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Journal

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Publication Date

DOI

Do Levels of Posttraumatic Growth Vary by Type of Traumatic Event Experienced? An Analysis of the Nurses' Health Study II

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Abstract

Objective.—Posttraumatic growth (PTG) has been documented in the aftermath of a range of traumatic events, including bereavement, physical assault, and rape. However, only a handful of studies have examined whether levels of total PTG, as well as the five domains of PTG (Appreciation of Life, New Possibilities, Relating to Others, Personal Strength, and Spiritual Change), vary by the type of potentially traumatic event. The current study examined variation in total PTG and PTG domains, as well as posttraumatic stress (PTS), by event type using data from a large epidemiological study.

Method.—Participants were from a substudy of the Nurses' Health Study II, an epidemiologic study of female nurses in the United States ($N = 1,574$).

Results.—Controlling for demographic covariates, we found that rape was consistently associated with lower PTG, both total PTG and all five PTG domains, relative to other event types.

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Other findings were limited to specific PTG domains; for example, intimate partner violence (IPV) was associated with higher Personal Strength and New Possibilities. In contrast, rape and IPV were associated with higher PTS, and the serious illness or injury of someone close with lower PTS, relative to other event types.

Conclusion.—These results add to the growing literature exploring variation in PTG by event type, and suggest that different events could yield markedly different patterns of PTG domains and PTS.

Keywords

Trauma exposure; posttraumatic growth; posttraumatic stress; women's mental health

The majority of persons will experience one or more potentially traumatic events (PTEs) – events involving actual or threatened death, serious injury, or sexual violence (American Psychiatric Association, 2013) – in their lifetime (e.g., Goldstein et al., 2016; McLaughlin et al., 2013). Epidemiologic studies have provided ample evidence that PTE exposure is associated with a range of adverse psychological outcomes, among them posttraumatic stress disorder (PTSD), major depressive disorder, and generalized anxiety disorder (for a review, see Lowe, Blachman-Forshay, & Koenen, 2015). It has long been recognized, however, that the experience of enduring and coping with a PTE can result in a range of positive psychological changes (Zoellner & Maercker, 2006). In their seminal work, Tedeschi and Calhoun (1996) coined the term posttraumatic growth (PTG), and specified five domains in which positive changes often occur: greater appreciation of life, a sense of new possibilities, stronger relationships with others, a feeling of greater personal strength, and positive spiritual changes. PTG has since been documented following a variety of PTEs, including bereavement (e.g., Armstrong & Shakespeare-Finch, 2011), physical assault (e.g., Kunst, 2011), sexual assault (Kuwert et al., 2014), and serious illness (e.g., Arpawong, Oland, Milam, Ruccione, & Meeske, 2013). It has been argued that, along with reducing distress, post-trauma clinical interventions should aim to foster the five domains of PTG among patients who have survived a PTE (e.g., Joseph & Linley, 2006; Tedeschi, Calhoun, & Groleau, 2015). An understanding of what types of PTEs are more or less likely to lead to PTG might help clinicians contextualize their initial assessment and monitoring of this outcome.

Variation in PTG by Type of PTE

Theory about the development of PTG suggests that different types of PTEs are likely to vary in the extent to which they trigger PTG both in general and in regard to its five domains (Tedeschi, 1999). PTG is thought to arise when the event is experienced as *seismic*, shattering the survivor's assumptions about the world and resulting in cognitive rumination, processing, and emotion regulation (Linley & Joseph, 2011; Tedeschi & Calhoun, 2004). Several factors are thought to influence the extent to which the mechanisms leading to PTG are triggered, including the severity and duration of the event, event centrality, and survivors' personality and baseline mental health (Linely & Joseph, 2004; Wamster-Nanner, Howell, Schwartz, & Hasselle, 2018; Zoellner & Maercker, 2006). It is likely, however, that different types of PTEs vary in this regard. For example, Ulloa et al. (2016) have posited

that PTEs that involve sexual violence might be more likely than other events to trigger growth in that such events have more profound effects on survivors' sense of self in relation to others, as well as their awareness of the societal ailments, such as sexism and misogyny, that contributed to their experience. This new awareness is thought to lead survivors to engage in activism, which is considered a behavioral marker of PTG (Ulloa et al., 2016). Conversely, Meyerson, Grant, Carter, and Kilmer (2011) have argued that survivors of sexual and other forms of violence might be less likely to experience PTG because such events are more clearly the result of human intervention than those that are driven largely by naturally occurring processes (e.g., illnesses and natural disasters). The perceived lack of preventability and controllability of violence is thought to challenge survivors' sense that they can make meaningful changes in their lives, thereby impeding the developing of PTG.

Different types of PTEs might also be especially likely to present opportunities for PTG in specific domains. For example, Tedeschi (1999) emphasized the key role of self disclosure in deepening interpersonal relationships, and it is possible that privately experienced events like sexual violence might require a greater degree of disclosure than those experienced in public spaces (e.g., car accidents) or that affect a larger community (e.g., natural disasters). Calhoun, Tedeschi, Cann, and Hanks (2010) have also discussed bereavement as a context especially conducive to the five domains of PTG, for example by requiring the survivor to take on new responsibilities (fostering a sense of new possibilities), providing space for new relationships (leading to growth in relations with others), showing the survivor that he or she can endure despite a major loss (illuminating personal strength), and serving as a reminder of one's mortality (increasing one's appreciation of life and promoting spiritual changes). More generally, existential issues and a search for meaning in life, indicators of spiritual change, are thought to arise especially after PTEs involving death (Tedeschi, 1999).

Given theory that different PTEs might differentially foster PTG and its five domains, it is surprising that few studies have investigated this phenomenon empirically. As others have noted (e.g., Armstrong & Shakespeare-Finch, 2011), most studies on PTG have investigated it as a unitary construct, rather than examining the five domains separately. Some researchers have nonetheless descriptively compared average levels of the five domains for survivors of the same PTE type, for example noting the highest levels of PTG in the personal strength domain among spinal cord injury survivors (Pollard & Kennedy, 2007), and the appreciation of life domain among survivors of interpersonal violence (Elderton, Berry, & Chan, 2017). This body of literature supports the notion of variability in the extent to which different PTEs foster the five domains of PTG, but does not directly examine such differences.

To our knowledge, only six studies have investigated differences in PTG by PTE type, most drawing on relatively small convenience samples. The first of these studies did not examine separately the five domains of PTG and included events that did not meet *DSM-5* criteria for a PTE. Milam, Ritt-Olson, and Unger (2004) assessed PTG among a predominantly Hispanic sample of 435 adolescents in relation to 10 negative life events and noted variation in PTG among the six most commonly reported, with highest levels for death of a close family member and lowest for moving to a new home; however, the observed differences were not statistically significant.

The second and third studies compared the five domains of PTG, but also included events that did not meet *DSM-5* criteria for a PTE. Ickovics and colleagues (2006) drew on a sample of 328 urban adolescent girls and asked them to identify "the hardest thing [they] ever had to deal with" (pp. 843), with some responses notably not meeting *DSM-5* criteria for a PTE. The authors found significant differences in total PTG by type of event, such that girls who listed an interpersonal problem (e.g., relationship conflicts or dissolution) as their worst traumatic event had significantly lower PTG than those who listed pregnancy and motherhood, the death of a loved one, or a physical threat (e.g., rape, chronic disease, financial strain). Subsequent analyses found that differences by event type varied across the PTG domains, such that participants reporting an interpersonal problem had significantly lower growth in appreciation of life than those reporting both pregnancy and motherhood, and the death of a loved one; significantly lower growth in new possibilities than those reporting pregnancy and motherhood only; and significantly lower growth in relating to others than those reporting death of a loved one only. Taku et al. (2007) s compared five categories of events (Self, Family, School, Relationship, Bereavement, and Other) among 312 Japanese undergraduate students and found that survivors reporting a Relationship event (e.g., relationship dissolution) had higher growth in relating to others than those reporting a School event (e.g., academic failure), and that those reporting Bereavement had higher scores on all domains than those reporting any other type of event. In contrast, the fourth study (Kuwert et al., 2014) compared two *DSM-5* PTEs, but did not separately assess the five PTG domains. In this study, elderly veterans ($N = 27$) who had experienced sexual violence during World War II were found to have higher levels of PTG than age- and gender-matched participants who experienced other forms of war-related trauma.

The final two studies on variation in PTG by PTE examined the five PTG domains and included only *DSM-5* PTEs, but were limited by comparing only the three PTE types that were most commonly reported in the given sample. Shakespeare-Finch and Armstrong (2010) found among 94 trauma survivors that bereaved participants reported higher growth in relating to others and appreciation of life than survivors of sexual abuse and motor vehicle accidents. Conversely, in the largest study of variation in PTG by PTE type to date, Karanci et al. (2012) found significant variation in PTG domains among 772 residents of three Turkish cities, with bereaved survivors reporting *lower* growth in appreciation of life than survivors of natural disasters, and lower growth in relating to others than survivors of both natural disasters and accidents.

Notably, of the six extant studies investigating PTG by PTE type, four consisted of univariate analyses only (Kuwert et al., 2014; Milam et al., 2004; Shakespeare-Finch et al., 2010; Taku et al., 2007). In those with multivariable models, Ickovics et al. (2006) included event timing (i.e., whether the event occurred within the past year, 1–2 years ago, and so on), and Karanci et al. (2012) included sociodemographic characteristics (age, sex, and years of education), personality traits, and posttraumatic stress (PTS). Thus, insight into whether differences in PTG by PTE type hold when adjusting for potential confounders is limited.

Current Study

Taken together, theory on PTG suggests variation in the extent to which different PTEs foster growth, and limited empirical evidence supports this notion. The few studies on PTG by PTE type, however, have yielded mixed findings and have been hampered by significant limitations, including small samples, univariate analyses, and either inclusion of events that do not meet *DSM-5* criteria for a PTE or a small number of commonly reported PTEs. The primary aim of the current study was to address this gap by examining variation by PTG and its five domains among a large epidemiologic sample, the Nurses' Health Study II (NHSII), a prospective cohort study of female nurses in the United States. Given the lack of research on this topic, our analyses are best conceptualized as exploratory and no specific hypotheses were proposed.

A secondary aim of the current study was to examine variation in PTS by PTE type, and to make descriptive comparisons with the results for PTG. Prior research has shown higher levels of PTS for sexual and other forms of violence relative to other PTEs (e.g., Breslau et al., 1998; McLaughlin et al., 2013), but this pattern has yet to be tested for in NHSII. Further, only two of the aforementioned studies explored variation in both PTG and PTS by PTE type in the same sample – Shakespeare-Finch and Armstrong (2011) found that PTG was highest for bereaved participants and PTS was highest for participants who experienced sexual violence, whereas Kuwert et al. (2014) found that both PTG and PTS were higher among war-related sexual violence survivors than survivors of other war-related trauma. Further research on this topic could provide additional preliminary insight into the types of events the yield different patterns of PTS and PTG.

Method

Participants and Procedure

Data were from the PTSD diagnostic subsample of the NHSII. The larger study, which has been described elsewhere (Bao et al., 2016), includes a total of 116,678 female nurses from the 14 most populous US states, aged 24–42 years at enrollment in 1989 and followed biennially. In 2008, 60,804 women who had responded to both the 2001 Violence Questionnaire as well as the most recent biennial questionnaire were mailed a supplementary questionnaire that assessed trauma exposure and PTS, and 54,282 (89.3%) participants returned the questionnaire. Of these, 43,413 (80.0%) reported exposure to at least one PTE, and 23,104 of the PTE-exposed respondents (53.2%) agreed to be interviewed via telephone. Probable PTSD cases and PTE-exposed controls were identified using Breslau's lifetime PTSD screen (Breslau, Peterson, Kessler, & Schultz, 1999), which was previously validated against the gold-standard Clinician-Administered PTSD Scale (CAPS; Blake et al., 1998) for the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders (*DSM-IV*; American Psychiatric Association, 1994).

Subsequently, 2,112 probable PTSD cases and 2,001 probable controls were randomly selected for diagnostic interviews. Among those selected, 3,013 participants (73.3%) completed structured telephone interviews, including 1,510 participants with and 1,503 without probable PTSD (71.5% and 75.1% completion rates, respectively). The structured

interview included assessments of participants' self-identified worst lifetime trauma, PTG, and PTS. The current study drew on data from 1,610 participants reporting on PTG and PTS in reference to the six most commonly identified worst traumatic events, each reported by 5% or more of the full sample to ensure adequate statistical power. Of the 1,610 participants, 36 (2.2%) were dropped due to missing data on one or more of the variables in the analysis. The final sample therefore consisted of 1,574 participants. The Partners Human Research Committee approved this study, and the protocol for the PTSD diagnostic subsample has been published (Koenen et al., 2009).

Measures

Worst lifetime traumatic event.—Participants were asked to identify traumatic events they had experienced from a list of 25 events drawn from diagnostic interviews used in previous epidemiologic studies (e.g., Kessler & Ustun, 2004; Robins, Helzer, Cottler, & Golding, 1988), and to indicate whether they had experienced any other "very stressful situation or event" that was not on the inventory. Participants reporting multiple lifetime traumatic events were then asked to identify which event they perceived as the "worst." Of the 25 events, six were identified as worst events by 5% or more of the participants who completed the inventory: (1) "had someone close to you experience a life-threatening physical illness or injury" (*illness/injury of someone close*); (2) "experienced the sudden unexpected death of someone close to you" (*bereavement*); (3) "been physically hurt for example, shoved, hit, kicked, or beaten up by a spouse or significant other" (*intimate partner violence; IPV*); (4) "been physically injured, for example hit, kicked, or beaten up, by a person other than your parents or spouse/significant other" (*physical assault*); (5) "rape – someone either having sexual intercourse with you or penetrating your body with a finger or object when you did not want them to. The person could have used pressure, force, threats or manipulation or you could have been too young to have known what was going on" (*rape*); and (6) "had a serious illness or operation" (*illness/operation*).

Posttraumatic growth.—PTG was assessed using the 10-item Posttraumatic Growth Inventory-Short Form (PTGI-SF), which has previously documented evidence of reliability and internal consistency (Cann et al., 2010). The short form was selected in the current study to reduce burden on participants and boost retention. Participants indicated whether they experienced various changes in their life as a result of their worst traumatic event from 0 (*a very small degree*) to 5 (*a great deal*). Two items assessed each PTG domain; responses were summed for a 0–10 point subscale. Responses to all 10 items were summed for a 0–50 point total PTG scale. Cronbach's alpha (α) of internal consistency of the PTG full and subscales ranged from .76 to .91.

Posttraumatic stress.—*DSM-IV* PTSD symptoms were assessed in reference to each participant's worst lifetime traumatic event via a 17-item diagnostic telephone interview, previously validated against the CAPS (Blake et al., 1998) in another cohort (Uddin et al., 2010). Participants indicated the extent to which they had ever been bothered by each symptom from 1 (*not at all*) to 4 (*extremely*). Responses were summed to generate PTS severity scores, ranging from 17–85 (α = .89).

Demographic covariates.—The following demographic covariates were included in the analysis based on previous research documenting their associations with PTS and PTG (e.g., Breslau et al., 1998; Elderton et al., 2017; Kessler et al., 1995): age (continuous) and marital status (reference: married) at the time of the worst traumatic event, race (reference: white), and annual household income in 2001 (reference: $49,999 or below). These data were obtained from the interviews as well as prior biennial NHSII questionnaires.

Data Analysis

Data analyses were computed in SAS (Cary, NC). First, a series of preliminary analyses was conducted. Descriptive statistics for all variables in the analyses were computed. Mean total PTG, PTG domain and PTS scores for each event type were computed and visually inspected. Independent-samples *t*-tests and Fisher's exact tests assessed for differences between the 1,574 participants included in analytic sample and the 36 participants who were dropped due to missing data. Second, multivariate generalized linear regression analyses predicting total PTG, PTG domains, and PTS were conducted to fulfill the study aims. Predictors in these analyses included demographic covariates and a categorical indicator for worst lifetime trauma type. Models predicting total PTG and PTG domains also included PTS as a covariate, whereas the model predicting PTS included total PTG as a covariate. When the omnibus effect of worst trauma type was statistically significant, all pairwise comparisons between worst trauma types were conducted, with a Bonferroni correction for multiple testing.

Results

Preliminary Analyses

Table 1 lists descriptive statistics for the 1,574 participants in the analytic sample. Nearly half (44.5%) reported *bereavement* as their worst trauma, while 24.6% reported *illness/injury of someone close*, 11.9% reported *rape*, 10.5% reported *illness/operation*, 7.2% reported *IPV*, and 1.4% reported *physical assault*. As shown in Table 2, PTG total and domain scores were generally highest for those who reported *IPV* or *illness/operation* as their worst trauma and lowest for those who reported *physical assault* or *rape* as their worst trauma. PTS was highest among those who reported *rape* as their worst trauma and lowest among those who reported *illness/injury of someone close*.

Significant differences between the 1,574 participants in the analytic sample and the 36 excluded due to missing data were detected in worst trauma type and marital status (Fisher's exact test *p*s = .030 and .005, respectively). Inspection of standardized residuals indicated that there were fewer participants in the analytic sample and more excluded participants who reported rape as their worst event than expected and whose event was prior to the baseline assessment (and thus their marital status at the time of the event was unknown). Additionally, there were more participants in the analytic sample and fewer excluded participants who were married than expected.

Multivariable Generalized Linear Regression Models

Table 3 shows the results of multivariable generalized linear regression models predicting total PTG, PTG domains, and PTS. The omnibus effect of worst event type was significant across all models. As such, all pairwise comparisons were conducted, with a Bonferroni correction for multiple testing. We note here that mean differences (M_{diff}) reported do not correspond to the differences between values reported in Table 2, but rather the least squares means as calculated in the multivariable models. These values and their 95% confidence intervals are reported in Supplementary Table 1.

Total PTG.—In the model predicting total PTG, participants reporting bereavement as their worst lifetime trauma had significantly higher scores than those who reported physical assault (M_{diff} = 7.51, 95% CI: 2.60–12.42, p = .003) and rape (M_{diff} = 6.16, 95% CI: 3.97–8.35, p < .001), as did those who reported illness/injury of someone close (physical assault: M_{diff} = 8.78, 95% CI: 3.79–13.77, p < .001; rape: M_{diff} = 7.43, 95% CI: 4.96–9.91, p < .001), IPV (physical assault (M_{diff} = 9.86, 95% CI: 4.57–15.14, p = .003; rape: M_{diff} = 8.51, 95% CI: 5.69–11.32, p < .001), and illness/operation (physical assault: M_{diff} = 11.34, 95% CI: 6.18–16.51, p < .001; rape: M_{diff} = 9.99, 95% CI: 7.18–12.82, p < .001). Additionally, those who reported illness/operation had significantly higher scores than those who reported bereavement (M_{diff} = 3.83, 95% CI: 1.84–5.82, p < .001).

PTG-Appreciation of Life.—Participants reporting the illness/injury of someone close as their worst lifetime trauma had significantly higher PTG-Appreciation of Life scores than those who reported rape (M_{diff} = 1.82, 95% CI: 1.26–2.38, p < .001) and physical assault (M_{diff} = 1.78, 95% CI: 0.65–2.91, p = .002). Those reporting bereavement also had significantly higher PTG-Appreciation of life scores than those reporting rape (M_{diff} = 1.54, 95% CI: 1.04–2.04, p < .001), as did those reporting IPV (M_{diff} = 1.75, 95% CI: 1.11–2.39, p < .00), and illness/operation (M_{diff} = 2.43, 95% CI: 1.79–3.07, p < .001). Additionally, participants reporting illness/operation had significantly higher PTG-Appreciation of Life scores than those reporting bereavement (M_{diff} = 0.89, 95% CI: 0.44–1.34, p < .001), and physical assault (M_{diff} = 2.39, 95% CI: 1.22–3.57, p < .001).

PTG-New Possibilities.—In the analysis predicting PTG-New Possibilities, participants reporting IPV as their worst lifetime trauma had significantly higher scores than those reporting illness/injury of someone close (M_{diff} = 1.82, 95% CI: 1.19–2.45, p < .001), bereavement (M_{diff} = 1.88, 95% CI: 1.30–2.47, p < .001), physical assault (M_{diff} = 3.10, 95% CI: 1.77–4.42, p < .001), and rape (M_{diff} = 2.54, 95% CI: 1.83–3.25, p < .001). Additionally, those reporting illness/operation had significantly higher scores than those reporting illness/injury of someone close (M_{diff} = 0.95, 95% CI: 0.42–1.48, p < .001), bereavement (M_{diff} = 1.01, 95% CI: 0.51–1.51, p < .001), and rape (M_{diff} = 1.67, 95% CI: 0.96–2.37, p < .001).

PTG-Relating to Others.—In the model predicting PTG-Relating to Others, participants reporting illness/injury of someone close as their worst lifetime trauma had significantly higher scores than those reporting physical assault (M_{diff} = 3.03, 95% CI: 1.87–4.18, p < .001) and rape (M_{diff} = 2.21, 95% CI: 1.64–2.78, p < .001), as did those reporting

bereavement (physical assault: M_{diff} = 2.76, 95% CI: 1.62–3.90, $p < .001$; rape: M_{diff} = 1.94, 95% CI: 1.44–2.45, $p < .001$), IPV (physical assault: M_{diff} = 2.21, 95% CI: 0.98–3.43, $p < .001$; rape: M_{diff} = 1.39, 95% CI: 0.74–2.04, $p = .002$), and illness/operation (physical assault: M_{diff} = 3.26, 95% CI: 2.06–4.45, $p < .001$; rape: M_{diff} = 2.44, 95% CI: 1.79–3.09, $p < .001$).

PTG-Personal Strength.—Participants whose worst lifetime trauma was IPV had significantly higher PTG-Personal Strength scores than those whose worst lifetime trauma was bereavement (M_{diff} = 1.04, 95% CI: 0.52–1.57, $p < .001$), physical assault (M_{diff} = 2.11, 95% CI: 0.92–3.30, $p < .001$), and rape (M_{diff} = 1.49, 95% CI: 0.85–2.12, $p < .001$). Additionally, participants whose worst lifetime trauma was illness/operation had significantly higher PTG-Personal Strength scores than those whose worst lifetime trauma was rape (M_{diff} = 1.08, 95% CI: 0.45–1.72, $p = .001$).

PTG-Spiritual Change.—In the analysis predicting PTG-Spiritual Change, participants whose worst lifetime trauma was bereavement, illness/injury of someone close, IPV, and illness/operation had significantly higher scores than those whose worst lifetime trauma was rape (M_{diff} = 1.87, 95% CI: 0.95–2.20, $p < .001$; M_{diff} = 1.95, 95% CI: 1.23–2.65, $p < .001$; M_{diff} = 1.34, 95% CI: −2.15- −0.53, $p = .001$; and M_{diff} = 2.37, 95% CI: 1.57–3.18, $p < .001$, respectively).

PTS.—The analysis predicting PTS showed that participants whose worst lifetime trauma was rape had significantly higher scores than those whose worst lifetime trauma was illness/injury of someone close (M_{diff}=13.76, 95% CI: 11.27–16.26, $p < .001$), bereavement (M_{diff} = 9.93, 95% CI: 7.69–12.17, $p < .001$), and illness/operation (M_{diff} = 11.14, 95% CI: 8.23–14.05, $p < .001$). Additionally, participants whose worst lifetime trauma was bereavement had significantly higher scores than those whose worst lifetime trauma was illness/injury of someone close (M_{diff} = 3.83, 95% CI: 2.32–5.34 $p < .001$); those whose worst lifetime trauma was IPV had significantly higher scores than those whose worst lifetime trauma was illness/injury of someone close (M_{diff} = 8.09, 95% CI: 5.44–10.60, $p < .001$) and illness/operation (M_{diff} = 5.39, 95% CI: 2.46–8.33, $p = .003$); and those whose worst lifetime trauma was physical assault had significantly higher scores than those whose worst lifetime trauma was illness/injury of someone close (M_{diff} = 9.73, 95% CI: 4.57–14.89, $p = .002$).

Discussion

This epidemiologic study of PTE-exposed women examined differences in total PTG, the five PTG domains, and PTS by type of PTE. Significant omnibus differences in each outcome by PTE type were detected in multivariable models, and the patterns of pairwise comparisons yielded three key findings. First, rape was most consistently associated with significantly lower PTG, both in terms of total PTG and of each of the five PTG domains, relative to other events. Second, differences in PTG for other event types were limited to distinctive PTG subdomains; IPV was associated with significantly higher growth in personal strength and new possibilities, serious illnesses or operations with significantly higher growth in appreciation of life and new possibilities, and physical assault with significantly lower growth in new possibilities and relating to others, relative to other events.

Third, the pattern of results for PTS was, descriptively, quite different than that for PTG. Specifically, rape and IPV were associated with significantly higher PTS, and the serious illness or injury of someone close with significantly lower PTS, relative to other events.

As noted, the literature exploring variation in PTG by PTE type is limited, making it difficult to situate the results of the current study in the context of other findings. For example, the largest study on this topic to date (Karanci et al., 2012) compared levels of PTG for three event types (bereavement, motor vehicle accidents, and natural disasters), but two of these were rarely identified as a worst trauma in our sample and thus not included in the analysis. Our finding that rape was associated with lower PTG relative to most other events is consistent with a prior study showing that sexual assault experiences (including rape) were associated with lower PTG than was bereavement (Shakespeare-Finch & Armstrong, 2010). Notably, however, the prior finding was limited to two PTG domains (relating to others, appreciation of life), whereas ours was consistent across the five domains. This divergence could be due to several issues, including differences in sample characteristics, or the small sample size (N=98) and more heterogeneous sexual assault category of the prior study. Other studies on this topic have included even more heterogeneous PTE categories, likely due to concerns of statistical power, but limiting the extent to which findings can be compared. For example, in their study of urban adolescents, Ickovics and colleagues (2006) included rape in an event category alongside pregnancy and motherhood, bereavement, chronic disease and financial strain. As another example, in their study of Japanese university students, Taku and colleagues (2007) included serious illness in the Self category, alongside accidents, crime victimization, and natural disasters. The necessarily heterogeneous event types used in prior research demonstrates the need for other large-scale investigations on this topic to ensure adequate statistical power when exploring variation in PTG across different event types. In doing so, future studies should employ commonly used inventories of events that meet *DSM-5* criteria for a PTE, which would facilitate comparison across samples.

Future research is also needed to better understand how different PTE types lead to PTG. For example, there is likely variation in the extent to which different PTEs impact survivors' assumptions about themselves, other people, and the world around them – in essence, in how *seismic* PTEs are (Tedeschi & Calhoun, 2004). One possibility is that events need to be seismic to a certain degree to trigger the mechanisms leading to PTG, such as cognitive rumination, processing, and emotion regulation (Calhoun & Tedeschi, 2006), but that extremely seismic events – likely including rape – hinder such processes. Further studies are thus needed that not only examine PTG by PTE type, but also the shattered assumptions and cognitive and affective processes that sometimes follow exposure.

Additional research is also needed to understand why some events might be especially conducive to specific PTG domains. It could be, for example, that some IPV survivors, through dissolving an abusive relationship, realize a renewed sense of strength and vision for what is possible in their intimate relationships and other aspects of their lives, accounting for the patterns observed in the current study. Serious illnesses, on the other hand, might be more likely than other PTEs to trigger existential concerns, which in turn foster greater appreciation of one's life and recognition of new possibilities to find meaning. Further work could explore these possibilities, as well as various characteristics of PTEs, including

survivors' sense of how much the event affected their daily lives, and whether the event was experienced private versus publicly, that might explain our results.

Regarding our analysis of type of worst trauma as predictive of PTS, the results were generally consistent with prior studies showing that events involving interpersonal violence tended to be associated with higher PTS symptoms (e.g., Breslau et al., 1998). A unique contribution of the study was our comparison of patterns of PTS versus PTG by PTE type. Here we observed that some PTEs were associated with higher levels of both PTG and PTS (e.g., IPV), whereas others were associated with higher PTG but lower PTS (e.g., illness/operation), and others higher PTS but lower PTG (e.g., rape), relative to other PTEs. This pattern of results could perhaps account for some of the inconsistency in the results of prior studies investigating associations between PTG and PTS, with some studies finding positive associations, others negative association, and others non-significant associations (Shakespeare-Finch & Lurie-Beck, 2014). That is, the association between PTG and PTS might vary by event type. Further work with this dataset will explore this possibility as well as other potential sources of variation in the PTG-PTS relationship. Future research should also explore factors that account for why some PTEs yield different patterns of PTG and PTS, including characteristics of PTEs (e.g., event centrality; extent to which different PTEs are due to human intervention or perceived as controllable; for assaultive PTEs, relationship to the perpetrator), internal mechanisms (e.g., shattered assumptions, cognitive and affective processes, existential concerns), and external events (e.g., new opportunities for relationships). For example, the extremely seismic events that hinder PTG might trigger PTS, whereas processing of existential concerns could foster PTG while protecting against PTS. In other scenarios, PTS and other forms of distress that follow exposure could result in PTG.

Our results should also be interpreted in light of at least four additional limitations. First, although using an inventory of PTEs and having participants respond in reference to an identified worst event was both efficient and consistent with prior epidemiologic studies (e.g., Breslau et al., 1998; McLaughlin et al., 2013), this approach did not account for the potential cumulative psychological impact of exposure to multiple PTEs, or allow for within-participant examination of variation in PTG by event type. In a similar vein, characteristics of PTEs, such as their severity or duration, were not assessed and thus could not be explored as predictors of PTG and PTS. Future research should therefore include more thorough assessments of PTEs to shed additional light on which PTE types, alone or in tandem with other PTEs, are more or less strongly linked to PTG and PTS. Second, there was substantial variability in the percentage of participants reporting the six most commonly identified worst traumatic events, ranging from 1.4% for physical assault to 44.5% for bereavement. It is thus possible that pairwise comparisons involving the less frequent event types did not reach statistical significance due to limited power. Third, the short form of the PTGI was used and, although this measure has demonstrated strong psychometric properties and reduced participant burden, a drawback was that the five PTG domains were each assessed with only two items, potentially reducing their validity. Lastly, the results may not generalize outside this majority white, middle-aged sample of women in the United States. It is also worth highlighting that all participants were nurses upon enrollment in the larger study, and women in this profession might differ in several meaningful ways (e.g., in their

life experiences, levels of hardiness, and coping styles) from those in other occupations. Therefore, replication in other populations is needed.

Despite these limitations, the current study provides evidence that levels of PTG, both as a single construct and its subdomains, vary by the type of event experienced, and that the events that are most strongly associated with PTG are not entirely overlapping with those that are most strongly associated with PTS. It builds off of prior work through its direct examination of variation in both total PTG and the five PTG domains by PTEs, inclusion of PTEs as defined in the *DSM-5*, adjustment for sociodemographic characteristics and PTS in multivariable models, and use of a large epidemiologic sample. A further understanding of the mechanisms by which different events might lead to the different components of PTG versus PTS might help clinicians and other service providers promote positive psychological outcomes among PTE-exposed populations.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

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Clinical Impact Statement

Posttraumatic growth (PTG), which consists of enhanced appreciation of life, a sense of new possibilities, improved relationships, increased personal strength, and spiritual change, has been documented after a range of traumatic events, including bereavement, physical assault, and rape. This study documented variation in PTG and posttraumatic stress (PTS) by event type in a large epidemiological study of female nurses in the United States. One key finding was that rape was associated with lower PTG and higher PTS relative to other events. Clinicians working with trauma-exposed patients might these findings useful in contextualizing their initial assessment and monitoring of PTG.

Table 1.

Descriptive Statistics for All Variables Included in the Analysis (N=1574)

	M / n	SD / %
Demographic covariates		
Age at time of worst traumatic event (years)	36.55	15.30
Marital status at time of worst traumatic event		
Event prior to baseline	635	40.3%
Never married	59	3.8%
Married	762	48.4%
Divorced, separated or widowed	77	4.9%
Missing marital status	41	2.6%
Race		
White	1525	96.9%
Black	7	0.4%
Asian	8	0.5%
Other	34	2.2%
Household income		
$49,999 and below	212	13.5%
$50,000-$74,999	392	24.9%
$75,000-$99,999	318	20.1%
$100,000-$149,999	333	21.2%
$150,000 and above	179	11.4%
Missing income	140	8.9%
Worst traumatic event		
Bereavement	700	44.5%
Illness or injury of someone close	387	24.6%
Intimate partner violence	113	7.2%
Physical assault	22	1.4%
Rape	187	11.9%
Illness/operation	165	10.5%
Posttraumatic Growth (PTG) and Posttraumatic Stress (PTS)		
PTG - Total	36.55	15.30
PTG - Appreciation of life	6.98	2.70
PTG - New opportunities	5.77	3.03
PTG - Relating to others	6.66	2.76
PTG - Spirituality	6.11	3.38
PTG - Personal strength	7.39	2.67
PTS	32.34	12.78

Note. *M* = Mean; *SD* = standard deviation. Total PTG scores range from 0–50, and each PTG domain ranges from 0–10, with higher scores indicating greater PTG. PTS ranges from 17–85 with higher scores indicating more severe PTS.

Table 2.

Mean Posttraumatic Growth (PTG) and Posttraumatic Stress (PTS) Scores by Worst Traumatic Event (N=1574)

Worst Traumatic Event	PTG-Total	PTG-AL	PTG-NP	PTG-RO	PTG-PS	PTG-SC	PTS
	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)
Bereavement	32.65 (11.64)	6.99 (2.62)	5.56 (2.93)	6.85 (2.57)	7.19 (2.66)	6.07 (3.33)	31.75 (11.87)
Illness or injury of someone close	32.75 (11.48)	7.05 (2.47)	5.29 (2.99)	7.05 (2.46)	7.19 (2.67)	6.16 (3.36)	27.98 (10.39)
Intimate partner violence	36.58 (10.17)	7.44 (2.42)	7.87 (2.47)	6.39 (2.78)	8.61 (2.19)	6.27 (3.59)	36.90 (13.35)
Physical assault	26.36 (11.21)	5.73 (2.55)	4.59 (3.08)	4.23 (3.02)	6.36 (2.40)	5.45 (3.17)	36.18 (14.88)
Rape	29.96 (14.44)	5.92 (3.46)	5.86 (3.43)	4.99 (3.34)	7.66 (2.84)	5.52 (3.78)	41.09 (14.72)
Illness/operation	35.96 (10.83)	7.81 (2.38)	6.39 (2.72)	7.35 (2.61)	7.64 (2.60)	6.78 (2.93)	31.49 (12.87)

Note. AL=Appreciation of Life; NP=New Possibilities; RO=Relating to Others; PS=Personal Strength; SC=Spiritual Change; *M*=Mean; *SD*=Standard Deviation. Total PTG scores range from 0–50, and each PTG domain ranges from 0–10, with higher scores indicating greater PTG. PTS ranges from 17–85 with higher scores indicating more severe PTS.

Table 3.

Results of Multivariable Models Predicting Total Posttraumatic Growth (PTG), PTG Domains and Posttraumatic Stress (PTS) ($N = 1574$)

	PTG-Total	PTG-AL	PTG-NP	PTG-RO
	B (SE)	B (SE)	B (SE)	B (SE)
Intercept	27.62 (2.18)***	5.19 (0.49)***	4.20 (0.55)***	5.71 (0.50)***
Demographic covariates				
Age at time of "worst" traumatic event	−.03 (0.04)	0.01 (0.01)	−0.01 (0.01)	0.01 (0.01)
Marital status at time of "worst" traumatic event				
Married	Ref	Ref	Ref	Ref
Event prior to baseline	1.29 (1.11)	0.40 (0.25)	0.44 (0.28)	0.19 (0.26)
Never married	−2.18 (1.59)	−0.35 (0.36)	−0.51 (0.40)	−0.40 (0.37)
Divorced, separated or widowed	−0.06 (1.40)	0.39 (0.32)	0.16 (0.35)	−0.20 (0.32)
Missing marital status	−1.41 (1.86)	−0.33 (0.42)	−0.46 (0.47)	−0.02 (0.43)
Race				
White	Ref	Ref	Ref	Ref
Black	−0.45 (4.38)	0.11 (0.99)	−0.82 (1.10)	−0.67 (1.01)
Asian	−0.12 (4.10)	1.13 (0.93)	0.47 (1.03)	−0.51 (0.95)
Other	2.59 (2.01)	0.64 (0.46)	−0.09 (0.50)	0.74 (0.47)
Household income				
$49,999 and below	Ref	Ref	Ref	Ref
$50,000–$74,999	−0.41 (1.00)	−0.05 (0.23)	>−0.01 (0.25)	0.07 (0.23)
$75,000–$99,999	0.20 (1.05)	0.23 (0.24)	<0.01 (0.26)	0.19 (0.24)
$100,000–$149,999	−1.15 (1.04)	−0.03 (0.24)	−0.12 (0.26)	0.02 (0.24)
$150,000 and above	−1.49 (1.20)	−0.01 (0.27)	−0.24 (0.30)	−0.09 (0.28)
Missing income	1.01 (1.28)	0.17 (0.29)	0.20 (0.32)	0.14 (0.30)
PTS	0.20 (0.02)***	0.04 (0.01)***	0.05 (0.01)***	0.02 (0.01)***
PTG-Total	--	--	--	--
Worst lifetime traumatic event	$F_{(5,1568)}$	$F_{(5,1568)}$	$F_{(5,1568)}$	$F_{(5,1568)}$
	13.40***	13.51***	14.68***	17.69***

	PTG-PS	PTG-SC	PTG
	B (SE)	B (SE)	B (SE)
Intercept	6.57 (0.49) ***	5.94 (0.62) ***	28.97 (2.25) ***
Demographic covariates			
Age at time of "worst" traumatic event	−0.02 (0.01) *	−0.02 (0.01) *	−0.04 (0.04)
Marital status at time of "worst" traumatic event			
Married	Ref	Ref	Ref
Event prior to baseline	0.26 (0.25)	−0.01 (0.32)	−1.72 (1.15)
Never married	−0.06 (0.36)	−0.85 (0.46)	−0.95 (1.65)
Divorced, separated or widowed	0.05 (0.31)	−0.45 (0.40)	0.62 (1.44)
Missing marital status	−0.26 (0.42)	−0.35 (0.53)	0.58 (1.92)
Race			
White	Ref	Ref	Ref
Black	−0.16 (0.99)	1.10 (1.25)	4.35 (4.53)
Asian	−0.36 (0.92)	−0.84 (1.17)	−1.56 (4.24)
Other	0.46 (0.45)	0.83 (0.58)	0.29 (2.08)
Household income			
$49,999 and below	Ref	Ref	Ref
$50,000-$74,999	−0.06 (0.23)	−0.37 (0.29)	−1.76 (1.04)
$75,000-$99,999	0.10 (0.24)	−0.33 (0.30)	−2.92 (1.08) **
$100,000-$149,999	−0.13 (0.23)	−0.88 (0.30) **	−1.92 (1.08)
$150,000 and above	−0.25 (0.27)	−0.90 (0.34) **	−3.27 (1.24) **
Missing income	<0.01 (0.29)	−0.50 (0.37)	−3.82 (1.32) **
PTS	0.04 (0.01) ***	0.04 (0.01) ***	0.21 (0.03) ***
PTG-Total	--	--	--
	F(5,1568)	F(5,1568)	F(5,1568)
Worst lifetime traumatic event	6.82 ***	7.74 ***	25.87 ***

Note. AL=Appreciation of Life; NP=New Possibilities; RO=Relating to Others; PS=Personal Strength; SC=Spiritual Change. Total PTG scores range from 0–50, and each PTG domain ranges from 0–10, with higher scores indicating greater PTG. PTS ranges from 17–85 with higher scores indicating more severe PTS.

*
p < .05,

**
p < .01,

*** $p < .001$

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