

Function of Personal Growth Initiative on Posttraumatic Growth, Posttraumatic Stress, and Depression Over and Above Adaptive and Maladaptive Rumination

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Objectives: The current study examined whether various types of rumination are distinguishable and the effects of personal growth initiative (PGI) on posttraumatic growth, posttraumatic stress, and depression through adaptive and maladaptive rumination. **Method:** Sample included 292 college students who experienced a potentially traumatic event (PTE). **Results:** Intrusive and deliberative rumination were found to be distinct factors. However, brooding and reflection, thought to be separate aspects of depression, were a single factor. PGI was positively associated with growth and negatively associated with depression for both genders, and a negative relationship was found between PGI and posttraumatic stress among women. Indirect effects of PGI were found on posttraumatic stress and growth through different forms of rumination. These relations did not change after including the covariates (i.e., time since the trauma, direct exposure, and intentional harm). **Conclusion:** The study provides new insight integrating rumination from the depression literature in the context of trauma and a potential benefit in applying PGI in alleviating pathology after a PTE and facilitating growth. © 2016 Wiley Periodicals, Inc. *J. Clin. Psychol.* 73:1126–1145, 2017.

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After a potentially traumatic event (PTE), people often experience symptoms of both posttraumatic stress and depression (e.g., O'Donnell, Creamer, Pattison, & Atkin, 2004; Rytwinski, Scur, Feeny, & Youngstrom, 2013). A prevalence rate of posttraumatic stress disorder (PTSD) and major depressive disorder (MDD) after a PTE was approximately 5% to 30% and 10% to 30%, respectively (e.g., O'Donnell et al., 2004; Roussos et al., 2005; Shih, Schell, Hambarsoomian, Marshall, & Belzberg, 2010). Furthermore, a meta-analysis indicated that 52% of people with PTSD also had co-occurring MDD (Rytwinski et al., 2013).

One explanation of the high comorbidity of these disorders may be because of their common cognitive vulnerability (i.e., rumination), such as worrying about negative outcomes, losing control, or something going wrong (Mitchell, Capron, Raines, & Schmidt, 2014; Taylor et al., 2007). In fact, a study found that decreased cognitive concerns led to reduction of both PTSD and depressive symptoms, suggesting a presence of common cognitive factors (Mitchell et al., 2014). However, there are limited studies that examined potential protective factors after a PTE (Yuan et al., 2011), especially a construct, which is relatively easy to train during pretrauma. Identifying these constructs can be important so that individuals are able to develop skillsets, which can be useful when coping from a PTE.

In the current study, we examined the effect of personal growth initiative (PGI; Robitschek et al., 2012), which is a skill set for bringing about change in one's self through identifying areas

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to grow, developing realistic plans, using available resources, and implementing the action plan developed for personal growth. We assessed the indirect effect of PGI on posttraumatic reactions through various forms of rumination, including both adaptive and maladaptive. In addition, because studies have found gender differences on levels of rumination (Treyner, Gonzalez, & Nolen-Hoeksema, 2003) and posttraumatic reactions, such as posttraumatic stress (Tolin & Foa, 2008), posttraumatic growth (Vishnevsky, Cann, Calhoun, Tedeschi, & Demakis, 2010), and depression (Treyner et al., 2003), we also compared the means and the relations among these constructs between genders.

Tedeschi and Calhoun's (2004) posttraumatic growth model suggests that individual characteristics may play an important role when delineating posttraumatic reactions. In the current study, we focused on the effect of PGI. Past studies have found that people with high intent of personal growth were reported to have lower levels of depression and distress (Robitschek & Kashubeck, 1999). Although the application of PGI within the context of trauma is relatively recent, existing studies have shown promising results. Among a genocide-affected population in Rwanda, PGI was negatively related to posttraumatic stress and depression and served as a protective factor against functional impairment (Blackie, Jayawickreme, Forgeard, & Jayawickreme, 2015).

In addition, among college students who experienced a PTE, including military veterans, PGI was positively associated with posttraumatic growth (Borowa, Robitschek, Harmon, & Shigemoto, 2016; Shigemoto, Ashton, & Robitschek, 2016). However, studies have also found no significant relation between PGI and posttraumatic stress (Borowa et al., 2016; Shigemoto et al., 2016). Considering that people with high PGI have the cognitive ability to actively think about personal growth and can actively engage in the change process (Robitschek et al., 2012), they may be more motivated in intentionally coping with the event both cognitively and behaviorally. However, after a PTE, it is also important to select an appropriate coping method.

Role constraint theory (Rosario, Shinn, Mørch, & Huckabee, 1988) suggests that potential gender differences in coping can be explained by social roles and constraints associated with social roles. Researchers have hypothesized that because of the increased social roles women play (e.g., mother, student, worker, homemaker, and caregiver), needing them to flexibly adjust to these roles, they may be better able to navigate coping strategies compared to men (Cheng, Lau, & Chan, 2014). This can be critical considering that one coping strategy may be beneficial after a certain PTE, but it may be harmful after a different PTE (Carver & Connor-Smith, 2010). As a result, the effect of PGI may be stronger for women who may be better at selecting appropriate coping strategies compared to men leading to better recovery. However, to date, no studies have examined the moderating role of gender on the effect of PGI after a PTE; therefore, we did not make a specific hypothesis in how gender may play a role in this relationship.

In predicting indirect effects of PGI on posttraumatic reactions, recent research found that high PGI was associated with higher self-esteem and lower depression through commitment making and cognitive exploration, such as deciding and thinking of plans for the future (Luyckx & Robitschek, 2014). This suggests that people with high PGI may experience low depression through engaging in more constructive rumination and avoiding unproductive rumination. Similarly, people with high personal mastery, autonomy, and self-esteem are able to recognize growth (Aldwin, Sutton, & Lachman, 1996; Joseph & Linley, 2005), typically by engaging in constructive rumination (Cann et al., 2011; Tedeschi & Calhoun, 2004). Therefore, we also expected to find an indirect effect of PGI on posttraumatic growth through rumination.

Rumination

The influence of cognitive vulnerability in posttraumatic reactions (i.e., PTSD symptoms, posttraumatic growth, and depression) has been examined from various theoretical perspectives. For example, a cognitive model of PTSD (Ehlers & Clark, 2000) considers rumination to be a maladaptive form of cognitive processing, which maintains symptoms of PTSD through increased problematic appraisals. In a longitudinal research study with survivors of motor vehicle accidents, rumination was an important predictor of PTSD symptoms (Ehlers, Mayou, & Bryant, 1998).

Similarly, response styles theory (developed from the depression literature) proposes that repeated self-focused rumination in reaction to a depressive mood may increase negative mood and cognitions (Nolen-Hoeksema, 1991). In line with this theory, college students who engaged in more rumination showed longer lasting depressed mood (Nolen-Hoeksema, Morrow, & Fredrickson, 1993). A longitudinal study also found that higher rumination predicted subsequent symptoms of both PTSD and depression (Ehring, Frank, & Ehlers, 2008). This body of literature highlights the commonality of the negative influence of rumination on both posttraumatic stress and depression.

However, research has shown that not all rumination is negative (Watkins, 2008). In a post-traumatic growth model (Tedeschi & Calhoun, 1996), effortful cognitive thinking has been proposed to lead to psychological growth after a PTE. A study based on a posttraumatic growth model introduced two types of rumination: deliberate and intrusive rumination (Cann et al., 2011). Deliberate rumination is defined as purposeful thoughts focused on the struggle of the event, and intrusive rumination refers to automatic, negative, and unwanted thoughts of the event (Cann et al., 2011). Studies have found that deliberate rumination uniquely predicted posttraumatic growth and intrusive rumination uniquely predicted posttraumatic stress (e.g., Cann et al., 2011; Triplett, Tedeschi, Cann, Calhoun, & Reeve, 2012), suggesting the existence of both adaptive and maladaptive forms of rumination.

Within the depression literature, rumination is also thought to be a multidimensional construct, consisting of two factors: brooding and reflection (Schoofs, Hermans, & Raes, 2010; Treynor et al., 2003). Treynor et al. (2003) defined brooding as “a passive comparison of one’s current situation with some unachieved standard” (p. 256) and reflection as “a purposeful turning inward to engage in cognitive problem solving to alleviate one’s depressive symptoms” (p. 256). A positive association was found between brooding and depression, suggesting brooding may be maladaptive; greater reflection led to less depression, suggesting reflection may be beneficial (Treynor et al., 2003).

Intrusive and deliberate rumination are considered distinct from brooding and reflection. Brooding and reflection are conceptualized as trait-like thinking styles or personality characteristics (Nolen-Hoeksema & Davis, 1999), whereas intrusive and deliberate rumination are specific to a particular PTE (Cann et al., 2011). In the few studies in which these types of rumination were examined simultaneously, deliberate rumination was the only unique positive predictor and brooding the only unique negative predictor of posttraumatic growth (Cann et al., 2011; Stockton, Hunt, & Joseph, 2011). In predicting PTSD symptoms, only intrusive rumination was found to be a unique positive predictor (Cann et al., 2011). These findings suggest a protective effect of deliberate rumination and a harmful effect of brooding and intrusive rumination, highlighting the unique roles of rumination subtypes from both the trauma and depression literatures. However, these studies did not examine co-occurring depressive symptoms after the occurrence of a PTE. This will be an important extension in the current study, considering the high prevalence of comorbidity after a PTE (Rytwinski et al., 2013).

When considering the positive effects of reflection in the depression literature, it is surprising that none of the studies (e.g., Cann et al., 2011, Stockton et al., 2011) found a significant relation between reflection and either posttraumatic growth or posttraumatic stress. Researchers have indicated that when the level of depression becomes significant, it becomes difficult to distinguish between brooding and reflection (Joormann, Dkane, & Gotlib, 2006). In fact, factor analysis indicated that brooding and reflection were distinct constructs among people who were either formerly depressed or never depressed; however, the distinction between the two constructs was blurred among people who were currently depressed (Whitmer & Gotlib, 2011). Therefore, it would be important to examine whether people who experienced a PTE may not be able to discriminate between the constructs of brooding and reflection, similar to people who are currently depressed.

Role of Gender

Multiple studies reported gender differences in rumination: Women tended to engage in more brooding and reflection than men (Treynor et al., 2003). Although the research on gender

difference in intrusive and deliberate rumination is limited, researchers state that women may engage more in various types of rumination (Vishnevsky et al., 2010); therefore, we predicted that women will also report higher intrusive and deliberate rumination than men.

To date, no studies have examined the moderating role of gender between PGI and posttraumatic reactions. However, considering that women may cope differently than men (Rosario, Shinn, Mørch, & Huckabee, 1988), it is critical to examine whether the relationship between PGI and posttraumatic reactions may differ between genders. Specifically, if individuals do not select appropriate coping strategies after a PTE, even those with high PGI may experience higher posttraumatic stress and depression.

Variabilities in PTEs

Posttraumatic reactions may also differ depending on the type of PTE. However, because of an expected low base rate for some PTEs (e.g., abuse, rape, and crime), events were categorized following Frazier et al. (2009). First, PTEs were categorized by whether participants directly versus indirectly (e.g., by witnessing) experienced the event. In addition, the events were also classified depending on whether the event was intentionally or unintentionally caused. Frazier (2012) discussed the utility of distinguishing a PTE along these dimensions in terms of effect on the victims; direct exposure and intentional harm will yield higher PTSD symptoms compared to indirect exposure and unintentional traumatic events. Therefore, we took these two dimensions of PTEs into consideration as potential covariates.

In addition, time since the PTE may also influence the posttraumatic outcome. It may be normal to experience high symptoms of posttraumatic stress and depression immediately after the trauma, but people may experience a reduction in posttraumatic stress due to coping as the time passes. In fact, a meta-analytic review found that time since a PTE was a significant predictor of lower depression and higher positive affect (Helgeson, Reynolds, & Tomich, 2006). Therefore, we also included time since a PTE as a potential covariate.

Research Questions and Hypotheses

The purpose of our study was to examine whether different types of rumination from trauma and depression literatures are distinguishable and also examine the effect of PGI on posttraumatic reactions (i.e., posttraumatic growth, posttraumatic stress, and depression) through various types of rumination (i.e., intrusive and deliberate rumination, brooding, and reflection) between genders. We addressed the following research questions and hypotheses:

RQ1: Are the four types of rumination distinct from each other?

H1: Women will have higher levels of rumination and posttraumatic reactions (i.e., posttraumatic growth, posttraumatic stress, and depression) compared to men.

H2: PGI will positively associate with posttraumatic growth and negatively with depression through different types of rumination for both genders. However, the relation with posttraumatic stress was exploratory.

RQ2: How do the covariates (i.e., time since a PTE, direct exposure, and intentional harm) associate with posttraumatic reactions and rumination and influence the effect of PGI in both genders?

Method

Participants

Participants were 292 (44.9% men, 55.1% women) undergraduate students recruited from a general psychology course at a large, public Southwestern university. Participants' age ranged from 17 to 36 (mean [M] = 19.91, standard deviation [SD] = 2.41). Ethnicities of participants were reported as follows: 63.8% Caucasian, 15.0% Latino/Mexican American, 8.8% Biracial, 6.8% African American, and the remaining 5.6% included Arab Americans, Asian Americans, and Others.

Measures

Type of traumatic event. Participants were asked to select the most stressful event they experienced in the past 3 years. We derived the list of PTEs from Cann et al.'s (2011) study, which identified 12 traumatic events that college students may experience. The average months since participants experienced a PTE was 15.64 ($SD = 11.83$) for men and 14.43 ($SD = 11.10$) for women. Participants reported experiencing an unexpected or violent death of close other (30.6%), close other experiencing a serious medical problem (23.1%), personally experienced very serious medical problem (11.1%), accident leading to serious injury to you or close other (7.8%), victim of severe physical or sexual assault (4.6%), exposed to threat of death or serious bodily harm (3.3%), place of residence seriously damaged (2.3%), witnessed severe assault of close other (2.3%), intimate partner violence (2.0%), victim of crime such as robbery or mugging (2.0%), being stalked (1.0%), and others (7.5%).

Referring to the criteria used by Frazier et al. (2009), the following events were classified as a direct experience (24% for men, 28% for women): personally experienced very serious medical problem, victim of severe physical or sexual assault, exposed to threat of death or serious bodily harm, place of residence seriously damaged, intimate partner violence, victim of crime such as robbery or mugging, and being stalked. Likewise, the following events were classified as an indirect experience (56% for men, 60% for women): an unexpected or violent death of close other, close other experiencing a serious medical problem, witnessed severe assault of close other. However, because of lack of information, not all events were classified in these two categories.

In addition, a PTE was classified as intentionally perpetrated or not. The following events were considered to be intentionally perpetrated (5% for men, 12% for women): victim of severe physical or sexual assault, intimate partner violence, victim of crime such as robbery or mugging, and being stalked. Likewise, the following events were classified as events that were unintentionally perpetrated (31% for men, 39% for women): close other experiencing a serious medical problem and personally experienced very serious medical problem. However, because of a lack of information, not all events were classified in these two categories.

PGI. The Personal Growth Initiative Scale-II (PGIS-II; Robitschek et al., 2012) measures skills for positive personal change and has 16 items with four subscales: Readiness for Change (e.g., "I can tell when I am ready to make specific changes in myself"); Planfulness (e.g., "I set realistic goals for what I want to change about myself"); Using Resources (e.g., "I ask for help when I try to change myself"); and Intentional Behavior (e.g., "I take every opportunity to grow as it comes up"). Items are scored on a 6-point Likert scale, with response choices ranging from 0 (*disagree strongly*) to 5 (*agree strongly*). The overall score was calculated by averaging the subscale scores. Higher scores indicate higher levels of PGI. Overall Cronbach's alpha in this study was .92 for both men and women.

Depression. The Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977) assesses the presence and severity of depressive symptoms (e.g., "I felt depressed"). The scale has 20 items, with response choices ranging from 0 (*rarely or none of the time*) to 3 (*most or all of the time*). The overall score was calculated by adding item scores after reverse coding the appropriate items. Total scores range from 0 to 60, with higher scores indicating more depressive symptoms. In this study, Cronbach's alpha was .92 for men and .93 for women.

Posttraumatic growth. The Posttraumatic Growth Inventory (Tedeschi & Calhoun, 1996) assesses the experience of posttraumatic growth and has 21 items with five subscales: Relating to Others (e.g., "I more clearly see that I can count on people in times of trouble"); New Possibilities (e.g., "I developed new interests"); Personal Strength (e.g., "I have a greater feeling of self-reliance"); Spiritual Change (e.g., "I have a better understanding of spiritual matters"); and Appreciation of Life (e.g., "I changed my priorities about what is important in life"). Participants respond to each item on a 6-point 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 overall score was calculated by adding item scores. Total scores range from 0 to

105, with higher scores indicating more posttraumatic growth. Cronbach's alpha for this study was .96 for men and .95 for women.

Posttraumatic stress. The Impact of Event Scale – Revised (Weiss & Marmar, 1997) assesses posttraumatic stress and has three subscales: Intrusion (e.g., “Any reminder brought back feelings about it”); Avoidance (e.g., “I avoided letting myself get upset when I thought about it or was reminded of it”); and Hyperarousal (e.g., “I felt irritable and angry”). The scale has 22 items, with response choices ranging from 0 (*not at all*) to 4 (*extremely*). Participants responded to the questions referring to the most traumatic event they reported at the beginning of the measure. The score was calculated by averaging all items, and higher scores reflect higher levels of posttraumatic stress. For this study, Cronbach's alpha was .96 for both men and women.

Intrusive and deliberate rumination. The Event Related Rumination Inventory (Cann et al., 2011) assesses two factors of rumination: Intrusive (e.g., “I thought about the event when I did not mean to”) and Deliberate (e.g., “I thought about whether I could find meaning from my experience”). The scale has 10 items for each factor, and response choices range from 0 (*not at all*) to 3 (*often*). The score was calculated by averaging the items; higher scores indicate more rumination about a given event. Cronbach's alphas for intrusive rumination were .95 for men and .96 for women, and Cronbach's alphas for deliberate rumination were .94 for men and .92 for women.

Reflection and brooding. The revised version of Ruminative Responses Scale (RRS; Nolen-Hoeksema & Morrow, 1991; Treynor et al., 2003) was used to assess reflection (e.g., “Analyze recent events to try to understand why you are depressed”) and brooding (e.g., “What am I doing to deserve this?”). There are five items for each subscale. Participants respond to items on a 4-point Likert-type scale ranging from 1 (*almost never*) to 4 (*almost always*). Total score for each subscale ranges from 5 to 20, with higher scores reflecting more rumination. Cronbach's alphas for reflection in this study were .85 for men and .86 for women, and for brooding, they were .88 for men and .86 for women.

Procedures

Participants were recruited from a general psychology course at a large, public Southwestern university. Data were collected via an anonymous online self-report survey, for which participants received course credit. The screening criterion in the current study was experiencing a PTE in the past 3 years. Thirty participants did not complete the majority of the survey, and therefore, they were excluded from further analyses, resulting in a sample of 292 students. We were not able to calculate a response rate because we did not know how many individuals who were exposed to a PTE in the past 3 years saw our study and decided to not complete it.

Missing responses to survey items totaled .3% of all item responses in the six self-report measures. Missing data points were imputed using multiple imputation because it allows for the inclusion of all variables available for the calculations and provides a maximal amount of variance estimated for missing data points (see Schlomer, Bauman, & Card, 2010).

Results

Exploratory Factor Analysis

To examine the extent to which the participants evidenced distinct forms of rumination, for each gender group, we conducted an exploratory factor analysis (EFA) with oblique rotation. EFA was conducted because we were interested in understanding the latent constructs, and we used oblique rotation because the factors were assumed to be correlated with each other. Items measuring intrusive and deliberate rumination, brooding, and reflection were included in the analysis. EFA was conducted using IBM SPSS Statistics (version 23). All factor loadings for both men and women are shown in Table 1.

Table 1

Factor Loadings based on Exploratory Factor Analysis Among Items on Intrusive Rumination, Deliberate Rumination, Reflection, and Brooding

Items	Men			Women		
	IntRum	DelRum	Ref/Brood	IntRum	DelRum	Ref/Brood
ERRI-I 1	0.74	0.08	-0.02	0.83	-0.02	-0.06
ERRI-I 2	0.84	-0.05	-0.01	0.83	0.01	0.06
ERRI-I 3	0.84	-0.02	0.07	0.71	0.07	0.14
ERRI-I 4	0.79	-0.01	0.12	0.89	-0.05	0.02
ERRI-I 5	0.89	-0.06	0.04	0.87	0.01	0.04
ERRI-I 6	0.54	0.17	0.03	0.66	0.11	0.07
ERRI-I 7	0.62	0.18	-0.01	0.78	0.09	-0.03
ERRI-I 8	0.70	0.15	0.09	0.75	0.18	-0.01
ERRI-I 9	0.73	0.16	0.01	0.68	0.11	0.12
ERRI-I 10	0.80	0.10	-0.04	0.71	0.07	0.18
ERRI-D 1	0.06	0.79	-0.09	0.15	0.67	-0.09
ERRI-D 2	0.07	0.77	0.01	0.12	0.68	0.10
ERRI-D 3	-0.01	0.66	0.19	-0.04	0.74	0.02
ERRI-D 4	-0.03	0.89	-0.07	0.04	0.84	-0.05
ERRI-D 5	0.25	0.60	-0.08	0.22	0.49	0.21
ERRI-D 6	0.17	0.71	-0.01	0.19	0.49	0.09
ERRI-D 7	0.40	0.48	-0.06	0.16	0.53	0.25
ERRI-D 8	-0.06	0.77	0.15	-0.15	0.78	0.00
ERRI-D 9	0.09	0.65	0.13	0.07	0.70	0.06
ERRI-D 10	0.19	0.57	0.08	0.29	0.62	-0.11
RRS-R 7	0.04	0.09	0.73	0.15	0.07	0.64
RRS-R 11	-0.13	0.24	0.71	0.12	0.00	0.77
RRS-R 12	0.27	0.01	0.39	-0.10	0.16	0.47
RRS-R 20	0.04	0.09	0.63	-0.12	0.04	0.87
RRS-R 21	-0.03	0.23	0.64	-0.08	0.04	0.79
RRS-B 5	0.22	-0.11	0.69	0.14	-0.14	0.57
RRS-B 10	-0.09	0.06	0.80	-0.02	0.04	0.80
RRS-B 13	0.22	-0.12	0.50	0.18	-0.09	0.60
RRS-B 15	0.00	-0.11	0.81	0.12	-0.04	0.67
RRS-B 16	-0.01	-0.11	0.88	0.12	-0.07	0.74

Note. IntRum = Intrusive Rumination; DelRum = Deliberate Rumination; Ref/Brood = Reflection and Brooding combined; ERRI-I = Event Related Rumination Inventory- Intrusive; ERRI-D = Event Related Rumination Inventory- Deliberate; RRS-R = Ruminative Responses Scale- Reflection; RRS-B = Ruminative Responses Scale- Brooding.

Numbers next to the scale correspond with the item number used in the original scales. Bold font indicates loadings greater than .32.

For men, EFA retained three factors (i.e., intrusive rumination, deliberate rumination, and brooding/reflection) with eigenvalues over 1.0, which explained 64.20% of the total variance. The eigenvalues of the three factors were 13.35, 3.86, and 2.05, respectively. All factor loadings were above .38, indicating a unique contribution of each item on the latent constructs (Worthington & Whittaker, 2006). However, item 7 on deliberate rumination ("I thought about whether my relationships with others have changed following my experience") cross-loaded on both deliberate rumination (.48) and intrusive rumination (.40), which suggests that this item may not distinguish between these two factors well compared to the other items. However, considering that this item loaded higher on the deliberate rumination, which was consistent with the original scale, and the purpose of the current study was to compare gender differences, we included this item to calculate the overall score for deliberate rumination for men. Intrusive rumination was significantly associated with deliberate rumination ($r = .62$), and the combined reflection

and brooding was related to intrusive rumination and deliberate rumination ($r_s = .43$ and $.30$, respectively).

Similar results were found for women, whereby EFA retained three factors (i.e., intrusive rumination, deliberate rumination, and brooding/reflection) with eigenvalues over 1.0, which explained 64.30% of the total variance. The eigenvalues of the three factors were 13.83, 3.40, and 2.06, respectively. Although the fourth factor also had an eigenvalue of 1.05, there was a break in the size of eigenvalues using the scree plot, and the highest item loading on this fourth factor was .31, indicating that addition of this factor did not contribute substantially to understanding rumination. All factor loadings of the three-factor model were above .47, and the highest cross-loading was .29, indicating a unique contribution of each item on these three factors (Worthington & Whittaker, 2006). Intrusive rumination was significantly associated with deliberate rumination ($r = .54$), and the combined reflection and brooding was related to intrusive rumination and deliberate rumination ($r_s = .57$ and $.34$, respectively).

As a result, we combined the items from brooding and reflection by calculating the total item scores (range: 10 to 40) and examined three types of rumination in our model for both genders. Cronbach's alpha for combined brooding and reflection was .91 for men and .92 for women.

When conducting structural equation modeling, we followed the recommendation of Little, Cunningham, Shaher, and Widaman (2002; see also Little, Rhemtulla, Gibson, and Schoemann, 2013), creating "parcels" for unidimensional constructs, using the item-to-construct balance approach (i.e., building parcels by adding items from the highest loadings), to decrease the number of factor loadings to be estimated. Parcels were used to specify latent variables as opposed to using the individual scale items, given the number of constructs to be estimated. Specifically, parceling was conducted for measures assessing intrusive rumination, deliberate rumination, combined reflection and brooding, and depression. For multidimensional constructs (i.e., PGI, posttraumatic growth, and posttraumatic stress), subscales were used as indicators.

Preliminary Analyses

Bivariate correlations, means, and standard deviations for each gender are found in Table 2. For both genders, PGI was significantly and positively correlated with posttraumatic growth, and negatively correlated with reflection/brooding and depression. However, no significant relation was found between PGI and deliberate or intrusive rumination for both genders. For women, PGI was negatively related to posttraumatic stress. In addition, no significant relations were found between posttraumatic growth and all types of rumination among women, whereas they were all positively correlated among men. Last, all types of rumination were significantly positively correlated with each other, and there was also positive correlation between posttraumatic stress and depression for both genders.

Multigroup Structural Equation Modeling

Measurement model. The first model was a configural model in which both genders were included in a joint analysis but there were no equality constraints between the groups. Then a series of models with additional constraints were examined by assessing the model fit and the degree of decrement in model fit compared to the previous model. Interpretation of goodness of fit criteria was based on Hu and Bentler's (1999) joint criteria. In evaluating measurement invariance, the decrement in goodness of fit was assessed by comparing to the previous model. Specifically, a criterion of change in comparative fit index (ΔCFI) $< .01$ (Cheung & Rensvold, 2002) indicated there was not a significant decrease in the model fit. Multigroup structural equation modeling was performed with Mplus (version 7.4).

For the configural model, all factors were allowed to covary. The chi-square test produced a significant result, $\chi^2_{(462)} = 766.67, p < .001$. However, considering that chi-square test is sensitive to sample size, other fit indices were examined. They suggested good model fit: standardized root mean-square residual (SRMR) = .053, CFI = .955, and root mean square error of approximation (RMSEA) = .067, (90% confidence interval (CI) [.059, .076]). As a result, we proceeded to the next model (weak invariance), which added equality constraints between groups for the factor

Table 2
Correlations and Descriptive Statistics for Observed Variables for Men and Women

Measure	1	2	3	4	5	6	7	8	9	Men		Women	
										M	SD	M	SD
1. PGIS-II	—	.08	.05	-.25**	-.21*	-.26**	.29**	-.06	-.20*	3.67	0.70	3.76	0.69
2. ERI-D	.12	—	.71***	.40***	.46***	.29**	.55***	.35***	.28**	1.59	0.84	1.67	0.82
3. ERI-I	-.10	.66***	—	.50***	.51***	.42***	.46***	.57***	.36***	1.39	0.83	1.58	0.88
4. RRS-R&B	-.20*	.45***	.62***	—	.93***	.93***	.28**	.49***	.66***	20.41	7.02	20.38	7.56
5. RRS-R	-.16*	.45***	.58***	.95***	—	.74***	.27**	.46***	.58***	9.89	3.70	9.66	4.07
6. RRS-B	-.23**	.40***	.59***	.94***	.78***	—	.25**	.45***	.64***	10.53	3.83	10.72	3.95
7. PTGI	.37**	.40***	.05	-.02	-.01	-.04	—	.39***	.19*	51.73	27.06	57.86	25.31
8. IES-R	-.24**	.38***	.64***	.59***	.56***	.55***	-.04	—	.60***	1.19	0.94	1.16	0.92
9. CESD	-.29***	.28***	.53***	.71***	.63***	.70***	-.18*	.68***	—	17.12	11.91	16.42	12.23

Note. Correlations for men ($n = 131$) are above the diagonal, and correlations for women ($n = 161$) are below the diagonal. PGIS-II = Personal Growth Initiative Scale-II; ERI-D = Event Related Rumination Inventory- Deliberate; ERI-I = Event Related Rumination Inventory- Intrusive; RRS-R&B = Ruminative Responses Scale- Reflection and Brooding combined; RRS-R = Ruminative Responses Scale- Reflection; RRS-B = Ruminative Responses Scale- Brooding; PTGI = Posttraumatic Growth Inventory; IES-R = Impact of Event Scale- Revised; CESD = Center for Epidemiological Studies Depression Scale.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 3
Latent Means and Effect Sizes of the Mean Differences Between Genders

Measure	Latent means		Latent Cohen's <i>d</i>
	Men (<i>n</i> = 131)	Women (<i>n</i> = 161)	
PGIS-II	3.68	3.78	-0.15
ERRI-D	1.65	1.73	-0.11
ERRI-I	1.39	1.58	-0.22
RRS-R&B	2.11	2.07	0.05
PTGI	2.46	2.77	-0.27
IES-R	1.17	1.14	0.04
CESD	0.85	0.82	0.06

Note. Latent means for both genders are the average of item scales. PGIS-II = Personal Growth Initiative Scale-II; ERRI-D = Event Related Rumination Inventory- Deliberate; ERRI-I = Event Related Rumination Inventory- Intrusive; RRS-R&B = Ruminative Responses Scale- Reflection and Brooding combined; PTGI = Posttraumatic Growth Inventory; IES-R = Impact of Event Scale- Revised; CESD = Center for Epidemiological Studies Depression Scale.

loadings. The chi-square test produced a significant result, $\chi^2_{(479)} = 778.76, p < .001$. The chi-square difference test indicated no significant difference from the configural model, $\Delta\chi^2_{(17)} = 12.09, p = .795$. Other fit indices maintained good model fit with SRMR = .055, CFI = .956, and RMSEA = .065 (90% CI [.057, .074]). Compared to the configural model, $\Delta\text{CFI} = -.001$ and therefore, the model did not significantly change using the criterion of $\Delta\text{CFI} < .01$.

The next model (strong invariance) retained the constraints from the weak invariance model and added equality constraints between groups for item intercepts. The chi-square test was significant, $\chi^2_{(496)} = 808.57, p < .001$. The scaled chi-square difference test indicated significant difference from the weak invariance model, $\Delta\chi^2_{(17)} = 29.82, p = .028$. However, considering the sensitivity of sample size on a chi-square test, other fit indices were also taken into account. In the current model, SRMR = .057, CFI = .954, and RMSEA = .066 (90% CI [.057, .074]), all indicating a good model fit. When compared to the weak invariance model, $\Delta\text{CFI} = .002$, indicating no significant change in the strong invariance model. We accepted this model as fit indices were acceptable and there was no decrement in CFI of more than .01. This suggests that results are comparable among the groups and differences are not because of participants' response bias. The measurement portion of all subsequent models used the same restrictions from the strong invariance model.

Latent mean differences. We examined the latent mean differences between genders using the chi-squared difference test. Compared to the strong invariance model, the model with constrained latent means for posttraumatic growth reproduced a significant loss of model fit, $\Delta\chi^2_{(1)} = 4.16, p = .041$, and the model with constrained latent means for intrusive rumination approached significance, $\Delta\chi^2_{(1)} = 3.52, p = .061$. All latent means and Cohen's *d* are shown in Table 3. Women reported higher intrusive rumination and posttraumatic growth compared to men: The corresponding effect size differences (Cohen's *d*) were 0.22 and 0.27, respectively.

Structural model. Given that the measurement invariance was established between genders, regression paths were examined. Specifically, the effects of various types of rumination and PGI on posttraumatic reactions were examined for both genders. Although using chi-square difference test for measurement invariance may be too conservative, considering a number of parameters to be constrained and a sensitivity to sample size, when analyzing a structural model, all parameter estimates are now considered to be error-free and unbiased; therefore, we used a more statistically strict approach (i.e., chi-square difference test) to compare model fit (Little, Card, Slegers, & Ledford, 2007).

The unconstrained model, in which all paths were allowed to vary between gender, produced the following results: $\chi^2_{(496)} = 808.57, p < .001$; SRMR = .057; CFI = .954; RMSEA = .066, 90% CI [.057, .074]. In order to compare the gender difference, the unconstrained model (i.e., strong invariance model) was compared to the constrained model (with all regression paths set to equal across gender; $\chi^2_{(511)} = 839.14, p < .001$; SRMR = .083, CFI = .951; RMSEA = .066, 90% CI [.058, .074]. The chi-square difference test produced a significant difference between these models, $\Delta\chi^2_{(15)} = 30.56, p = .010$, indicating that there may be significant differences in the regression paths between genders.

To assess which regression paths could be fixed to zero to enhance parsimony or should be freely estimated between genders, we conducted a chi-square difference test. First, considering that previous studies have found no significant path from intrusive rumination to posttraumatic growth (Cann et al., 2011; Stockton et al., 2011), we fixed this path to zero and compared to the unconstrained model. This model, $\chi^2_{(498)} = 813.73, p < .001$; SRMR = .058; CFI = .953; RMSEA = .066, 90% CI [.058, .074], was not significantly different compared to the unconstrained model, $\Delta\chi^2_{(2)} = 5.16, p = .076$.

Similarly, for the same reason, we also fixed the path from deliberate rumination to posttraumatic stress to zero. The fit for this model, $\chi^2_{(498)} = 814.15, p < .001$; SRMR = .058; CFI = .953; RMSEA = .066, 90% CI [.058, .074], was also not significantly different from the unconstrained model, $\Delta\chi^2_{(2)} = 5.58, p = .061$. Furthermore, we examined whether other regression paths were able to be fixed at zero. A path from PGI to intrusive rumination was not statistically significant, and as a result, this path was fixed to zero for both genders. This model, $\chi^2_{(498)} = 810.92, p < .001$; SRMR = .061; CFI = .954; RMSEA = .066, 90% CI [.057, .074], was not significantly different from the unconstrained model, $\Delta\chi^2_{(2)} = 2.35, p = .309$. Also, a model in which a path from PGI to posttraumatic stress was fixed to zero for men, $\chi^2_{(497)} = 808.67, p < .001$; SRMR = .057; CFI = .954; RMSEA = .066, 90% CI [.057, .074], was also not significantly different from the unconstrained model, $\Delta\chi^2_{(1)} = 0.10, p = .754$.

We next examined regression paths, which may significantly improve model fit once the paths are freely estimated between genders. Compared to the constrained model, the model fit significantly improved, $\Delta\chi^2_{(1)} = 9.85, p = .002$, after freely estimating regression path from reflection/brooding to posttraumatic growth between genders, $\chi^2_{(510)} = 829.28, p < .001$; SRMR = .066; CFI = .953; RMSEA = .065, 90% CI [.057, .073]. Following these modifications, the final model produced the following results: $\chi^2_{(513)} = 832.72, p < .001$; SRMR = .066; CFI = .953; RMSEA = .065, 90% CI [.057, .073]. Compared to the unconstrained model, the chi-square difference test produced a nonsignificant difference between these models, $\Delta\chi^2_{(17)} = 24.15, p = .116$, indicating no significant drop in model fit.

All regression paths from this model are presented in Figure 1. For both genders, there were significant positive direct paths from PGI to posttraumatic growth ($B = .41$, standard error [SE] = .09, $p < .001$, for both genders) and deliberate rumination ($B = .59$, $SE = .09$, $p < .001$, for both genders). The relation from reflection/brooding to posttraumatic growth for men approached significance ($B = .20$, $SE = .11$, $p = .060$), and there was a significant negative relation for women ($B = -.19$, $SE = .09$, $p = .029$). Posttraumatic stress had positive direct paths from intrusive rumination ($B = .55$, $SE = .09$, $p < .001$, for both genders) and reflection/brooding ($B = .35$, $SE = .08$, $p < .001$, for both genders). There was also a significant negative relation from PGI to posttraumatic stress for women ($B = -.19$, $SE = .09$, $p = .019$), although this path was fixed to zero for men.

There were positive paths from intrusive rumination ($B = .21$, $SE = .10$, $p = .033$, for both genders) and reflection/brooding ($B = .95$, $SE = .13$, $p < .001$, for both genders) to depression and negative paths from PGI ($B = -.20$, $SE = .07$, $p = .004$, for both genders). A path from deliberate rumination to depression was at the borderline of statistical significance ($B = -.17$, $SE = .09$, $p = .050$, for both genders). R-squares for deliberate rumination, reflection/brooding, posttraumatic growth, posttraumatic stress, and depression in the final model were .02, .05, .41, .38, and .54 for men and .02, .04, .35, .52, and .65 for women, respectively. The regression path from PGI to intrusive rumination was fixed to zero; therefore, there were no variances explained for intrusive rumination in the current model.

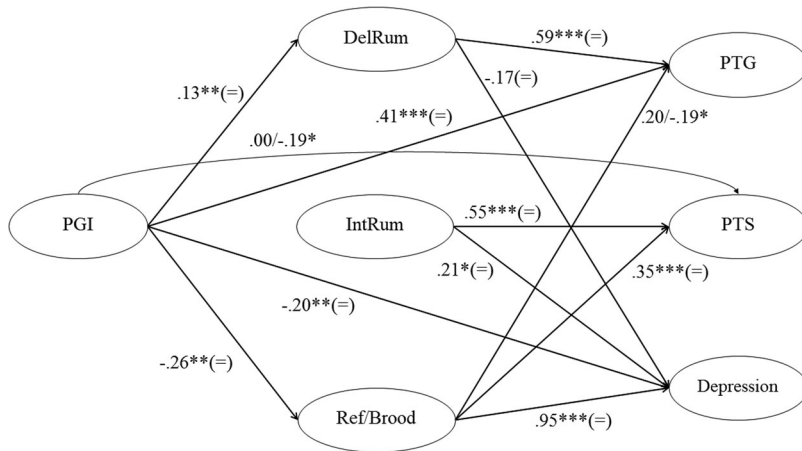


Figure 1. Final model before covariate controls (N = 292).

Note. Regression paths shown are unstandardized regression paths. Equal mark (=) represents that paths are constrained to be equal between genders. For paths, which are not constrained between genders, the first unstandardized regression coefficient is for men and the second unstandardized regression coefficient is for women. The regression paths that are not showed in the figure are fixed to zero for both genders, and the path PTS regressing on PGI is fixed to zero only for men. PGI = personal growth initiative; DelRum = deliberate rumination; IntRum = intrusive rumination; Ref/Brood = reflection and brooding combined; PTG = posttraumatic growth, PTS = posttraumatic stress. *** $p < .001$. ** $p < .01$. * $p < .05$.

Indirect effects. To examine indirect effects of PGI on posttraumatic outcomes through rumination, we used a bootstrap estimation approach with 1,000 samples. Considering that the relation between PGI and intrusive rumination was fixed to zero for both genders because they were not statistically significant, there was no indirect effect of intrusive rumination on PGI to posttraumatic responses. However, we left intrusive rumination in the model to examine a direct effect of PGI on posttraumatic reactions, controlling for different types of rumination. Results indicated a significant indirect coefficient ($B = .08$, 95% CI [.02, .16], $SE = .04$ for both genders) from PGI to posttraumatic growth through deliberate rumination for both genders. Significant indirect effect was also found from PGI to posttraumatic stress through reflection/brooding for both genders ($B = -.08$, 95% CI [-.15, -.03], $SE = .03$ for both genders). Last, there was a significant indirect effect of PGI on depression through reflection/brooding ($B = -.22$, 95% CI [-.38, -.09], $SE = .07$ for both genders).

Covariate effects. To examine the effect of potential covariates, we controlled the effect of the three covariates (i.e., time since the trauma, direct event (1 = direct exposure, 0 = indirect exposure), and intentional event (1 = intentional harm, 0 = unintentional harm) on the six endogenous variables (i.e., intrusive rumination, deliberate rumination, reflection/brooding, posttraumatic growth, posttraumatic stress, and depression). To compare the model with covariates with the baseline model (i.e., strong invariance model), we re-estimated the strong invariance model including the covariates. Fit indices for the strong invariance model with covariates were as follows: $\chi^2_{(598)} = 978.21$, $p < .001$; SRMR = .057; CFI = .945; RMSEA = .066, 90% CI [.058, .073]. Compared to the regression model with covariates, $\chi^2_{(615)} = 1011.60$, $p < .001$; SRMR = .066, CFI = .943; RMSEA = .066, 90% CI [.059, .074], the chi-square difference test produced a significant difference between these models ($\Delta\chi^2_{(17)} = 33.39$, $p = .010$), indicating a significant effect of the covariates on the endogenous variables.

In further inspection of the effect of the covariates, time since the trauma was negatively related to posttraumatic stress among women ($B = -.25$, $SE = .09$, $p = .004$). Directedness was positively related to reflection/brooding for men ($B = .28$, $SE = .13$, $p = .037$) and women ($B = .25$, $SE = .12$, $p = .049$). Intentionality was negatively related to intrusive rumination ($B = -.29$, $SE = .15$, $p = .049$) and reflection/brooding ($B = -.38$, $SE = .18$, $p = .031$) for men,

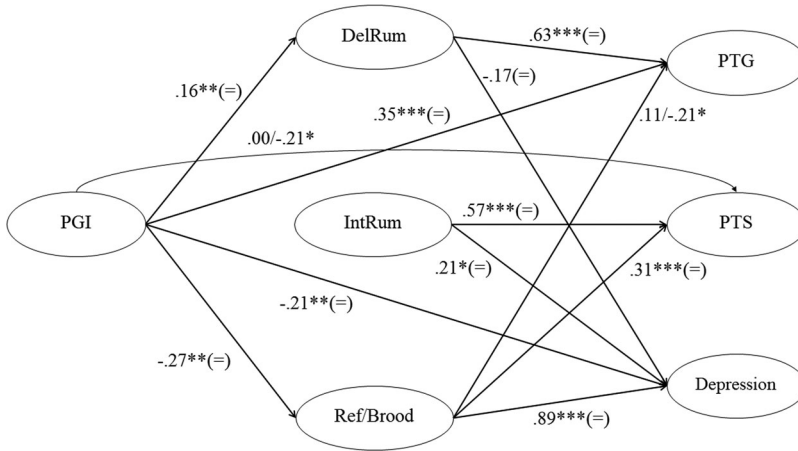


Figure 2. Final regression model after covariate controls (N = 292). Note. Regression paths shown are unstandardized regression paths. Equal mark (=) represents that paths are constrained to be equal between genders. For paths, which are not constrained between genders, the first unstandardized regression coefficient is for men and the second unstandardized regression coefficient is for women. The regression paths that are not showed in the figure are fixed to zero for both genders, and the path PTS regressing on PGI is fixed to zero only for men. PGI = personal growth initiative; DelRum = deliberate rumination; IntRum = intrusive rumination; Ref/Brood = reflection and brooding combined; PTG = posttraumatic growth, PTS = posttraumatic stress. *** $p < .001$. ** $p < .01$. * $p < .05$.

Table 4
Covariate Effects on Endogenous Variables in the Final Regression Model (Figure 2)

Construct	Men			Women		
	Time since trauma	Directedness	Intentionality	Time since trauma	Directedness	Intentionality
Intrusive rumination	.01	.04	-.29*	-.01	-.02	.31*
Deliberate rumination	.06	-.001	-.04	.05	.05	.18
Reflection/brooding	-.04	.28*	-.38*	.01	.25*	.20
Posttraumatic growth	.15	.07	-.27	-.09	.04	-.02
Posttraumatic stress	.06	.10	.09	-.25**	.09	-.06
Depression	< .001	.07	-.02	.08	-.02	-.06

** $p < .01$. * $p < .05$.

but intentionality was positively related to intrusive rumination ($B = .31, SE = .13, p = .016$) for women. However, the directions and the overall strengths of the regression paths and indirect effects after including covariates were the same compared to the model without covariates. The results of the regression model with covariates is shown in Figure 2, and the effect of covariates is presented in Table 4.

Discussion

The purpose of our study was to examine whether different types of rumination from trauma and depression literatures are distinguishable, as well as examining the effect of PGI on posttraumatic reactions (i.e., posttraumatic growth, posttraumatic stress, and depression) through various types of rumination (i.e., intrusive and deliberate rumination, brooding, and reflection) among male and female college students who experienced a PTE in the last 3 years. Regarding our first research question (RQ1), participants in the current study evidenced distinct intrusive and deliberative rumination, but indistinct reflection and brooding. This may suggest that those with

psychological diagnoses other than MDD may also have difficulty exhibiting distinct brooding and reflective factors (Whitmer & Gotlib, 2011). Perhaps, this may be one reason that past studies did not find a relation between reflection and both posttraumatic growth and posttraumatic stress when other types of ruminations were simultaneously included in the model (e.g., Cann et al., 2011; Stockton et al., 2011).

In addition, in the current study, reflection was positively correlated with posttraumatic stress and depression, and negatively correlated with PGI; therefore, it appeared to be qualitatively similar to brooding as originally defined by Treynor et al. (2003). After exposure to a traumatic situation, which involves continued efforts toward meaning making, the cognitive processes may not be linear but involve more complex change processes (Park, 2010). In these situations, using reflection (which involves active engagement specifically in cognitive problem solving) may be problematic and lead to negative consequences, thereby making it difficult to distinguish from brooding. Using the traditional cutoff score (16 or higher) of CES-D for clinical referral, 41.0% of women and 42.7% of men in the current sample scored at or above the cutoff score, which was comparable with other general college students (e.g., Radloff, 1991), indicating a unique cognitive processing after a PTE, which is distinct from depressive symptoms.

Our first hypothesis (H1), expecting women to report higher levels of rumination and posttraumatic reactions (i.e., posttraumatic growth, posttraumatic stress, and depression) than men was partially supported. Contrary to our hypotheses, no gender differences were found in deliberate rumination, reflection/brooding, posttraumatic stress, and depression. Small effect sizes were found between gender for posttraumatic growth and intrusive rumination, in which women tended to score higher than men. This was in line with past studies in which women scored higher on posttraumatic growth than men (Vishnevsky et al., 2010). One potential reason we did not find gender differences for reflection/brooding, posttraumatic stress, and depression may be that soon after a PTE, it may be natural to engage in various rumination and symptoms regardless of one's gender. Indeed, Cann et al. (2011) found that participants engaged in more rumination immediately after a PTE. Future studies should examine the changes in levels of rumination, posttraumatic stress, and depression as the time passes among men and women.

The second hypothesis (H2), in which PGI was hypothesized to positively associate with posttraumatic growth and negatively with depression through deliberate rumination, was supported for both genders. The positive relation between PGI and posttraumatic growth was in line with past studies (e.g., Blackie et al., 2015; Borowa et al., 2016; Shigemoto et al., 2016). However, because of the cross-sectional nature of the current study, we are not able to make causal inferences about a potentially important role of PGI after a PTE. As a result, future studies should examine whether PGI can enhance posttraumatic growth after a PTE both directly and indirectly through deliberate rumination. Considering that people with high PGI are able to act upon personal growth (Robitschek et al., 2012) as well as to engage in intentional and reflective coping strategies (Robitschek & Cook, 1999), it is expected that these people will be able to experience growth through productive thinking (i.e., deliberate rumination) and active coping (i.e., using resources and intentional behavior).

Last, although PGI and deliberate rumination predicted posttraumatic growth, the total variance explained for posttraumatic growth was less than 50% (41% for men and 35% for women). This indicates that there are other variables that may influence growth. Researchers have suggested that early successful coping may lead to later growth (Tedeschi & Calhoun, 2004). In fact, coping was a significant predictor of posttraumatic growth even after accounting for variables, such as social support, past trauma experience, loss of resources, health problems, gender, age, and education (He, Xu, & Wu, 2013; Sattler, Assanangkornchai, Moller, Kesavathana-Dohrs, & Graham, 2014).

In addition, PGI was found to protect against depression, which was in line with previous studies (e.g., Robitschek & Kashubeck, 1999). Furthermore, female students also reported less posttraumatic stress. These relations were also found by engaging in less reflection/brooding. These results imply that PGI may play an important role as a pretrauma characteristic, as implied in the posttraumatic growth model (Tedeschi & Calhoun, 1996). In other words, increasing PGI prior to a PTE may alleviate future posttraumatic stress and depressive symptoms and enhance posttraumatic growth. However, the finding that a negative relationship between PGI

and posttraumatic stress was found only among women may explain the previous mixed results, finding negative relation (e.g., Blackie et al., 2015) and no significant relation (Borowa et al., 2016; Shigemoto et al., 2016). This may be because of a moderating effect of gender, whereby combining genders may have eliminated the effect of PGI on posttraumatic stress among women.

The original authors of the PGIS-II reported that gender differences may not be found in the score for PGI, but the difference may be found in relation with the other constructs (e.g., men with higher PGI reported higher assertiveness and internal locus of control than women; Robitschek et al., 2012). This may indicate how people use PGI skill sets may differ between genders. In fact, researchers have found that PGI was more strongly related to emotion-focused coping for women than men, but they did not find a difference in relation between PGI and problem-focused coping between genders (Robitschek & Cook, 1999). This raises a point that women with higher PGI may be willing to use various coping strategies compared to men with higher PGI. However, no studies have examined the relation between PGI and coping strategies among participants who experienced a PTE; therefore, future studies should examine these relations.

Last, in examining our second research question (RQ2), we explored how time since a PTE and different types of a PTE influence the effect of PGI as well as how they relate with posttraumatic reactions and rumination. Significant associations were found between the covariates and rumination and posttraumatic reactions, but the effect of PGI on rumination and posttraumatic outcomes did not change even after including the covariates. This indicates that relation between PGI and posttraumatic reactions are independent of trauma characteristics. Although the effect of trauma characteristics between PGI and posttraumatic reactions is limited, a past study also found that people with higher psychological hardiness, which comprises commitment, control, and challenge dispositions, reported lower posttraumatic stress event, even after accounting for characteristics of the stressors (King, King, Fairbank, Keane, & Adams, 1998).

However, considering that our sample was limited to college students and types of a PTE were unbalanced, it is critical to examine whether the effect of PGI on posttraumatic reactions is independent of trauma characteristics with different samples. In addition, considering that the relations between PGI and posttraumatic reactions did not change after controlling for trauma characteristics, this raises an importance of considering the time passed since a PTE and types of a PTE to fully understand how people engage in different types of rumination and how people react after a PTE beyond the effect of PGI. Specifically, time since a PTE was negatively associated with posttraumatic stress among women, but no significant effects of time since a PTE were found for men. This was in line with the past meta-analytic review, finding reduced depression and greater positive affect as the time passed (Helgeson et al., 2006). However, because gender was not taken into account, further studies should examine the effect of time in recovery across genders.

In addition, for both genders, direct exposure was positively associated with increased reflection/brooding, but it was not associated with posttraumatic reactions. Although direct exposure has been argued to be more traumatic than indirect exposure (Frazier, 2012), studies have also shown a significant impact of repeated indirect exposure, such as through media, which can elicit significantly more posttraumatic stress than direct exposure (Holman, Garfin, & Silver, 2014). Considering that there was no significant relation between direct exposure and posttraumatic stress in the current study, it may be important to examine the amount of indirect exposure as well as the impact of direct exposure on one's level of brooding in addition to posttraumatic stress.

Additionally, intentionality of a PTE was positively related to intrusive rumination for women, but surprisingly for men, intentionality was negatively related to intrusive rumination and reflection/brooding. However, considering that close to 75% of participants in a study that found a positive relation between intentionality and both posttraumatic stress and depression were female college students (Frazier et al., 2009), there may be differences in how men and women respond after an intentional PTE. In other words, women may be more likely to engage in intrusive rumination after being exposed to intentional events, whereas among men, nonintentional events may trigger intrusive rumination. This increases an importance of examining how different genders influence various types of rumination after a PTE.

Limitations

There are some limitations to this study. First, although the prevalence rate of experiencing a PTE among college students was similar to the general population (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995), replication with diverse populations is recommended as children and elderly may react differently and there may be a different trend between gender for different age groups.

In addition, although PGI has been examined as a trait (e.g., Shigemoto et al., 2016; Weigold & Robitschek, 2011), this was a cross-sectional study; therefore, whether PGI facilitates posttraumatic growth and alleviates pathological symptoms, or whether individuals gain skills associated with PGI and be able to use adaptive rumination as they cope with trauma, is not clear. However, although we acknowledge that feedback loop from posttraumatic outcomes to PGI may exist—those who are able to cope better after a PTE may engage in increased activities associated with PGI as they feel more confident planning for personal growth and utilizing resources—we believe that the pretrauma PGI has a stronger influence on posttraumatic outcome than the increased PGI in posttrauma.

In using an analogy of sports, an individual may be more likely to be able to play beyond one's ability against an advanced player than playing against a player whose ability is below that of the individual. However, we believe that this growth is not significant compared to an individual's preexisting ability before the match. Third, although we statistically controlled for different dimensions of PTEs in our model, because of a lack of information about individuals' PTEs, not all PTEs were included as covariates in the model. As a result, the results after controlling for covariates may not be representative of the various PTEs.

Directions for Future Research

There are several suggestions for future research. The current study found that PGI was associated with less posttraumatic stress only among women. However, it is uncertain what factors may contribute to this relation. Considering a potential difference in how women and men may engage in various coping strategies (e.g., Robitschek & Cook, 1999), it will be important to examine the effect of gender on coping in relation to one's level of PGI. In addition, considering how women and men reacted differently after experiencing an intentional event, future studies should explore this relation with including a larger sample of people who experienced an intentionally perpetrated PTE. Last, studies should examine the effect of reflection in the aftermath of PTEs. Although people who used reflection in the current study also experienced increased posttraumatic stress and depression, it is possible that there is an aspect of reflection that may be beneficial as proposed by the original authors (Treynor et al., 2003).

Implications

Last, there are several clinical implications based on the current findings. Consistent with the previous studies (e.g., O'Donnell et al., 2004; Rytwinski et al., 2013), both posttraumatic stress and depression were prevalent after a PTE. This increases the importance for clinicians to assess for symptoms of posttraumatic stress and depression among college students after a PTE. In addition, although reflection was considered to be beneficial in alleviating symptoms of depression (Treynor et al., 2003), the current study suggests that analytical style of rumination may be harmful after a PTE. This was similar to people who are in a depressed state, in which reflection may not be beneficial (Whitmer & Gotlib, 2011).

This suggests that clinicians should carefully monitor clients' excessive reflection after a PTE considering researchers have indicated that self-reflection can elicit feelings of guilt or shame, which are associated with negative self-view and poor mental health (Leary, 2007; Tangney, Stuewig, & Mashek, 2007). Also, this may explain the effectiveness of prolonged exposure therapy in alleviating symptoms of posttraumatic stress and depression after a PTE through reducing negative cognition related to the PTE (Zalta et al., 2014). Also, researchers and clinicians using the reflection subscale of the RRS among trauma exposed samples should examine the factor

structure of the RRS beforehand and determine whether clients are able to distinguish reflection from brooding.

Last, considering the cross-sectional nature of the study, it would be critical to evaluate whether providing training to individuals pretrauma will facilitate coping during trauma. Specifically, utilizing an intervention aimed at teaching PGI skills, such as intentional growth training (IGT; Thoen & Robitschek, 2013), has been found to protect against depressive symptoms (Borowa et al., 2014; Harmon et al., 2014). However, because IGT has not been applied in the context of trauma, conducting these studies would provide clearer ideas regarding whether IGT may benefit people who are coping after a PTE.

Conclusion

This study offers new insight integrating rumination from both the depression and trauma literature and a potential benefit in applying PGI in alleviating pathology after a PTE and facilitating growth. Considering that reflection and brooding were not distinguishable, it appears important to assess what aspects of reflection can be harmful or beneficial after a PTE. In addition, the current finding provides potential application of PGI in the context of trauma, finding an indirect effect of PGI on posttraumatic growth through deliberate rumination and combined reflection and brooding, an indirect effect of PGI on posttraumatic stress through combined reflection and brooding, and an indirect effect of PGI on depression through deliberate rumination and combined reflection and brooding. Also, although this was the first study to examine gender differences in the effect of PGI on posttraumatic reactions, women had a direct negative relation between PGI and posttraumatic stress, suggesting that higher PGI is associated with less stress for women. This implies potential gender differences in how people utilize PGI skills after a PTE. Lastly, considering that all associations among PGI, rumination styles, and post-trauma outcomes did not change even after controlling for time since trauma, directedness, and intentionality, the effect of PGI may be independent of these trauma characteristics, highlighting the role of PGI after a PTE. However, considering the significant effects of trauma characteristics on post-trauma outcomes, it is critical to take these characteristics into consideration to alleviate pathology.

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