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Psychometric evaluation of the Simplified Chinese Version of the Posttraumatic Growth Inventory for assessing breast cancer survivors

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A B S T R A C T

Purpose: Due to the rapid increase in the number of breast cancer survivors in China, it is important to have a valid instrument to assess their posttraumatic growth. We carried out a study to validate the psychometric testing of the Simplified Chinese Version of the Posttraumatic Growth Inventory (PTGI-SC) in breast cancer survivors.

Methods and sample: A convenience sampling method was used to collect data from 1227 breast cancer survivors at eight tertiary hospitals and some anticancer groups in Beijing between April 2010 and April 2012. We tested the item discrimination, content validity, construct validity, and internal consistency of the PTGI-SC.

Key results: The difficulties of the items ranged from 0.432 to 0.737, and their discrimination correlation coefficients ranged from 0.324 to 0.721. The content validity index of the inventory was 0.98. Five factors were extracted using exploratory factor analysis, and their cumulative contribution was determined to be 68.3%. The results of the confirmatory factor analysis include $\chi^2/df = 3.912$, SRMR = 0.046, RMSEA = 0.055, IFI = 0.932, CFI = 0.932, and Cronbach's $\alpha = 0.90$.

Conclusion: The validity and reliability of the PTGI-SC support its use for evaluating Chinese breast cancer survivors. This reliable and valid inventory can be used in practice to measure PTG in breast cancer survivors and provide information about their psychological adjustment. It can also facilitate further psychological research among Chinese breast cancer survivors.

Introduction

Breast cancer is one of the most commonly diagnosed cancers worldwide. Its incidence has increased globally over the last few decades (Anderson and Jakesz, 2008; Porter, 2008), especially in Asian countries (Green and Raina, 2008). Although China is considered a low-incidence country, its average annual growth rate of breast cancer diagnosis is 3% (Xu, 2010). In developed areas of China, breast cancer has become the most common malignant tumor in women.

Breast cancer diagnosis and treatment have various physical and psychological impacts on women, including fatigue, sexual disorders, anxiety, depression, potential feelings of social isolation, and fear of cancer recurrence (Cordova and Andrykowski, 2003; Harrington et al., 2010; Wang, 2011). Tedeschi and Calhoun (1996) reported positive changes subsequent to stressful events or crises and coined the most widely used term – "posttraumatic growth (PTG) " – which is considered to be the "positive psychological change experienced as a result of the struggle with highly challenging life circumstances" (Calhoun and Tedeschi, 1999). To quantify PTG, Tedeschi and Calhoun (1996) developed the posttraumatic growth inventory (PTGI), which consists of five factors that are widely accepted to be personal strength, new possibilities, relating to others, appreciation of life, and spiritual change. It was reported that PTG was common among breast cancer survivors, whose PTGI scores have been reported to range from 47 to 73 (Manne et al., 2004; Sears et al., 2003; Weiss, 2004).

As one of the most popular quantitative measurements of PTG, the PTGI has been examined with regard to its factor structure in many different people (Ho et al., 2004; Jaarsma et al., 2006; Joseph

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et al., 2004; Levine et al., 2008; Powell et al., 2003; Sears et al., 2003; Taku et al., 2008). Levine et al. (2008) recommended a two-factor model based on their investigation of 4054 Israeli adolescents who had been exposed to terror. Powell et al. (2003) employed a three-factor model to assess former refugees and displaced individuals, which consisted of "changes in perception of self," "changes in interpersonal relationships," and "changes in philosophy of life." Over the last few years, some authors (Linley et al., 2007; Taku et al., 2008) have reported results that support the use of a five-factor model in people who have experienced a range of adverse life events and consider a PTGI to be a meaningful way to understand PTG. In 2004, one study (Ho et al., 2004) translated the English version of the PTGI into traditional Chinese (PTGI-C) and studied a four-factor PTGI model in adult cancer survivors in Hong Kong. We believe that there are only two articles relating to a psychometric evaluation of the PTGI in breast cancer survivors. One of these studies was conducted in the United States by Sears et al. (2003), who used the PTGI in early-stage breast cancer survivors and explored a single factor for the scale; the other was conducted in Canada (Brunet et al., 2010) and assessed five factors.

To date, most of the studies conducted on PTGI factor structure have assessed samples gathered from survivors following a variety of traumatic events (Ho et al., 2004; Jaarsma et al., 2006; Levine et al., 2008; Linley et al., 2007; Taku et al., 2008). This limits the interpretation of these findings to particular groups of people. Despite the prevalence of breast cancer worldwide, few studies in the international literature (Brunet et al., 2010; Sears et al., 2003) have examined PTGI factor structure when assessing breast cancer survivors, and there are no existing studies on PTGI factor structure and breast cancer survivors in China.

This study attempted to determine the psychometric characteristics, especially the factor structure, of Chinese breast cancer survivors using the simplified Chinese version of the PTGI (PTGI-SC) to provide a valid instrument to assess PTG in breast cancer survivors on the Chinese mainland.

Methods

Sample

We used a descriptive research design with convenience sampling to collect the data. The inclusive criteria for breast cancer survivors were: (1) ≥18 years of age, (2) no prior psychiatric history, (3) confirmed histopathological diagnosis of breast cancer, and (4) had undergone breast cancer surgery.

Procedure

The study was conducted at the breast cancer departments of eight tertiary hospitals and some anticancer groups in Beijing, China, between April 2010 and April 2012. All investigators received communication skills training and were instructed how to administer the scale. In total, 1253 breast cancer survivors were enrolled. After providing informed consent, all participants answered the written questionnaire and returned it to the hospital, whereupon researchers checked the completeness of the questionnaires. Twenty-six incomplete datasets were excluded from the analysis. Subsequently, 1227 patients were included, to give an overall response rate of 97.9%.

Instrument

The version of the PTGI, developed by Tedeschi and Calhoun, consists of 21 items and five factors: relating to others (seven items), new possibilities (five items), personal strength (four items), appreciation of life (three items), and spiritual change (two items). The answers are rated from 0 to 5 (where 0 indicates "I did not experience this change as a result of my crisis" and 5 indicates "I experienced this change to a very great degree as a result of my crisis"). In the study by Tedeschi and Calhoun (1996), the PTGI demonstrated both good internal reliability ($\alpha = 0.90$) and test–retest reliability (0.71) over a 2-month period.

A simplified Chinese version of the posttraumatic growth inventory (PTGI-SC) was translated, modified, and validated. This was based on the original English version developed in 1996 by Tedeschi and Calhoun and the Hong Kong Chinese version (PTGI-C) translated in 2004 by Ho. Two bilingual nursing experts independently translated and back-translated the original English PTGI to develop the original Chinese mainland version, which was then compared with the Hong Kong (HK) version; items that were consistent with the HK version were retained, while the inconsistent items were modified. Next, the PTGI-SC was preliminarily evaluated by seven breast cancer survivors with differing educational levels and three nursing experts in a tertiary Beijing hospital. They identified questions that were not clearly expressed or that did not fit with Chinese idiomatic expressions. Finally, 21 items from the original English and HK versions of the PTGI-SC were left unchanged from the original English and HK versions, while 4 items were modified (items 1, 3, 5, and 21) from the PTGI-C (Liu et al., 2014).

Five experts (including one scale development expert and four expert cancer care nurses) were invited to assess the content validity of the PTGI-SC. They were asked to rate how adequately the items matched the PTG domain using the following four-point scale: (1) irrelevant, (2) somewhat relevant, (3) very relevant (relevant but needs minor alteration), or (4) very relevant and succinct. We used the content validity index (CVI) (Lynn, 1986) to determine the content validity of the PTGI-SC. The CVI was computed by summing the percentage of agreement between all items that were given a rating of 3 or 4 by the experts. Our calculations indicated that the CVI of this scale was 0.980.

Statistical analyses

Data were input using EpiData 3.0 software. After systematic logic error detection, the database was imported into an SPSS 16.0 software system. First, item analysis was used to confirm discrimination between each item. Generally, we consider that the difficulty of each item should have a value close to 0.5, which indicates that it is a more reliable and distinct item. Lord reported that additional choices lower the true difficulty values for each item (Lord, 1952). The PTGI-SC, which has six choices for each item, should have a true difficulty value of 0.5–0.7. Next, the factor structure of the PTGI-SC was determined using exploratory factor analysis. We used analysis of moment structures (AMOS, version 17.0) to conduct the confirmatory factor analysis (CFA, i.e., maximum likelihood) to verify the fitness of the hypothesized model and the data of the 1227 breast cancer survivors. The model's goodness-of-fit was assessed using χ^2/degrees of freedom (df), standardized root mean squared residual (SRMR), root mean square error of approximation (RMSEA), goodness-of-fit index (GFI), adjusted goodness-of-fit index (AGFI), comparative fit index (CFI), Tucker–Lewis index (TLI), normed fit index (NFI), and incremental fit index (IFI). The ideal value of χ^2/df is < 2 (Kit-Tai et al., 2004); however, this value is sensitive to the sample size (Marsh and Balla, 1988). Therefore, an χ^2/df value between 2 and 5 is generally acceptable (Jöreskog and Sörbom, 2006). SRMR values $\leq$0.08 and RMSEA values $\leq$0.06 (Hu and Bentler, 1999; Thompson, 2004) generally indicate reasonable model fit. GFI, AGFI, NFI, IFI, TLI, and