Exploring curvilinear effects and gender differences in posttraumatic growth and posttraumatic stress disorder symptoms in college students

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Exploring Curvilinear Effects and Gender Differences in Posttraumatic Growth and Posttraumatic Stress Disorder Symptoms in College Students

Abstract of

a thesis presented to the Faculty

of the University at Albany, State University of New York

in partial fulfillment of the requirements

for the degree of

Master of Arts

College of Arts & Sciences

Department of Psychology

Vivian S. Hwang
2011
Abstract

Posttraumatic growth following stressful and traumatic experiences has been associated with positive psychological and physical outcomes. In addition, distress-related variables, such as symptoms of posttraumatic stress disorder, have been related to growth. Some studies suggest that a curvilinear relation may exist between distress and growth, although literature in this area is sparse. This study examined how distress, as measured by the civilian version of the PTSD Checklist, and posttraumatic growth are related. Results demonstrated both linear and curvilinear effects of PTSD symptom severity on growth. Data for men were significantly explained by a linear effect only, whereas data for women were significantly explained by a curvilinear effect only. Study limitations and implications for further research are discussed.
Exploring Curvilinear Effects and Gender Differences in Posttraumatic Growth and Posttraumatic Stress Disorder Symptoms in College Students

A thesis presented to the Faculty of the University at Albany, State University of New York in partial fulfillment of the requirements for the degree of Master of Arts

College of Arts & Sciences
Department of Psychology

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Introduction

Research on the psychological aftermath of adverse events has predominantly focused on negative outcomes such as posttraumatic stress disorder (PTSD), depression, and anxiety. However, research focus has more recently shifted toward examining positive outcomes that occur in the wake of traumatic and stressful events. One direction researchers have taken has been in the area of posttraumatic growth (PTG), which is defined as “positive psychological change experienced as a result of the struggle with highly challenging life circumstances” (Tedeschi & Calhoun, 2004, p. 1). The term posttraumatic growth highlights the process by which individuals who confront adversity experience positive change different from that which previously existed (Linley & Joseph, 2004). Thus, posttraumatic growth denotes not merely a return to baseline, but rather an improvement in development that surpasses initial levels after encountering distress (Tedeschi & Calhoun, 2004). Posttraumatic growth may result in changes across three general domains: the individual’s perception of self, relationships with others, and general life philosophy (Tedeschi & Calhoun, 1995). Within these three broad categories lie five more specific factors, identified through factor analysis by Tedeschi and Calhoun (1996). These factors include personal strength, new possibilities, relating to others, appreciation of life, and spiritual change.

The theoretical basis for posttraumatic growth builds on theories of change that involve the reformulation of one’s “assumptive world” following an adverse event (Janoff-Bulman, 1992; Parkes, 1971). Within this theoretical framework, an individual must necessarily undergo a highly stressful or traumatic event, as well as the emotional distress accompanying such an event (Tedeschi & Calhoun, 2004). The distressing
nature of negative events challenges an individual’s beliefs about the world and
necessitates re-examination of such beliefs in the context of what has been experienced
(Tedeschi, Calhoun, & Cann, 2007). This schema-change perspective therefore calls into
question the seriousness of negative events, the subsequent experience of emotional and
psychological distress, and their role in determining amount of growth (Tedeschi &
Calhoun, 1995).

Relationship of Growth and Distress

Reviews of the PTG literature (e.g., Linley & Joseph, 2004; Zoellner & Maercker,
2006) have observed that findings regarding the relations between growth and distress
have been inconsistent. Researchers originally held that distress and growth were on
opposite ends of the adjustment spectrum, but evidence from studies has since
determined that these two elements of adjustment do indeed coexist within the experience
of trauma (Linley & Joseph, 2004).

Although the relations between growth and distress remain unclear, evidence
from numerous studies supports a positive relation between these constructs in various
populations, including parents of pediatric leukemia patients (Best, Streisand, Catania, &
Kazak, 2001), bereaved HIV/AIDS caregivers (Cadell, Regehr, & Hemsworth, 2003),
Holocaust survivors (Lev-Wiesel & Amir, 2003), female sexual abuse survivors (Lev-
Wiesel, Amir, & Besser, 2005), and college undergraduates (Morris, Shakespeare-Finch,
Rieck, & Newbery, 2005; Park, Cohen, & Murch, 1996). Other studies have found a
negative correlation between levels of distress and growth (Frazier, Conlon, & Glaser,
2001; McMillen, Smith, & Fisher, 1997), whereas some studies have found no
association (Elder & Clipp, 1989; Joseph, Williams, & Yule, 1993; Lehman et al., 1993; Rosenbach & Renneberg, 2008).

Further, it is difficult to comment on the directionality of the associations found in the literature, as many studies have been cross-sectional. It is unclear if higher distress begets higher growth, or if the direction is reversed. For example, in a review of their studies examining the effects of exposure to terrorism, Hobfoll and colleagues (2007) have suggested that increased levels of PTG contribute to greater distress and greater likelihood of a PTSD diagnosis. However, other researchers (e.g., Butler, 2007; Lechner, Carver, Antoni, Weaver, & Phillips, 2006) encourage the examination of distress as a possible predictor of growth.

Curvilinear Associations Between Distress and Growth

Researchers have begun to investigate whether or not a curvilinear relation exists between the negative and positive aspects of trauma (Linley & Joseph, 2004; Zoellner & Maercker, 2006). Fontana and Rosenheck (1998) initially found a significant quadratic trend between negative variables (e.g., perceived threat, death of others) and positive variables (e.g., psychological benefits, solidarity). Other studies have since found evidence for a curvilinear relation between distress and growth (e.g., Lechner et al., 2006; McCaslin et al., 2009; Shiri, Wexler, Alkalay, Meiner, & Kreitler, 2009; Solomon & Dekel, 2007), although the specific variables and measures of distress and growth used in the literature have been inconsistent. These findings suggest that reports of growth are higher when individuals are experiencing moderate levels of trauma or distress, whereas individuals who report low or high distress report lower levels of growth. Some studies have also shown this curvilinear trend to be more parsimonious in explaining findings.
than a linear trend (Butler et al., 2005; Colville & Cream, 2007; Levine, Laufer, Hamama-Raz, Stein, & Solomon, 2008).

A recent study on assault survivors (Kleim & Ehlers, 2009) supported the existence of a curvilinear relation between PTSD symptoms and PTG. In this study distress was treated as the dependent variable, and the inverted-U shape graphed onto the data indicated that higher PTSD severity occurred at moderate levels of growth, but lower PTSD severity occurred at high and low levels of growth (Kleim & Ehlers, 2009). One study by Hobfoll and colleagues (2007) explored a quadratic, curvilinear relation of PTG on PTSD symptoms, but found only the linear relation to be significant.

*Gender Differences in Growth Experiences*

Gender differences in PTSD have long been recognized to occur, with women having a higher risk than men, and a longer duration of symptoms following trauma (e.g., Breslau et al., 1998; Holbrook, Hoyt, Stein, & Sieber, 2002). In contrast, there have been mixed findings for gender differences in growth measures (Linley & Joseph, 2004). Some studies on benefit-finding and PTG have found no significant gender differences in samples of university students (Taku et al., 2007), bone marrow transplant patients (Widows, Jacobsen, Booth-Jones, & Fields, 2005), bereaved parents (Polatinsky & Esprey, 2000), patients with rheumatoid arthritis (Danoff-Burg & Revenson, 2005), cancer patients (Collins, Taylor, & Skokan, 1990), and war refugees (Powell, Rosner, Butollo, Tedeschi, & Calhoun, 2003). In contrast, other studies have shown that women tend to report higher levels of PTG than do men. This gender difference has been found in samples of university students (Park et al., 1996; Tedeschi & Calhoun, 1996), community members (Bates, Trajstman, & Jackson, 2004), breast cancer patients and
their husbands (Weiss, 2004), burn injury patients (Rosenbach & Renneberg, 2008), and bereaved individuals (Lehman et al., 1993).

The literature on the role of gender in the relation of distress and growth remains limited, as most studies simply report descriptive statistics on gender differences. To date, as best as we could determine, no studies examining the curvilinear association between distress and growth have explored or reported gender differences.

Research Questions

The present study explored the relation between PTSD symptom severity and PTG in a mixed-gender sample of college students who reported experiencing various highly stressful or traumatic events and perceiving growth as a result of these events. Due to the unique nature of this sample (i.e., various traumas, already reported growth), our research questions were exploratory. Our first question asked how PTSD symptom severity and PTG are related in our sample. Symptom severity for one month after the event occurred as well as current level of severity was assessed. In addition, we hoped to delineate whether or not the responses followed a curvilinear, quadratic trend, and whether this relation was a more parsimonious explanation than a linear one or not. Finally, due to the lack of previous literature on gender differences in the association between distress and growth, we asked whether or not men and women differ in their experiences of trauma and growth.
Method

Participants

Participants were undergraduate students enrolled in psychology courses at a state university in the northeastern United States, recruited through the psychology department research pool. Students were eligible to participate if they a) were 18 years of age or older, b) had experienced a life-changing event, and c) believed they had experienced positive changes as a result of the event. Of the 399 students who initially accessed the online survey, 76 left the survey blank, seven did not complete the qualitative portion of the survey, and four did not complete the quantitative portion of the survey. These 87 cases were deleted. In addition, two sets of responses were determined to be duplicates. In each of these two responses, we kept the survey that was completed first and deleted the second. Four subjects who did not report gender were also not included in our analyses.

The study sample consisted of the remaining 306 participants and was almost equally divided in terms of reported gender (52% male, 48% female). Participants ranged in age from 18-30 years of age ($M = 19.1, SD = 1.7$), and approximately half of the individuals were in their first year of college (54%; 19% sophomore, 14% junior, 13% senior). Reported age at the time of the stressful event ranged from 2-25 years of age ($M = 14.5, SD = 4.1$). The mean time since the event was 5.3 years ($SD = 12.2$). The ethnic distribution of the sample was as follows: 69% Caucasian, 9% Hispanic, 9% Asian, 8% African American, and 5% identified as other or of mixed ethnicity.
Procedure

The study protocol was reviewed, approved, and conducted in accordance with the university’s institutional review board. Eligible participants completed an anonymous online survey. The first webpage of the survey consisted of informed consent. Upon completion of the study questionnaires, participants were directed to separately email the researchers in order to receive course credit for their participation.

Measures

Life-Changing Events. Participants were asked to recall a life-changing event, including details surrounding what happened, what led up to the event, and their thoughts, feelings, and memories of the event. Screening of the responses involved verifying that participants identified at least one narrative description of a stressful or traumatic experience. Some examples of experiences described include physical and/or sexual assault, death of a loved one, motor-vehicle accidents, and military combat.

Demographics. Demographic information was collected, including gender, current age, age at the time of the event, date of the event, year in school, ethnicity, and marital status. Time since the event was calculated using the difference between reported date of the event and date on which the survey was taken.

Posttraumatic Growth Inventory (PTGI). The PTGI (Tedeschi & Calhoun, 1996) is a 21-item measure of self-perceived, positive changes occurring after a stressful or traumatic event. Responses lie on a 6-point scale ranging from 0 (“I did not experience this change as a result of my traumatic event”) to 5 (“I experienced this change to a very great degree as a result of my traumatic event”). The scale consists of five subscales representing the five growth domains listed by Tedeschi and Calhoun (1996): new
possibilities, relating to others, personal strength, spiritual change, and appreciation of life. Internal consistency of the scale for this sample was $\alpha = .94$.

*PTSD Checklist – Civilian Version (PCL-C).* The PCL-C (Weathers, Litz, Herman, Huska & Keane, 1993) is a 17-item, self-report measure of PTSD symptoms. Items on the PCL-C correspond with the diagnostic features of PTSD in the *Diagnostic and Statistical Manual of Mental Disorders, fourth edition* (DSM-IV, American Psychiatric Association, 1994), and scores for each of the three symptom clusters (re-experiencing, avoidance/numbing, and hyperarousal) can be calculated in addition to an overall score. We asked participants to respond to each item with regards to how they felt one month following the life event, and then asked them to respond to the items with regards to how they currently felt. Internal consistency of the scale in this present study was $\alpha = .93$ for the PCL-C after the event and $\alpha = .95$ for the PCL-C currently.
Results

Scores on the PTGI ranged from 11 to 105, with a mean score of 64.8 ($SD = 20.5$), and were within the range of published results in previous studies of different populations (see Powell et al., 2003). Compared with a sample of motor vehicle accident survivors (Blanchard et al., 1996) reported PLC-C scores for individuals meeting the cutoff of 44 for a PTSD diagnosis (Blanchard et al., 1996) were also within the range of published results for a sample of motor vehicle accident survivors ($M = 44.7$, $SD = 15.0$) for one month after the event and from 16 to 85 ($M = 31.6$, $SD = 13.8$) for current status. Table I shows means and standard deviations for these measures and their subscales by gender.

PTGI score was positively correlated with PCL-C score after the event ($r = .261$, $p < .001$), but not significantly correlated with current PCL-C score. The demographic variables of current age, event age, and time since the event were also not significantly correlated with PTGI or PCL-C scores.

A one-way analysis of variance (ANOVA) was conducted to examine gender differences in PTGI and PCL-C scores. For this study sample we found significant gender differences for total PTGI score, $F(1,305) = 12.73$, $p < .001$ and PCL-C at event score, $F(1,305) = 10.48$, $p < .01$, with women reporting higher scores on both variables. There was no significant gender difference for current PCL-C score, $F(1,305) = 2.15$, $p = .144$. Table I reports gender difference statistics for the subscales of these measures. None of the current PCL-C symptom clusters demonstrated significant gender differences.

Regression Analyses
In order to test the hypothesis that a curvilinear relation exists between amount of growth and PTSD symptom severity, we conducted a hierarchical regression with PTGI score as the criterion variable. A new predictor variable was first created by mean-centering and squaring PCL-C scores for one month after the event (Pedhazur, 1982). Gender was first entered in the first step of the regression. The initial PCL-C variable was then entered in the second step of the regression, and the new, quadratic PCL-C variable was entered in the third step. Current PCL-C scores were not examined in these analyses, as they demonstrated no relation to growth scores.

Results of this analysis indicated that there was a significant effect of gender on the model, $\beta = .20, R^2 = .04, p < .01$. Our analysis also revealed a significant linear effect of PTSD symptom severity on growth, $\beta = .25, \Delta R^2 = .06, p < .001$, as well as a significant quadratic effect, $\beta = -.13, \Delta R^2 = .02, p < .05$ (see Table II). These results support the notion that, although growth and PTSD symptom severity are positively related, those who reported a moderate level of PTSD symptom severity also reported more growth than those reporting low or high levels of symptoms. Figure 1 shows both the linear and quadratic regression lines, the latter of which takes on an inverted-U shape.

Similar analyses were conducted by gender to determine if and how women and men differed in terms of the effect of PTSD symptom severity on growth. Men demonstrated a significant linear effect of PTSD symptoms on growth, $\beta = .36, R^2 = .11, p < .001$. However, there was no significant quadratic effect, $\beta = -.02, \Delta R^2 = .00, p = .398$. In contrast, results showed a nonsignificant linear effect for women in the second step of the regression, $\beta = .15, R^2 = .02, p = .192$. Women demonstrated both a significant linear effect, $\beta = .24, \Delta R^2 = .05, p < .05$, as well as a quadratic effect, $\beta = -.25,$
$\Delta R^2 = .05, p < .05$ in step three (see Table III). Figures 2 and 3 show the regression lines for men and women, respectively. These findings suggest that men and women differ in terms of how PTSD symptom severity influences amount of growth. More specifically, a positive, linear relation may explain the effect of PTSD on growth in men, whereas women appear to report higher growth at moderate levels of PTSD symptoms.

Discussion

In building a more comprehensive understanding of the trauma experience, researchers have turned to examining the positive changes that occur in the aftermath of adversity. Results from this study highlighted and supported previous notions that psychological distress and growth can coexist and are related. In using a sample presenting with a broad range of trauma experiences that was also equally distributed in gender, we were able to contribute unique findings on gender differences to a body of literature that has departed from traditional linear models between distress and growth. These findings may account for the discrepancies seen in previous studies on gender differences in PTSD and PTG.

Our analyses of the entire sample yielded support for a cross-sectional, curvilinear relation between these PTG and PTSD variables. The inverted-U shape of the curve fitted to the data suggests that those who have experienced a stressful or traumatic event report more growth at moderate levels of distress. Lower and higher levels of distress therefore predict lower growth scores. This finding is in line with previous findings (e.g., Butler et al., 2005; Levine et al., 2008; Solomon & Deckel, 2007), and supports the important role of the nature and level of distress experienced after an adverse event in
promoting positive changes. When individuals experience lower levels of distress, their core beliefs about the world may not be threatened enough to provoke a change. In contrast, if an individual is experiencing high levels of distress and threat, it may prohibit the experience of growth.

To our knowledge, this study was the first to explore curvilinear effects of distress on growth separately by gender. Our findings suggest that men and women do experience PTSD symptoms and growth differently, and that the relation between these variables also differs by gender. Namely, women’s experience of PTSD and growth is better explained by the curvilinear model explained above, whereas men’s experience after adverse events demonstrates a linear relation in which PTSD symptom severity predicts more growth. It has been recognized in the literature that PTSD is more prevalent in women than in men when exposed to trauma (Breslau, Davis, Andreski, Peterson, & Schultz, 1997). More recently, researchers have identified that this gender difference occurs in samples where individuals have experienced assault or violence (e.g., Breslau, Wilcox, Storr, Lucia, & Anthony, 2004), and that evidence exists for a sensitizing effect of a prior trauma on the PTSD risk from a subsequent traumatic event (Breslau & Anthony, 2007). Although event type (including whether or not assault was identified) was not formally analyzed for the purposes of this study, the qualitative responses did suggest some differences. For example, those students who reported sexual assault as their event were all female, whereas responses about military combat exposure were reported by men only. This subset of participants who experienced assault-related trauma may have accounted for the gender differences observed in our sample at high levels of PTSD symptom severity.
Furthermore, although the literature on gender differences in reported PTG and benefit finding remains mixed (Helgeson, Reynolds, & Tomich, 2006), some studies highlight the possible role of gender differences in variables that have been found to influence the relation between distress and growth, such as coping, spirituality, and social support (Powell et al., 2003; Rosenbach & Renneberg, 2008; Weiss, 2002).

Study Limitations

One major limitation of this study is the retrospective nature of the PCL-C score after the event. Our results are therefore subject to error in memory and should be interpreted with caution. In addition, interpretability of our results is further compromised by the fact that we asked study participants to respond to the same PCL-C items twice in a row, albeit with different timepoint instructions. This calls into question the validity of our data, as responses to the PCL-C for current status could have been confounded with the fact that participants had recently seen the measure items. Rather than using a cross-sectional design, a prospective study with assessments of PTSD occurring at separate timepoints would allow more conclusive interpretations of the data. This study is also limited in its generalizability to non-college populations, and it would be important to investigate this relationship in older populations, as age has been found to affect growth scores (Rosenbach & Renneberg, 2008).

In addition, we utilized self-report questionnaires as measures of growth and PTSD symptoms, which may have been improved upon by having corroborated growth reports (such as in Weiss, 2004) and clinician-administered diagnostic measures for PTSD. However, we did include narrative methodology to our data collection, which has been implicated in both the scientific study, as well as the clinical application, of how
individuals develop PTG (for commentaries see Neimeyer, 2004; Pals & McAdams, 2004). Given the emphasis by Tedeschi and Calhoun (2004) on PTG as both an outcome and a process, qualitative and narrative methods of data collection may impact the validity of self-report measures by encouraging individuals to engage in narrative processing of their experiences.

**Future Research and Implications for Application**

Despite these limitations, our findings contribute to the growing body of literature examining the effect of distress on growth. Moreover, the evidence for differences by gender in the curvilinear effect of PTSD severity and posttraumatic growth opens the door for new research to replicate and explore with more depth. If these findings replicate, it may be potentially useful for clinical practice to understand how these gender differences are explained.

The literature thus far has been dominated by cross-sectional research. Studies utilizing prospective designs would allow us to determine with more clarity the directionality of the association between distress and growth, and would allow us to interpret causality. In addition, more research on the moderators of this curvilinear effect would allow us to explain the relation.

Incorporation of PTG into clinical work is still in development. Some interventions have been shown to increase reported levels of growth (e.g., Antoni et al., 2001; Low, Stanton, & Danoff-Burg, 2006), although it should be noted that there have been no studies on interventions formally targeting growth as an outcome. Park and Helgeson (2006) maintain that the field is not yet equipped to endorse growth-based interventions, and that clinical application should be implemented with caution. More
research on gender differences and potential moderators of the relation between distress and growth could influence clinical practice as well, allowing us to tailor interventions to specific profiles of individuals.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Men</th>
<th></th>
<th>Women</th>
<th></th>
<th></th>
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<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
<td>F(1,305)</td>
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<td>68.88</td>
<td>19.41</td>
<td>12.73**</td>
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<td>Relating to others</td>
<td>19.28</td>
<td>7.51</td>
<td>21.56</td>
<td>7.48</td>
<td>7.09*</td>
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<td>New possibilities</td>
<td>15.16</td>
<td>5.41</td>
<td>17.23</td>
<td>4.44</td>
<td>13.26**</td>
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<td>Personal strength</td>
<td>11.92</td>
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<td>13.66</td>
<td>4.00</td>
<td>12.76**</td>
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<td>Spiritual change</td>
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<td>6.16</td>
<td>2.79</td>
<td>3.84</td>
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<td>Appreciation for life</td>
<td>8.64</td>
<td>3.42</td>
<td>10.25</td>
<td>3.33</td>
<td>17.30**</td>
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<td>PCL-C after event</td>
<td>41.99</td>
<td>13.92</td>
<td>47.47</td>
<td>15.69</td>
<td>10.48*</td>
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<td>Re-experiencing</td>
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<td>4.79</td>
<td>15.54</td>
<td>4.87</td>
<td>19.16**</td>
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<tr>
<td>Avoidance/numbing</td>
<td>16.88</td>
<td>6.15</td>
<td>18.30</td>
<td>7.14</td>
<td>3.54</td>
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<tr>
<td>Hyperarousal</td>
<td>11.99</td>
<td>4.75</td>
<td>13.63</td>
<td>5.60</td>
<td>7.61*</td>
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<td>PCL-C current</td>
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<td>6.30</td>
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<td>9.17</td>
<td>4.78</td>
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*p < .01, **p < .001

Note. N = 159 for men, N = 147 for women. PTGI = Posttraumatic Growth Inventory; PCL-C after event = PTSD Checklist – Civilian Version reported for one month after event; PCL-C current = PTSD Checklist – Civilian Version reported for current status.
Table II
*Standardized regression coefficients and effect sizes for entire sample*

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<td>Gender</td>
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<td>Age</td>
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<td>Gender</td>
<td>.17**</td>
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<td></td>
<td>PCL</td>
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<td>Gender</td>
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<td>PCL²</td>
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*p < .05, **p < .01, ***p < .001
Note: PCL² = Quadratic PCL-C score
Table III
*Standardized regression coefficients and effect sizes for hierarchical model in men*

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*p < .05, **p < .01, ***p < .001

*Note: PCL² = Quadratic PCL-C score*
Table IV
*Standardized regression coefficients and effect sizes for hierarchical model in women*

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*p < .05, **p < .01, ***p < .001
Note: PCL² = Quadratic PCL-C score
Figure 1. Linear and quadratic relations of PTSD symptom severity (PCL-C) one month after traumatic event and posttraumatic growth score (PTG) for total sample.
Figure 2. Linear and quadratic relations of PTSD symptom severity (PCL-C) one month after traumatic event and posttraumatic growth score (PTG) for men (N = 159).
Figure 3. Linear and quadratic relations of PTSD symptom severity (PCL-C) one month after traumatic event and posttraumatic growth score (PTG) for women ($N = 147$).
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