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GENDER DIFFERENCES IN SELF-REPORTED POSTTRAUMATIC GROWTH: A META-ANALYSIS

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A meta-analysis was conducted to examine the direction and magnitude of gender differences in self-reported posttraumatic growth. Results from 70 studies ($N = 16{,}076$) revealed a small to moderate gender difference ($g = .27$, 95% CI = .21 −.32), with women reporting more posttraumatic growth than men. Moderator analyses were then conducted to identify possible sources of these differences. The following moderators were examined: mean age of sample, measure used, nature of the stressful event, language of the measure, and type of sample (i.e., community samples, college students, or mixed). The only significant moderator was age, with women reporting incrementally more posttraumatic growth as the mean age of the sample increased ($B = .004$, $p < .01$, $SE = .001$, $Q = 9.13$). To check for publication bias, effect sizes were compared across published and unpublished research. The size of the gender difference was not significantly different between published ($g = .30$, 95% CI = .23 − .38) and unpublished ($g = .22$, 95% CI = .12 −.31) studies. The present findings indicate that modest, but reliable gender differences exist in posttraumatic growth even when unpublished data are included in the analyses. Possible explanations for these findings and suggestions for future research are discussed.

Although much attention has been paid to the negative sequelae of trauma, recent literature has been expanded to acknowledge that positive psychological changes may occur after dealing with a highly distressing event. Posttraumatic growth (PTG), or the experience of positive change as a result of the struggle with a major crisis (Tedeschi & Calhoun, 1996), has been shown to occur among people facing a variety of stressful circumstances. Some evidence suggests a gendered pattern in the degree to which men and women report posttraumatic growth. For instance, in Tedeschi and Calhoun's (1996) study of posttraumatic growth in a college sample, the authors found a significant gender difference in PTG as measured by the Posttraumatic Growth Inventory, with women reporting higher levels of posttraumatic growth than men. Parallel findings were noted by Park, Cohen, and Murch (1996) using the Stress-Related Growth Scale (SRGS) in a college sample. Gender differences have also been reported across multiple types of trauma including cancer, HIV/AIDS, terrorism, and natural disasters (e.g., Bellizzi, 2004; Jang, 2006; Milam, 2004; Milam, Ritt-Olson, Tan, Unger, & Nezam, 2005). However, a number of studies have found either no gender differences or the opposite gender relationship (e.g., Hooper, 2003; Polatinsky & Esprey, 2000). Given the substantial variability across research studies, a meta-analysis is needed to clarify the direction and size of any gender differences that exist in self-reported posttraumatic growth.

Although few studies have focused exclusively on gender and PTG, gender differences have been widely studied in the field of psychology. In general, men and women tend to score similarly on most psychological constructs including cognitive variables, psychological well-being, and social and personality variables (Hyde, 2005). Moreover, aside from motor performance and sexuality, effect sizes for psychological gender differences generally fall within the small to moderate range (Hyde, 2005).

Gender has been primarily regarded as a control variable in studies on posttraumatic growth. Nonetheless, research within the broader domain of trauma has examined the construct of gender more thoroughly. In a meta-analysis examining gender differences in posttraumatic stress disorder (PTSD), as well as the relationship between potentially traumatic events (PTEs) and PTSD, Tolin and Foa (2006)

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found that whereas men are more likely to experience a potentially traumatic event, women who experienced a PTE were more likely to meet criteria for PTSD. For certain types of events, such as nonsexual assault, women were more than four times as likely to develop PTSD, and they reported greater severity of PTSD symptoms (odds ratio for meeting criteria for PTSD = 4.11). For other events, such as adult sexual assault (odds ratio = 1.10) or child sexual abuse (1.71), there were no significant gender differences in PTSD. These results suggest that the effect size for gender differences in PTSD may vary depending on the type of traumatic event. However, taken as a whole, women were consistently more likely to meet criteria for PTSD and experience more severe symptoms than men who experienced the same PTE. Given these findings, Tolin and Foa (2006) proposed that women's increased risk for PTSD is not due to greater rates of exposure to certain types of trauma but to other factors, such as differences in cognitive or affective processing of traumatic events.

In a recent review, Olff, Langeland, Draijer, and Gersons (2007) concluded that gender differences in PTSD are a result of differences not only in cognitive appraisal, but also in acute reactions to trauma. Olff and colleagues (2007) surmised from the extant literature that women are more likely than men to perceive a situation as threatening, rate events as significantly more stressful, and endorse more loss of personal control. Considering these conclusions, they suggest that the elevated prevalence rate of PTSD in women is related to higher perception of threat and control loss. Additionally, women are more likely than men to experience acute psychological and biological responses to trauma including intense fear, avoidance, intrusive thoughts, horror, helplessness, panic, and anxiety (Olff et al., 2007). Given these differences in responses to trauma, it is possible that similar gender differences exist in posttraumatic growth. For instance, according to the posttraumatic growth model, higher perceived threat may lead to greater upheaval of an individual's assumptive world, and this pattern sets the stage for greater reports of PTG (Calhoun & Tedeschi, 2006).

A meta-analysis that specifically focuses on the differences in men and women's reports of posttraumatic growth is useful for several reasons. First, most studies investigating posttraumatic growth have a small sample size and thus limited power to detect significant gender differences. Combining these studies in a meta-analysis will increase power and allow us to more clearly determine whether gender differences may be valid. Second, a meta-analysis can examine data from both published and unpublished research, making it less susceptible to publication bias. Since most of what we currently know about gender differences in posttraumatic growth is based on published findings, a meta-analysis would be informed by a more representative sample and would expand the scope of current knowledge on PTG. Lastly, a meta-analysis may help identify specific variables that may facilitate posttraumatic growth in each gender. This identification would add to current knowledge on posttraumatic growth and may help to clarify the existing models of PTG processes.

To date, one published meta-analysis has examined gender, along with other variables potentially associated with posttraumatic growth (Helgeson, Reynolds, & Tomich, 2006). The analysis revealed a small effect indicating that women reported slightly more posttraumatic growth than did men ($r = .08$, $p < .001$); however, there was no examination of potential moderators of the gender difference. Also, the report by Helgeson and colleagues (2006) included only published studies and combined a heterogeneous set of closed-ended and open-ended measures of growth with variable psychometric properties.

The current meta-analysis was conducted to assess the reliability of the findings supporting a gender difference in self-reported PTG and to identify other variables that might moderate this relationship. It should be noted that our analyses focused exclusively on individuals' reports of posttraumatic growth. As with all self-report measures, there is a possibility that scores on the questionnaires do not correspond to actual growth (Frazier & Kaler, 2006; Ransom, Sheldon, & Jacobsen, 2008). Indeed, many posttraumatic growth researchers have called for additional validation efforts (e.g., Tomich & Helgeson, 2004), and there is some evidence that both actual change processes and perceived change post-trauma contribute to reports of PTG (Ransom et al., 2008). Although self-reported growth may, to some extent, reflect "illusory perceptions of temporal change" (McFarland & Alvaro, 2000, p. 340), there is considerable evidence that self-reported PTG is related to other positive mental health outcomes, including lower rates of depression and positive well-being (Helgeson et al., 2006). Self-reported posttraumatic growth has also been related to longer survival after cancer and better recovery from chemotherapy (Dunigan, Carr, & Steel, 2007). Additionally, two studies have made an effort to establish the validity of posttraumatic growth by comparing self-reported PTG to reports from significant others (Park, Mills-Baxter, & Fenster, 2006; Weiss, 2002). Both studies found that self-reports were moderately correlated with informant reports, indicating that at least some positive changes were apparent to others. Thus, although there are inherent limitations to relying solely on self-report measures, there is sufficient evidence that self-reported PTG warrants further investigation (Calhoun & Tedeschi, 2004).

Although we made an effort to include both published and unpublished research in our analyses, we focus only on studies that used measures of *posttraumatic growth*, defined as the "experience of significant positive change arising from the struggle with a major life crisis" (Calhoun, Cann, Tedeschi, & McMillan, 2000, p. 521). There are a number of measures that are aimed at capturing variations of the construct of "growth" including the Benefit Finding Scale (Mohr et al., 1991; Tomich & Helgeson, 2004), Perceived Benefit Scale (McMillen & Fisher,

1998), Changes in Outlook Questionnaire (Joseph et al., 2005), Posttraumatic Growth Inventory (PTGI; Tedeschi & Calhoun, 1996), and SRGS (Park et al., 1996) as well as open-ended measures (e.g., Bower, Kemeny, Taylor, & Fahey, 1998). The Benefit Finding Scale and Perceived Benefit Scale measure a variety of "benefits" that may occur after experiencing a traumatic event, some of which would not be associated with posttraumatic growth (Sears, Stanton, & Naoff-Berg, 2003; Tedeschi, 2008). For instance, one might report perceived "benefits" from experiencing a natural disaster (e.g., being financially compensated for losses) but may not experience profound and enduring positive change (i.e., personal growth). The Changes in Outlook Questionnaire measures both positive and negative change(s) following a traumatic event; however, it is a relatively new questionnaire and was not widely used at the time that this meta-analysis was conducted (up to May 2006). Lastly, open-ended measures of growth have not been extensively validated, and they vary in the extent to which they truly measure posttraumatic growth as opposed to a related construct such as perceived benefits.

Therefore, we restricted our analysis to studies that used the Posttraumatic Growth Inventory and the Stress Related Growth Scale. These measures adequately capture the construct of *posttraumatic growth*, have desirable psychometric properties, and have been employed extensively with a variety of populations (Park & Blumberg, 2002; Park et al., 1996; Tashiro & Frazier, 2003; Tedeschi & Calhoun, 1996, 2004). Additionally, given that both measures were specifically designed to assess PTG, we will be able to see if gender differences vary depending on the scale used. Because potential moderators to examine will depend on the available literature, the relevance of each mediator will be considered later along with the discussion of identified moderators.

METHOD

Identification of Studies

Several approaches were used to identify relevant studies that used the PTGI or the SRGS. First, three computerized databases (PsycINFO, Academic Search Premier, and Dissertation Abstracts International) were searched for studies published up to May 2006 using the following keywords and their derivatives: "posttraumatic growth," "stress related growth," "posttraumatic growth inventory," and "stress related growth scale." Second, a manual search was conducted using reference lists from reviews, book chapters, and articles in order to find additional studies that may have been overlooked. Of the 224 studies that were identified and reviewed, 48 met inclusion criteria for the analysis. Lastly, in an effort to capture studies that were unpublished, emailed messages requesting published and unpublished data were sent to 65 leading authors in the field of posttraumatic and stress related growth, as well as to 15 students who had written master's theses and dissertations in this area. From these emails, a total of 22 studies were added to our analysis, yielding a final sample of 70 studies (see supporting information for full reference list).

Inclusion Criteria

To be included in the meta-analysis, studies had to use either the Posttraumatic Growth Inventory or the Stress Related Growth Scale in their battery of measures. It should be noted that three studies were found that used the Posttraumatic Growth Inventory for Children (PTGI-C), but given such a limited number of studies, they were excluded from the analyses. Analyses were also restricted to studies that had both men and women in their sample. No restrictions were placed on age of the participants, the language in which the measures were administered, or the country where the study was conducted. Studies needed to cite men's and women's mean scores on the PTGI or the SRGS, and ideally, the standard deviation and the sample size for each gender. However, two studies did not include the standard deviation for each gender; in this case, the effect size was estimated using the t value, a standard practice in meta-analyses (Lipsey & Wilson, 2001).

Moderator Variables

The moderator variables identified through this search were: (a) mean age of participants, (b) measure used, (c) nature of the stressful event, (d) language of the measure, and (e) type of sample (i.e., community samples, college students, or "mixed"). Because few studies have specifically examined gender differences in posttraumatic growth, there was no research to support a hypothesized direction for the moderator effects. Instead, we anticipated that gender differences would remain constant across all levels of the moderators. Although other moderator variables were considered (e.g., the length of time since the traumatic event and coping style), only the selected moderator variables had enough data to provide a meaningful analysis. Because there is no consensus on the minimum number of studies necessary to conduct a meta-analysis, moderators were chosen based on the overall sample size for each study and the likelihood that the results reflect true differences and not sampling error (see Table 1 for details on sample sizes).

We felt that the selected moderator variables were important to consider for several reasons. First, given the previously cited research on gender differences in reactions to trauma (Olff et al., 2007; Tolin & Foa, 2006), it would seem possible for gender differences to vary due to the type of traumatic event encountered. In addition, given that women perceive more events as highly stressful, gender differences could vary with age due to the accumulated effect of perceiving more events as highly stressful. The comparison of college student with community samples also could capture any similar gender differences due to age or stage of life. Examining language, even in the

Table 1
Characteristics of Studies Included in Meta-Analysis

Author(s) and Date	*N*	*Age (Mean, SD)*	*Type of Participant*	*Location*	*Language*	*Measure Used*	*Type of Event*	*Published*	*Effect Size*
Alday (1997)	247	not stated	college	USA	English	PTGI	bereavement	no	0.46
Armeli, Gunthert, & Cohen (2001), Sample 1	481	18.6, 1.6	college	USA	English	SRGS	mixed	no	0.05
Armeli, Gunthert, & Cohen (2001), Sample 2	466	46.51, 8.32	mixed	USA	English	SRGS	mixed	yes	0.13
Baker (2005)	286	22.03, 7.38	mixed	USA	English	PTGI-42	mixed	no	0.61
Barbero & Linley (2006)	191	not stated	community	Spain	other	PTGI short form	March 11 Madrid bombings	yes	0.30
Bates, Trajstman, & Jackson (2004)	129	41.0	community	Australia	English	PTGI	mixed	yes	0.46
Bellizzi (2004)	74	53, 16.72	community	USA	English	PTGI	cancer	yes	0.56
Brabham (2002)	45	41.51	mixed	USA	English	PTGI	bereavement	no	0.69
Bryant (2004)	52	48.0	community	USA	English	PTGI	mixed	no	0.29
Butler et al. (2005)	1,505	44.7, 12.26	community	international	English	PTGI	Sept. 11 attacks (internet sample)	yes	0.41
Cadell (2003)	172	40.65, 11.4	community	Canada	English	PTGI	HIV/ AIDS	yes	0.14
Calhoun, Cann, Tedeschi, & McMillan (2000)	54	22.5	college	USA	English	PTGI	mixed	yes	−0.13
Calhoun, Tedeschi, Fulmer, & Harlan (2000)	32	48.0	community	USA	English	PTGI	bereavement	no	0.43
Carboon et al. (2005)	54	43.4, 14.3	community	Australia	English	PTGI	cancer	yes	0.65
DeBrule, Calhoun, Tedeschi, & Cann (2001)	32	19.9, 1.6	college	USA	English	PTGI	athlete-related injury	no	−0.04
Elci & Karanci (2004)	136	38.7, 6.8	community	Turkey	other	PTGI	parents of autistic children	no (not in English)	0.46
Fazio (2004)	240	not stated	community	USA	English	PTGI	bereavement after 9/11	no	0.56
Gunes, Karanci, Sumer, & Kazak Berument (2006)	336	33.8, 11.6	community	Turkey	other	SRGS	Marmara 1999 earthquake	no	0.23
Harlan (2002)	40	42.38, 6.22	community	USA	English	PTGI	parents of children w/ disability	no	0.47
Harris, Erbes, Engdahl, Olson, & Winskowski (2006)	103	57, 15.8	community	USA	English	PTGI	mixed	no	0.49
Heiland (2004)	92	49.91	community	USA	English	PTGI	cancer	no	0.19
Ho, Chan, & Ho (2004)	188	49.29, .622	community	China	other	PTGI	cancer	yes	0.03
Hooper (2003)	143	22.45	college	USA	English	PTGI	mixed	no	−0.29
Jang (2006)	572	not stated	community	Taiwan	other	PTGI	9/21 earthquake	no	0.06
Kaniecki (2003)	29	37.52, 7.99	community	USA	English	PTGI	emergency workers Flight 93	no	0.21
Karanci & Acarturk (2006)	200	not stated	community	Turkey	other	SRGS	earthquake survivors	yes	0.75
Kesimci, Goral, & Gencoz (2005)	132	17–41	college	Turkey	other	SRGS	mixed	yes	0.34

(*continued*)

Table 1
(*Continued*)

Author(s) and Date	*N*	*Age (Mean, SD)*	*Type of Participant*	*Location*	*Language*	*Measure Used*	*Type of Event*	*Published*	*Effect Size*
Lechner et al. (2003)	255	62.5, 12.4	community	USA	English	PTGI	cancer	yes	0.20
Lev-Wiesel & Amir (2003)	72	67.9, 4.65	community	Israel	other	PTGI	Holocaust survivors	yes	0.10
Linley (2004), Chapter 1	146	20.23, 4.16	college	UK	English	PTGI	mixed	no	0.03
Linley (2004), Chapter 2	190	21.94, 4.23	college	UK	English	PTGI	mixed	no	0.21
Linley & Joseph (2006)	55	45.08, 11.75	community	UK	English	PTGI	natural disaster workers	yes	0.56
Linley & Joseph (2007)	156	53.67, 10.9	community	UK	English	PTGI	mixed	yes	0.60
Linley, Joseph, & Goodfellow (2006)	57	45, 11.52	community	UK	English	PTGI	mixed	no	0.13
Maercker & Langner (2001)	135	37.5, 17.8	college	Germany	other	PTGI	mixed	yes	−0.08
Manne, Ostroff, & Winkel (2004)	510	not stated	community	USA	English	PTGI	breast cancer & husbands	yes	0.66
Michael & Snyder (2005)	157	19.19, 2.28	college	USA	English	PTGI	bereavement	yes	0.13
Milam (2004)	835	38.35, 7.83	community	USA	English	PTGI	HIV/ AIDS	yes	0.35
Milam, Ritt-Olson, Tan, Unger, & Nezam (2005)	513	13.54, .52	adolescent	USA	English	PTGI-modified	9/11 attacks (vicarious trauma)	yes	0.06
Morris, Shakespeare-Finch, Rieck, & Newbery (2005)	219	24.79, 8.70	college	Australia	English	PTGI	mixed	yes	0.36
Murch (1995)	142	19.35, 3.28	college	USA	English	SRGS	mixed	no	0.49
Pargament, Magyar, & Benore (2005)	119	47, 13.94	community	USA	English	PTGI	mixed	yes	0.45
Park (2005)	139	not stated	college	USA	English	SRGS	bereavement	yes	0.19
Park, Cohen, & Murch (1996), Study 1	506	not stated	college	USA	English	SRGS	mixed	yes	0.44
Park, Mills-Baxter, & Fenster (2006)	70	77.9	community	USA	English	SRGS	mixed	yes	0.14
Pelphrey (2004)	255	47.7, 15.5	community	Poland	other	SRGS	1997 flood	no	−0.19
Polatinsky & Esprey (2000)	88	not stated	community	South Africa	English	PTGI	bereavement	yes	0.19
Powell, Rosner, Butollo, Tedeschi, & Calhoun (2003)	136	not stated	community	former Yugoslavia	other	PTGI	former refugees	yes	−0.02
Pratti (2006)	61	47.38, 14.68	community	Italy	other	PTGI	severe trauma (violence, etc.)	yes	0.69
Proffitt, Cann, Calhoun, & Tedeschi (2007)	30	49.1	community	USA	English	PTGI	mixed	yes	0.26
Pryzgoda (2005)	142	23.29, 8.33	mixed	USA	English	PTGI	mixed	no	0.40
Putterman (2005)	408	49.79	community	USA	English	PTGI	mixed	no	−0.10

(*continued*)

Table 1
(*Continued*)

Author(s) and Date	*N*	*Age (Mean, SD)*	*Type of Participant*	*Location*	*Language*	*Measure Used*	*Type of Event*	*Published*	*Effect Size*
Roesch, Rowley, & Vaughn (2004)	1,011	20.12, 2.23	college	USA	English	SRGS	mixed	yes	0.23
Schatz (2004)	273	20.79, 5.02	college	USA	English	SRGS	9/11 attacks (direct & vicarious trauma)	no	−0.08
Schuster, Edmondson, Park, Wachen, & Clen (2006)	449	not stated	college	USA	English	SRGS	mixed	no	0.35
Schuster & Park (2007)	198	not stated	college	USA	English	SRGS	college transition	no	0.52
Shakespeare-Finch, Gow, & Smith (2005)	504	39.84, 9.41	community	Australia	English	PTGI	ambulance drivers	yes	0.32
Sheikh & Marotta (2005)	110	64, 20	community	USA & UK	English	PTGI	cardiovascular disease	yes	0.05
Smith (2001)	276	37.7, 12.4	community	USA	English	PTGI	mixed	no	0.27
Snape (1997)	53	not stated	community	UK	English	PTGI	accident/ assault	yes	−0.16
Tashiro & Frazier (2003)	92	20	college	USA	English	PTGI	relationship break up	yes	0.67
Tedeschi & Calhoun (1996), Study 1	604	not stated	college	USA	English	PTGI	mixed	yes	0.34
Tedeschi & Calhoun (1996), Study 3	117	not stated	college	USA	English	PTGI	mixed	yes	0.53
Tedeschi, Calhoun, & Cooper (2000)	37	not stated	community	USA	English	PTGI	mixed	no	0.12
Thornton & Perez (2006)	149	61.27, 7.19	community	USA	English	PTGI	prostate cancer & partners	yes	0.12
Ullrich & Lutgendorf (2002)	122	20.5, 2.4	college	USA	English	PTGI	mixed	yes	0.09
Vaughn, Roesch, & Aldridge (2009)	388	15.49, .96	adolescent	USA	English	SRGS	mixed	no	−0.03
Wachen (2006)	132	18.73, 1.33	college	USA	English	SRGS	mixed	no	−0.03
Weiss (2002)	82	not stated	community	USA	English	PTGI	breast cancer & husbands	yes	0.67
Yaskowich (2003)	52	not stated	community	USA	English	PTGI	parents of children w/ cancer	no	0.21

Note. PTGI = Post Traumatic Growth Inventory; SRGS = Stress Related Growth Scale.
See supporting information for a full list of references.

simplest way possible, could help to identify potential gender differences across cultures. Research has indicated that the PTGI may have a different factor structure in different cultures (Ho, Chan, & Ho, 2004; Taku et al., 2007; Weiss & Berger, 2006). Lastly, variable gender differences between the two commonly used measures of PTG would be important information for researchers deciding which measure to employ.

Coding System

All studies were coded based on the suggestions described by Lipsey and Wilson (2001). The following five variables were coded: posttraumatic growth measure, mean age, nature of the traumatic event, the language of the measures, and the publication status of the study. Measures were categorized as the PTGI or SRGS. Age was coded as a continuous variable, with one mean for each study in the analysis. Events were grouped into the following categories to allow for moderator analysis: serious illness (e.g., cancer, HIV/AIDS, etc.), terrorism (e.g., September 11 attacks, Flight 93, etc.), natural disaster (e.g., September 21 earthquake), bereavement, and "mixed" (multiple types of traumatic events in the same sample). In order to have an adequate sample size for moderator analysis, the language of the measure was separated into two categories: English or "other" (all other languages). Type of sample was coded as college, community, or "mixed" (both college and community samples used in the same study). Publication status was coded as published (appeared in a peer-reviewed journal or in press) or unpublished (master's thesis, dissertation, or unpublished data and manuscripts).

RESULTS

Analysis Plan

Given that Cohen's d is known to be biased in small samples (Lipsey & Wilson, 2001), Hedge's g, an unbiased adjustment to Cohen's d, was used in our analysis (Cooper & Hedges, 1994). Effect sizes were computed using the mean, standard deviation, and sample size (by gender) for each study. For studies that did not report standard deviations, t values were used to obtain an estimate of Hedge's g. In this analysis, a positive effect size indicated that women reported more posttraumatic growth than men. Data were analyzed using Comprehensive Meta Analysis (CMA) Version 2, a computer-based meta-analysis program (Borenstein, Hedges, Higgins, & Rothstein, 2005). This program assigns weights to each effect size based on the sample size and the variability of PTGI/ SRGS scores in each study. Effect sizes were computed as standardized mean differences and were reported with 95% confidence bounds. Because a meta-analysis assumes that each data point is statistically independent (Lipsey & Wilson, 2001), a single data point was selected from longitudinal studies to ensure that each study contributed only one effect size. To ensure consistency, only the first time point in a longitudinal study was used (5 of the 70 total studies were longitudinal). A homogeneity statistic, Q, was used to determine whether variability across studies was greater than expected from sampling error (Lipsey & Wilson, 2001). The effect size distributions in this analysis appeared to be heterogeneous, as indicated by a statistically significant Q-value, $Q(69) = 162.56$, $p < .001$, for the overall model. Thus, a random effects model was implemented to account for both within and between study variability. This model assumes that in addition to sampling error, there are other sources of variability that are expected to be randomly distributed (Lipsey & Wilson, 2001).

Moderator Analyses

Moderator analyses were conducted to ascertain whether particular characteristics of the study might be related to gender differences in posttraumatic growth. The mean age of participants was assessed using a regression analysis, with mean age of the sample as the predictor variable and the difference between men and women's scores (g) as the criterion variable. The remaining moderator variables were categorical and were entered as grouping variables in the effect size calculations.

Although we made a conscientious effort to include unpublished research, to address the "file-drawer problem," or the possibility that significant results are more likely to be published than null findings, a fail-safe N statistic was calculated to determine how many unpublished studies with null findings would have to be reported in order to shift the significance of each effect size to greater than $p = .05$ (Rosenthal, 1991). Additionally, moderator analyses were conducted to compare effect sizes for published studies to those that were unpublished.

Findings

Table 1 presents descriptive information and effect sizes for each study included in the meta-analysis. The total sample represents 16,076 participants from 70 studies (see supporting information for full reference list). The most common types of traumatic events were cancer ($k = 8$), bereavement ($k = 7$), terrorism ($k = 5$), natural disaster ($k = 5$), and "mixed" ($k = 26$). The majority of studies were conducted in the USA ($k = 43$), UK ($k = 6$), Australia ($k = 4$), and Turkey ($k = 4$). Results for the overall model and the moderator analyses are presented in Table 2. As a general rule in psychological research, effect sizes less than .20 are considered small whereas effect sizes greater than .80 are considered large (Lipsey & Wilson, 2001). Analysis for the overall model revealed a small to moderate gender difference, with women reporting more posttraumatic growth than men ($g = .27$, 95% CI = .21 −.32).

As indicated by overlapping confidence intervals, gender differences did not significantly vary across levels of categorical moderator variables (see Table 2). However,

Table 2
Effect Sizes for Overall Model and Moderator Variables (Random Effects Model)

Variable	*k*	*Hedge's g*	*Lower 95% CI*	*Upper 95% CI*	*Fail-Safe N*
Overall Model	70	0.27***	0.21	0.32	3,305
Measure					
PTGI	52	0.29***	0.22	0.36	
SRGS	16	0.21**	0.10	0.33	
Nature of Traumatic Event					
Serious illness	11	0.33***	0.17	0.49	
Bereavement	7	0.38***	0.23	0.53	
Natural disaster	5	0.25**	0.05	0.55	
Terrorism	5	0.19**	0.03	0.41	
"Mixed"	31	0.24***	0.16	0.32	
Type of Sample					
Community	42	0.29***	0.21	0.37	
College	22	0.24***	0.15	0.33	
"Mixed"	4	0.41**	0.12	0.70	
Language					
English	57	0.28***	0.21	0.34	
Non-English	13	0.23***	0.08	0.38	
Publication Status					
Published	39	.30***	0.23	0.38	
Unpublished	31	.22***	0.12	0.31	

Note. Larger *g* values indicate higher posttraumatic growth scores for women. PTGI = Post Traumatic Growth Inventory; SRGS = Stress Related Growth Scale
$^{**}p < .01$. $^{***}p < .001$.

effect sizes were positive for all moderators, indicating that women consistently reported more posttraumatic growth than men. On the other hand, the meta-regression looking at the relationship of growth and mean age of the sample ($k = 52$) was significant, $B = .004$, $p < .01$, $SE = .001$, $Q = 9.13$, indicating that women reported incrementally more posttraumatic growth than men as the mean age of the sample increased.

Lastly, to check for publication bias, we compared effect sizes across published and unpublished research (see Table 2). Although the size of the effect was slightly larger for studies that were published ($g = .30$, 95% CI = .23 − .38) versus unpublished ($g = .22$, 95% CI = .12 − .31), the overlapping confidence intervals suggest this is not a significant difference. Furthermore, results from the fail-safe *N* statistic indicate that 3,305 additional studies with null findings would be necessary to conclude that there was no gender effect for the overall model. Therefore, we concluded that our general findings are representative of both published and unpublished samples.

DISCUSSION

This meta-analysis illustrates that there is a small to moderate gender difference in posttraumatic growth, with women reporting greater levels of posttraumatic growth than men. Given that effect sizes were similar across both the PTGI and the SRGS, this suggests that gender differences do exist and are not simply an artifact of a particular measure that might be biased to elicit a stronger response from women. These measures were developed independently of one another, making it is more likely that gender differences are a result of true differences in posttraumatic growth.

Within the moderator analyses, the only statistically significant finding was the meta-regression involving age, which showed that women reported incrementally more growth than men as the mean age of the sample increased. On average, the differences in posttraumatic growth were more pronounced in adults over the age of 35, as compared to adults 18–34 of age. However, it must be noted that few studies looked specifically at middle aged and older adults. For example, only five studies had samples with a mean age above 60. Thus, these findings should be considered with some caution.

Future Research Directions

Unfortunately, the moderators that were available for this analysis do little to clarify the bases for the apparent gender differences so that we can only speculate about why these gender differences exist. One possible explanation for women reporting more posttraumatic growth among samples with a higher mean age is that there may be cohort differences. Women in older cohorts may perceive events as more severe or "seismic," which, according to the PTG model, may be related to more self-reported growth (Tedeschi & Calhoun, 1996). An alternative explanation could be that women are more likely to experience events that involve perceived loss (and subsequent growth) as they get older. There is some limited support for this hypothesis because gender differences tended to be larger when the event was bereavement, an event that is more likely to occur as people get older. Additional research is needed to gain a better understanding of the relationships among gender, the nature of the traumatic event, and age.

Also, although little research has been conducted that directly examines potential underlying processes that might lead to overall gender differences in PTG, one possible mediator is the tendency for women to engage in more ruminative thought than men. Negative rumination has been linked to higher reports of depression in women (Nolen-Hoeksema, Larson, & Grayson, 1999; Nolen-Hoeksema, Morrow, & Frederickson, 1993). However, a recent study by Treynor, Gonzalez, and Nolen-Hoeksema (2003) found that women engaged in significantly more deliberate (productive and contemplative) *and* brooding (negative) rumination. The tendency to ruminate on constructive issues, such as an increased awareness of personal strengths or an appreciation of the importance of social connections, has been suggested as a mechanism leading to greater reports of posttraumatic growth (Janoff-Bulman, 1992, 2006; Tedeschi & Calhoun, 2004). Several studies lend evidence to this association. For example, Calhoun and colleagues (2000) found that recent deliberate rumination was

significantly associated with posttraumatic growth in a sample of bereaved parents belonging to self-help groups; similarly, reflective rumination predicted positive affect and well being in women who were at high risk for breast cancer (Segerstrom, Stanton, Alden, & Shortridge, 2003). Thus, to the extent that women may engage in more rumination of any type, but particularly if they evidence more reflective/deliberate rumination, they may recognize more benefits through their efforts to cope with a traumatic event and report greater levels of PTG.

Another potential mediator in processing traumatic events is coping style. Women are more likely to utilize emotion-focused coping (de Ridder, 2000; Thoits, 1991; Vingerhoets & Van Heck, 1990), which involves the use of cognitive and behavioral strategies to manage stressors and maintain emotional equilibrium (Billings & Moos, 1981). Tedeschi and Calhoun (2004) have stressed that posttraumatic growth results from actively struggling to come to terms with the aftermath of the traumatic event. Emotion-focused coping embodies this process (i.e., thinking about the event, trying to make sense of it, and trying to work through it cognitively). Therefore, if women are utilizing more emotion-focused coping strategies, they are engaging in a process that is related to core mechanisms proposed to be operating in the posttraumatic growth experience. Interestingly, Helgeson et al. (2006) found that posttraumatic growth was only related to emotion-focused coping strategies, including positive reappraisal, acceptance, and denial. Similarly, Butler et al. (2005) found that posttraumatic growth at follow-up was related to acceptance and positive reframing. In view of these findings, future research should consider more closely examining the interaction among gender, coping strategies, and posttraumatic growth.

This meta-analysis is a first step in beginning to understand the underlying mechanisms for gender differences in reports of posttraumatic growth, but to date only a handful of studies have examined variables that have been suggested as playing a role in the differences observed. Additional research is needed to specifically examine the cognitive processes that occur when men and women experience trauma, and to determine if coping style and rumination play a role in these gender differences.

Limitations

As stated earlier, our analyses were limited by the types of moderator variables available across multiple studies. As a result, we were unable to include other moderators that may be important in understanding the relationship between gender and posttraumatic growth (e.g., rumination, coping style, etc.). Researchers in this area should consider including these variables in future studies, paying particular attention to how gender differences may be influencing the findings.

Another possible limitation is that our analyses represent findings from cross-sectional data. For example, we cannot reliably say whether the posttraumatic growth scores of men and women change over time or whether they stay constant. It appears more likely that gender differences shift depending on the age of the sample; however, additional longitudinal data are needed to determine whether this effect remains when looking at the same individuals over time.

Conclusions

The present findings are consistent with prior research and indicate that small to moderate gender differences in posttraumatic growth exist, even when the sample of studies examined is broader than those analyzed in previous reports (Helgeson et al., 2006). However, as with most psychological research on gender differences, the effect sizes in this analysis were relatively small (Hyde, 2005). Although the categorical moderator analyses were not significant, the meta-regression indicated that gender differences increase with age, and the direction of the gender differences was reliable across all moderators. Our findings highlight the need for future research that examines additional moderators and/or mediators of gender differences in PTG. Much is still unknown about how women and men process trauma, and how traumatic experiences could facilitate growth rather than distress. Given that posttraumatic growth is a burgeoning area of research, it is critical that we better understand the mechanisms that lead women and men to perceive growth differently. A first step in this direction would be to continue to investigate variables that may be involved in posttraumatic growth and to consider gender as a primary variable of interest in such research.

Our findings may also have implications for practitioners working with people who have experienced major life crises. First, because women are more likely to seek professional help than men (Pederson & Vogel, 2007), clinicians may be more likely to encounter PTG in their clientele than is the case in the general population. Second, because men may be somewhat less likely to experience or report growth and less likely to engage in self-disclosure in psychotherapy (Shay, 1996), clinicians working with men may need to be particularly attuned to the absence of posttraumatic growth in men who seek help for trauma-related difficulties. Under some circumstances, clinicians might consider gently encouraging men who have experienced a traumatic event to elaborate on their experiences and to explore the ways in which they may have changed. Although additional data are needed to validate the development of gender-specific interventions for posttraumatic growth, this shortcoming does not negate the potential benefit of having clinicians attend to the possibility of growth following highly stressful events (Calhoun & Tedeschi, 2006), particularly with male clients.

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REFERENCES

*References marked with an asterisk indicate studies included in the meta-analysis.

*Bellizzi, K. M. (2004). Expressions of generativity and posttraumatic growth in adult cancer survivors. *International Journal of Aging and Human Development, 58,* 267–287.

Billings, A. G., & Moos, R. H. (1981). The role of coping responses and social resources attenuating the stress of life events. *Journal of Behavioral Medicine, 4,* 139–157.

Borenstein, M., Hedges, L., Higgins, J., & Rothstein, H. (2005). *Comprehensive meta analysis version 2*. Englewood, NJ: Biostat.

Bower, J. E., Kemeny, M. E., Taylor, S. E., & Fahey, J. L. (1998). Cognitive processing, discovery of meaning, CD4 decline, and AIDS-related mortality among bereaved HIV-seropositive men. *Journal of Consulting and Clinical Psychology, 66,* 979–986.

*Butler, L. D., Blasey, C. M., Azarow, J., McCaslin, S. E., Garlan, R. W., Chen, X.-H., et al. (2005). Posttraumatic growth following the terrorist attacks of September 11, 2001: Cognitive, coping, and trauma symptom predictors in an internet convenience sample. *Traumatology, 11,* 247–267.

*Calhoun, L. G., Cann, A., Tedeschi, R. G., & McMillan, J. (2000). A correlational test of the relationship between posttraumatic growth, religion, and cognitive processing. *Journal of Traumatic Stress, 13,* 521–527.

Calhoun, L. G., & Tedeschi, R. G. (2006). The foundations of posttraumatic growth: An expanded framework. In L. G. Calhoun & R. G. Tedeschi (Eds.), *Handbook of posttraumatic growth* (pp. 1–23). Mahwah, NJ: Erlbaum.

Calhoun, L. G., & Tedeschi, R. G. (2004). The foundations of posttraumatic growth: New considerations. *Psychological Inquiry, 15,* 93–102.

Cooper, H., & Hedges, L. V. (1994). *The handbook of research synthesis*. New York: Russell Sage Foundation.

de Ridder, D. (2000). Gender, stress and coping: Do women handle stressful situations differently from men? In L. Sherr & J. St. Lawrence (Eds.), *Women, health and the mind* (pp. 115–135). Chichester, UK: Wiley.

Dunigan, J. T., Carr, B. I., & Steel, J. L. (2007). Posttraumatic growth, immunity and survival in patients with hepatoma. *Digestive Diseases and Sciences, 52,* 2452–2459.

Frazier, P. A., & Kaler, M. E. (2006). Assessing the validity of self-reported stress- related growth. *Journal of Consulting and Clinical Psychology, 74,* 859–869.

Helgeson, V. S., Reynolds, K. A., & Tomich, P. L. (2006). A meta-analytic review of benefit finding and growth. *Journal of Consulting and Clinical Psychology, 74,* 797–815.

*Ho, S. M. Y., Chan, C. L. W., & Ho, R. T. H. (2004). Posttraumatic growth in Chinese cancer survivors. *Psycho-Oncology, 13,* 377–389.

*Hooper, L. M. (2003). Parentification, resiliency, secure adult attachment style, and differentiation of self as predictors of growth among college students. *Dissertation Abstracts International: Section B: The Sciences and Engineering, 64,* 1493.

Hyde, J. S. (2005). The gender similarities hypothesis. *American Psychologist, 60,* 581–592.

*Jang, L. (2006). The 9-21 earthquake: A study of the effects of Taiwanese cultural factors on resilience. *Dissertation Abstracts International: Section A: Humanities and Social Sciences, 66,* 2723.

Janoff-Bulman, R. (1992). *Shattered assumptions*. New York: The Free Press.

Janoff-Bulman, R. (2006). Schema-change perspectives on posttraumatic growth. In L. G. Calhoun & R. G. Tedeschi (Eds.), *Handbook of posttraumatic growth: Research and practice* (pp. 81–99). Mahwah, NJ: Erlbaum.

Joseph, S., Linley, P. A., Andrews, L., Harris, G., Howle, B., Woodward, C., et al. (2005). Assessing positive and negative changes in the aftermath of adversity: Psychometric evaluation of the Changes in Outlook Questionnaire. *Psychological Assessment, 17,* 70–80.

Lipsey, M. W., & Wilson, D. B. (2001). *Practical meta-analysis*. Thousand Oaks, CA: Sage.

McFarland, C., & Alvaro, C. (2000). The impact of motivation on temporal comparisons: Coping with traumatic events by perceiving personal growth. *Journal of Personality and Social Psychology, 79,* 327–343.

McMillen, J. C., & Fisher, R. H. (1998). The Perceived Benefit Scales: Measuring perceived positive life changes after negative events. *Social Work Research, 22,* 173–186.

*Milam, J. E. (2004). Posttraumatic growth among HIV/AIDS patients. *Journal of Applied Social Psychology, 34,* 2353–2376.

*Milam, J. E., Ritt-Olson, A., Tan, S., Unger, J., & Nezam, E. (2005). The September 11th 2001 attacks and reports of posttraumatic growth among a multiethnic sample of adolescents. *Traumatology, 11,* 233–246.

Mohr, D. C., Dick, L. P., Russo, D., Pinn, J., Boudewyn, A. C., Likosky, W., et al. (1991). The psychosocial impact of multiple sclerosis: Exploring the patient's perspective. *Health Psychology, 18,* 376–382.

Nolen-Hoeksema, S., Larson, J., & Grayson, C. (1999). Explaining the gender differences in depressive symptoms. *Journal of Personality and Social Psychology, 77,* 1061–1072.

Nolen-Hoeksema, S., Morrow, J., & Frederickson, B. L. (1993). Response styles and the duration of episodes of depressed mood. *Journal of Abnormal Psychology, 102,* 20–28.

Olff, M., Langeland, W., Draijer, N., & Gersons, B. P. R. (2007). Gender differences in posttraumatic stress disorder. *Psychological Bulletin, 133,* 183–204.

Park, C. L., & Blumberg, C. J. (2002). Disclosing trauma through writing: Testing the meaning-making hypothesis. *Cognitive Therapy and Research, 26,* 597–616.

*Park, C. L., Cohen, L. H., & Murch, R. L. (1996). Assessment and prediction of stress-related growth. *Journal of Personality, 64,* 71–105.

*Park, C. L., Mills-Baxter, M. A., & Fenster, J. R. (2006). Posttraumatic growth from life's most traumatic event: Influences of elder's current coping and adjustment. *Traumatology, 11,* 297–306.

Pederson, E. L., & Vogel, D. L. (2007). Male gender role conflict and willingness to seek counseling: Testing a mediation model of college-aged men. *Journal of Counseling Psychology, 54,* 373–384.

*Polatinsky, S., & Esprey, Y. (2000). An assessment of gender differences in the perception of benefit resulting from the loss of a child. *Journal of Traumatic Stress, 13,* 709–718.

Ransom, S., Sheldon, K. M., & Jacobsen, P. B. (2008). Actual change and inaccurate recall contribute to posttraumatic

growth following radiotherapy. *Journal of Consulting and Clinical Psychology, 76,* 811–819.

Rosenthal, R. (1991). *Meta-analytic procedures for social research*. Newbury Park, CA: Sage.

Sears, S. R., Stanton, A. L., & Naoff-Berg, S. (2003). The yellow brick road and the emerald city: Benefit-finding, positive reappraisal coping, and posttraumatic growth in women with early-stage breast cancer. *Health Psychology, 22,* 487–497.

Segerstrom, S. C., Stanton, A. L., Alden, L. E., & Shortridge, B. E. (2003). A multidimensional structure for repetitive thought: What's on your mind, and how, and how much? *Journal of Personality and Social Psychology, 85,* 909–921.

Shay, J. J. (1996). "Okay, I'm here but I'm not talking!" Psychotherapy with the reluctant male. *Psychotherapy: Theory, Research, Practice, Training, 33,* 503–513.

Taku, K., Calhoun, L. G., Tedeschi, R. G., Gil-Rivas, V., Kilmer, R. P., & Cann, A. (2007). Examining posttraumatic growth among Japanese university students. *Anxiety, Stress, & Coping, 20,* 353–367.

*Tashiro, T., & Frazier, P. (2003). "I'll never be in a relationship like that again": Personal growth following romantic relationship breakups. *Personal Relationships, 10*(1), 113–128.

Tedeschi, R. G. (2008, August). Models of posttraumatic growth: Recent developments and misconceptions. In L. G. Calhoun (Chair), *Conceptions and misconceptions of posttraumatic growth*. Symposium conducted at the annual meeting of the American Psychological Association, Boston.

*Tedeschi, R. G., & Calhoun, L. G. (1996). The Posttraumatic Growth Inventory: Measuring the positive legacy of trauma. *Journal of Traumatic Stress, 9,* 455–471.

Tedeschi, R. G., & Calhoun, L. G. (2004). Posttraumatic growth: Conceptual foundations and empirical evidence. *Psychological Inquiry, 15,* 1–18.

Thoits, P. A. (1991). Gender differences in coping with emotional distress. In J. Eckenrode (Ed.), *The social context of coping* (pp. 107–138). New York: Plenum.

Tolin, D. F., & Foa, E. B. (2006). Sex differences in trauma and posttraumatic stress disorder: A quantitative review of 25 years of research. *Psychological Bulletin, 132,* 959–992.

Tomich, P. L., & Helgeson, V. S. (2004). Is finding something good in the bad always good? Benefit finding among women with breast cancer. *Health Psychology, 23,* 16–23.

Treynor, W., Gonzalez, R., & Nolen-Hoeksema, S. (2003). Rumination reconsidered: A psychometric analysis. *Cognitive Therapy and Research, 27,* 247–259.

Vingerhoets, A. J. J. M., & Van Heck, G. L. (1990). Gender, coping and psychosomatic symptoms. *Psychological Medicine, 20,* 125–135.

*Weiss, T. (2002). Posttraumatic growth in women with breast cancer and their husbands: An intersubjective validation study. *Journal of Psychosocial Oncology, 20,* 65–80.

Weiss, T., & Berger, R. (2006). Reliability and validity of a Spanish version of the Posttraumatic Growth Inventory. *Research on Social Work Practice, 16,* 191–199.

SUPPORTING INFORMATION

Additional Supporting Information may be found in the online version of this article:

References Included in the Meta Analysis