



The mediating role of resilience in the relationship between social support and posttraumatic growth among colorectal cancer survivors with permanent intestinal ostomies: A structural equation model analysis

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ABSTRACT

Purpose: Information on posttraumatic growth (PTG) among colorectal cancer (CRC) survivors with permanent intestinal ostomies is limited. The aim of this cross-sectional study was to investigate the occurrence of PTG among CRC survivors with permanent intestinal ostomies and its association with perceived social support and resilience.

Methods: This study was conducted with 164 CRC survivors with permanent intestinal ostomies at least one month after surgery. Participants completed questionnaires assessing socio-demographic and clinical characteristics, perceived social support, resilience and PTG.

Results: The mean total score on the Post Traumatic Growth Inventory was 66.74 (SD = 13.99). Perceived social support ($r = 0.450$) and resilience ($r = 0.545$) were significantly positively correlated with PTG. Structural equation modeling analysis showed that resilience mediated the relationship between perceived social support and PTG in which the indirect effect of perceived social support on PTG through resilience was 0.203 ($P < 0.001$).

Conclusions: Moderate to high PTG was found in CRC survivors with permanent intestinal ostomies. The most important implication of this study was that improving social support and resilience might be scientific intervention strategies for promoting PTG among CRC survivors.

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1. Introduction

Colorectal cancer (CRC) is the third most common and leading cause of death from cancer worldwide (Siegel et al., 2013). Treatment approaches for CRC include surgery, radiation, and chemotherapy, and are usually accompanied by the placement of an intestinal ostomy, or stoma (Wendel et al., 2014), of which a permanent intestinal ostomy is the most frequently used (Krouse et al., 2009). A permanent intestinal ostomy is an intrusive surgical

operation, which unavoidably results in the absence of a significant body function (Sun et al., 2013) and a devastating alteration of body image (Sharpe et al., 2011). It may lead to negative changes among CRC survivors, including low self-esteem, social withdrawal, depression and even suicidal ideations (Ahwal et al., 2016; Chongpison et al., 2015; Hong et al., 2014). Although both CRC and a permanent intestinal ostomy are traumatic events (Koopman et al., 2002; Salsman et al., 2009), studies have found that a relatively large proportion of CRC survivors report positive changes in the context of their diseases (Hawkes et al., 2014; Jansen et al., 2011; Occhipinti et al., 2015; Salsman et al., 2009), such as posttraumatic growth (PTG) (Tedeschi and Calhoun, 2004). A result of the struggling with a traumatic event, PTG is defined as psychological growth beyond previous levels of functioning and an

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active change in one's capacity to deal with adverse events (Sumalla et al., 2008; Tedeschi and Calhoun, 2004). Even years after the cancer diagnosis and treatment, PTG may develop in several areas of life: relating to others, new possibilities, personal strength, spiritual change, and appreciation of life (Calhoun et al., 2006).

The social-cognitive processing model (Tedeschi and Calhoun, 2004) emphasizes the significance of cognitive processing in producing PTG, and the important role of social interactions in enhancing or hindering the cognitive adaptation processes. Some studies have found that social support, as a supportive social context and a key environmental resource (Calhoun and Tedeschi, 2004; Schaefer and Moos, 1992) can facilitate the successful confrontation of difficulties and cognitive adaptation processes when facing a cancer diagnosis, and thereby promote PTG (Morris and Shakespeare-Finch, 2011; Nenova et al., 2013; Scrignaro et al., 2011; Silva et al., 2012). However, social support is a complex multifaceted construct, and different types of social support yield different effects on PTG (Lepore and Revenson, 2007; Schroevers et al., 2010), which may be one of the reasons for the mixed results of correlations between social support and PTG (Prati and Pietrantonio, 2009; Sears et al., 2003; Weiss, 2004). Furthermore, to date, research has not yet tried to understand the relationship between perceived social support and PTG in CRC survivors with permanent intestinal ostomies. Therefore, more research is needed in the next step to understand the relationship between social support and PTG.

The existence of PTG in cancer survivors is well known, although less is known about why some cancer survivors experience more positive changes than others do. It believes that resilience is the main factor that accounts for the different perceptions found in patients about their PTG (Mancini and Bonanno, 2006). Resilience refers to the process of adapting well in the face of adversity, trauma, and even significant sources of threat (Norris et al., 2008; Southwick and Charney, 2012b). Resilient individuals are more likely to focus on positive emotions (Cohn et al., 2009), and exhibit cognitive flexibility (Southwick and Charney, 2012a) under stressful circumstances, which thereby help them maintain psychological adjustment to other challenging situations (Cohn et al., 2009; Manne et al., 2014). Recently, the comprehensive concept of resilience has been introduced to refer to protective attributes in an individual's adaptation to cancer (Gouzman et al., 2015). Studies have found that individuals with greater resilience manifest a better psychological state and quality of life (Molina et al., 2014; Rosenberg et al., 2015a; Wu et al., 2015), and previous research suggests resilience can have an effect on an individual's PTG (Gouzman et al., 2015; Tedeschi and McNally, 2011; Wilson et al., 2014). Additionally, social support, as an external resource has been found to have enhancing effects on resilience (Mo et al., 2014; Southwick and Charney, 2012b; Stewart and Yuen, 2011). Hence, based on previous studies, it can be deduced that resilience might mediate the relationship between social support and PTG.

Above all, the primary aim of this study was to test the direct and indirect effects of variables on PTG among CRC survivors with permanent intestinal ostomies. Based on previous research, it was hypothesized that a positive association would be found between perceived social support, resilience, and PTG. In addition, the mediation effect of resilience might exist between perceived social support and PTG. To the authors' knowledge, this is the first study that aimed to investigate the correlations between perceived social support, resilience, and PTG among CRC survivors with permanent intestinal ostomies. Furthermore, this study was designed to explore an important target of treatment to develop intervention that contributes to improving PTG.

2. Methods

2.1. Participants and procedures

This cross-sectional, observational study was conducted over a period of 2 years from 2014 to 2015 in Shandong Cancer Hospital & Institute, and was approved by the Ethics Committee at Shandong University. All CRC survivors with permanent ostomies who provided informed consent were enrolled from the colostomy outpatient clinic. The inclusion criteria were as follows: (1) age 18 or older; (2) diagnosed with CRC and treated with curative intent; (3) received surgery at least one month before the study; and (4) able to understand and answer the questionnaires; and (5) knew about their diagnosis of cancer. The exclusion criteria were as follows: (1) CRC patients in whom the stoma was reversed; and (2) severe mental illness or cognitive impairment that would impede their ability to complete the survey. The convenience sample, which consisted of 178 participants who meet the inclusion criteria, were invited to take part in this study. Participants were requested to independently finish the questionnaires at the hospital, which were collected by investigators on spot. Among them, 8 declined participation, 6 provided incomplete data, and finally 164 participants completed all the questionnaires.

2.2. Measures

The participants completed questionnaires on PTG (Post-traumatic Growth Inventory; PTGI), perceived social support (Perceived Social Support Scale; PSSS), and resilience (the 10-item Connor-Davidson Resilience Scale; CD-RISC10). Participants also completed a study-specific questionnaire on socio-demographic factors including age, gender, marital status, education, employment, and average monthly income. Clinical-related information including time since operation and complication were obtained from medical records.

The PTGI is a 21-item measure of posttraumatic growth, which has been validated in Chinese patients with cancer (Ho et al., 2004; Liu et al., 2015). It has five subscales: relating to others, new possibilities, personal strength, spiritual change, and appreciation of life. Participants responded on a 6-point degree-based ranging from scale was used with 0 (not at all) to 5 (very great degree of PTG). The total score ranges from 0 to 105. A higher score indicates a higher level of PTG [48]. In the current study, the PTGI had a Cronbach's alpha of 0.92.

A valid Chinese version of PSSS was used to assess individuals' perceived social support (Huang et al., 1996). The PSSS developed by Zimet et al. (Zimet et al., 1990) has 12 items; each item is rated on a 7-point Likert scale ranging from very strongly disagree (1) to very strongly agree (7). It contains three subscales: family support, friend support, and other support. The total score is the sum of all the items' points. A higher score indicates a higher level of perceived social support. The Cronbach's alpha coefficient of the PSSS was 0.94 in this study.

The 10-item CD-RISC (Campbell-Sills and Stein, 2007) is a 5-point frequency-based rating scale, ranging from 0 (not true at all) to 4 (true nearly all the time), which has a single dimension in the original version. The final score on the questionnaire is the sum of the each item's points (range 0–40). Higher total scores indicate higher resilience. It had good internal consistency and was validated in Chinese (Wang et al., 2010). In the current study, the CD-RISC10 had a Cronbach's alpha of 0.93.

2.3. Statistical analysis

Data analyses were conducted using SPSS (version 22.0) and

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