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REVIEW ARTICLE

# A Meta-analytic Review of the Relationship Between Posttraumatic Growth, Anxiety, and Depression

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## Abstract

The present meta-analysis consolidated research examining how posttraumatic growth relates to global anxiety and depression. Articles were identified by searching PTSDpubs, PsycINFO, PubMed, and ProQuest Dissertations and Theses databases, as well as searching the reference sections of relevant review articles. Meta-analytic review of 129 included studies indicated that neither overall posttraumatic growth nor its subcomponents were meaningfully associated with symptoms of depression and anxiety when the literature was considered in aggregate, as effect sizes for these relationships were generally weak ($\leq$|.10|) and/or bordered on zero. The moderator analysis indicated significant heterogeneity in effects. The pattern of results indicated that depression was more strongly associated with less posttraumatic growth in samples with cancer compared to samples without cancer, while certain facets of posttraumatic growth were related to greater anxiety in non-cancer samples, though the effect sizes for these relationships remained small. The present findings support the perspective that outcomes representing positive functioning are separable and not dependent on the absence of mental illness. Future research should identify moderators of the relationships between posttraumatic growth and symptoms of anxiety and depression.

**Keywords** Posttraumatic growth · Anxiety · Depression · Meta-analysis

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## 1 Introduction

Traumatic experiences are unfortunately common, with 89.7% of Americans endorsing at least one trauma in their lifetime (Kilpatrick et al. 2013). Following traumatic experiences, some individuals may experience mental health issues such as symptoms of emotional disorders, including posttraumatic stress disorder (PTSD), anxiety, and depression (Boscarino et al. 2014; Galea et al. 2007; Kessler et al. 2008; Schwartz et al. 2015). Yet a large portion of trauma survivors are able to recover (Southwick et al. 2014), and some may even experience positive personal change as a result of traumatic circumstances in the form of posttraumatic growth (PTG; Bonanno et al. 2011; Southwick et al. 2014; Tedeschi and Calhoun 2004). Though symptoms of psychopathology and positive functioning are traditionally assumed to be diametrically opposed, increasing evidence suggests that mental illness and wellness are separable and exist on a dual continuums (Huppert and Whittington 2013; Keyes 2005). Positive and negative outcomes of trauma such as symptoms of mental illness and PTG may even be experienced concurrently (Jin et al. 2014; Lowe et al. 2013). More extensive research has examined how PTG relates to PTSD following traumatic events, suggesting that there may be a positive association between the two outcomes (Shakespeare-Finch and Lurie-Beck 2014). However, fewer studies have examined how PTG relates to other mental health outcomes following trauma, such as anxiety and depression. Thus, the present meta-analyses sought to consolidate prior research examining the relationship between PTG and symptoms of anxiety and depression.

### 1.1 Posttraumatic Growth

Although research has shown that traumatic events can have a negative psychological impact, many survivors experience positive outcomes following trauma. One positive outcome that may occur after a traumatic experience is PTG. Tedeschi and Calhoun (1996) conceptualize PTG as the experience of positive change after a trauma. When people experience a traumatic event, their core beliefs about the world are disrupted (Janoff-Bulman 1989; Schuler and Boals 2016). As survivors process the trauma and its influence on their belief systems, emotional responses, and functioning, they may experience PTG if they are able to resolve challenges and perceive benefits associated with their struggles. Thus, PTG can be considered both a process and eventual outcome of trauma (Tedeschi and Calhoun 1996). PTG is comprised of five distinct domains: relating to others, new possibilities, personal strength, spiritual change, and appreciation of life (Tedeschi and Calhoun 2004). Relating to others consists of positive changes in relationships, such as more meaningful social connections. New possibilities consists of identifying and pursuing new hobbies, interests, and paths in life. Personal strength is related to the perceived capacity to handle stressful situations in the future. Spiritual change occurs when people experience a greater involvement in religious or existential questions. Finally, appreciation of life is a sense of appreciation of the small elements of living that may have gone unnoticed or were taken for granted before the trauma. There is growing evidence that people experience PTG following various types of traumatic events, including natural disasters (Cook et al. 2013), cancer (Cordova et al. 2001), assault (Kleim and Ehlers 2009), combat (Solomon and Dekel 2007) and traffic accidents (Nishi et al. 2010).

Similar concepts have emerged in the literature to describe positive changes in response to traumatic events, such as stress-related growth, benefit-finding, and thriving, which, along with PTG, have been collectively referred to as adversarial growth (Linley and Joseph 2004). However, Tedeschi and Calhoun (2004) highlight notable distinctions between PTG and such related terms. For instance, stress-related growth (Park et al. 1996) encompasses enhancements in social and personal resources more broadly, while also including improvements in coping skills. PTG is considered an ongoing process or an outcome of trauma, as opposed to a way of coping, and is theorized to occur after major crises rather than stress in general (Tedeschi and Calhoun 2004). In addition, Tedeschi and Calhoun (2004) emphasize that PTG refers to actual positive changes in specific domains, as opposed to perceived benefits from adversity indicated by the term benefit-finding (Affleck and Tennen 1996). Finally, Tedeschi and Calhoun (2004) underscore that PTG may necessitate a traumatic experience that shatters fundamental belief systems and thus may coincide with symptoms of distress, which is not captured by terms such as thriving.

### 1.2 Posttraumatic Growth and Distress

Much of the research examining how PTG relates to mental illness after a trauma has focused on symptoms of PTSD. A recent meta-analysis examining the association between PTG and PTSD found that these constructs were positively linearly related, but also demonstrated a stronger curvilinear relationship such that a moderate level of posttraumatic stress symptoms is associated with the greatest degree of PTG (Shakespeare-Finch and Lurie-Beck 2014). Thus, too little distress resulting from a traumatic event may indicate that the event was not significant enough to disrupt one's belief system, while too much distress may preclude positive personal growth. Traumatic events that disrupt one's conceptualization of the world are associated with posttraumatic stress symptoms following the event, but also with greater PTG (Groleau et al. 2013). Some research has suggested that this relationship may be explained by factors such as event centrality, the extent to which a traumatic event acts as a reference point for one's identity and worldview (Berntsen and Rubin 2006). Events that are more central to identity may lead to greater cognitive disruption, which can contribute to distress (e.g. symptoms of emotional disorders such as PTSD) but also PTG (Groleau et al. 2013; Schuettler and Boals 2011).

In addition to PTSD, anxiety and depression are common consequences of exposure to traumatic events (Freedy et al. 1993; Lustig et al. 2004; Suris and Lind 2008), and these symptoms are often comorbid (Ginzburg et al. 2010). In a study comparing traumatized and non-traumatized students, undergraduates who experienced trauma had significantly higher levels of both anxiety and depression, and this relationship was stronger among those who had experienced a greater number of traumatic events (Vrana and Lauterbach 1994). In addition, a history of child abuse was found to be significantly associated with greater lifetime incidence and greater chronicity of both anxiety and depression among adults (Hovens et al. 2012). Among veterans, the rate of comorbidity for PTSD, anxiety, and depression was greater than the rate of PTSD alone (Ginzburg et al. 2010). Furthermore, comorbid symptoms of PTSD, anxiety, and depression were associated with greater distress than PTSD alone among child survivors of Hurricane Katrina (Lai et al. 2015). Thus, examining the relationship between PTG and other trauma-related outcomes such

as anxiety and depression will allow for a more complete understanding of how traumatic events influence mental health.

### 1.3 Anxiety, Depression, and PTG

Studies examining how PTG relates to anxiety and depression have generated mixed results. An earlier meta-analysis suggested that benefit finding and growth following stressors were weakly related to lower levels of depression but unrelated to anxiety (Helgeson et al. 2006). Since then, many more studies have examined the psychological correlates of PTG. In particular, a large number of studies have examined these relationships in cancer populations. A recent meta-analysis examining psychological distress and PTG specifically among cancer patients found that depression demonstrated a weak inverse relationship with PTG while anxiety showed a very weak positive relationship to PTG, which was not statistically significant (Shand et al. 2015). PTG and mental health have also been examined in other specific populations with mixed findings. A review of PTG and mental health among individuals with a serious medical condition reflected inconsistent results, as half of the studies examining PTG and depression found an inverse relationship and half found no significant association between PTG and depression (Barskova and Oesterreich 2009). In addition, some of the studies found a positive relationship between PTG and anxiety, while others found an inverse relationship or no relationship (Barskova and Oesterreich 2009).

While symptoms of anxiety, depression, and PTSD are common among survivors of trauma, PTSD is uniquely anchored to a traumatic event in a way that the other emotional disorders are not. In the Diagnostic and Statistical Manual Version 5 (DSM-5), depression, anxiety, and PTSD are separated in distinct categories (American Psychological Association 2013). Although these disorders share common features and symptoms, PTSD is distinct in its direct association with a necessary Criterion A traumatic event. Despite the prevalence of anxiety and depression following stressors, these disorders are less sensitive and specific to posttraumatic reactions to stressors (Friedman et al. 2011). Survivors may not relate symptoms of anxiety and depression associated with the trauma to the trauma itself, particularly if a greater amount of time has passed since the trauma (NICE 2005). In a study of combat veterans, those with PTSD showed greater physiological reactivity to imaginal exposure to the traumatic event compared to those with non-PTSD anxiety (Pitman et al. 1993). This may suggest that the event itself is more strongly associated to symptoms of PTSD compared to anxiety, which may indicate that anxiety has a weaker association than PTSD with PTG. Further, while depression and PTSD are often comorbid following trauma, depression without PTSD is predicted by different factors than PTSD. In a group of injury survivors, characteristics of the traumatic event predicted PTSD as well as comorbid PTSD and depression, but did not predict depression alone (O'Donnell et al. 2004). This suggests that, similarly to anxiety, depression is less directly related to the traumatic event than PTSD and may show a weaker relationship to PTG compared to PTSD. The literature suggests that while trauma can be a risk factor for the development of PTSD, anxiety, and depression, the three disorders are distinct outcomes. Thus, the relationships between these mental health issues and PTG may differ, possibly due differences in how they are connected to the traumatic event.

### 1.4 The Present Study

Given the mixed findings from studies investigating the relationships between PTG and symptoms of anxiety and depression, the present meta-analysis aimed to synthesize the existing literature examining how global anxiety and depression are associated with the positive outcome of PTG following a variety of traumatic experiences. The present research will also expand on prior reviews by examining the associations between the subcomponents of PTG and these outcomes. We hypothesized that both anxiety and depression would have a weak inverse association with PTG given that symptoms of anxiety and depression are less directly anchored to trauma-related cognitive processing compared to PTG and other outcomes of trauma such as PTSD. Furthermore, because a large portion of the present literature consists of studies conducted with cancer survivors, it is important to consider whether there are any notable differences in these relationships between cancer survivors and survivors of other traumas when reviewing the literature as a whole. Thus, we also aimed to examine whether cancer status is a moderator of the relationships between PTG and symptoms of anxiety and depression. In addition, we examined whether relevant demographic characteristics of the samples (e.g. age and gender) influenced this relationship.

## 2 Methods

### 2.1 Literature Search

A comprehensive literature review was conducted by searching relevant databases (see Fig. 1) for appropriate articles in accordance with PRSIMA guidelines. Searches of PTSDpubs (formerly Published International Literature on Traumatic Stress), PsycINFO, PubMed, and ProQuest Dissertations and Theses online databases conducted in September, 2019 identified a total of 3968 available articles. Search parameters included various combinations of the phrases "anxiety" and "depress*," along with "posttraumatic growth", "post-traumatic growth," "post traumatic growth," and "PTG." Database searches identified these terms within keywords, titles, test or measures, abstracts, and full text when possible. In addition, articles were identified by examining the reference sections of relevant systematic and meta-analytic reviews (Barskova and Oesterreich 2009; Casellas-Grau et al. 2017; Chan et al. 2016; Grace et al. 2015; Habib et al. 2018; Helgeson et al. 2006; Linley and Joseph 2004; Meyerson et al. 2011; Schubert et al. 2015; Shand et al., 2015; Sherr et al. 2011; Turner et al. 2018; Warsini et al. 2014; Zoellner and Maercker 2006). In total, 4553 articles were identified from both online database searches and the reference sections of relevant review articles (before duplicates were removed). Articles that were identified by searching databases or relevant review articles were then screened to determine whether they met the inclusion criteria.

### 2.2 Inclusion and Exclusion Criteria

In order to be included in the meta-analyses studies had to include: (a) a continuous measure of global anxiety or depression, (b) The Posttraumatic Growth Inventory (PTGI; either the complete 21-item version or 10-item short form i.e. Cann et al., 2010; Tedeschi &

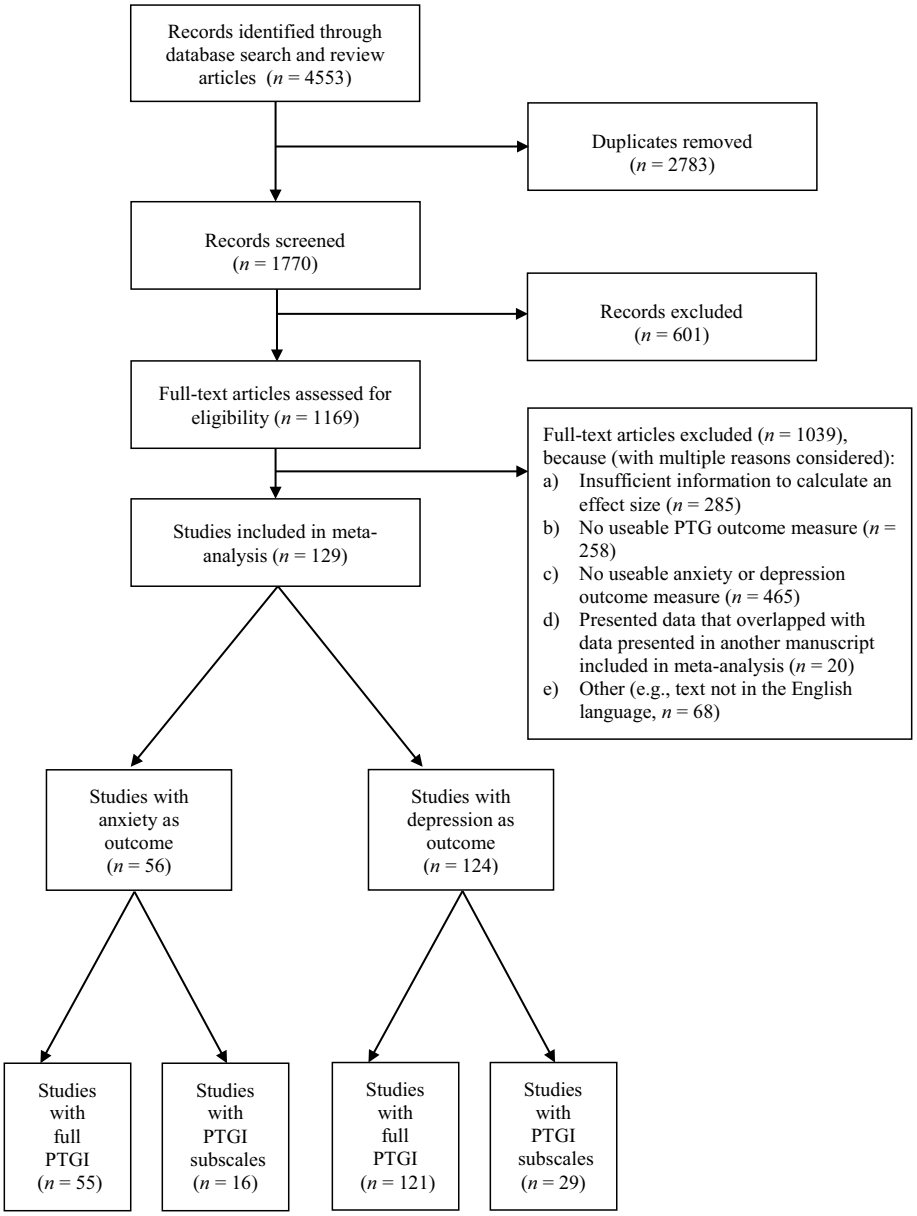


**Fig. 1** PRISMA literature search flow diagram

Calhoun, 1996), (c) text in the English language, (d) a reported Pearson's r cross-sectional effect size (ES) or sufficient information to calculate this ES, (e) and unique data that were not present in full or part in another published study. Figure 1 depicts a flow chart of the

literature search process. A total of 1770 studies were identified through the literature search after duplicates were removed, and 1169 studies passed the screening for potential inclusion. Of these, 129 met inclusion criteria for the meta-analysis.

### 2.3 Coding Procedure

Relevant information from the studies was recorded onto a coding form. This included (a) report information (i.e., full bibliographic reference), (b) publication type (e.g., peer reviewed journal article, dissertation), (c) study design (e.g., treatment outcome, cross-sectional, longitudinal), (d) sample characteristics (e.g., total *n*, mean age, child versus adult, race, clinical versus non-clinical, diagnostic status, trauma type, (e) anxiety measure (e.g., STAIT) (f) depression measure (e.g., BDI-II), (g) Posttraumatic Growth Inventory version (e.g., full or short-form) and (h) ES information. Of the studies identified for further review, 75% were independently coded by two different authors and the agreement rate for study inclusion was 97%. Discrepancies were resolved through discussion.

### 2.4 Converting and Calculating Effect Sizes

Effect sizes characterizing the cross-sectional relationship between total PTG or a PTGI subscale and either global anxiety or depression symptoms were identified during article coding (if longitudinal studies reported more than one cross-sectional ES, the ES from the first measurement timepoint was used).Given that Pearson's correlation coefficient *r* was the most commonly reported ES, other reported ES (e.g. $R^2$ values for univariate regressions) were converted to *r* (Lipsey and Wilson 2001). When correlations for each component subscale of the PTGI were reported without including a correlation for the total PTGI, subscale correlations were averaged to create an ES for the relationship between total PTG and anxiety or depression symptoms.

Afterwards, resulting ES were transformed into Fisher *z* scores in order to address non-normal distribution due to the bounded properties of *r*. Sampling error was also corrected by weighting the Fisher's *z* ES by sample size based on assumptions that ES from larger samples would be more accurate representations of the population statistic. Next, resulting Fisher's *z* ES were weighted in accordance with a random effects model. The resulting weighted mean fisher's *z* ES were then converted back to Pearson's *r* weighted mean ES with 95% confidence intervals (CI). Forest plots and funnel plots were created using the metafor package for R (Version 3.5.3).

Next, we examined the heterogeneity of effects in order to determine whether moderators were likely to influence the strength of the relationships between PTG and global anxiety and depression. A significant *Q* statistic indicated significant variance in an effect, suggesting the presence of moderators. We then examined whether cancer status (i.e., cancer vs. non-cancer sample) and gender (e.g., majority male vs. majority female) moderated the relationships between PTG and global anxiety and depression. We also examined whether age (e.g., adult vs. child/adolescent) moderated the relationship between PTG and total depression (while all included studies described the age characteristics of their samples, only studies examining the relationship between PTG and total depression demonstrated sufficient variability in age to conduct these analyses). All moderator analyses were calculated using the MetaF SPSS Macro developed by Lipsey and Wilson (2001).

## 3 Results

A total of 129 manuscripts were included in the meta-analysis that reported cross-sectional associations between PTG and global anxiety and depression.

### 3.1 Anxiety and Total PTG

Figure2 presents the ES and 95% confidence intervals for individual studies examining the association between anxiety and total PTG. The associations ($r$) between anxiety and total PTG ranged from − 0.54 to 0.54. Based on $k = 55$ studies resulting in a

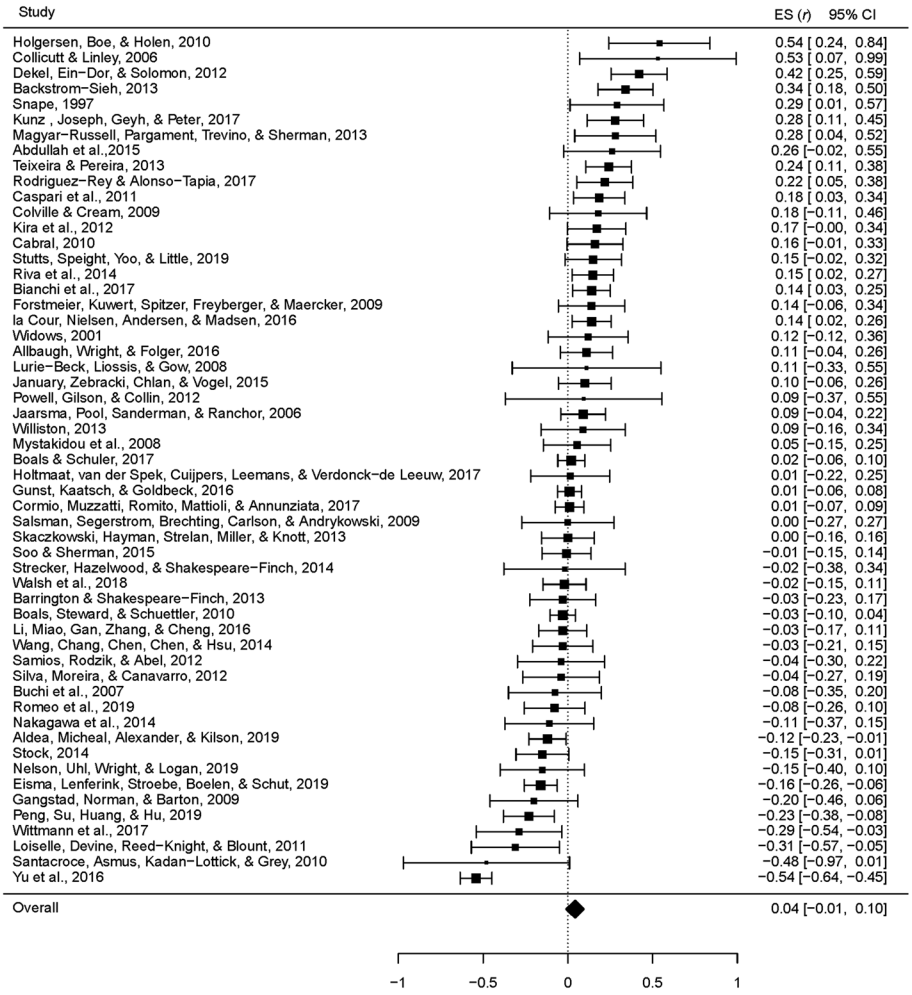


**Fig. 2** Forest plot with anxiety effect sizes

combined sample size of $n = 9425$, the weighted mean ES for the association between anxiety and total PTG was 0.04 (95% CI −0.01: 0.10). Given the very small, non-statistically significant ES, the results suggest that global anxiety and PTG are practically unrelated when the literature is considered in aggregate. The fail safe N for this effect was 184 and a funnel plot with included effects sizes appeared symmetrical (See Supplemental Figure 1), which suggests that this is a robust finding that is unlikely to be due to spurious results associated with publication bias. However, the heterogeneity analysis for the cross-sectional associations indicated significant variance in the ES ($Q = 369.62$, $df = 54$, $p < 0.001$).

### 3.2 Depression and Total PTG

Figure 3 presents the ES and 95% confidence intervals for individual studies examining the association between depression and total PTG. The associations ($r$) between depression and total PTG ranged from -0.53 to 0.47. Based on $k = 121$ studies resulting in a combined sample size of $n = 30{,}550$, the weighted mean ES for the cross-sectional association between depression and total PTG was −0.04 (95% CI −0.07: −0.001. This indicates that depression and PTG are generally unrelated when the literature is considered in aggregate. The fail safe N for this effect was 574 and a funnel plot with ES from included studies appeared symmetrical (See Supplemental Figure 2), which suggest that this is a robust finding that is unlikely to be due to spurious results. Heterogeneity analysis for the cross-sectional associations indicated significant variance in the depression and PTG ES ($Q = 1032.59$, $df = 120$, $p < 0.001$).

### 3.3 Anxiety and PTG Components

Table 1 presents the results of the meta-analytic review of the relationships between anxiety and PTG components (a list of ES and associated 95% CIs from included studies are also available in Figs. 4, 5, 6, 7 and 8). The number of studies ($k$) included in the analyses ranged from 15 to 16, and the combined sample size ($n$) ranged from 2593 to 2652. The weighted mean ES for these relationships were generally small, ranging from 0.03 to 0.10. While all but two of these relationships were statistically significant, the magnitude of the ES indicated generally weak relationships between PTG components and greater anxiety, which are unlikely to hold clinical significance. In addition, the fail-safe Ns and visual inspection of associated funnel plots (See Supplemental Figures 3–7) suggest that these results are unlikely to reflect bias due to unpublished null findings. However, heterogeneity analysis for these associations indicated significant variance in the effect sizes (except for in the case of the association between anxiety and personal strength).

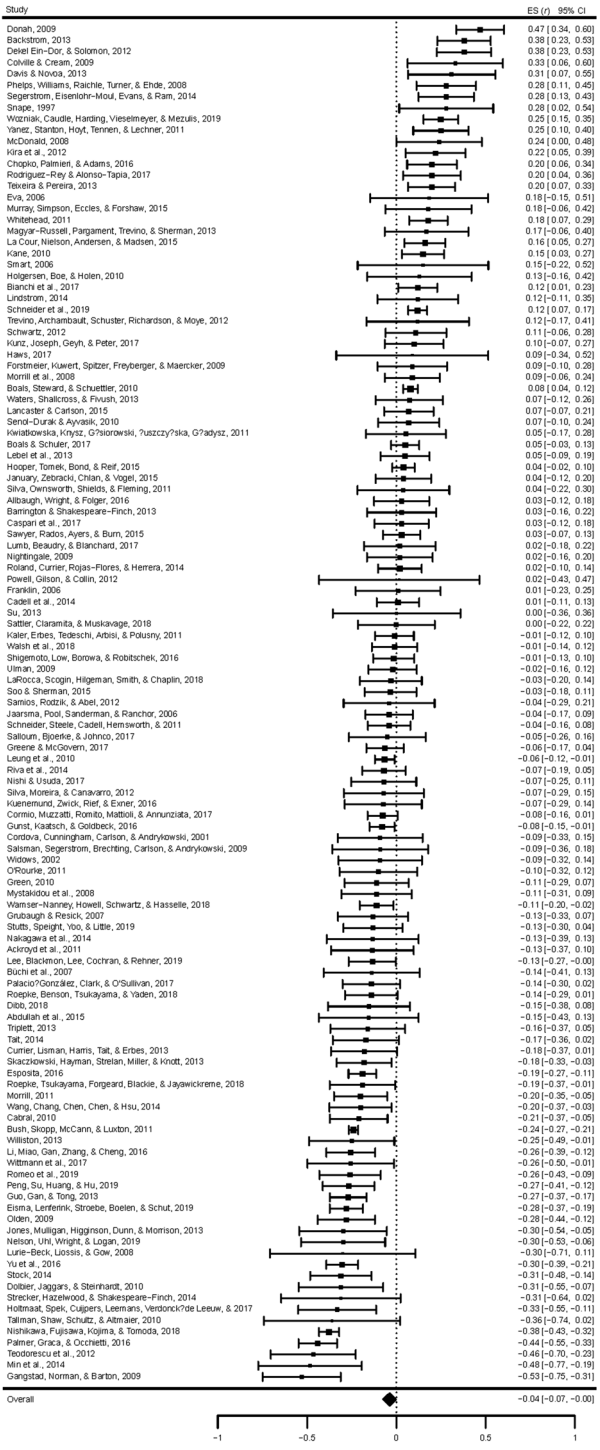


**Fig. 3** Forest plot with total depression effect sizes

**Table 1** Results from the posttraumatic growth components analysis

| Outcomes | *k* | *n* | ES | 95% CI | ES range | Fail-safe *N* | *Q* | *df* | *p* |
|---|---|---|---|---|---|---|---|---|---|
| Anxiety with | | | | | | | | | |
| Relating with others | 16 | 2652 | .07 | .002 .13 | −.14 to .29 | 91 | 36.61 | 15 | < .001 |
| New possibilities | 16 | 2652 | .07 | −.002: .13 | −.13 to .27 | – | 39.89 | 15 | < .001 |
| Personal strength | 16 | 2652 | .03 | −.01: .07 | −.22 to .22 | – | 19.33 | 15 | .20 |
| Spiritual change | 15 | 2593 | .10 | .04: .15 | −.15 to .37 | 132 | 28.17 | 14 | .01 |
| Appreciation of life | 15 | 2593 | .07 | .02: .13 | −.20 to .25 | 93 | 26.71 | 14 | .02 |
| Depression with | | | | | | | | | |
| Relating with others | 28 | 6922 | −.04 | −.11: .03 | −.38 to .25 | – | 213.27 | 27 | < .001 |
| New possibilities | 29 | 7189 | −.01 | −.08: .06 | −.42 to .23 | – | 226.85 | 28 | < .001 |
| Personal strength | 28 | 6922 | −.07 | −.13: −.01 | −.41 to .18 | 225 | 128.15 | 27 | < .001 |
| Spiritual change | 25 | 4644 | .01 | −.03: .06 | −.39 to .23 | – | 55.28 | 24 | < .001 |
| Appreciation of life | 28 | 6939 | −.04 | −.11: .03 | −.40 to .24 | – | 204.61 | 27 | < .001 |

*n* designates the combined sample size for all included studies

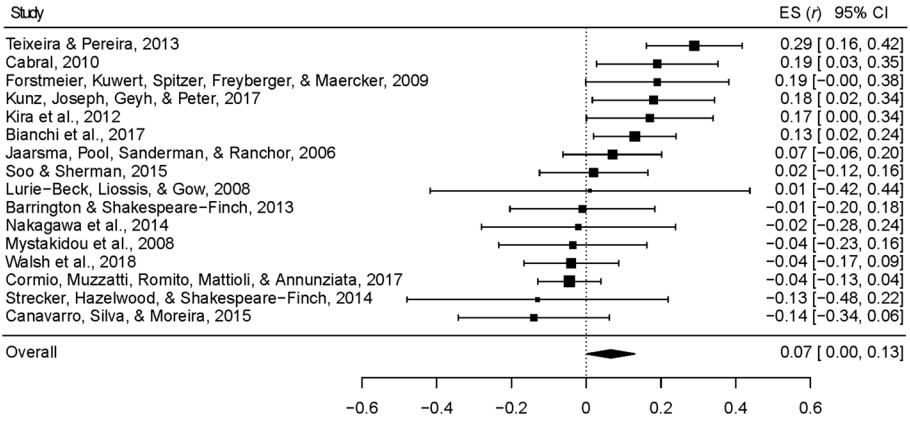


**Fig. 4** Anxiety and posttraumatic growth inventory-relating to others subscale effect sizes

### 3.4 Depression and PTG Components

The results of the meta-analytic review of the relationships between depression and PTG components are also presented in Table 2 (a list of ES and associated 95% CIs from included studies are also available in Figs. 9, 10, 11, 12, 13). The number of studies included in the analyses (*k*) ranged from 25 to 29, and the combined sample size (*n*) ranged from 4644 to 7189. Again, the weighted mean ES for these relationships were generally small, ranging from −0.07 to 0.01, suggesting that PTG components are weakly related with lower levels of depression in general (with the exception of spiritual change, which showed a positive but negligible correlation with depression). In addition, the fail-safe Ns and visual inspection of associated funnel plots (See Supplemental Figures 8–12) suggest that these results are unlikely to reflect bias due to unpublished null findings. Yet heterogeneity analysis for these associations indicated significant variance in the effect sizes.

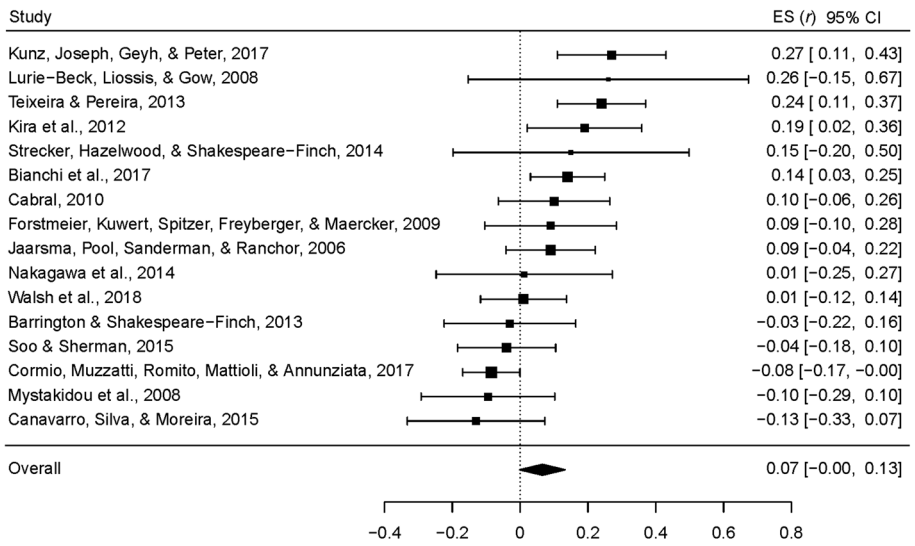


**Fig. 5** Anxiety and posttraumatic growth inventory-new possibilities subscale effect sizes

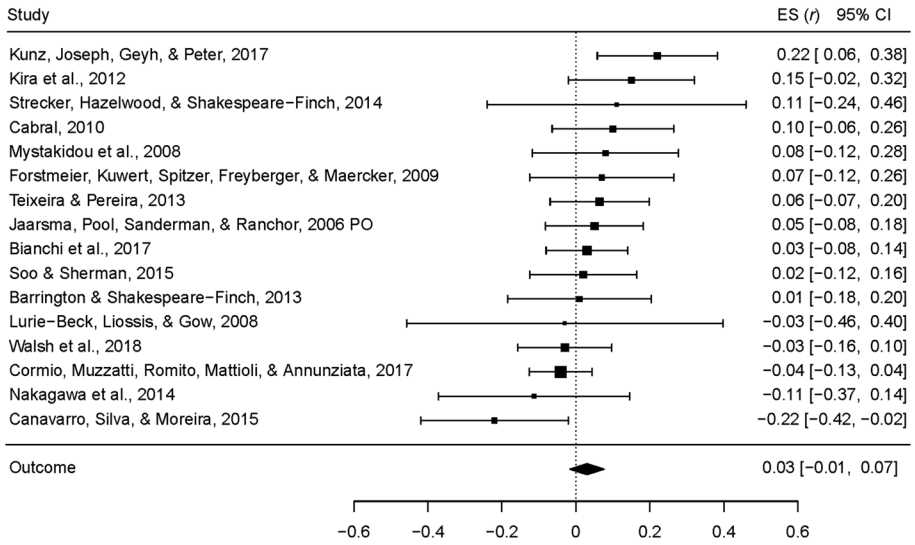


**Fig. 6** Anxiety and posttraumatic growth inventory-personal strength subscale effect sizes

## 3.5 Moderator Analysis

Results from the cancer status moderator analysis are presented in Table 2. The results provided some evidence that the relationships between PTG and symptoms of depression and anxiety were not fully uniform across cancer and non-cancer samples, however, observed differences were relatively small and not definitive. The effect size for the relationship between depression and total PTG was close to zero among individuals without

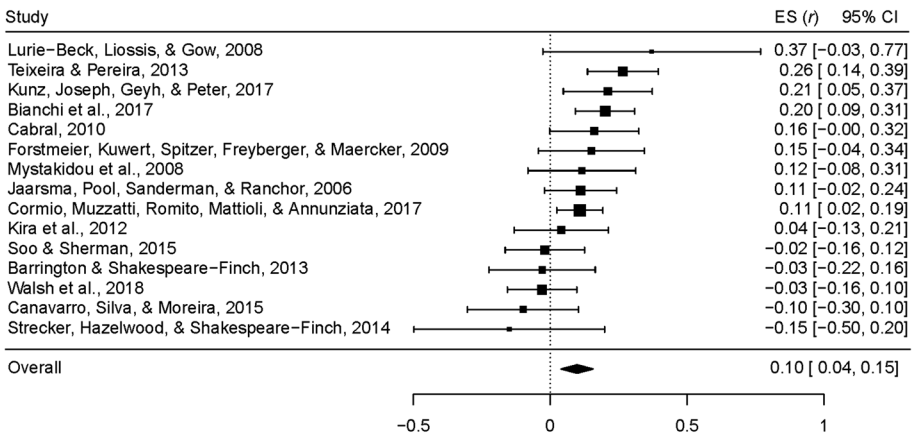


**Fig. 7** Anxiety and posttraumatic growth inventory-spiritual change subscale effect sizes

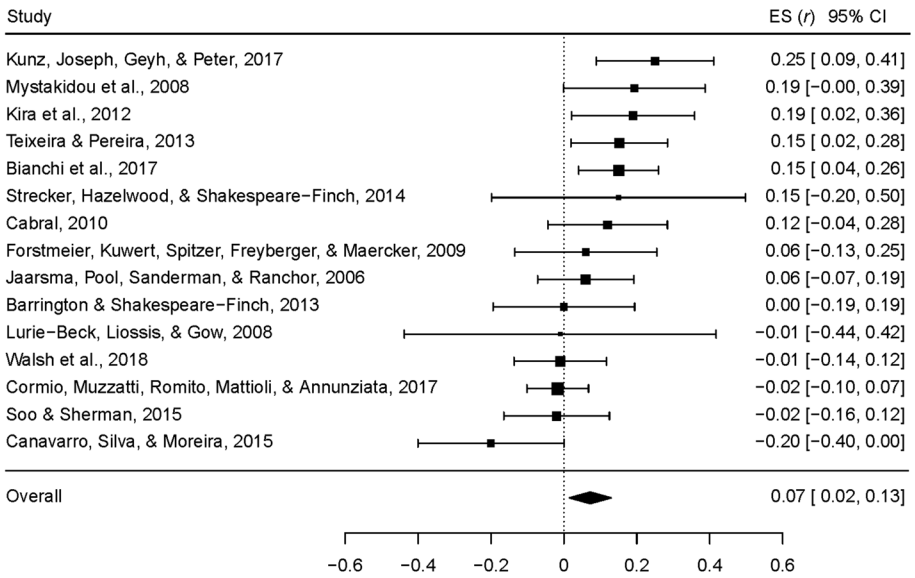


**Fig. 8** Anxiety and posttraumatic growth inventory-appreciation of life subscale effect sizes

cancer ($k=93$, ES $=-0.02$, $-0.06$: 0.02) and was slightly stronger among those with cancer ($k=29$, ES $=-0.10$, $-0.17$: $-0.03$), though still small in magnitude ($Q_B=3.77$, $df=1$, $p=0.05$). When the relationships between depression and specific components of PTG were examined, significant differences between cancer and non-cancer effect did not emerge.

The relationship between anxiety and total PTG did not appear to differ between cancer and non-cancer samples ($Q_B=0.90$, $df=1$ $p=0.34$), however, the findings regarding the

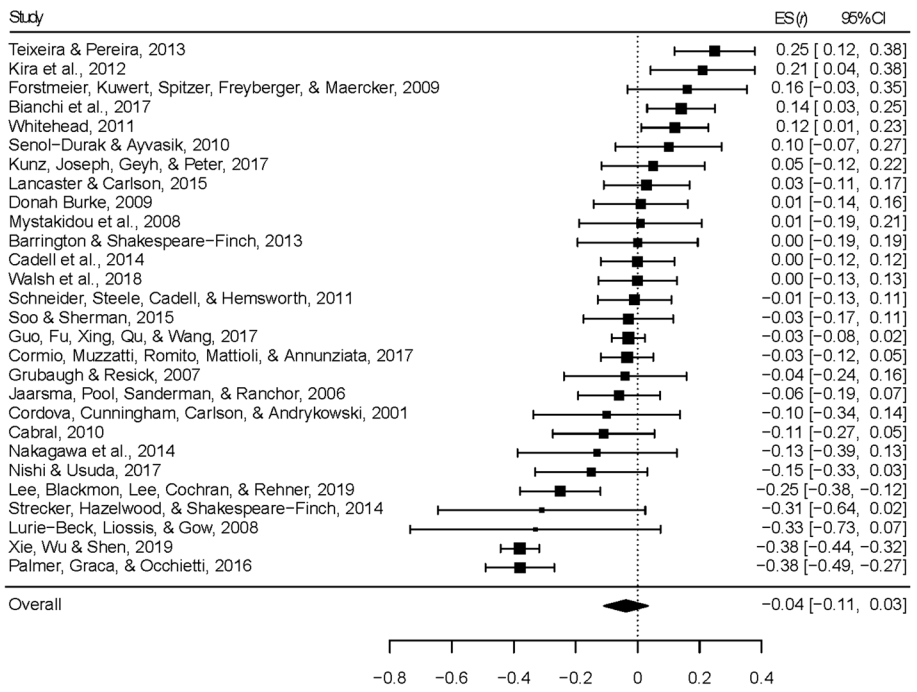


**Fig. 9** Depression and posttraumatic growth inventory-relating to others subscale effect sizes

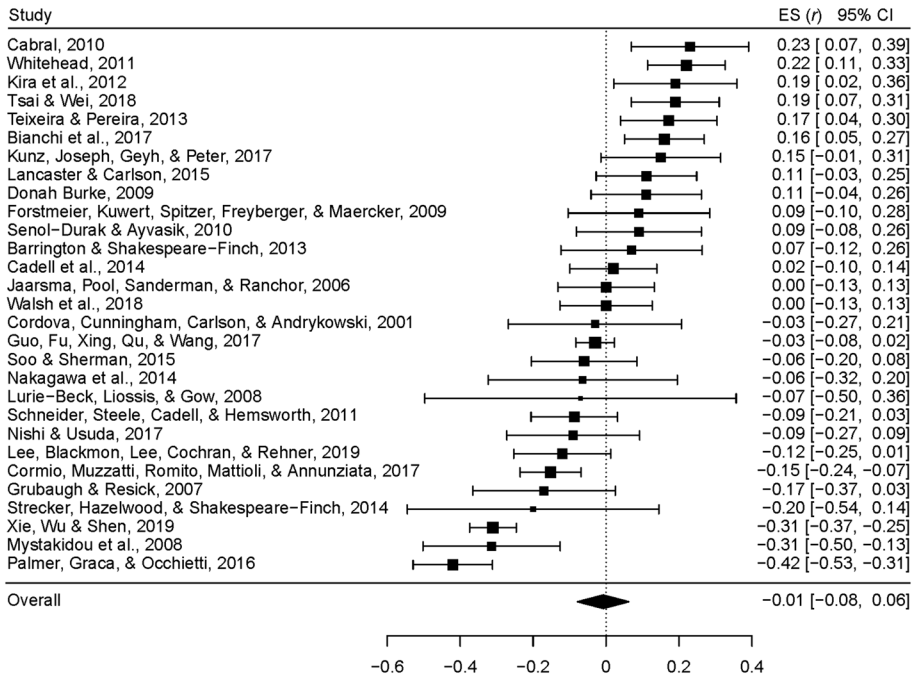


**Fig. 10** Depression and posttraumatic growth inventory-new possibilities subscale effect sizes

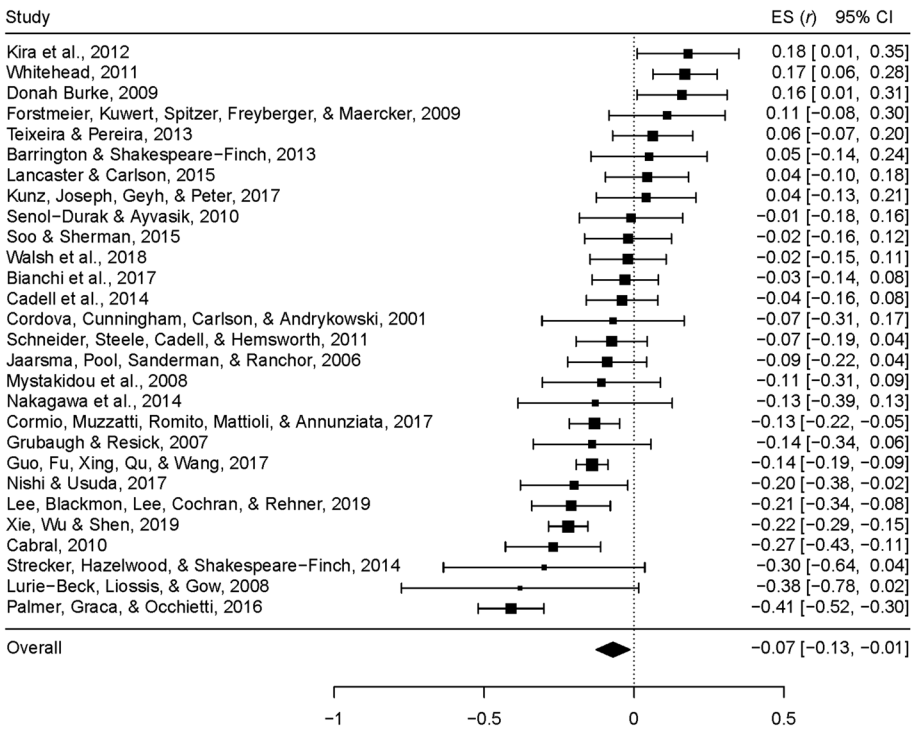


**Fig. 11** Depression and posttraumatic growth inventory-personal strength subscale effect sizes

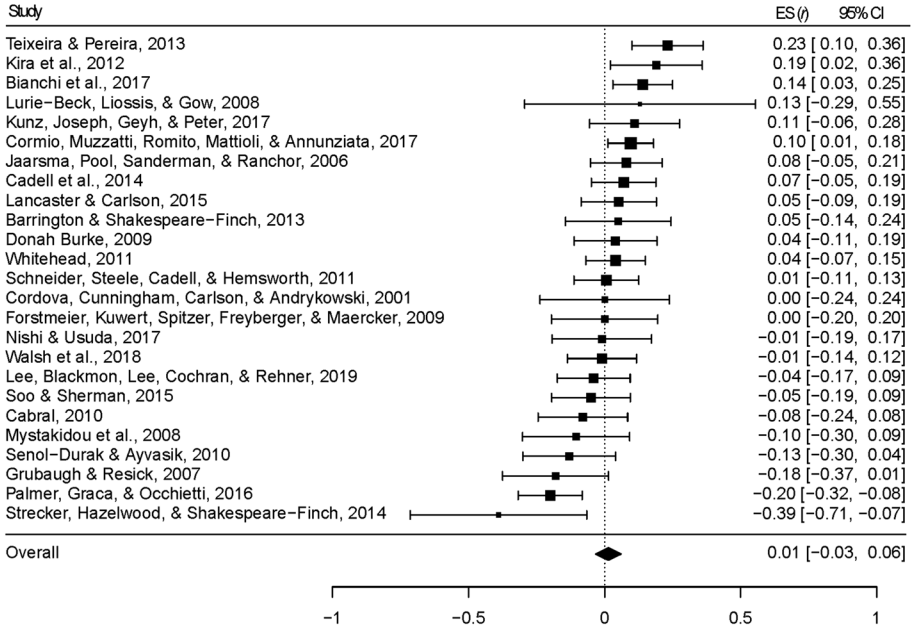


**Fig. 12** Depression and posttraumatic growth inventory-spiritual change subscale effect sizes

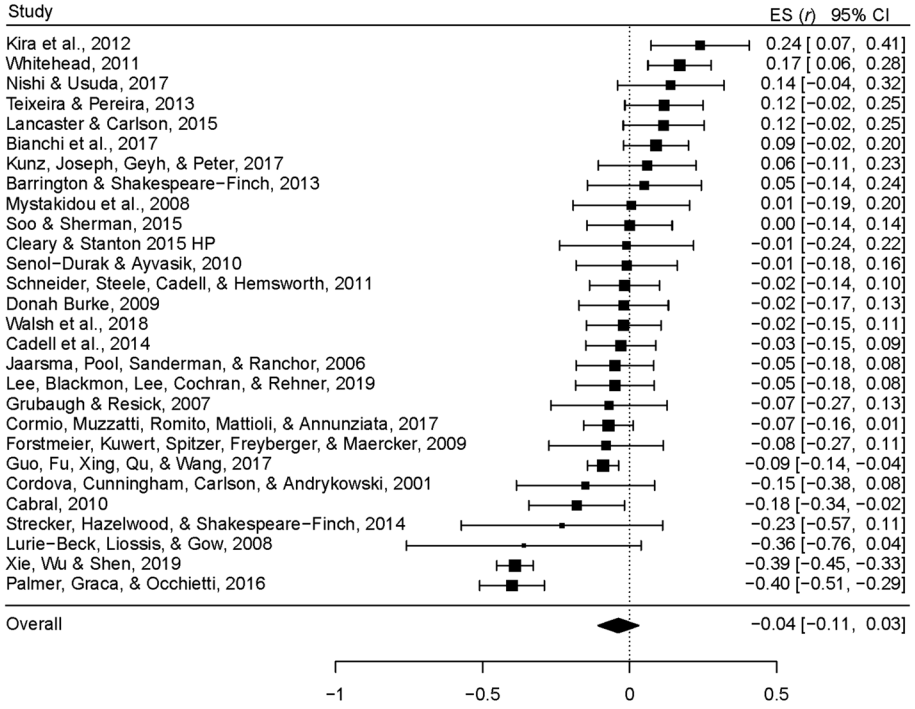


**Fig. 13** Depression and posttraumatic growth inventory-appreciation of life subscale effect sizes

**Table 2** Moderator analysis for cancer versus non-cancer samples

| Outcomes | $Q_T$ | $Q_B$ (*df*) | $Q_W$ (*df*) | Cancer | | | Non-cancer | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *k* | ES | 95% CI | *k* | ES | 95% CI |
| Anxiety with | | | | | | | | | |
| Full PTGI | 50.94 | 0.90 (1) | 50.04 (53) | 21 | .01 | −.08: .10 | 34 | .07 | −.01: .14 |
| Relating with others | 15.45 | 1.99 (1) | 13.46 (14) | 7 | .03 | −.06: .11 | 9 | .11 | .02: .20 |
| New possibilities | 16.68 | 4.05 (1)* | 12.64 (14) | 7 | .01 | −.07: .09 | 9 | .13 | .04: .21 |
| Personal strength | 18.11 | 4.04 (1)* | 14.07 (14) | 7 | −.01 | −.06: .04 | 9 | .08 | .01: .14 |
| Spiritual change | 14.59 | 0.75 (1) | 13.83 (13) | 7 | .07 | −.01: .15 | 8 | .13 | .04: .21 |
| Appreciation of life | 18.46 | 4.90 (1)* | 13.56 (13) | 7 | .02 | −.04: .09 | 8 | .13 | .06: .21 |
| Depression with | | | | | | | | | |
| Full PTGI | 116.53 | 3.77 (1)* | 112.75 (119) | 29 | −.10 | −.17: −.03 | 93 | −.02 | −.06: .02 |
| Relating with others | 20.28 | 0.00 (1) | 20.28 (26) | 7 | −.04 | −.18: .11 | 21 | −.04 | −.12: .04 |
| New possibilities | 22.27 | 0.01 (1) | 22.26 (27) | 7 | −.01 | −.16: .14 | 22 | −.01 | −.09: .08 |
| Personal strength | 28.16 | 0.39 (1) | 27.78 (26) | 7 | −.04 | −.15: .07 | 21 | −.08 | −.14: −.02 |
| Spiritual change | 24.88 | 0.88 (1) | 23.99 (23) | 7 | .05 | −.04: .13 | 18 | .00 | −.06: .06 |
| Appreciation of life | 17.92 | 0.02 (1) | 17.90 (26) | 7 | −.05 | −.19: .10 | 21 | −.04 | −.12: .05 |

*ES* effect size, *PTGI* posttraumatic growth inventory

*$p < .05$,

**Table 3** Moderator analysis for gender

| Outcomes | $Q_T$ | $Q_B$ (*df*) | $Q_W$ (*df*) | Majority male | | | Majority female | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *k* | ES | 95% CI | *k* | ES | 95% CI |
| Anxiety with | | | | | | | | | |
| Full PTGI | 49.63 | 0.98 (1) | 48.65 (51) | 27 | .02 | −.07: .10 | 26 | .08 | −.01: .16 |
| Relating with others | 13.10 | 1.99 (1) | 13.46 (14) | 8 | .05 | −.04: .14 | 8 | .09 | −.13: .18 |
| New possibilities | 15.48 | 3.43 (1) | 12.04 (14) | 8 | .01 | −.07: .10 | 8 | .13 | .04: .22 |
| Personal strength | 15.16 | 1.04 (1) | 14.12 (14) | 8 | .01 | −.05: .07 | 8 | .06 | −.01: .13 |
| Spiritual change | 13.74 | 0.11 (1) | 13.63 (13) | 8 | .09 | .01: .17 | 7 | .11 | .01: .20 |
| Appreciation of life | 15.26 | 2.18 (1) | 13.08 (13) | 8 | .04 | −.03: .11 | 7 | .12 | .04: .20 |
| Depression with | | | | | | | | | |
| Full PTGI | 134.65 | 1.99 (1) | 132.66 (117) | 68 | −.01 | −.06: .03 | 51 | −.06 | −.12: −.01 |
| Relating with others | 20.13 | 0.00 (1) | 20.23 (26) | 19 | −.04 | −.12: .05 | 9 | −.04 | −.17: .09 |
| New possibilities | 22.52 | 0.00 (1) | 22.53 (27) | 20 | −.01 | −.09: .08 | 9 | −.01 | −.14: .12 |
| Personal strength | 26.68 | 0.04 (1) | 26.64 (26) | 19 | −.07 | −.13: .00 | 9 | −.08 | −.18: .03 |
| Spiritual change | 23.81 | 0.00 (1) | 13.81 (23) | 17 | .01 | −.04: .07 | 8 | .01 | −.08: .10 |
| Appreciation of life | 18.97 | 0.18 (1) | 18.79 (26) | 20 | −.03 | −.11: .05 | 8 | −.06 | −.20: .07 |

*ES* effect size, *PTGI* posttraumatic growth inventory

*$p < .05$

relationships between anxiety and the different components of PTG were more mixed. The average ESs were generally greater for samples without cancer than for samples of cancer survivors, but ES were still relatively small in magnitude, ranging from 0.07 to 0.13 among non-cancer samples. The *Q* statistics between cancer and non-cancer samples were statistically significant for the relationships between anxiety and new possibilities, personal strength, and spiritual change, but not relating to others or appreciation of life.

The moderator analysis examining the influence of age on the relationship between depression and PTG did not reflect significant differences between adult and child/adolescent samples. The relationship between PTG and lower levels of depression was stronger in magnitude among child/adolescent samples ($k = 116$, ES = −0.17, −0.32: −0.001) compared to adult samples, in which this relationship bordered on zero ($k = 5$, ES = −0.03, −0.08: 0.00). However the difference between these groups was not statistically significant ($Q_B = 2.46$, $df = 1$ $p = 0.12$; $Q_W = 120.80$, $df = 119$ $p = 0.44$; $Q_T = 123.26$, $df = 120$ $p = 0.40$). In addition, there was no evidence that gender moderated the relationships between PTG and symptoms of anxiety or depression (see Table 3).

## 4 Discussion

The present study meta-analytically reviewed the relationships between PTG and global anxiety and depression. The results indicate that PTG is broadly unrelated to global anxiety and depression when the literature is considered in aggregate. PTG demonstrated a negligible association with greater anxiety and was very weakly related to lower levels of depression, with both effect sizes bordering on zero. While the relationship between PTG and depression was statistically significant, the magnitude of the effect size did not suggest a clinically significant relationship.

The findings regarding the relationships between specific components of PTG and global anxiety and depression were somewhat more mixed, though the magnitude of these associations were also weak (i.e. all $\leq 0.10$) and thus unlikely to hold clinical significance. Generally, components of PTG were weakly related to greater anxiety, and a number of these relationships did not reach statistical significance. The strongest relationship was between anxiety and spiritual change, followed by relating to others and appreciation of life, however, ES were weak and $\leq |.10|$. The relationships between anxiety and other PTG components were not statistically significant. Depression was generally inversely related to components of PTG, but the magnitude of the ES were weak. Only the relationship between depression and personal strength was statistically significant, and the other effect sizes for the relationships between PTG components and depression were $\leq$ |.05|.

Given that a sizable portion of the identified studies included participants effected by cancer, it was important to consider whether there are any differences in the relationships between PTG and symptoms of anxiety and depression within this population compared to other trauma-exposed populations, which could impact the general conclusions drawn from a meta-analytic review of the broader literature. The moderator analysis indicated that these relationships were not completely uniform across cancer and non-cancer samples, but observed differences between these samples were relatively small. Certain components of PTG were more strongly related to anxiety in non-cancer samples compared to cancer samples (i.e. new possibilities, personal strength, and appreciation of life). However, the ES for these relationships were generally small in magnitude. Thus, it is less likely that these distinctions are clinically significant. Furthermore, the results suggest that neither age nor gender moderated the relationships between PTG and symptoms of anxiety and depression, though few studies were conducting using samples of children or adolescents.

The present findings are generally consistent with results from early reviews and the contemporary literature examining how PTG is related to depression and anxiety within specific sub-populations, such as cancer patients (Casellas-Grau et al. 2017). During the previous decade, Helgeson et al. (2006) meta-analytically reviewed the relationship between broader benefit finding behavior (which is was inclusive of PTG) and outcomes including anxiety ($k = 9$) and depression ($k = 17$). The results indicated very weak relationships between benefit finding and both outcomes, which only reached statistical significance for the outcome of depression. While there was a positive association between PTG and anxiety, this effect size was close to zero and not statistically significant. Since this review was published, increasing scientific interest in PTG has spurred a great amount of research in this area, with a considerable number of studies focusing on PTG in the context of cancer. A more recent meta-analysis examining these relationships specifically among cancer survivors found results that were consistent with the present findings, indicating a weak inverse relationship between PTG and depression and a positive but not statistically significant relationship between PTG and anxiety (Shand et al. 2015). Effect sizes for associations between PTG and these mental health outcomes have generally been small to the point of bordering on zero, which likely contributes to fluctuations in the direction of previously observed effect sizes.

The results of the present meta-analytic review contribute to growing evidence that mental well-being and mental illness are not opposite ends of a single spectrum of mental health. Some have expressed skepticism regarding whether positive outcomes such as PTG routinely occur alongside significant struggles with mental illness in the aftermath of a trauma. Yet if PTG and symptoms of mental illness like anxiety and depression represented opposing outcomes following a traumatic event, we would expect to see relatively large, inverse relationships between them upon meta-analytic review. Actual observed effect sizes

were generally small, bordering on zero. These results indicate that the development of PTG is not dependent on whether survivors are free of mental illness.

Though symptoms of anxiety and depression are common outcomes of trauma, the relationship between PTG and another type of emotional disorder, PTSD, has generally received more research attention. Meta-analytic review of this area has indicated a more complicated relationship in which greater symptoms of PTSD are associated with greater PTG, or even a curvilinear relationship in which PTG is greatest at moderate levels of PTSD (Liu et al. 2017; Shakespeare-Finch and Lurie-Beck 2014; Wang et al. 2016). PTSD may be more strongly related to PTG compared to anxiety and depression because both PTSD symptoms and PTG are uniquely positioned in terms of the traumatic event. PTG involves reflecting on changes in important domains after a traumatic event has occurred. PTSD is the only psychological disorder (other than acute stress disorder) in which symptoms are explicitly anchored to a required criterion A traumatic event, and symptom clusters are strongly linked to the trauma. For example, when intrusion symptoms occur, the traumatic event is brought into the forefront of consciousness. Thus, intrusion symptoms may prompt processing of the trauma in a way that general symptoms of anxiety and depression do not. Avoidance of distressing trauma reminders and associated emotions may paradoxically trigger more trauma-related intrusions (Amstadter and Vernon 2006; Shipherd and Beck 2005; Wenzlaff and Wegner 2000). This may prompt trauma-related processing that is necessary for PTG.

While the findings from the current meta-analysis demonstrated very weak associations between PTG and symptoms of depression and anxiety when the literature was considered in aggregate, it would be imprudent to conclude that PTG is unrelated to depression and anxiety in all contexts. The moderator analysis indicated that there was a large degree of heterogeneity in effect sizes across the included studies, and visual examination of their range, magnitude, and direction reflects that they were quite variable as opposed to uniformly bordering zero, which would indicate the presence of generally null relationships. This suggests that other factors may influence how PTG relates to anxiety and depression. It is possible that under certain conditions, PTG is more strongly related to these outcomes, and the direction of the effect could go be positive or negative depending on the circumstances. For example, prior research has indicated that greater symptoms of depression and anxiety are associated with lower levels of PTG when the trauma is perceived as more central to one's identity (i.e. conditions of high event centrality; Berntsen and Rubin 2006; Schuettler and Boals 2011). As previously mentioned, greater event centrality may suggest that the experience of the trauma was more disruptive to core beliefs, which may lead to greater distress but also PTG as the trauma is processed and challenges are resolved. Relatively little research has examined how event centrality influences the development and interrelationships between PTG and symptoms of mental illness other than posttraumatic stress, and this may be a fruitful area of future study.

Additionally, trauma type has been implicated as a potential moderator of the relationship between PTG and PTSD (Shakespeare-Finch and Lurie-Beck 2014) and may also influence the relationship between PTG and other emotional disorders such as anxiety and depression. PTG appears to be more strongly linked to symptoms of PTSD among civilians in conflict zones, survivors of natural disasters, and children, while this relationship is weaker among survivors of sexual abuse and those who are either experiencing or caring for someone with a medical illness. These findings may also be relevant to the relationship between PTG and other emotional disorders. Examining unique aspects posttraumatic functioning after specific types of traumatic experiences is complicated given that traumatic events are relatively common and many experience more than one trauma in

their lifetime. For example, Kilpatrick et al. (2013) found that 89.7% of a national sample of adults endorsed a criterion A trauma, and the modal number of traumatic events participants experienced was 3. Studies examining posttraumatic functioning among trauma-exposed community samples and college students typically reflect exposure to a wide range of trauma types, and even studies that focus on specific trauma-exposed populations indicate that participants have experienced a variety of types of criterion A events. Such studies examining posttraumatic functioning after specific types of trauma or within specific trauma-exposed populations routinely fail to control for prior trauma exposure, including prior exposure to different categories of traumatic events. However, prior trauma appears to increase the risk of developing PTSD after a subsequent traumatic event (Breslau et al. 1999), and trauma exposure early in life has been implicated in the development of other mental health problems such as depression and anxiety disorders (Vitriol et al. 2014). These challenges dilute the capacity for broader meta-analytic reviews to draw meaningfully conclusions about unique aspects posttraumatic functioning after specific types of trauma. Studies examining posttraumatic functioning among specific populations or after specific types of trauma should be mindful about reporting and controlling for prior trauma exposure, which may set the stage for meaningful targeted reviews of post-trauma functioning in specific contexts.

### 4.1 Strengths and Limitations

A major strength of present research was the large number of studies that were included in the meta-analysis. Database search terms were developed to be exhaustive, and a large number of relevant review articles were chosen to identify potential studies for inclusion. In general, the results from the fail safe N analysis provide evidence for the validity of the results and suggest that the present findings were not significantly impacted by publication bias. The present study also extended the findings from previous meta-analytic reviews by examining the relationship between symptoms of emotional disorders and different subcomponents of PTG. Finally, the scope of the present meta-analysis focused on studies using versions of the PTGI, the most widely used measure of PTG associated with the most prominent model of PTG (Steffens and Andrykowski 2015). This approach reduces variability due to differences in measurement and conceptualization of PTG, which has its strengths in light of common criticism regarding inconsistencies in the way positive change after trauma is defined. However, this approach necessarily precludes other research examining how anxiety and depression are associated with other similar or related constructs. Future research may examine the relationships of depression and anxiety with broader stress-related growth and related constructs such a benefit finding using a broader range of measures.

In response to the controversy surrounding the "replication crisis" within the psychological sciences, meta-analysis has been proposed as a way to aggregate and evaluate the validity of findings from individual studies (Sharpe and Poets 2020). However, critics note that meta-analyses may still overestimate the magnitude of effect sizes due to selective reporting bias (e.g., bias due to pressures to publish novel findings and practices such as conducting selective analyses aimed towards produce statistically significant results), and the quality of the results will ultimately depend on the quality of the included studies. While some work has indicated that selective reporting bias is minimal across meta-analytics reviews, problems such as inadequate statistical power of original studies and significant between-study heterogeneity have the potential to limit the conclusions of meta-analyses (Stanley

et al. 2018). Furthermore, correcting for unreliability is one way to address the potentially inflated of effect sizes due to measurement error. However, this method could not be utilized in the present meta-analysis due inconsistent reporting of the internal consistencies for the measures that were included in the individual studies. As a result, the quality of included measures was somewhat unclear. Future studies should make ensure to report internal consistencies for included meausres to aid in later meta-analytic review.

In addition, the scope of the present meta-analysis focused on cross-sectional studies and is therefore bound by the limitations of this research design, which precludes any conclusions regarding causality or directionality of relationships. It remains unclear how symptoms of depression and anxiety are related to PTG over time, which is particularly relevant given that PTG is conceptualized as a process that unfolds as time passes. Furthermore, cross-sectional studies that utilize self-report measures of PTG rely on respondents to retrospectively assess the extent to which they have grown after a trauma, which may be influence by biased recall (Jayawickreme and Blackie 2014). This process is mentally taxing given that it requires respondents to make an accurate assessment of their current level of functioning in a certain domain and then compare it to prior levels of functioning, while also determining the degree of change that has resulted specifically from the trauma (Ford et al. 2008). Thus, survivors may overestimate the amount of growth they experienced after a trauma when directly questioned (Frazier et al., 2009). The majority of studies focusing on PTG have collected data from survivors after trauma exposure given the challenges inherent to conducting prospective research. Yet additional prospective and longitudinal research should be conducted to overcome the limitations of cross-sectional and self-report methods. Studies should utilize additional objective methods for assessing PTG, as well as non-trauma exposed control groups to ensure that genuine posttraumatic growth after a traumatic event is occuring, as opposed to changes related other phenomena such as maturation or the cumulative effects of daily experiences (versus significant life events). (Jayawickreme and Blackie 2014; Jayawickreme and Blackie 2016; Rzeszutek and Gruszczyńska 2018; Tennen and Affleck 2009). This work will be vital given the current debate surrounding the actual or illusory nature of PTG. While Tedeschi and Calhoun (2004) maintain that PTG reflects truth growth in the wake of a trauma, other work has suggested that survivors may be perceiving that they have experienced PTG in the absence of real positive change (Mangelsdorf et al. 2019). Thus, it has been argued that PTG could be conceptualized as an illusory compensation strategy (Maercker and Zoellner 2004) or a method of coping similar to positive re-appraisal (Nolen-Hoeksema and Davis 2004). More longitudinal and prospective research will help clarify the true nature of PTG.

Furthermore, the present meta-analysis focused on cancer vs. non-cancer sample type as a potential moderator of the relationships between PTG and global anxiety and depression due the comparably large literature examining these relationships within this subpopulation. Other potential moderating variables such as trauma type and time since trauma were coded but not included in the analytic plan due to sparse and inconsistent reporting, as well as issues due to the heterogeneity of trauma samples as referenced above. Future research should work to identify moderators that influence the relationship between PTG and global anxiety and depression, such as exposure to specific types of traumatic events and event centrality. These studies must fully report sample characteristics and carefully consider the role of prior exposure to other traumatic events in order to allow for more broad synthesis of findings clarifying how PTG relates to symptoms of emotional disorders. Additional research should also be conducted to determine the relationship between PTG and symptoms of anxiety among children and adolescents. Furthermore, the present study focused on the relationships between PTG and global depression and anxiety more broadly due to a

lack of studies focusing on specific depressive or anxiety-related disorders. Future research may examine whether PTG is more strongly related to symptoms of specific emotional disorders.

## 5 Conclusions

The results from the present meta-analysis indicate that PTG is practically unrelated to global anxiety and depression when the literature is considered in aggregate. While findings regarding the relationships between these symptoms and specific facets of PTG were more mixed, the magnitudes of these associations were also very weak and unlikely to be clinically significant. However, the moderator analysis indicated that there was a significant heterogeneity within the literature, thus, there may be certain conditions under which PTG is more meaningfully related to anxiety and depression. Additional research will help identify influential moderators of this relationship. Nevertheless, the present findings support the assertion that positive and negative outcomes of trauma separable and distinct rather than opposing stages of the recovery process.

**Supplementary Information** The online version contains supplementary material available at https://doi.org/10.1007/s10902-021-00370-9.

**Declaration**

**Conflict of interest** The authors declare that they have no conflict of interest.

**Ethical Approval** As the present research reviewed previously published studies, it did not involve the recruitment of (or data collection from) human or animal subjects.

**Informed Consent** The present research did not necessitate informed consent nor approval from an institutional IRB.

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