

Post-traumatic Growth and Rumination Following a Cancer Diagnosis: The Moderating Roles of Psychological Distress and Emotional Regulation Strategies

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Backgrounds: Many studies have found that the concepts of intrusive rumination (IR) and deliberate rumination (DR) play significant roles in post-traumatic growth, and it is the change from intrusive to deliberate rumination that facilitates post-traumatic growth. However, most studies exploring the relationship between rumination and post-traumatic growth have utilized a cross-sectional methodology or individuals from natural disasters. Additionally, no empirical study has investigated the role of psychological distress and emotion regulation strategies in the revised model of post-traumatic growth. Therefore, this current research employed cancer outpatients as participants and a retrospective two-time-point approach to examine the process of violated core beliefs, two types of ruminative thoughts, and post-traumatic growth among cancer outpatients. Furthermore, the study explored whether psychological distress and emotion-regulation strategies may moderate the above relationship to expand the understanding of the cognitive process of post-traumatic growth. **Methods:** This study recruited 184 cancer outpatients diagnosed between six months and five years following their initial intensive treatment. Self-reported questionnaires were the major instruments used, and the moderator-mediator analysis was employed to examine the data. **Results:** The pathways of the sequential relationship between (1) initial IR and recent IR, and (2) initial IR and recent IR, as well as recent DR, can partially mediate the relationship between the destruction of core beliefs by the cancer diagnosis and the post-traumatic growth. Psychological distress positively moderated the relationship between initial IR and recent IR and subsequently impaired post-traumatic growth. The reappraisal strategy negatively moderated the relationship between initial IR and recent IR and then facilitated the subsequent post-traumatic growth. **Conclusions:** This current study found that IR and DR had a sequential mediating role in the association between the disruption of core beliefs and post-traumatic growth. It is also the first to demonstrate the moderating effect of psychological distress and emotion-regulation strategies on intrusive rumination at different time points, which then affects the post-traumatic growth among cancer patients.

Keywords: cancer, deliberate rumination, emotion-regulation strategies, intrusive rumination, post-traumatic growth, psychological distress

Extended Abstract

In their conceptualization of post-traumatic growth (PTG), Tedeschi and Calhoun (2004) asserted that positive changes in survivors are caused by a series of cognitive processes in the aftermath of traumatic events, rather than by the trauma itself. This conceptualization is the most commonly used model of PTG, and its proposal that rumination is essential to PTG is supported

by most studies (Greenberg, 1995; Hill & Watkins, 2017; Stockton et al., 2011). While these studies have consistently found that deliberate rumination (DR) is conducive to PTG, their results on the relationship between intrusive rumination (IR) and PTG have been relatively inconsistent (Greenberg, 1995; Hill & Watkins, 2017; Li, 2012). Moreover, only a few studies have

examined the relationship between the rumination process in general and PTG. In exploring how the rumination process influences the PTG of cancer patients, this study referred to the retrospective research design of Taku et al. (2009) and Wu et al. (2015). It measured the IR at the initial cancer stage and the IR and DR at the current cancer stage. Therefore, the first purpose of this study was to explore the serial mediating role of rumination, in the context of patients developing cancer, in the relationship between the violation of their core beliefs by cancer and their PTG. Accordingly, the first research question was as follows: How does the violation of core beliefs by cancer affect PTG through IR and DR?

Studies have also found that psychological distress affects individuals' thinking process repeatedly thinking and trying to understand the traumatic event and promote the emergence of DR (Calhoun et al., 2010). It has been found that IR after traumatic events may cause psychological distress and thus lead to significant cognitive dissonance when individuals repeatedly think about the traumatic clues, contributing to the emergence of DR (Zhou & Wu, 2016). The successful management of psychological distress has also been found to be a key factor affecting individuals' subsequent cognitive processing of trauma (Triplett et al., 2012). Therefore, the second purpose of this study was to explore the moderating role of psychological distress and emotional regulation strategies in the relationship between rumination and PTG. Accordingly, we put forward the following two research questions: Question 2. For the model involving the violation of core beliefs, rumination (IR and DR), and PTG after developing cancer, is the mediating effect of rumination on the relationship between the violation of core beliefs and PTG moderated by psychological distress? What is the effect of this moderation on the PTG model? Question 3. For the model involving the violation of core beliefs, rumination (IR and DR), and PTG after developing cancer, is the mediating effect of rumination on the relationship between the violation of core beliefs and PTG moderated by the two emotional regulation strategies of reappraisal and suppression? What is the effect of this moderation on the PTG model?

Methods

Participants and procedures

This study received approval from the institutional review board of a private hospital in northern Taiwan (IRB No.: 202000219B0). We recruited 243 cancer patients as participants, of which 184 completed the study. The final sample consisted of 140 men and 44 women, whose average age was 50.98 years and whose average time since diagnosis was 27.78 months.

Instruments

1. Belief Violation Questionnaire (BVQ; Su & Chen, 2014): This scale was used to evaluate the degree to which the participants' core beliefs were violated after they developed cancer. Cronbach's α was 0.91.
2. Event Related Rumination Inventory (ERRI; Cann et al., 2011): This scale was used to evaluate the participants' frequency of IR at the initial stage of cancer diagnosis and their frequency of IR and DR at the current stage. Cronbach's α s for initial IR, recent IR, and recent DR were 0.96, 0.96, and 0.94, respectively.
3. Post-Traumatic Growth Inventory-X (PTGI-X; Su, 2018): This scale was used to evaluate the participants' degree of PTG after receiving their cancer diagnosis and treatment. Cronbach's α was 0.97.
4. Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983): This scale was used to evaluate the psychological distress of the participants due to cancer diagnosis and treatment in the previous month. Cronbach's α was 0.85.
5. Emotional Regulation Questionnaire (ERQ; Gross & John, 2003): This scale was used to evaluate the frequency at which the participants adopted the strategies of reappraisal and suppression to regulate their emotions after cancer diagnosis and treatment. Cronbach's α of reappraisal and suppression internal consistency was 0.88 and 0.75, respectively.

Statistics

We used the PROCESS v3.5 software developed by Hayes (2012) to test our data for serial mediation and moderated mediation. We performed bootstrapping analyses with 5000 samples and 95% bias-corrected confidence intervals. If a mediation effect was found to be significant, we performed simple slope and pairwise contrast analyses of the proposed conditional indirect effects to determine the path of the mediation effect.

Results

Analysis of the serial mediation effect of rumination at the initial and current cancer stages on the relationship between the violation of core beliefs and PTG

The analysis results for serial mediation showed that after controlling for age, education level, monthly income, cancer stage, and time since cancer diagnosis, the violation of core beliefs directly affected PTG. As to the

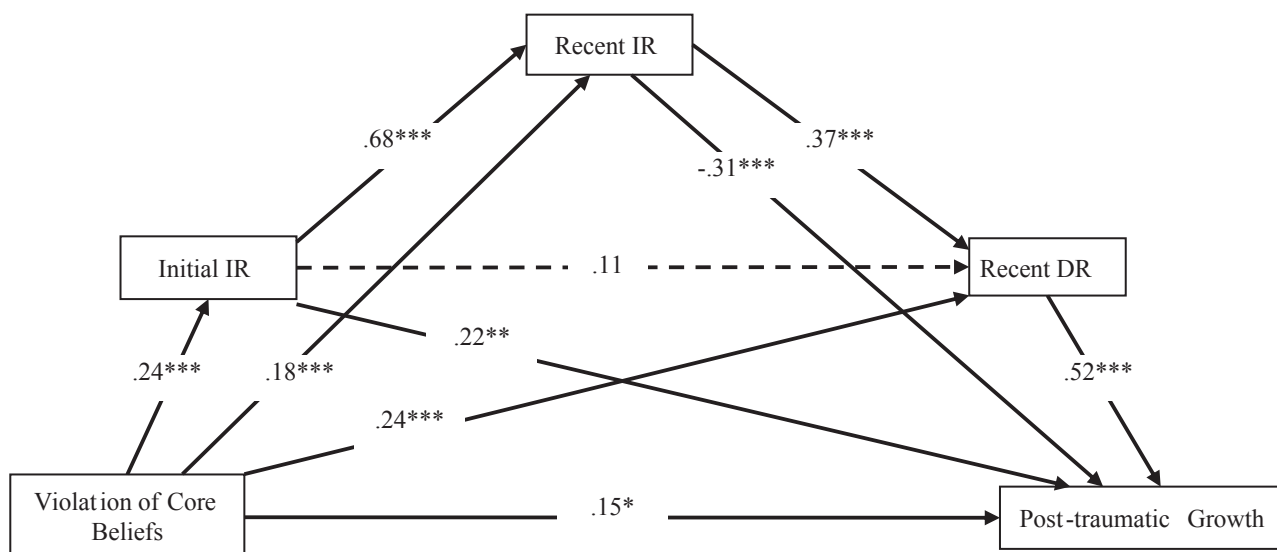
possible mediation pathways, Path 2, initial IR to recent DR, was not significant. In contrast, the bias-corrected confidence intervals of Path 1, initial IR to recent IR, and Path 3, initial IR to recent IR to recent DR, were significant at -0.01 to -0.02 and 0.01 to 0.07, respectively. These results indicate that Paths 1 and 3 had the effects of partial mediation or partial serial mediation (Figure 1).

Analysis of the moderated mediation effects of psychological distress and emotional regulation strategies on the rumination process in the PTG model

The moderating effects of psychological distress on initial IR to recent DR and recent IR to recent DR were not significant. Only that on initial IR to recent IR was significant, with the unstandardized interaction coefficient being 0.02 ($p < 0.001$). As shown in Figure 2, the higher the degree of psychological distress, the higher the correlation between initial IR and recent IR. The simple slope and pairwise contrast results showed that the

Figure 1

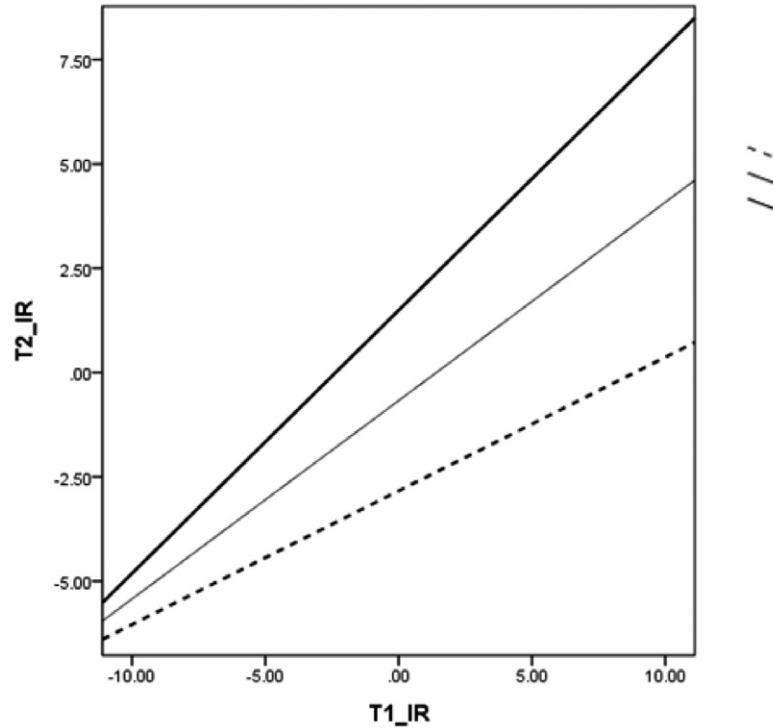
A serial mediation model of violation of core beliefs on posttraumatic growth: the core roles of initial IR, recent IR, and recent DR



Note. Age, education, income, stage, and time since diagnosis were controlled in this model; Standardized values were shown; Solid line represents a significant effect, while the luminous line represents an insignificant effect; IR: intrusive rumination; DR: deliberated rumination. * $p < .05$. ** $p < .01$. *** $p < .001$.

Figure 2

The moderating effect of psychological distress on the relationship between initial IR and recent IR



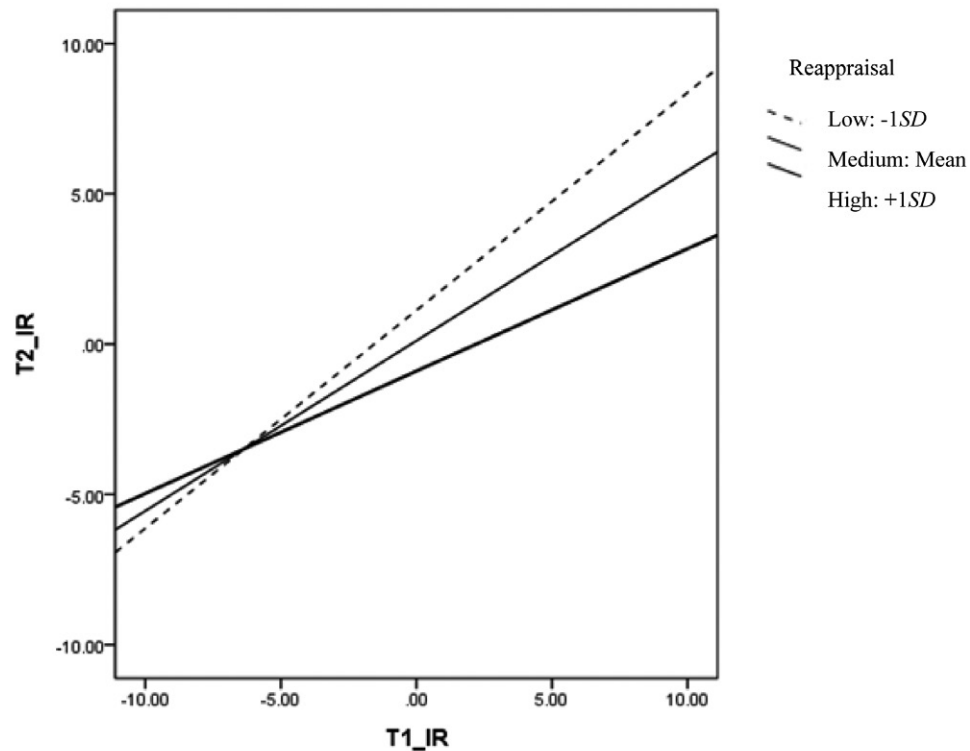
Note. T₁_IR: Initial Intrusive Rumination; T₂_IR: Recent Intrusive Rumination.

higher the degree of psychological distress after cancer diagnosis and treatment, the greater the hindering effect of the violation of core beliefs on PTG through initial IR à recent IR.

As to emotional regulation strategies, only the moderating effect of reappraisal on initial IR à recent IR was significant, with the unstandardized interaction coefficient being -0.02 ($p < 0.01$). In contrast, suppression did not have a significant moderating effect on any of the three paths. As shown in Figure 3, the higher the degree of reappraisal, the lower the correlation between initial IR and recent IR. The simple slope and pairwise contrast results showed that higher the degree of reappraisal after cancer diagnosis and treatment, the smaller the hindering effect of the violation of core beliefs on PTG through initial IR à recent IR.

Conclusions

The results of this study support the serial mediation effect of rumination at different cancer stages on the relationship between the violation of core beliefs and PTG. We found that IR at different stages predicted PTG in opposite directions. Specifically, when cancer violated the patient's core beliefs, initial IR was positively correlated with PTG, while recent IR was negatively related to PTG. However, when testing for serial mediation, we found that the initial IR à recent IR path had a negative effect on PTG, while initial IR à recent IR à recent DR promoted PTG. Although this result is not consistent with that of Wu et al. (2015), it is with that of Zhou and Wu (2016). As pointed out by Tedeschi and Calhoun (2004) and Taku et al. (2009), initial IR is an automatic response that generally appears after the individual experiences a major stress event. It can result in the individual's need for further cognitive processing

Figure 3*The moderating effect of reappraisal on the relationship between initial IR and recent IR*

Note. T₁_IR: Initial Intrusive Rumination; T₂_IR: Recent Intrusive Rumination.

of the event. IR generally occur after a traumatic event and it will last for a period of time (Lindstrom et al., 2013). Therefore, the presence of initial IR and recent IR may indicate that the individual needs to spend time processing their trauma in the PTG process. Our findings imply that the persistent presence of IR from initial cancer diagnosis to more recent stages may not be detrimental to PTG. Persistent IR may allow individuals to examine and reconstruct their cancer experience more deeply. Therefore, the results of this study suggest that IR and DR may play essential roles in the PTG model, and that the effectiveness of IR and DR on PTG should be understood by taking into account from the temporal relationship between the emergence of IR and DR. To fully account for the phenomenon of PTG after cancer diagnosis and treatment, it is necessary to investigate the temporal sequence relationship between IR and DR in addition to the degree to which the cancer experience violates the individual's core beliefs.

We also found that psychological distress and reappraisal had moderating effects on the mediating effect of initial IR → recent IR, in that they worsened and diminished the disadvantage of persistent IR on PTG, respectively. Therefore, the results of this study also suggest that these moderating effects should be taken into account in examinations of how to promote individuals' PTG after cancer diagnosis and treatment.

In conclusion, this study found that IR and DR had a serial mediating role in the association between the violation of core beliefs and PTG among cancer patients. It was also the first study to demonstrate the moderating effects of psychological distress and emotional regulation strategies on IR at different time points, which in turn affected PTG. Not only did this study examine the modified PTG model (Calhoun et al., 2010), but it also was the first study to support the importance of managing psychological distress in shaping the rumination process and thus PTG, as argued by Calhoun and Tedeschi (2013).

