A Brazilian adaptation of the Posttraumatic Growth Inventory (PTGI) . (Silva,Donat, Gauer & Kristensen,2016					0.93
Paredes et al.,2018	The Portuguese version of Posttraumatic Growth Inventory (PTGI) (Silva, Moreira, Pinto, & Canavarro, 2009)					0.94
Silva et al.,2012						0.81~0.87
Michalczyk et al.,2022	Posttraumatic growth inventory (PTGI)(Ogi´nska -Bulik and Juczy ´nski, 2010)	Posttraumatic growth inventory (PTGI) (Tedeschi & Calhoun, 1996)	Changes in self-perception, Changes in relating with others, Greater appreciation of life, Spiritual change	105	The higher the score, the higher the PTG level.	0.93

### 3.2 Influencing factors of breast cancer patients’ posttraumatic growth

By categorizing and summarizing, this review discussed the factors that influence post-traumatic growth in breast cancer patients in four categories: emotion and mentation, coping strategies, social support, and rumination, which was described in more detail. See **Table 3**.

**Table3 Influencing factors of PTG in breast cancer**

<b>Emotion and Mentation</b>	Emotional attention
	Emotional clarity
	Emotional repair
	Use of alcoholic beverage, spiritual change
<b>Coping strategies</b>	Positive Reevaluation
<b>Social support</b>	Having a husband/partner
	Cognitive support
	Friends support
	Belief-based support
	Religion
<b>Rumination</b>	Intrusion
	instrumentality
	brooding

#### 3.2.1 Emotion and Mentation

It is clear that the influence of emotional and psychiatric diseases on post-traumatic growth of breast cancer is obvious, and there are many related words in the included articles, and we have combined and summarized them into Emotion and Mentation, and the higher emotional repair, emotional attention, and emotional clarity, the more the post-traumatic growth in adenocarcinoma patients. Emotional attention, which means people's ability to pay attention to their emotions(Guil,Ruiz-Gonzalez,Morales-

Sanchez,Gomez-Molinero & Gil-Olarte,2022). Emotional clarity means the ability to discern one's own emotions(Guil et al.,2022). And emotional repair, meaning the ability of people to be able to repair and manage their emotions(Guil et al.,2022). Also, use of alcoholic beverage causes spiritual change to be summed up in mentation(Villanova ,Bridi ,Rudnicki& De,2020).

Guil (2022) showed that the higher Emotional repair ( $\beta=1.39$ ,  $p=0.000$ ) had a significant effect on PTG. In addition, Guil(2022) indicated that Emotional attention ( $\beta=0.36$ ,  $p=0.003$ ) and Emotional clarity ( $\beta=0.32$ ,  $p=0.026$ ) also had an effect, but not so obviously. Therefore, one article showed that the use of alcoholic beverages on mental alteration hinders PTG (Villanova Quiroga et al., 2020) in breast cancer patients.

### **3.2.2 Coping strategies**

Coping strategies are the way people deal after a major traumatic event. Coping strategies could predict the occurrence of post-traumatic growth in breast cancer patients, and the higher positive reevaluation, the more the post-traumatic growth in adenocarcinoma patients(Villanova et al.,2020). As there are many coping strategies, such as comfort,self-Control,problems resolution and positive reevaluation etc, the authors identified the positive reevaluation through data filtering and listed it separately

In the article wrote by Villanova (2020), it was shown that positive coping in breast cancer patients, where positive reevaluation ( $\beta = 0.51$ ,  $p < 0.001$ ), had a facilitative effect on PTG.

### **3.2.3 Social support**

Social support is a category that the two authors put into a separate category, because social support covers a lot of things, it's mentioned in almost every inclusion article, and we picked out some meaningful data that showed his effect on PTG of breast cancer. Social support could predict the occurrence of post-traumatic growth in breast cancer patients, and the greater cognitive support, friends support and belief-based support, the more the post-traumatic growth in adenocarcinoma patients. The patient who having a husband/partner, the more the post-traumatic growth in adenocarcinoma patients.

In the article wrote by Villanova Quiroga et al (2020), it was shown that having a husband/partner ( $\beta=0.22$ ,  $p =0.01$ ), PTG had a facilitating effect. In addition, the results of article wrote by Hasson-Ohayon et al(2016) showed that cognitive support ( $\beta=0.35$   $p<0.001$ ), friends support ( $\beta=0.32$   $p<0.01$ ), belief-based support ( $\beta=0.35$   $p<0.01$ ) of social support all promoted Breast cancer patients' PTG. Religion (Villanova Quiroga et al., 2020) affects both relationship with others ( $\beta=0.22$ , $p=0.036$ ) and personal strength ( $\beta=0.20$ , $p=0.052$ ) dimensions of PTG.

### **3.2.4 Rumination**

Soo(2015) illuminated that rumination means reacting to pain, which involves repeatedly and passively paying attention to the pain process and considering possible consequences. Rumination could happened the occurrence of post-traumatic growth in breast cancer patients, and the higher rumination, the more the post-traumatic growth in adenocarcinoma patients(Soo& Sherman,2015). For PTG, brooding, intrusion and instrumentality were significant predictors of new possibilities, intrusion and instrumentality for relating to others and instrumentality for personal strength and appreciation of life(Soo& Sherman,2015).

. Brooding and instrumentality predicted spiritual change(Soo& Sherman,2015).

The article examined rumination(Soo& Sherman,2015), where rumination includes three aspects intrusion, instrumentality, and brooding. Intrusion had an effect on PTG's relating to others ( $\beta=0.21$   $p<0.05$ ) and new possibilities ( $\beta=0.47$   $p<0.01$ ), and brooding had an effect on both new possibilities ( $\beta=-0.25$   $p<0.01$ ) and spiritual change ( $\beta=-0.32$   $p<0.05$ ) of PTG. However, instrumentality had a positive effect on five aspects of PTG relating to others ( $\beta=0.30$   $p<0.01$ ), new possibilities ( $\beta=0.30$   $p<0.01$ ), personal strength and appreciation of life ( $\beta=0.30$  ,  $p<0.01$ ), spiritual change ( $\beta=0.18$   $p<0.01$ ), and appreciation of life ( $\beta=0.34$  ,  $p<0.01$ ) all had a facilitative effect(Soo& Sherman,2015).

## **4 Discussion**

### **4.1 Main result**

The aim of this literature is to describe the influencing factors of posttraumatic growth in breast cancer patients.The 10 articles included in this review all used the PTGI to measure posttraumatic growth in breast cancer patients, And the post-traumatic levels measured by PTGI are at moderate to high levels( $M=65.10 \pm 22.47$ ). The 10 articles are summarized in this paper, and the factors influencing the PTG are grouped into four areas: emotion and mentation, coping strategies, social support, and rumination.

### **4.2 Results discussion**

From the included articles, the PTGI scores of women with breast cancer post-traumatic growth were basically at a medium to high level ( $M=65.10 \pm 22.47$ ) (Stutts et al., 2015). Studies have shown that there was no significant gender difference in PTGI among amputees (Stutts et al., 2016). Zwahlen , Hagenbuch, Carley, Jenewein, and Buchi (2010) found that women with cancer reported more PTG than men; mastectomy may be qualitatively different from limb loss, both of which are the loss of body organs.



Social support and coping strategies were found to be able to predict posttraumatic growth in breast cancer patients in this study . This was consistent with the results of previous studies described (Fu, X., Sun, J., Wang, X., Cui, M., & Zhang, Q. 2022; Figen and Besti 2014 ; Casellas-Grau, A., Vives, J., Font, A., & Ochoa, C. 2016).Fu, X et al (2022) indicated that positive coping, close relationships, and especially couple relationships, are all influential factors for PTG, as well as Figen and Besti (2014)indicated that cognitive and positive reinterpretation can also promote posttraumatic growth. That demonstrated in this literature. The most critical factor in promoting posttraumatic growth is not the trauma itself, but the process of trying to fight it and eventually survive. The PTG model (Tedeschi & Calhoun, 2004)stated that PTG is generated through self-representation and self-analysis, and that various coping strategies, distraction, and talking to people can change intrusive thoughts into more positive thoughts. Fu, X et al (2022) and Villanova Quiroga et al (2020) showed that intimate relationships can promote posttraumatic growth because traumatic experiences make patients aware of how important an intimate relationship is. According to the analysis of the PTG model (Tedeschi & Calhoun, 2004),when the patient is traumatized, the patient is more willing to be exposed themselves than before. When this exposure is responded to others, the patient will feel that when they are in difficulty, they can still rely on others, which is a process of psychological healing. However, positive coping can also promote posttraumatic growth. When the patient suffers from trauma, the patient will identify their negative emotions, and then reanalyze the impact of this matter on themselves, describe and evaluate the trauma in a new and optimistic way, and analyze its positive significance for their present and future life, that is, to understand the events that produce negative emotions in a positive way. This positive coping allows patients to feel strong and able to control and manage difficult situations.

On the other hand, ruminate was considered as an influential factor for posttraumatic growth of breast cancer, which was consistent with the findings of Fu, X et al (2022) showed that avoidance in ruminating were the factors affecting PTG in breast cancer patients. while the results of this literature showed the effect of intrusion in ruminating, instrumentality and brooding in ruminating had an effect on PTG. According to the PTG model(Tedeschi & Calhoun, 2004), unintentional, intrusive thoughts occur frequently when people experience a traumatic event, In this process, some people are able to ease their grief by themselves, manage the passive ruminant process, and enter into the active and meaningful ruminant. After entering the meaningful meditation, individuals can gradually change their cognitive ways and narrative ways, and make new meaning discoveries. After suffering trauma patients take some time to come to terms with themselves. This painfully long process can keep cognitive processing active, grow after trauma, gain the wisdom of life, while quickly resolving and adapting to the traumatic event. So, rumination could promote post-traumatic growth. By the way, among all the influencing factors, emotional repair had the greatest impact.

Because repairing and managing emotions could help oneself to reduce grief emotions and be liberated from goals.

### **4.3 Methods discussion**

According to Polit&Beck (2017), the author used clear, specific inclusion and exclusion criteria to ensure that the retrieved literature was closer to the purpose of the review, thereby improving the validity and authenticity of the study. One of the inclusion criteria for this review is that the articles must be written in English, which has both strengths and limitations. English is the first universal language in the world, and is highly quoted and recognized by the academic community, so it is naturally more advantageous. However, everything is two-fold. Using only English literature, excellent articles in other languages will be missed. In addition, English is not the author's mother language, and there will be obstacles and deviations in the process of reading. Therefore, when authors use some translation software, there will be some complex, long sentences of grammar errors, thus making it difficult to further understand what authors wants to express.

The authors used databases for the literature search, and also used the Boolean terms "And" and "OR" to search for different combinations in order to screen out more articles related to the purpose of this study. According to Polit & Beck (2017) believes that the data collection method used by the authors has advantages, narrowing the search range, making the search results more consistent with the study purpose, which improved the credibility of the articles. But the authors have only used two databases, and some articles are still ignored. There is also a limitation.

The authors of the selected articles were not from the same country. Different countries have different cultural and different educational backgrounds. In this way, the review covers a wide range of areas and is more valuable for reference. In addition, the two authors browsed the literature, understood the literature from an objective and rational perspective, and thought about it. Finally, authors completed the writing after discussion and cooperation.

### **4.4 Clinical implications**

A model of posttraumatic growth can help analyze related factors and influencing factors of PTG. In clinical terms, for nurses, understanding the influencing factors of PTG can help nurses improve nursing measures, integrate humanistic nursing into clinical nursing, implement psychological nursing more comprehensively, communicate with patients timely and effectively give patients innovative, operable, scalable and personalized interventions, so that patients can get rid of adversity or pain as soon as possible, guide positive changes in psychology, help patients find their dignity , regain hope and enthusiasm for life, improve the quality of life, thereby improving the level of PTG, promote patients' health. In terms of

scientific research, sorting out the predictors of PTG will not only provide research inspiration for future research in this area, but also facilitate the collection of information.

#### **4.5 Suggestions for future research**

Breast is a typical feature of women, and women have higher PTG, so fewer PTG related studies compared with male and female breast cancer patients are a direction for future research. In addition, the scope of application of the posttraumatic growth scale is actually relatively wide, many diseases can be applied, but relatively speaking, the use of cancer patients is more, in the future, a special post-traumatic growth scale for cancer patients can be developed, so that different cancer post-traumatic comparisons can be carried out, and a deeper understanding of the post-traumatic growth of cancer patients can be obtained.

#### **4.6 Conclusion**

The purpose of this review was to describe the factors influencing posttraumatic growth in breast cancer patients. By generalization, the most commonly used scale to measure posttraumatic growth in breast cancer was the PTGI, and posttraumatic growth in breast cancer patients was influenced by four areas: emotion and mentation, coping strategies, social support, and rumination. Understanding the factors that influence post-traumatic growth in breast cancer patients could help nurses better integrate the distressing factors and positive aspects, give patients timely and effective individualized interventions to guide them to positive psychological changes.

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## 6 Appendix

Table 5

Author(s)	Aim	Results
Guil, R., Ruiz-Gonzalez, P., Morales-Sanchez, L., Gomez-Molinero, R., & Gil-Olarte, P. (2022).	This study aims to investigate the existence of difference of PTG and perceived emotional intelligence (PEI) among breast cancer survivors (BCSs) and healthy controls. Moreover, it aims to investigate the mechanism by which PEI affects the relationship between disease survival and PTG	Emotional attention ( $\beta = 0.36, p = 0.003$ ), emotional clarity ( $\beta = 0.32, p = 0.026$ ), emotional repair ( $\beta = 1.39, p = 0.000$ ) were all significant predictors of PTG. An indirect effect showed that cancer survival predicts reduced levels of emotional Attention ( $\beta = -2.82; p = 0.005$ ), decreasing PTG ( $\beta = -0.30; \text{BootSE} = 0.19; 95\% \text{BootCI} = -0.73, -0.01$ ). However, the most statistical indirect effect evidenced that BCSs regulate their emotions appropriately, having a powerful effect on PTG ( $\beta = 4.41; \text{BootSE} = 1.31; 95\% \text{BootCI} = 1.96, 7.14$ ) and counteracting the negative effects of poor emotional attention.
Michalczyk, J., Dmochowska, J., Aftyka, A., & Milanowska, J. (2022)	The aim of the study was to evaluate whether PTG happens in a group of women with breast cancer and whether resilience is a personal trait leads to its occurrence	The results obtained confirm the co-occurrence of psychological resilience ( $r = 0.54, p < 0.05$ ) and PTG, especially personal resilience ( $r = 0.54, p < 0.05$ ) and social competences ( $r = 0.45, p < 0.05$ ). A weaker correlation occurred between post-traumatic growth and family competences ( $r = 0.38, p < 0.05$ ), arousal ( $r = 0.31, p < 0.05$ ), and overall severity of post-traumatic stress symptoms (PTSS; $r = 0.30, p < 0.05$ ). Additionally, women subjected to additional traumatic events other than cancer manifested a higher level of PTG ( $74.46 \pm 13.30$ and $80.60 \pm 12.98$ , respectively, $Z = 2.38, p < 0.05$ )
Hamama-Raz, Y., Pat-Horenczyk, R., Roziner, I., Perry, S., & Stemmer, S. M. (2019)	aim to test the following two alternative hypotheses : (1) higher report of PTG after medical treatment of breast cancer patients would lead to increased report of positive coping strategies, (2) higher report of positive CER coping strategies after medical treatment of breast cancer would	The path that describes the first alternative. In addition, positive coping strategies were found to be positively linked to PTG after 6 months ( $3.2, P < .001$ ), and the link was slightly stronger after 2 years ( $3.4, P < .001$ ). Nevertheless, 7 years after diagnosis, no association was found between positive coping strategies and PTG measurements.



	lead to increased sense of PTG.	
Li, L., Hou, Y., Li, L., Hou, Y., Kang, F., & Wei, X. (2020)	This study aimed to analyze the moderation and moderation effects of resilience on the anxiety, depression impact on post-traumatic growth (PTG) among breast cancer patients undergoing chemotherapy	Resilience showed significant correlations with anxiety, depression and PTG ( $r=-0.379$ , $P<.01$ ). However, resilience could regulate anxiety, depression, and PTG. Anxiety and depression were negatively predictive of PTG in an indirect manner with resilience as a mediator and the standardized estimate of path coefficient was $-0.223$ ( $P<.05$ ). The overall effect of anxiety and depression on PTG was $-0.321$ ( $P<.05$ ), and the direct effect was $-0.223$ ( $P<.05$ ),
Paredes, A. C., & Pereira, M. G. (2018)	The aims of this study were to analyze the relationship between spirituality, distress, posttraumatic growth and clinical variables, to analyze the disparity in psychological variables , and to determine the predictors of PTG.	Younger age ( $r = -.390$ , $p = .000$ ), disease recurrence( $r = .204$ , $p = .042$ ) and higher spirituality( $r = .411$ , $p = .000$ ) predicted higher PTG ( $F(5) = 10,27$ , $p = .000$ )
Villanova Quiroga, C., Bridi Dacroce, L. R., Rudnicki, T., & De Lima Argimon, I. I. (2020)	Assessing the effects of adaptive coping strategies, social support, and rumination on PTG in breast cancer patients	Adaptive strategies influence PTG, social support is an important influence but needs to be examined, and rumination is an influence but is not relevant to the data obtained from the researchers in this paper. Religion is an influential factor in PTG.
Danhauer, S. C., Case, L. D., Tedeschi, R., Russell, G., Vishnevsky, T., Triplett, K., Avis, N. E. (2013)	To understand the changes in PTGI scores over 24 months after breast cancer diagnosis and to understand the correlation between sociodemographic , disease/treatment, and psychosocial variables and PTGI, and whether there is an association between PTGI values and related variables at each time period.	PTGI scores increased over time and PTGI scores increased over 24 months in relation to sociodemographic, disease/treatment, and psychosocial variables, and positive PTGI values for each time period were associated with related variables, except for psychiatric variables.
Silva, S. M., Crespo, C., & Canavarro, M. C.	To study the effects of PTG and internal regulation in female breast cancer patients, as well as to understand the effects of	Adaptability had the greatest impact on breast cancer patients, anxiety was most pronounced in T1, type of surgery and conservative treatment for PTG patients' moderation was not found. personal resources and skills in T2, T1 by seeking social support and using cognitive

(2012)	regulation in patients undergoing surgery and conservative treatment. To examine the relationship between the moderators of patient coping (T1), PTG (T2), and psychological adjustment (T3).	strategies, and T3 by psychological quality of life and depression were associated.
Soo, H., & Sherman, K. A. (2015)	To analyze the role of resilience on the effect of anxiety and depression on PTG in breast cancer chemotherapy patients and to verify whether resilience is an influential factor between anxiety, depression and post-traumatic growth. Whether anxiety and depression have different effects on PTG at different levels of psychological resilience.	There is a negative correlation between anxiety, depression, and resilience, PTG, and a positive correlation between resilience and PTG. Whether or not resilience was an influential factor between anxiety, depression and post-traumatic growth, anxiety and depression indirectly negatively predicted resilience with PTG as a mediator. Resilience had a significant effect on anxiety, depression and PTG in breast cancer patients.
Hasson-Ohayon, I., Tuval-Mashiach, R., Goldzweig, G., Levi, R., Pizem, N., & Kaufman, B. (2016)	To study the effect of different relationship support on PTG in women with breast cancer.	Social support provided by family, friends, and belief systems was associated with PTG, independent of support provided by spouses.

**Table 6**

<b>Emotional and Mental</b>	Emotional attention	$\beta = 0.36, p = 0.003$
	Emotional clarity	$\beta = 0.32, p = 0.026$
	Emotional repair(1)	$\beta = 1.39, p = 0.000$

	Use of alcoholic beverage, spiritual change	$\beta = -0.91, p = 0.025$
<b>Coping strategies</b>	Positive Reevaluation	$\beta = 0.51, p < 0.001$
<b>Social support</b>	Having a husband/partner	$\beta = 0.22, p = 0.01$
	Cognitive support	$\beta = 0.35 p < 0.001$
	Friends support	$\beta = 0.32 p < 0.01$
	Belief-based support	$\beta = 0.35 p < 0.01$
	Religion	relationship with others ( $\beta = 0.22, p = 0.036$ ), personal strength ( $\beta = 0.20, p = 0.052$ )
<b>Rumination</b>	Intrusion	relating to others ( $\beta = 0.21 p < 0.05$ ), new possibilities ( $\beta = 0.47 p < 0.01$ )
	instrumentality	relating to others ( $\beta = 0.30 p < 0.01$ ), new possibilities ( $\beta = 0.30 p < 0.01$ ), personal strength and appreciation of life ( $\beta = 0.30, p < 0.01$ ), spiritual change ( $\beta = 0.18 p < 0.01$ ), appreciation of life ( $\beta = 0.34, p < 0.01$ )
	brooding	new possibilities ( $\beta = -0.25 p < 0.01$ ), spiritual change ( $\beta = -0.32 p < 0.05$ )

**Table 4**

<b>Authors</b>	<b>Title</b>	<b>Design</b>	<b>Participants</b>	<b>Data collection method(s)</b>	<b>Data analysis method(s)</b>
Rocío Guil , Paula Ruiz-González, Lucía Morales-Sánchez , Rocío Gómez-Molinero and Paloma Gil-Olarte ; 14 July 2022	Idiosyncratic Profile of Perceived Emotional Intelligence and Post-Traumatic Growth in Breast Cancer Survivors: Findings of a Multiple Mediation Model	cross-sectional, analytical, and ex post factor design	A total were 636 women; 56 breast cancer survivors were randomly selected who recruited from the oncology units of the reference hospitals of the province of Cadiz, Spain (Mage = 51.77) 580 disease-free women were randomly selected from a group of women from the province of Cadiz through social networks and the general population. (Mage = 40.40)	Post-traumatic growth inventory ((PTGI); Spanish version by Weiss & Berger ; five domains: relating to others, new possibilities, personal strength, spiritual change, and appreciation of life;21 items;A 5-point Likert scale, ranging from 0 (I did not experience this change as a result of my crisis) to 5 (I experienced this change to a very great degree as a result of my crisis). The scores range from 0 to 105, and higher scores indicate that a person perceived the development of greater PTG resulting from their traumatic experience; $\alpha = 0.90$	A one-way analysis of variance (ANOVA); Linear regression ; A serial multiple mediation ; A bootstrapping resampling method of 10.000 simulations.
Justyna Michalczyk , Joanna Dmochowska, Anna Aftyka and Joanna Milanowska 27May	Post-Traumatic Growth in Women with Breast Cancer: Intensity and	cross-sectional study	100 Amazon Club women with breast cancer throughout Poland, aged 31–80	Post-Traumatic Growth Inventory (PTGI); Authored by Tedeschi and Calhoun, adapted for the Polish context by Ogińska-Bulik and Juczyńska;	The mean level of PTG measured using the PTGI; The mean PTSD

2022	Predictorss		years, almost half of whom were aged 61–70 years	21 statements concerning positive changes resulting from a negative life event;four subscales: (1) Changes in self-perception ,changes in relating with others ,greater appreciation of life, and spiritual change;Each question has a 0-5 score to choose from, Choosing a higher score testifies to a greater intensity of the positive change ; Impact of Event Scale—Revised;developed by Weiss and Marmur , andadapted by Juczy ´nski and Ogi ´nska-Bulik; $\alpha = 0.93$ ;	level assessed using the IES-R; The mean resilience assessed using the KOP scale
Yaira Hamama-Raz, Ruth Pat-Horencz, Ilan Roziner, Shlomit Perry,Salomon M. Stemmer 2019	Can posttraumatic growth after breast cancer promote positive coping?—A cross-lagged study	A longitudinal study	198 breast cancer patients who were women with a first diagnosis of breast cancer with no other chronic illness, were Hebrew speaking, aged 25 to 75 years	Post-Traumatic Growth Inventory (PTGI); 21 items;self-rated on a 6-point Likert scale (0 = no change;5 = very large extent);The scores range from 0 to 105, and higher scores indicate that a person perceived the development of greater PTG resulting from their traumatic experience. $\alpha = 0.92$ ; .93; and .90 at wavesn T1, T3, and T5	Descriptive statistics (percentages, means, and standard deviations); Structural equation modeling; Mplus MLR estimator , chi-square calculation;
Linbo Lia, Yongchao Houa, Yongchao Houb, Fengying Kangc, Xueliang Wei 2020	The mediating and moderating roles of resilience in the relationship between anxiety, depression, And post-traumatic	An observational study; cross-sectional study	260 breast cancer patients undergoing chemotherapy in the department of breast and general surgery of a	Post –traumatic growth questionnaire; designed and developed by American psychologists Tedeschi and Calhoun in 1996; 21 items;5 dimensions: interpersonal relationship, new possibility, personal	Estimated values of model path coefficients and significance test ; Hierarchical regression and

	growth among breast cancer patients based on structural equation modeling An observational study		tertiary general hospital in Shanxi Province of China, who were age $\geq 18$ years old and know their own condition	power, mental changes and life enjoyment; Total score of 0 to 105 points, the higher the score, the higher the PTG level; Total Cronbach a coefficient of the questionnaire is 0.926, and the half-fold reliability is 0.900.	simple slope test.
Paredes, A. C., & Pereira, M. G. ,2018,Pereira	Spirituality, Distress and Posttraumatic Growth in Breast Cancer Patients	Quantitative study	100 women, aged between 25 and 78 years , diagnosed with breast cancer and undergoing chemotherapy Treatment, without severe psychiatric disturbances , recruited in an oncology unit at a hospital in the north of Portugal	Posttraumatic Growth Inventory; Tedeschi and Calhoun 1996; 21 items;6-point Likert scale ranging from 0 to 5 so that higher scores indicate greater PTG;four dimensions: Perception of Personal Resources and Abilities , New Possibilities and Life Appreciation , Strengthening of Social Relationships, Spiritual Development; $\alpha = 0.94$	Pearson correlation tests ; Mann–Whitney tests A hierarchical regression analysis model (enter method).
Carolina Villanova Quiroga; Luísa Raquel Bridi Dacroce; Tânia Rudnicki ; Irani Iracema de Lima Argimon. 2020.Brazilian	Posttraumatic growth and predictor variables in Brazilian women with breast cancer	exploratory study Quantitative study	Source of participants: Snowball sampling , assistance institutions for people with cancer Number: 92 people were collected in the first period and 7 people declined to participate in the second period, for a total of 84 people.	Snowball method Brazilian adaptation of the Posttraumatic Growth Inventory (PTGI) : Version: Translation of the Brazilian Portuguese version. Silva TLG, Donat JC, Gauer G, Kristensen CH .2016 Scale content: 21 item, 5 dimension Scoring method : adding up the total score Reliability coefficient of the scale : $\alpha = 0.90$ Reliability coefficients in this study : $\alpha =$	T-student test; Pearson correlations; Multiple Linear Regression.

			Age: women at least 18 years old or older	0.93	
Suzanne C. Danhauer, L. Douglas Case1, Richard Tedeschi , Greg Russell , Tanya Vishnevsky, Kelli Triplett. Edward H. Ip and Nancy E. Avis 2013.USA	Predictors of posttraumatic growth in women with breast cancer	Linear mixed effects models observational, longitudinal study  Quantitative study	Participant Source : at Memorial Sloan Kettering Cancer Center and the University of Texas Southwestern Center for Breast Care Number of people:653 Age : Median age was 54 years aged $\geq 18$ years newly	Posttraumatic Growth Inventory PTGI. Version : Tedeschi RG, Calhoun LG.1996. Scale content:21 item ,5 dimension Scoring method : adding up the total score Reliability coefficient of the scale : $\alpha = 0.90$ Reliability coefficients in this study : $\alpha = 0.91 \sim 0.93$	Linear mixed effects models; Both linear and quadratic terms; An unstructured covariance matrix .
Sónia Martins Silva a, Carla Crespo a & Maria Cristina Canavarro.2012,Coimbra , Portugal	Pathways for psychological adjustment in breast cancer: A longitudinal study on coping strategies and posttraumatic growth	A longitudinal study	Diagnosed with BC at the Gynaecology Department of Coimbra University Hospitals (CUH), Portugal. Number of people:50 Age:At least 18 years old,the average age is 52.1 years	The Posttraumatic Growth Inventory (PTGI). Version: Tedeschi & Calhoun, 1996;The Portuguese version of PTGI (Silva, Moreira, Pinto, & Canavarro, 2009)Scale content:4dimension Scoring method : adding up the total score Reliability coefficient of the scale : $\alpha = 0.81 \sim 0.87$ Reliability coefficients in this study : $\alpha = 0.77 \sim 0.90$	MANOVAs; ANOVAs; Univariate tests; Bonferroni tests; correlation analyses;simple mediation analyses.
Soo, H., & Sherman, K. A. ,2015	Rumination, psychological distress and post-traumatic growth in	Quantitative study	Participants included 185 females (mean age 55.98 years, SD = 9.26, range 33–	Post –traumatic growth questionnaire. Version: Tedeschi RG, Calhoun LG.1996. Scale content: 21 item ,5 dimension Scoring method : adding up the total score	Pearson’ s correlations (continuous and ordinal

	women diagnosed with breast cancer.		77), diagnosed with primary breast cancer and able to complete an online English-language questionnaire	Reliability coefficients in this study : In the current study, high internal consistency was demonstrated for the subscales of relating to others (0.91), new possibilities (0.89), personal strength (0.86), spiritual change (0.74) and appreciation (0.86).	variables); Hierarchical regression
Hasson-Ohayon, I., Tuval-Mashiach, R., Goldzweig, G., Levi, R., Pizem, N., & Kaufman, B. (2016). Israel	The need for friendships and information: Dimensions of social support and posttraumatic growth among women with breast cancer	A cross-sectional design quantitative study	Participant Source: patient in a major public hospital located in central Israel  Number of people:80 Age: average age was 53.24 years and the average number of years of diagnosis was 5.79 years	Post –traumatic growth questionnaire. Version: Tedeschi RG, Calhoun LG.1996. Scale content: 21 item ,5 dimension Scoring method : adding up the total score Reliability coefficients in this study : $\alpha=0.54\sim0.89$	Pearson correlations; hierarchical regression analyses



