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Factors Influencing Posttraumatic Growth in Mothers of Children With Cancer

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Abstract

The psychological adaptation of mothers of children with cancer has a significant impact on the management of the disease. As the mothers' psychological adaptation and positive emotions have an impact on the psychological adaptation of the children, it is important to facilitate the positive growth of the mothers during their adjustment to their children's illness. Therefore, it is necessary to determine the factors that influence posttraumatic growth (PTG) in these mothers. This research aimed to test the variables of PTG based on an existing theoretical model of PTG in mothers of children with cancer. Data were collected, using self-report questionnaires, from 222 mothers of children with cancer who visited an outpatient clinic between August 9 and September 17, 2013. The variables of optimism, disruption of core beliefs, social support, and deliberate rumination accounted for 41.4% of the variance in the mothers' PTG. Social support and deliberate rumination are important factors directly affecting PTG in mothers of children with cancer.

Keywords

child, oncology, mothers, posttraumatic growth

In 2010, cancer was the leading cause of disease-related death in children, and an average of 138.3 per million children were diagnosed with cancer in South Korea; moreover, the number of cases has been increasing annually (Korean Central Cancer Registry, 2012).

When a child is diagnosed with cancer, parents often experience uncertainty, anxiety, and depression (Vrijmoet-Wiersma et al., 2008). Moreover, the mothers, who usually care for the children, experience a high level of psychological distress and emotional disturbance; this stress, in turn, affects the emotional distress of the children and the care provided to them (Steele, Dreyer, & Phipps, 2004). However, severe psychological trauma does not always have negative repercussions. Posttraumatic growth (PTG), a positive change occurring as a result of dealing with adversity, has been reported in individuals after they experienced a diverse range of traumatic events (Tedeschi & Calhoun, 1996). Calhoun and Tedeschi (2006) proposed a PTG model to explain individuals' positive transformations as a result of coping with extremely stressful incidents. According to this model, experiencing a traumatic event disrupts individuals' cognitive system, restructuring their fundamental schemas so that they can create positive changes in their life by utilizing inherent personality traits and diverse resources. However, the specific components of the model have not been empirically tested in the context of childhood cancer. Therefore, based on Calhoun and Tedeschi's (2006) model, this research aimed to test the variables of PTG for mothers of children with cancer.

The following major variables were examined: optimism, which was defined as a universal sense of expectation that positive events are more likely to occur than are negative events (Scheier & Carver, 1992); disruption of core beliefs, which were defined as fundamental assumptions that people make about themselves and the world (Cann et al., 2010); social support, which was defined as the perception of the availability of support and assistance from others (Lin, Simeone, Ensel, & Kuo, 1979); and deliberate rumination, which was defined as purposeful repetitive thinking focused on struggling against painful events (Calhoun & Tedeschi, 2006).

The psychological adaptation and positive emotions of mothers of children with cancer have an effect on the psychological adaptation of the children (Sawyer, Streiner,

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Antoniou, Toogood, & Rice, 1998). Therefore, as mothers play a key role in their children's disease management, it is important for nurses to know the factors that facilitate PTG in mothers of children with cancer so that they can foster the development of these factors in the mothers. To better explain PTG in mothers of children with cancer, structural equation modeling was used to identify the direct and indirect effects of various predictor variables on PTG.

Theoretical Framework and Hypothetical Model

In Calhoun and Tedeschi's (2006) PTG model there exists the concept of person pretrauma, and in this model pretrauma personal traits include extroversion, openness to experience, optimism, resilience, hope, self-efficacy, and self-esteem (Calhoun & Tedeschi, 2006; Helgeson, Reynolds, & Tomich, 2006; Linley & Joseph, 2004). A meta-analysis of PTG revealed that optimism, among a range of personal traits, was associated with PTG (Prati & Pietrantoni, 2009). Optimism, because of its robust positive correlation with PTG as reported by numerous studies, was conceptualized as a pretrauma personal trait in this study. Individuals high in optimism experience a seismic event, in which the subjective interpretation of the recognition of the event as a life crisis is more important than the event itself (Calhoun & Tedeschi, 2006). Therefore, in this study, subjective awareness, rather than the traumatic event itself, was measured. As severe emotional stress can disrupt one's preexisting values, life goals, and belief systems, in the present study such challenges to preexisting beliefs were termed as disruption of core beliefs (Janoff-Bulman, 2006; Joseph & Linley, 2008). People who have experienced traumatic events have to deal with prolonged and extreme emotional stress and agony, which disrupts their assumptions about the world. Subsequently, they engage in rumination, wherein they recurrently think about the concerned traumatic event as well as other painful experiences. During this process, it is believed that appropriate self-disclosure (ie, sharing one's experiences with others) can enhance a sense of closeness with others, which in turn can lead to broadened and solidified cognitive processes related to the self-management of traumatic events. In the PTG model, rumination in the early stages of the aftermath of a traumatic event is said to be automatic and intrusive, whereas rumination in the later stages is more intentional. Deliberate rumination pertains to thinking carefully about the traumatic event, understanding one's experience of the event, and discovering the potential benefits or meaning gained from the experience (Taku, Cann, Tedeschi, & Calhoun, 2009). Finally, as PTG depends on how the intrusive rumination is converted into deliberate rumination, it is directly related to deliberate rumination. Therefore, intrusive rumination was excluded from the model and deliberate rumination was included in it. In addition, self-disclosure, which is related to intrusive rumination, was excluded from the hypothetical model.

Another aspect of Calhoun and Tedeschi's (2006) PTG model is sociocultural elements, which refers to individuals' relationships with others and is an expansion of the concept of social support in Tedeschi and Calhoun's (1996) model. Given that previous studies have shown that social support affects psychological growth (Hungerbuehler, Vollrath, & Landolt, 2011), social support was considered to represent sociocultural elements.

In summary, the hypothetical model included direct and indirect pathways through which optimism, disruption of core beliefs, social support, and deliberate rumination affect PTG (Figure 1).

Methods

Design

A descriptive cross-sectional design was used, and the study was conducted at a university hospital located in Seoul, Korea.

Subjects

The criteria for selecting the subjects were as follows: the mothers needed to have a child who had been diagnosed with cancer over 3 months before the study or, in cases where the child was being followed-up and monitored after treatment completion, who had discontinued treatment within the past 5 years.

Measures

Optimism. Optimism was measured using the Life Orientation Test–Revised, which was developed and revised by Scheier, Carver, and Bridges (1994) and later translated into Korean and validated by Shin (2005). This tool consists of 10 items that are rated on a 5-point Likert-type scale, ranging from 0 (*strongly disagree*) to 4 (*strongly agree*). The total score can range from 0 to 24, with higher scores indicating a stronger tendency to be optimistic. Optimism was considered to be a stable personal trait that is relatively constant; therefore, trait optimism was investigated before the traumatic event. Cronbach's α for this tool was .78 in the original study and .70 in the present study.

Disruption of Core Beliefs. Core beliefs were measured using the Core Beliefs Inventory developed by Cann

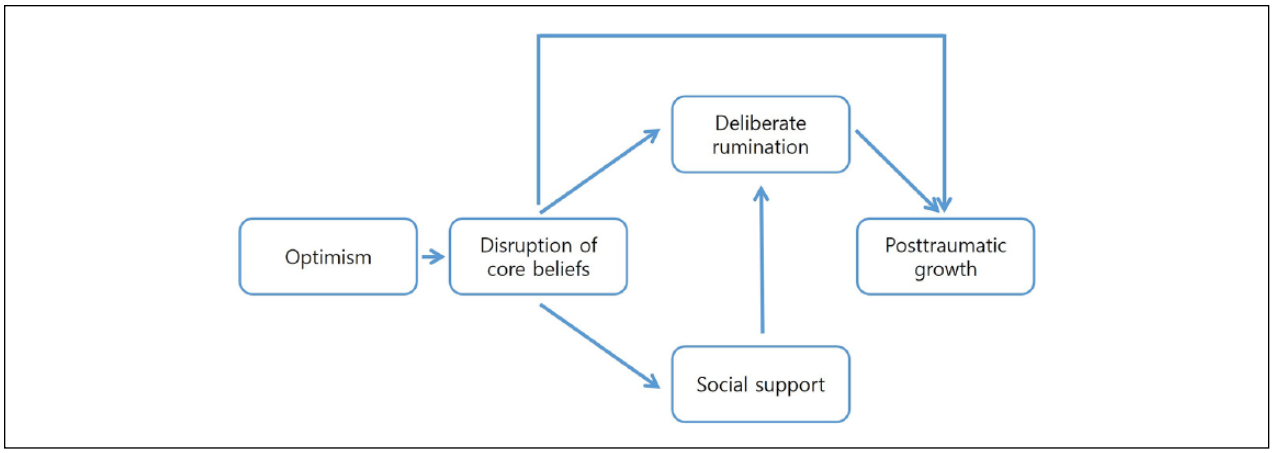

Figure 1. Conceptual framework.

et al. (2010), and translated into Korean and validated by Jo (2012). The tool consists of 9 items addressing the extent to which respondents reflect on their strengths and weaknesses, spiritual beliefs, human nature, the meaning of life, and relationships with others as a result of traumatic events. The subjects respond to items using a 6-point Likert-type scale, ranging from 0 (*strongly disagree*) to 5 (*strongly agree*), and the total score can range from 0 to 45. Higher scores are indicative of a greater disruption of core beliefs. Cronbach's α for this tool ranged from .82 to .89 in the original study and was .86 in the present study.

Social Support. Social support was measured using the Multidimensional Scale of Perceived Social Support developed by Zimet, Dahlem, Zimet, and Farley (1988) and translated into Korean and validated by Shin and Lee (1999). The scale consists of 12 items assessing the level of support received from family, friends, and significant others. The respondents respond to items using a 7-point Likert-type scale, and the total score can range from 12 to 84; higher scores are indicative of higher levels of perceived social support. *Significant others* were defined as mothers of other children with diseases. Cronbach's α for this tool was .83 in the original study and .91 in the present study.

Deliberate Rumination. Deliberate rumination was measured using the Event-Related Rumination Inventory developed by Cann et al. (2011) and translated and validated by Ahn, Joo, Min, and Sim (2013). The subjects respond to items using a 4-point Likert-type scale ranging from 0 (*strongly disagree*) to 3 (*strongly agree*). The total score can range from 0 to 30, where higher scores indicate greater deliberate rumination. Cronbach's α for the tool was .88 in the original study and .89 in the present study.

Posttraumatic Growth. PTG was measured using the Posttraumatic Growth Inventory (PTGI) developed by Tedeschi and Calhoun (1996) and translated into Korean and validated by Song, Lee, Park, and Kim (2009). The Korean version of the PTGI has a 6-point Likert-type scale and consists of 16 items distributed across the following 4 subscales: changes in self-awareness, increase in the depth of interpersonal relationships, discovery of new possibilities, and increase in religious/spiritual interest. The 6-point Likert-type scale ranges from 0 (*strongly disagree*) to 5 (*strongly agree*), and the total score can range from 0 to 80, with higher scores indicating greater growth. Cronbach's α for this tool was .92 in the original study and .92 in the present study.

Data Collection

A trained researcher collected data from mothers visiting the hospital for their children's consultations between August 9 and September 17, 2013. The researcher informed 270 mothers of children with cancer about the study, and out of these mothers, 230 completed the questionnaires. Thus, the response rate was 85.2%. Mothers' reasons for not participating in the study were the lack of time or lack of motivation to complete the questionnaire. The data of 8 subjects were excluded from the analyses because they had left certain items unanswered; thus, ultimately, the data of 222 subjects (82.2%) were included in the final analysis.

Ethical Considerations

To protect the subjects, the hospital's institutional review board (IRB No. H-1307-064-503, EU15-02) approved the study. The consent form for participation guaranteed subjects' anonymity and confidentiality and stated that

Table 1. Characteristics of the Subjects and Their Children.

Variables	Categories	n (%)
Mother's age (years)	20-29	8 (3.6)
Mean ± SD = 39.3 ± 5.97	30-39	109 (49.1)
	40-49	90 (40.5)
	≥50	15 (6.8)
Ethnicity	Korean	222 (100)
Marital status	Separated	0 (0)
	Married	222 (100)
	Divorced	0 (0)
Level of education	Middle school	3 (1.4)
	High school	85 (38.3)
	College and higher	134 (60.4)
Employment (full-time)	Employed	40 (18.0)
	Not employed	182 (82.0)
Religion	Have	150 (67.6)
	Not have	72 (32.4)
Child's age (years)	0-2	36 (16.2)
Mean ± SD = 8.4 ± 5.42	3-6	58 (26.1)
	7-12	67 (30.2)
	13-17	51 (23.0)
	18-23	10 (4.5)
Child's gender	Male	126 (56.8)
	Female	96 (43.2)
Child's age at diagnosis (years)	0-2	85 (38.3)
Mean ± SD = 5.3 ± 4.60	3-6	56 (25.2)
	7-12	63 (28.4)
	13-17	18 (8.1)
Diagnosis	Leukemia	86 (38.7)
	Brain tumor	36 (16.2)
	Neuroblastoma	24 (10.8)
	Malignant lymphoma	20 (9.0)
	Retinoblastoma	13 (5.9)
	Others	43 (19.4)
Duration of illness	3 months to 1 year	72 (32.4)
Mean ± SD = 2.7 ± 2.8	1-3 years	75 (33.8)
	3-5 years	47 (21.2)
	5-10 years	21 (9.5)
	≥10 years	7 (3.2)
Current treatment	On treatment	140 (63.1)
	Treatment terminated	82 (36.9)

participation could be discontinued at any time during questionnaire completion.

Data Analysis

The collected data were analyzed using the statistical software IBM SPSS version 20.0 and AMOS version 21.0. The normality of the sample distribution was confirmed through multivariate normality tests of means, standard deviations, skewness values, and kurtosis, using AMOS. The hypothetical model was validated by testing the goodness-of-fit, which was conducted using AMOS.

Results

Characteristics of the Subjects and Their Children

The average age of the mothers in this study was 39.3 (SD = 5.97) years. The majority of the women were between 30 and 39 years old (N = 109, 49.1%). All the subjects were Korean and were married. The average age of the children with cancer was 8.4 (SD = 5.42) years, and the majority of them were between 7 and 12 years old (30.2%; Table 1).

Table 2. Descriptive Statistics of the Measured Variables and Correlations.

Variables	Mean ± SD	Range	Optimism	Disruption of Core Beliefs	Social Support (Family)	Social Support (Friend)	Social Support (Significant Others)	Deliberate Rumination	PTG
Optimism	17.0 ± 3.28	8-24	1						
Disruption of Core Beliefs	27.3 ± 7.79	9-45	.299*	1					
Social Support (Family)	23.1 ± 4.81	6-28	.250*	.129	1				
Social Support (Friend)	20.4 ± 5.70	6-28	.348*	.133*	.654*	1			
Social Support (Significant Others)	20.4 ± 5.91	6-28	.195*	.266*	.316*	.397*	1		
Deliberate Rumination	20.8 ± 5.97	6-30	.088	.550*	.034	.006	.229*	1	
PTG	52.7 ± 14.60	14-80	.260*	.493*	.268*	.254*	.437*	.504*	1

Abbreviation: PTG, posttraumatic growth.
*Correlation is significant at the .05 level (2-tailed).

Table 3. Comparison of Model Fit for the Modified Model to the Hypothetical Model.

Model	χ^2 (*P*)	df	χ^2/df	GFI	AGFI	CFI	SRMR
Reference	(>.05)		<3	≥.9	≥.85	≥.9	<.10
Hypothetical	54.79 (<.001)	4	13.699	.907[a]	.649	.790	.108
Modified	22.19 (<.001)	3	7.396	.963[a]	.816	.921[a]	.077[a]

Abbreviations: GFI, goodness-of-fit index; AGFI, adjusted goodness-of-fit index; CFI, comparative fit index; SRMR, standardized root mean square residual.
[a]The goodness-of-fit indices met the appropriate levels.

Descriptive Statistics of the Measured Variables and Correlations

The descriptive statistics of the measured variables and the correlations are presented in Table 2. The *Z* scores for skewness and kurtosis were not greater than the critical value (±1.96) at a .05 level of significance for all variables; therefore, the assumption of normality was satisfied (Hair, Anderson, Tatham, & Black, 1998).

Validation of the Hypothetical Model

Goodness-of-Fit of the Hypothetical Model. The goodness-of-fit index (GFI) is recommended in various studies involving the evaluation of the fit of a model. Goodness-of-fit indices include χ^2 statistics, degrees of freedom, GFI, adjusted GFI (AGFI), comparative fit index (CFI), and standardized root mean square residual (SRMR). As χ^2 statistics are sensitive to sample number, the normed chi-square, which divides the χ^2 value by the degree of freedom, is recommend. A standard chi-square value of less than 2 or 3 is considered a good fit. The GFI is an absolute fit index, for which a value of 0.9 or above is considered a good fit. The AGFI adjusts the GFI value by taking into account the simplicity of the model and an AGFI value of 0.85 or higher is considered a good fit. The CFI is a type of relative fit index, where a value of 0.9 or higher is considered a good fit, whereas the SRMR is based on the standardized residual, where a value lower than 0.10 is considered a good fit. In accordance with the principles of structural equation modeling (Polit & Beck, 2012), the goodness-of-fit of the hypothetical and modified model of PTG of mothers of children with cancer was tested.

The GFI for this model only partially met the recommended levels; therefore, the model was revised by adding a direct path from social support to PTG, as this was determined to be valid using the modified index as a reference. The fit indices of the revised model were even closer to the recommended level; therefore, the revised model was accepted as more suitable than was the hypothetical model (Table 3).

The Estimated Parameters of the Modified Model. Of the 7 paths in the modified model, the following 6 were statistically significant: optimism to disruption of core beliefs

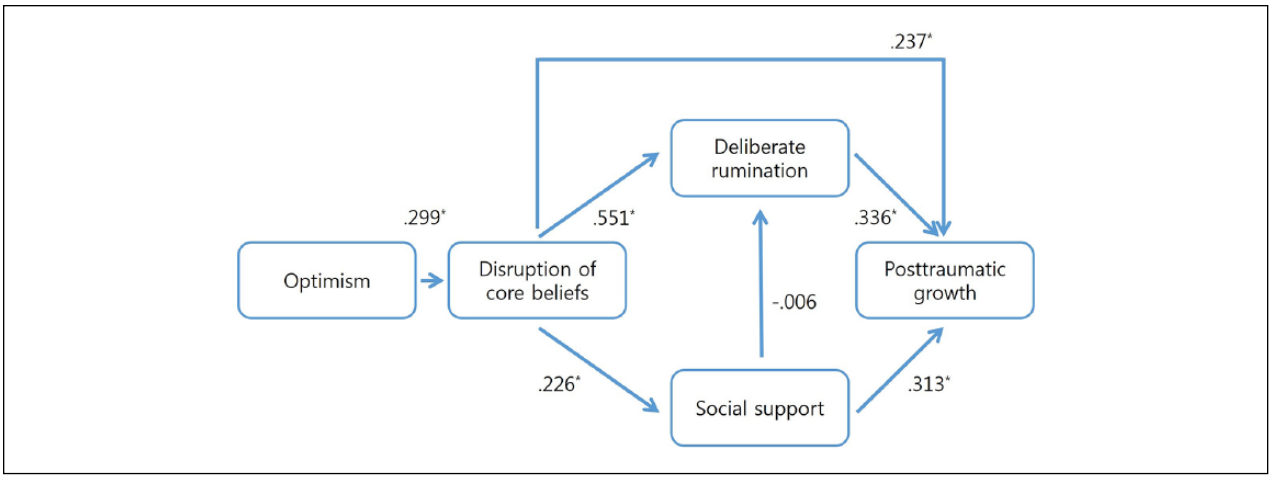

Figure 2. Coefficients for the modified model.

Table 4. Standardized Estimates and Standardized Direct, Indirect, and Total Effects for the Modified Model.

Independent Variable	Dependent Variable	Standardized Estimates (β)	*t* Value	SMC	Direct Effects (*P*)	Indirect Effects (*P*)	Total Effects (*P*)
Optimism	Disruption of core beliefs	.299	4.663*	.090	.299*		.299*
	Social support					.067*	.067*
	Deliberate rumination					.165*	.165*
	Posttraumatic growth					.148*	.148*
Disruption of core beliefs	Social support	.226	3.441*	.051	.226*		.226*
	Deliberate rumination	.551	9.563*	.303	.551*	−.001	.550*
	Posttraumatic growth	.237	3.774*	.414	.237*	.256*	.493*
Social support	Deliberate rumination	−.006	−.098		−.006		−.006
	Posttraumatic growth	.313	5.928*		.313*	−.002	.311*
Deliberate rumination	Posttraumatic growth	.336	5.453*		.336*		.336*

Abbreviation: SMC, squared multiple correlations.
*$P < .001$.

(β = .299, $t = 4.663$), disruption of core beliefs to social support (β = .226, $t = 3.441$), disruption of core beliefs to deliberate rumination (β = .551, $t = 9.563$), disruption of core beliefs to PTG (β = .237, $t = 3.774$), deliberate rumination to PTG (β = .336, $t = 5.453$), and social support to PTG (β = .313, $t = 5.928$; Figure 2). In total, 41.4% of the variance in PTG was explained by optimism, disruption of core beliefs, deliberate rumination, and social support (Table 4).

Analysis of the Effects of the Modified Model. Analysis of the direct, indirect, and total effects of the modified model revealed that the direct and total effects of optimism on disruption of core beliefs, as well as its indirect and total effects on social support, were significant. Additionally, the direct and total effects of disruption of core beliefs on social support were significant. The direct and total effects of optimism on deliberate rumination were also significant, as were the direct and total effects of disruption of core beliefs on deliberate rumination. The indirect and total effects of optimism on PTG were significant. In addition, the direct, indirect, and total effects of disruption of core beliefs on PTG were significant. The direct and total effects of deliberate rumination on PTG were significant, as were the direct and total effects of social support on PTG (Table 4).

Discussion

In this study, a model of PTG applicable to mothers of children with cancer was verified. The goodness-of-fit of the final model surpassed the recommended level and 41.4% of PTG was explained by the model's key concepts (ie, optimism, disruption of core beliefs, social support, and deliberate rumination). Social support strongly and directly affected PTG, which suggests that it is an

important contributor to PTG. From among the social support subscales, the highest score was obtained on family support, suggesting that family members are core sources of support for mothers of children with cancer. This result is in line with previous findings that the quality of family relationships plays an important role in the PTG of parents of children with type 1 diabetes mellitus and cancer (Hungerbuehler et al., 2011).

The families' secure everyday life disappeared, and was replaced by fear, chaos, and loneliness (Björk, Wiebe, & Hallström, 2005). Previous studies on PTG have reported that children with cancer and their parents experienced PTG in the midst of difficulties (Gunst, Kaatsch, & Goldbeck, 2016; Kremer, Schieber, Metzler, Schuster, & Erim, 2016; Tillery, Sharp, Okado, Long, & Phipps, 2016); they tried to find positive meaning, even stating that the illness was a teacher that guided them to look into themselves deeper and to view the world with a new sense of meaning (Duran, 2013). However, posttraumatic growth is not a universal experience. Estimates of the "prevalence" of growth that have relied on quantitative assessments noted the range to be from 3% to 100%; more commonly, however, the reported percentages of those who show PTG tend to range from a sizeable minority (eg, 30% to 40%) to the majority (eg, 60% to 80%) of persons who have struggled with trauma (Calhoun & Tedeschi, 2006). Furthermore, posttraumatic stress disorder (PTSD) or symptoms indicative of cancer-related PTSD were reported in 40% to 44% of parents of children with cancer (Fuemmeler, Mullins, & Marx, 2001; Landolt, Vollrath, Ribi, Gnehm, & Sennhauser, 2003), suggesting that parents' sharing of their children's battle with cancer is a severely traumatic experience (Vrijmoet-Wiersma et al., 2008). As such, PTG does not occur spontaneously with time.

Previous studies on PTG that is induced by childhood cancer can be largely divided into 2 types, namely, the PTG of the cancer survivors themselves and that of their parents. Regarding factors influencing PTG among cancer survivors, a study on childhood cancer, with adolescents and young adults as participants reported that actual age and fewer years off therapy, and being female and younger at diagnosis, were possible predictors of PTG (Tremolada, Bonichini, Basso, & Pillon, 2016). In another study conducted with young adult survivors of childhood cancer, higher PTG was observed in females, non-White survivors, and those diagnosed at older ages, and PTG was positively correlated with optimism and social support (Yi, Zebrack, Kim, & Cousino, 2015). A study with long-term survivors of adolescent cancer diagnosed 5 or more years before reported that PTG was positively correlated with fear of death, psychosocial support, and current symptoms of depression (Gunst et al., 2016). In yet another study conducted with childhood cancer survivors, high PTG was shown among female children who were older at diagnosis and had longer duration of treatment (Gianinazzi et al., 2016). Moreover, another study demonstrated that higher posttraumatic stress diagnosis showed lower PTG, and that the older ones' age and the shorter time since diagnosis were associated with greater PTG (Yi & Kim, 2014).

Regarding factors influencing parents' PTG, the parent–child relationship, use of coping strategies, life satisfaction, and time since diagnosis were reported to influence experiences after cancer diagnosis (Turner-Sack, Menna, Setchell, Maan, & Cataudella, 2016). Studies that have examined the long-term positive and negative psychological late effects on the parents of childhood cancer survivors have reported that the long-term late effects were associated with several factors, such as parents' poor adjustment to the child's cancer when it was first diagnosed and children's current poor adjustment (Ljungman et al., 2014), and that PTG was higher as the perceptions of treatment severity and life threat were stronger (Barakat, Alderfer, & Kazak, 2006). A study conducted with parents of children that underwent stem cell transplantation demonstrated that the differences between 2 groups that were high PTG versus high posttraumatic stress symptoms were attributable to the differences in perceived support, child's health problems, job stress, and partner-relationship satisfaction (Riva et al., 2014).

As such, factors affecting PTG are diverse. Whereas patients' sociodemographic and disease characteristics play a significant role in their PTG, factors contributing toward parents' PTG are diverse. Accordingly, it is necessary to investigate and identify the common factors, so as to empower patients appropriately, periodically assess posttraumatic stress symptoms and PTG, and provide them with support, including proper care and feedback (Kamibeppu et al., 2010; Yi et al., 2015). Therefore, to facilitate the growth of families of patients with cancer, nurses should encourage family members to support one another and programs supporting the families of patients with cancer should be developed and implemented.

Although social support plays an important role in PTG, unlike in Calhoun and Tedeschi's (2006) model, in the present study the path mediated by deliberate rumination was nonsignificant; only the direct path to PTG was significant. There are a few possible reasons for these findings. First, it may be worth considering the possibility that the nature of the trauma of having a child diagnosed with cancer influences the relationship between social support and deliberate rumination. Calhoun and Tedeschi (2006) claimed that people experiencing trauma gain emotional relief and comfort by self-disclosing their experiences, during which deliberate rumination is gradually refined via appropriate responses from others.

However, it is not easy for parents to discuss their experiences of having sick children, and they may not actively engage in deliberate rumination even with a high level of social support. This is in accordance with a report stating that interacting with individuals who have effectively overcome a particular difficulty was positively correlated with PTG (Weiss, 2004), and that a support system comprising relationships with other parents of children with chronic illness including cancer (Speechley & Noh, 1992) is important for PTG. Therefore, it is possible that because of these factors, there was no significant path from social support to deliberate rumination in this sample.

Second, it may also be considered that Calhoun and Tedeschi (2006) expanded the concept of relationship experiences with others to include sociocultural elements, which were simply referred to as social support in the previous model (Tedeschi & Calhoun, 1996). Thus, relationships, which include physical contact and routine meetings, as well as macroscopic aspects such as society, culture, and groups to which one belongs were added. In the present study, social support was specified only as the primary reference group. It is possible that not including an inclusive concept may have affected the paths from social support.

After social support, deliberate rumination had the second largest direct effect on PTG. Previous studies have shown that a higher frequency of deliberate rumination was correlated with higher PTG (Jo, 2012; Nishi, Matsuoka, & Kim, 2010; Taku, Calhoun, Cann, & Tedeschi, 2008). This suggests that a high frequency of deliberate rumination increases the likelihood that individuals' schemas will change in a positive way. According to the PTG model by Calhoun and Tedeschi (2006), deliberate rumination is strengthened by self-disclosure, which is in line with the present findings that the only category of social support that had a direct correlation with deliberate rumination was significant others (ie, mothers of ill children). This finding suggests that an intervention involving people who have experienced similar difficulties can be effective when dealing with mothers caring for a sick child.

Significant others were limited to include only mothers of ill children, based on cultural considerations, as in the Korean patriarchal culture fathers mainly support the family financially while mothers care for ill children. Therefore, in future studies, the scope of significant others would have to be expanded to include both parents, and the effect of significant others would have to be investigated in a broader context. Furthermore, disease type and duration (ie, chronic disease versus acute disease) of the child may have an effect on the rate of influence of the significant other, and additional studies would be needed to investigate this. In this study, subjects with a broad disease experience of 3 months to subjects who had been caring for a sick child for over 10 years postdiagnosis were included. Although PTG is thought to be achieved after a certain length of time posttrauma, there is no consistency with regard to the correlation between length of time posttrauma and PTG. Therefore, this research aimed to generate comprehensive results by including subjects who had cared for a sick child for a short or long period of time postdiagnosis. However, as this may serve as a limitation of the study, future studies investigating the correlation between time and growth from various aspects are needed.

There was a significant path from disruption of core beliefs to PTG as well as an indirect path through deliberate rumination, whereby greater disruption of core beliefs resulted in greater PTG. This suggests that although the disruption of core beliefs might seem negative and can induce psychological maladjustment, it can also serve as a starting point for PTG and act as a driving force for positive changes when managed appropriately.

The path from optimism to disruption of core beliefs was significant, indicating that the higher the optimism, the greater the disruption of core beliefs. Additionally, the indirect effect of optimism on PTG was significant, indicating that the higher the optimism, the higher the PTG. This result shows that although people who are optimistic about the future seem to experience a greater shock and their existing values appear to be challenged more when they encounter an unforeseen problem, their optimism can nevertheless ultimately act as a personal strength in overcoming the problem.

The overall results of the present study are of significance because not only did the study focus on the agony and difficulties experienced by mothers of children with cancer but it also furthered the understanding of positive aspects and provided a balanced perspective.

This study will not only help nurses understand that the adversity experienced by the mothers of children with cancer cause a sense of deficiency and loss but will also provide such mothers with the potential for psychological growth. Thus, when dealing with such mothers, it would be important to implement interventions designed to help them discover the positive aspects of their situations right from the time their children are diagnosed with the disease. Furthermore, the mothers' personal strength and intrinsic resources must be conserved and nurtured so that they are not overpowered by the trauma. Therefore, it is important for nurses to be involved right from the time children are diagnosed with cancer, and to create a supportive atmosphere, react sensitively to the emotions and psychological changes in the mothers of the sick children, and foster the development of mothers' PTG by encouraging them to express their emotions, feelings, conflicts, and the role changes they have been faced with.

The limitations of this study are as follows. First, because this study was conducted at just one university hospital in Korea, the results cannot be generalized to the entire Korean population. Second, it is possible that the pretrauma characteristics of the subjects could not be accurately assessed because they were investigated retrospectively. Third, because the model was tested with cross-sectional data, it was difficult to explain the context of the relevant variables (ie, relationships between the variables before and after diagnosis). Fourth, the definitions and measures that were used did not capture all the aspects of the model; specifically, intrusive rumination, self-disclosure, and distal sociocultural elements (eg, societal themes) were not measured. Therefore, caution must be taken when interpreting the results.

Conclusion

In the present study, based on Calhoun and Tedeschi's (2006) model, the variables of PTG were tested based on an existing theoretical model of PTG, on mothers of children with cancer. It is recommended that in the future the following types of studies be conducted: (*a*) a model construction study that includes various PTG-related concepts, (*b*) a longitudinal study that helps us gain a deeper understanding of the cognitive processes that are difficult to investigate using a cross-sectional design, (*c*) a study that considers social support to signify relationships with others as well as sociocultural elements including relationships with society and culture, and (*d*) a study that develops and verifies the effects of an intervention program designed to promote PTG.

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