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Self-reported Posttraumatic Growth Predicts Greater Subsequent Posttraumatic Stress Amidst War and Terrorism

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Abstract

Background and Objective—This study tested three alternative explanations for research indicating a positive, but heterogeneous relationship between self-reported posttraumatic growth (PTG) and posttraumatic stress symptoms (PSS):a) the third-variable hypothesis that the relationship between PTG and PSS is a spurious one driven by positive relationships with resource loss, b) the growth over time hypothesis that the relationship between PTG and PSS is initially a positive one, but becomes negative over time, and c) the moderator hypothesis that resource loss moderates the relationship between PTG and PSS such that PTG is associated with lower levels of PSS as loss increases.

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All authors declare no conflicts of interest.

Design and Method—A nationally representative sample (N = 1622) of Israelis was assessed at 3 time points during a period of ongoing violence. PTG, resource loss, and the interaction between PTG and loss were examined as lagged predictors of PSS to test the proposed hypotheses.

Results—Results were inconsistent with all 3 hypotheses, showing that PTG positively predicted subsequent PSS when accounting for main and interactive effects of loss.

Conclusions—Our results suggest that self-reported PTG is a meaningful but counterintuitive predictor of poorer mental health following trauma.

Keywords

Posttraumatic growth; resource loss; posttraumatic stress; political violence; terrorism

Conservation of Resources (COR) theory (Hobfoll, 1989, 2011) is one of the leading theories of traumatic stress. Briefly, COR theory emphasizes the role of personal, social, and economic resources in supporting self-enhancement, creating safety, and sustaining well-being (see Halbesleben, Neveu, Paustian-Underdahl, & Westman, 2014 for a review of the empirical literature on COR theory). COR theory proposes that individuals seek to build and retain resources and that stress results from actual or threatened loss of these resources. In traumatic circumstances, those losses are rapid and fundamental to safety and physical integrity. Resource gains can help to offset the impact of resource losses; however, resources losses are believed to have a much greater impact on outcomes than equivalent resource gains. Thus, resource gains are thought to have little direct impact on well-being, but serve a buffering function in the context of resource loss. Based on these principles, COR theory predicts that resource losses due to traumatic stress and the interaction between losses and gains predict individual responses to traumatic events.

Posttraumatic growth (PTG; Tedeschi & Calhoun, 2004) has been conceptualized as a type of positive change that individuals may experience as a result of facing an extremely challenging life event. These changes are seen as more than a return to prior functioning after a period of loss; rather, they are viewed as true gains beyond functioning prior to the event such that individuals experience greater satisfaction and quality of life post-trauma compared to pre-trauma (Linley & Joseph, 2005). This conceptualization would suggest that PTG is an important source of resource gain after trauma that could help to buffer against resource loss. Despite the proposed benefits of PTG, however, two meta-analyses have shown an overall positive relationship between self-reported PTG and posttraumatic stress symptoms (PSS), indicating that those who claim to have higher levels of growth after trauma also report higher levels of distress (Helgeson, Reynolds, & Tomich, 2006; Shakespeare-Finch & Lurie-Beck, 2013). Moreover, Frazier and colleagues (2009) showed that self-reported PTG is largely unrelated to measures of actual positive change after trauma and that self-reported PTG is associated with increased distress from pre- to post-trauma whereas actual growth is associated with decreased distress from pre- to post-trauma. These findings have led investigators to question the construct validity of self-reported PTG. Yet some studies have shown that self-reported PTG is related to lower levels of PSS following trauma exposure as expected (Frazier, Conlon, & Glaser, 2001; Hall et al., 2008; Lev-Wiesel & Amir, 2003). The tenants of COR theory offer several alternative explanations that may

account for conflicting findings regarding the relationship between self-reported PTG and PSS.

According to PTG theorists, growth occurs as a result of a struggle with highly challenging life event. Consistent with this idea, Helgeson and colleagues' (2006) meta-analysis showed that higher event severity was associated with greater PTG. As the severity of an event increases, resource loss is also likely to increase. Thus, one would expect growth and loss to be positively related (i.e., both increasing as event severity increases). According to COR theory and supporting empirical research, resource losses are stronger predictors of outcome than are equivalent resource gains (Halbesleben et al., 2014). Thus, the positive relationship between PTG and distress may be a function of co-occurring losses (i.e., a third variable problem). Prior work suggests that the significant association between PTG and PSS is not explained by co-occurring losses (e.g., Hobfoll et al., 2009); however, PTG and loss have only been examined as predictors of co-occurring PSS in cross-sectional analyses.

The time course of the relationship between PTG and PSS is another important methodological issue that may account for past research findings. Investigators have proposed that PTG may be associated with greater initial distress following trauma, but growth helps individuals to recover from distress over time. In other words, growth may be present immediately after trauma, but needs time to have an effect on an individual's well-being. In the context of COR theory, this would suggest that resource losses after trauma lead to high initial levels of PSS, but PTG may serve as a type of resource caravan that helps individuals to recover over time. In this case, PTG and PSS would be positively correlated soon after trauma, but negatively correlated later in time. Thus, studies examining the cross-sectional relationship between PTG and PSS at different points in time may report different correlations between these variables.

Few existing studies have explored the issue of time in the relationship between PTG and PSS. In their meta-analysis, Helgeson and colleagues (2006) showed that time since trauma was a significant moderator of the relationship between PTG and psychological distress; however, these findings were inconsistent across different measures of distress. One study examining the relationship between PTG and PSS after amputation showed that PTG 6 months after amputation was positively but not significantly associated with PSS 12 months after amputation ($r = .19$; Phelps, Williams, Raichle, Turner, & Ehde, 2008). Two longitudinal studies examining the directional relationship between PTG and PSS, showed that posttraumatic distress predicts greater subsequent PTG but not vice versa (Dekel, Ein-Dor, & Solomon, 2012; Hall, Saltzman, Canetti, & Hobfoll, 2015); however, Dekel and colleagues' (2012) study had a significant methodological limitation in that PTG and PSS were assessed approximately 30 years after trauma exposure. By contrast, another prospective study with soldiers deployed to Iraq showed that perceived PTG 5-months post-deployment predicted higher levels of PSS at 15-months post-deployment when controlling for PSS at 5-months post-deployment (Engelhard, Lommen, & Sijbrandij, 2015). These studies consistently suggest a positive relationship between PTG and PSS over time, however there is conflicting evidence regarding the direction of this relationship. Moreover, none of these studies accounted for the potential impact of loss, suggesting that further examination is warranted.

Another important consideration is the possible role of moderators that may impact the relationship between PTG and PSS. Both meta-analyses (Helgeson et al., 2006; Shakespeare-Finch & Lurie-Beck, 2013) reported significant heterogeneity among the studies used to create the combined effect size, suggesting that important moderators may exist. McMillan and colleagues (1997) showed that perceived PTG moderated the relationship between the severity of trauma exposure and changes in mental health diagnoses over time. For those without PTG, as trauma exposure severity increased, recovery from mental health diagnoses decreased. By contrast, for those with PTG, as trauma exposure severity increased, the amount of recovery from mental health diagnoses increased. These findings are consistent with COR theory in that trauma severity is likely associated with the extent of loss experienced after trauma and the interaction between losses and gains is proposed to predict outcomes following trauma. Specifically, COR theory states that gains should have a more beneficial impact on outcomes as loss increases. This means that the relationship between self-reported PTG and PSS may be positive when resource loss is low, but negative when resource loss is high. This is consistent with the idea that self-reported PTG is likely to be illusory if losses are low because true PTG is only thought to occur following an extremely challenging event. To our knowledge, no studies have examined the interaction between PTG and resource loss as a predictor of PSS.

The purpose of the current study was to examine the 3 proposed hypotheses regarding the relationship between self-reported PTG and PSS in a prospective, nationally representative sample of Israeli Jews and Palestinian Citizens of Israel (PCI) during a time of ongoing conflict. During the course of this study, the threat of political violence was ubiquitous in the course of everyday life. Mass terror alerts were broadcast via cell phone, and political violence was repeatedly discussed in the news media. In the event of an actual rocket or missile attack, warning sirens were activated and individuals had seconds to minutes to seek safety an air raid shelter. During this time of an active attack, cell phone service was shut down and individuals were often unable to contact family and loved ones for hours. Thus, at a national level, nearly all individuals were exposed to the threat of violence and death, which is a defining feature of trauma. In addition to the general salience of threat, many individuals were directly affected by political violence when they or family members were injured or killed, and when they were direct witness to violence and destruction.

To test the 3 competing hypotheses, we examined self-reported PTG, personal and social resource loss (referred to as “loss” throughout this article), and the interaction between self-reported PTG and loss as predictors of PSS in a 3-wave lagged mixed model. The first hypothesis, the *third-variable hypothesis,* states that the positive relationship between PTG and PSS is a spurious one due to co-occurring losses. This first hypothesis would be supported if the association between PTG and PSS was no longer significant after account for plausible confounders such as trauma exposure, and resource loss. The second hypothesis, the *growth over time hypothesis*, states that PTG has an initial positive association with PSS, but predicts lower PSS over time. This second hypothesis would be supported by a significant positive association between PTG and PSS when measured concurrently, and by a significant negative association between PTG and subsequent PTG. The third hypothesis, the *moderator hypothesis,* states that resource loss moderates the relationship between PTG and PSS. This third hypothesis would be supported by the finding

that the relationship between PTG and PSS goes from positive to negative as resource loss increases.

Method

Participants and Procedures

A random telephone survey was conducted to assess a nationally representative sample of Israeli Jews and Palestinian Citizens of Israel (PCI). Stratified random sampling was conducted by ethnic group (i.e., separate strata for Jewish vs. Palestinian residents of Israel). Structured telephone interviews were conducted at three time points (Waves 1 – 3) by an experienced, computerized survey institute using interviewers. Wave 1 was conducted from May 30th to July 18th, 2007, Wave 2 was conducted from November 18th, 2007 to January 31st, 2008, and Wave 3 was conducted from October 28th to November 27th, 2008. Data from waves 2 and 3 of this study have been previously published in an article examining the relationship between social support, alcohol use, and depression (Kane et al., 2014). The data from the current sample are completely independent from the sample reported by Hobfoll and colleagues (2009), which was collected from 2004-2005.

The three waves of data collection were conducted during a period of ongoing violence in Israel; between 2007 and 2009, 3,890 rockets and 3,490 mortar shells were fired from the Gaza Strip into Southern Israel (B'Tselem, 2013). The third wave of data collection occurred just prior to Operation Cast Lead, a three-week conflict in the Gaza strip, which was the response to consistent rocket fire by Hamas from 2001-2008. Oral informed consent was obtained from study participants before beginning the survey questions. A structured survey was originally written in English, then translated and back-translated into Hebrew, Arabic, and Russian. Interviews were conducted by native speakers in Hebrew, Arabic, or Russian. This study was approved by the institutional review boards of the University of Haifa, Kent State University, and Rush University Medical Center.

The first wave included a total of 1622 respondents (1365 Jews and 257 Palestinian Citizens of Israel [PCI]). This represented 68% of eligible respondents, which compared favorably to a previous study using the same methodology (57% response; Johnson et al., 2009). The second and third waves included 1292 (1103 Jews, 189 PCI) and 1178 respondents (1042 Jews, 155 PCI), respectively. Participants were contacted at wave 3 regardless of whether they participated at wave 2. The overall retention rate was high with 70% of individuals from Wave 1 completing all three interviews (n = 1132). Demographic and descriptive characteristics of this sample are presented in Table 1. Using a cutoff score of 14 on the PTSD Symptom Scale (Coffey, Gudmundsdottir, Beck, Palyo, & Miller, 2006), 18.8% of participants had probable PTSD at wave 1, 14.5% of participants had probable PTSD at wave 2, and 12.1% of participants had probable PTSD at wave 3. Among those who endorsed direct trauma exposure, 22.7% had probable PTSD at wave 1, 18.2% had probable PTSD at wave 2, and 14.5% had probable PTSD at wave 3. There are few reports of 3 waves of data in a zone of conflict in the stress literature.

Measures

Demographic variables and variables assessing perceived threat were assessed at Wave 1. All other variables were assessed at each of the three time points. The Cronbach's alphas for the predictor and outcome variables are reported in Table 2.

Descriptive variables

Demographic variables: Demographic variables included sex, marital status, age, education, ethnicity (Jewish or PCI), language, immigration status (dichotomized based on whether or not the individual immigrated from the Former Union of Soviet Socialist Republics (USSR) after 1989), and income in relation to the average monthly household income.

Exposure to terrorism: At wave 1, participants were asked to report whether they had ever experienced any of the following: witnessing or being exposed to a terror or rocket attack, being seriously injured in an attack, and/or death or injury of a person close to them as a result of terror or rocket attacks (Hobfoll et al., 2009). At waves 2 and 3, participants were asked whether they had experienced one of these events in the past 6 months. These variables were dichotomized as having experienced one of these events or not.

Predictor variables

Posttraumatic growth: Ten items of the COR-Evaluation scale (Hobfoll & Lilly, 1993) were used to assess self-reported posttraumatic growth (COR-PTG-10) in a terrorism context. Participants were asked to report "to what extent have you gained any of the following things… as a result of the terror or rockets" on a scale of 0 *(Did not gain at all)* to 3 *(Gained to a very great degree)*. The ten items were summed to create an overall score of self-reported PTG with higher scores indicating higher levels of perceived growth (potential range from 0 to 30). Participants were asked about potential gains in the past year at wave 1 and the past 6 months at waves 2 and 3. Similar to the most commonly used measure of PTG, the Posttraumatic Growth Inventory (PTGI; Tedeschi & Calhoun, 1996), the COR-PTG-10 has items that capture 5 domains of perceived growth including relating to others, new possibilities for one's life, personal strength, spiritual change, and appreciation for life. A validation study of the COR-PTG-10 showed had very high zero-order and disattenuated correlations with the PTGI (r = .82 and .88, respectively), indicating that they measure overlapping constructs (Siedjak, Zalta, Hobfoll, & Hall, 2015). Moreover, the COR-PTG-10 demonstrated strong psychometric properties with good internal reliability, discriminant validity, and a single factor structure (unpublished data available upon request). For the current study, Cronbach's alpha for the COR-PTG-10 was high at all three time points (α = .92-.94), indicating good internal reliability.

Personal and social resource loss: Nine items were used to assess loss of personal and social resources in a terrorism context. These items were selected from the COR-E (Hobfoll & Lilly, 1993) and items recommended by the National Institutes of Health Office of Behavioral and Social Science Research to measure the impact of terrorist attacks (National Institutes of Health). This measure asked participants "to what extent have you lost any of the following things… as a result of the terror or rockets." The questionnaire included items

such as “The feeling that you are a successful person,” “The feeling that you have control over your own life,” and “Stability of your family.” Answers for the items ranged from 0 (*Did not lose at all)* to 3 *(Lost to a very great degree).* The nine items were summed to create an overall score of personal and social resource loss with higher scores indicating higher levels of loss (potential range from 0 to 27). Participants were asked about potential losses in the past year at wave 1 and the past 6 months at waves 2 and 3. Similar measures of personal and social resource loss have been used extensively in studies of terrorism in Israeli (e.g., Hobfoll et al., 2009) and have demonstrated strong psychometric properties. Cronbach's alpha for this measure was high at all three time points (α = .90-.91), indicating good internal reliability.

Outcome variable

Posttraumatic stress symptoms: Symptoms of posttraumatic stress were assessed with the 17-item PTSD Symptom Scale (Foa, Riggs, Dancu, & Rothbaum, 1993). Participants indicated the severity of their symptoms in relation to their exposure to terror or rocket attacks. Items were answered on a 3-point scale ranging from 0 *(Not at all)* to 3 *(Extremely).* We refer to these as posttraumatic stress symptoms (PSS) because diagnostic levels of posttraumatic stress disorder were not assumed. Cronbach's alpha for this measure was high at all three time points (α = .90-.92), indicating good internal reliability.

Statistical Approach

Preliminary analyses were conducted to examine the univariate associations between PTG, loss, and PSS at each of the three time points. We used Meng and colleagues' (1992) procedure for comparing correlation coefficients to examine whether loss was more strongly associated with PSS than PTG.

Based on COR theory and the existing empirical literature, we examined a series of potential covariates that were likely to impact the development of PSS in this sample. For demographic characteristics, we focused on ethnicity (Jewish vs. PCI) and sex (male vs. female) because of previous research demonstrating that Palestinian Citizens of Israel report higher rates of PSS than Jewish citizens (e.g., Hobfoll et al., 2009) and women report higher rates of PSS than men (Tolin & Foa, 2006). We also examined a series of characteristics that were likely related to individuals' personal and financial resources including immigration status (dichotomized based on whether or not the individual immigrated from the Former USSR after 1989), marital status (dichotomized as married or cohabitating versus not married or cohabitating), education (dichotomized as high school or less versus greater than high school education), and income (dichotomized as less than average income versus average income and above)[1]. Finally, we considered direct exposure to rocket attacks as an important predictor of PSS. Marital status was not related to PSS at wave 1 and was therefore excluded from subsequent analyses ($p = .57$). All other potential covariates were significantly related to PSS at wave 1 ($ps < .05$) and were therefore included in the primary analyses.

[1]Language was not examined as a potential covariate because it is completely collinear with ethnicity and immigration status.

To examine PTG and loss as predictors of future changes in PSS, we conducted a lagged mixed model in which PTG and loss at waves 1 and 2 predicted PSS at waves 2 and 3 (Diggle, Heagerty, Liang, & Zeger, 2004). Time was included as an indicator variable in the model to assess PSS change between wave 2 and 3. Mixed models work under an assumption of data missing at random; thus, individuals were included in the model if they had a time 2 or 3 PSS score (N=1120; Dempster, Laird, & Rubin, 1977). Sensitivity analyses were conducted to test the impact of missing data on the model results. The coefficient for time was the only variable impacted by missing data, suggesting that the relationships between PTG and PSS were not affected by missing data. In addition to examining the main lagged effects of PTG and loss, we used interactions of lagged PTG and loss at waves 1 and 2 to understand the impact of this interaction on PSS changes in the subsequent time periods. Several baseline covariates were included in the model including male sex, ethnicity, education, income, and immigration status. Trauma exposure was included as a time-varying covariate in the model. A sensitivity analysis was conducted to ascertain whether the model held in the subsample that reported direct trauma exposure at time 1; trauma exposure was removed from this model as a covariate. All models were calculated using SAS software Version 9.3 (SAS Institute Inc, 2011).

Results

Preliminary Analyses

The estimated correlations between PTG, loss, and PSS based on multiple imputation with 5 imputed data sets (Barnard & Meng, 1999) are presented in Table 2. PSS was significantly and positively correlated with both PTG and loss at all time points, meaning that greater levels of PSS were associated with higher levels of self-reported PTG and loss. Within a given wave, these relationships were generally moderate in size (PSS with PTG r = .406-.451; PSS with loss r = .503-.629). PTG and loss were also significantly and positively correlated (r = .381-.403 within each wave). Based on the procedure for comparing correlation coefficients (Meng et al., 1992), the correlations between PSS and loss were significantly larger than the correlations between PSS and PTG at all three time points (all p<.05).

PTG and Loss as Predictors of Subsequent PSS

Results from the lagged mixed model are presented in Table 3. Higher levels of PTG at waves 1 and 2 were associated with higher subsequent PSS at waves 2 and 3 (Estimate = 0.125; SE=0.027; p<0.0001). Similarly, higher levels of loss at waves 1 and 2 were associated with higher subsequent PSS at waves 2 and 3 (Estimate=0.509; SE=0.067; p<0.0001). The interactions between PTG and loss at waves 1 and 2 were also significant predictors of PSS at waves 2 and 3 (Estimate= -0.016; SE=0.004; p<0.0001). A depiction of this interaction is displayed in Figure 1 in which the relationship between PTG and PSS is plotted for the 0^{th}, 75^{th} and 90^{th} percentile of scores on loss. Linear contrasts were used to establish whether each of the three lines in the figure were significantly different from 0. At the 0^{th} percentile of loss, there was a significant positive relationship between PTG and PSS (p < .0001). At the 75^{th} and 90^{th} percentiles of loss, the relationship between PTG and PSS was non-significant (p = 0.11 and 0.34, respectively). Thus, this interaction indicates the

relationship between PTG and PSS gets weaker as loss increases such that the relationship between PTG and PSS goes from a positive relationship to a null relationship as loss increases.

Sensitivity Analysis of Participants with Direct Trauma Exposure

A sensitivity analysis was conducted with a subsample of participants with direct exposure to political violence (n = 441). Relationships among PTG, loss, and PSS within the directly exposed subsample were comparable to those found in the full sample. Higher levels of PTG at waves 1 and 2 were associated with higher subsequent PSS at waves 2 and 3 (Estimate = 0.109; SE=0.046; p=0.018). Similarly, higher levels of loss at waves 1 and 2 were associated with higher subsequent PSS at waves 2 and 3 (Estimate=0.583; SE=0.108; p<0.0001). The interactions between PTG and loss at waves 1 and 2 were also significant predictors of PSS at waves 2 and 3 (Estimate= -0.015; SE=0.007; p<0.026).

Discussion

We used a longitudinal, nationally representative sample of Israeli Jews and PCI to test 3 alternative explanations that could account for the overall positive, but heterogenous relationship between self-reported PTG and PSS. Our findings were inconsistent with all 3 proposed hypotheses: PTG and loss were independent predictors of subsequent PSS when examined concurrently, inconsistent with the *third-variable hypothesis*; higher levels of PTG predicted greater subsequent PSS, inconsistent with the *growth over time hypothesis*; and the relationship between PTG and PSS went from a positive relationship to a null relationship as loss increased, inconsistent with the *moderator hypothesis*. Our model controlled for trauma exposure and other potential confounds, suggesting that self-reported PTG was a robust predictor of PSS in this sample. Our findings are consistent with the majority of evidence indicating a positive relationship between self-reported PTG and PSS (Frazier et al., 2009; Hall et al., 2010; Helgeson et al., 2006; Hobfoll et al., 2009; Shakespeare-Finch & Lurie-Beck, 2013) and extend these results by demonstrating that higher levels of self-reported PTG are not only concurrently associated with higher levels of PSS, but are also associated with increased PSS over time. Moreover, sensitivity analyses indicated that these processes occur among those exposed to political violence more broadly as well as those who are directly exposed.

Our results, along with past research findings, suggest that self-reported PTG captures something counterintuitive, but meaningful and can be used as an indicator of who is likely to develop posttraumatic stress symptoms following trauma. Hobfoll and colleagues' revision to COR theory, the Action-Focused growth model (Hobfoll et al., 2007) proposes that PTG can be beneficial if it is ultimately translated into personal and social actions that serve to restore feelings of safety, control, and competency. However, if perceived PTG only reflects cognitive attempts to find meaning following a traumatic event without corresponding behavioral changes, then it merely serves as form of illusory coping, which is likely to have a detrimental impact on well-being. In support of this model, Frazier and colleagues (2009) showed that self-reported PTG was associated with positive reinterpretation coping whereas actual growth was not. Our findings add to the controversy

surrounding the validity of retrospective measures of perceived PTG and whether they reflect actual growth. There are several reasons why retrospective self-report measures may have poor construct validity and these alternatives have different implications for improved measurement strategies. Jayawickreme and Blackie (2014) outline 5 steps required to determine one's posttraumatic growth: (i) deduce one's standing after the trauma, (ii) recall one's standing prior to the trauma, (iii) compare these standings, (iv) assess the degree of change, and (v) evaluate the degree to which change was due to the traumatic event. Individuals may have biased perceptions in any one of these steps. It is also possible that individuals may be responding to demand characteristics based on the way the questions are posed. Further research is needed to develop valid measures of actual growth including action-based growth. This would enable researchers to evaluate the extent to which this type of growth helps to buffer individuals against distress after trauma and determine characteristics that predict who is likely to translate growth into action.

We found a significant interaction between self-reported PTG and loss predicting subsequent PSS. Our findings suggest that high levels of loss predict high levels of subsequent PSS regardless of the level of PTG. Similarly, high levels of PTG appear to predict high levels of subsequent PSS regardless of the extent of loss. If there were no significant interaction between PTG and loss, we would expect that high levels of both PTG and loss would lead to higher levels of PSS as compared to having a high score on one predictor and a low score on the other predictor. These findings suggest that having low levels of loss is not protective against PSS if PTG is high and vice versa. The magnitude of this interaction was small compared to the main effects of PTG and loss on subsequent PSS, suggesting that the interaction between PTG and loss was significant but had a minimal impact on subsequent PSS in this sample. Further examinations of the interaction between PTG and loss are warranted, particularly in samples with higher average levels of PTG and loss and measures of actual growth following trauma.

Our findings do not imply that positive change after trauma does not occur or that true positive changes are not beneficial, but rather that true positive changes are likely to be rare in certain contexts and that individuals have difficulty ascertaining the extent to which they have experienced actual growth. Moreover, our findings suggest that maintaining a positive illusion of growth can have a detrimental impact on individuals. This raises the question as to whether it would be beneficial to give individuals feedback as to the growth or depreciation that they experienced as a result of trauma and the impact that this feedback would have on subsequent behaviors and symptoms. If maintaining a positive illusion is likely to exacerbate symptoms and prevent recovery, eliminating this illusion may have positive effects. Consistent with the aims of evidence-based treatments for posttraumatic stress disorder and depression, the active and direct confrontation of distress enables the individual to re-engage in meaningful living and stop the cycle of resource loss (Cahill & Foa, 2007; Carvalho & Hopko, 2011). These clinical implications are highly speculative and warrant further investigation; however, it is clear that attempts to promote perceptions of growth in clinical settings are premature.

Our results are consistent with one previous study in which PTG prospectively predicted PSS (Engelhard et al., 2015) and conflict with findings from two previous studies in which

PSS predicted increases in PTG over time but not vice versa (Dekel et al., 2012; Hall et al., 2015). Dekel and colleagues (2012) assessed changes in PTG and PSS over a 5-year period (from 2003 to 2008) among Israeli veterans who participated in the Yom Kippur War approximately 30 years prior. Thus, it is quite likely that sampling differences account for conflicting results with this study. It is surprising that our results differed from Hall and colleagues (2015) as both studies examined a nationally representative sample of Israelis and Palestinians during a period of increased terrorism. It is possible that our modeling of loss and adjustment for potential confounding variables in the current study may have contributed to the differences in our results. Ideally, research is needed that captures individuals both before and immediately after trauma using frequent assessments to capture what is likely a dynamic relationship between PTG and PSS in the aftermath of trauma.

The average ratings of self-reported PTG, loss, and PSS were low in this sample. However, the correlations between self-reported PTG, loss, and PSS were on par with previous research (e.g., Hall et al., 2010; Heath, Hall, Canetti, & Hobfoll, 2013), suggesting that the relationships between these variables were similar across samples. It is also important to note that resilience to trauma is in fact the norm. In the National Comorbidity survey, the conditional probably of PTSD based on the “worst” traumatic event was approximately 8% for men and 20% for women (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). More recent national estimates report that the conditional probability of DSM-5 PTSD was 9.3% (Kilpatrick, Resnick, Milanak, Miller, Keyes, & Friedman, 2013). These rates are consistent with the rates of probable PTSD in our study. Moreover, our rates of probable PTSD were not dramatically different between those with and without direct trauma exposure, providing further evidence that living in a conflict zone during a period of ongoing violence is traumatogenic. Our study is advantageous in that it reports how terrorism is likely to impact rates of self-reported PTG, loss, and PSS in a nationally representative sample during a period of terrorism and political conflict; however, our findings should be replicated in samples with higher rates of direct trauma exposure to determine whether the pattern of results holds in other samples with different types and higher rates of trauma. Future studies on PTG may also benefit from an assessment of life events that lead to “shattered assumptions,” i.e., events that alter individuals' beliefs that the world is predictable and benevolent, rather than simply trauma exposure to more closely evaluate the theory underlying PTG.

This study had a number of limitations that should be considered when interpreting our results. One major limitation of this study is that we had no behavioral measures to determine the extent to which growth resulted in action. Thus, we were not able to evaluate the Action-Focused Growth model. Another limitation to consider is that posttraumatic stress is just one type of psychological adjustment following trauma. In the meta-analysis by Helgeson and colleagues (2006), the relationship between PTG and distress differed based on the outcome variable assessed. Examining the prospective relationship between PTG and different outcomes of distress and well-being would lend confidence to these results. Finally, it is possible that our results do not extend to other traumatized samples. We examined the relationship between PTG and PSS in a sample of individuals exposed to ongoing conflict. Thus, it is possible that ratings of PTG and PSS at different time points are in reference to different trauma exposures. However, it is notable that new trauma exposure was uncommon

at waves 2 and 3 (less than 5% of the sample at each time point) and our findings were consistent with recent meta-analytic results (Helgeson et al., 2006; Shakespeare-Finch & Lurie-Beck, 2013) and other prospective work (Engelhard et al., 2015).

Despite these limitations, our study is among the first to examine self-reported PTG as a prospective predictor of PSS in a large, nationally representative sample. Our findings caution against the promotion of perceived growth in traumatized individuals without further research indicating how perceived growth could be effectively used to buffer against experiences of loss due to trauma exposure. Such research will need to conduct prospective assessments, measure growth after trauma using multiple methods, and examine these constructs in different trauma contexts to clarify when and for whom PTG will have salutatory versus detrimental effects on well-being.

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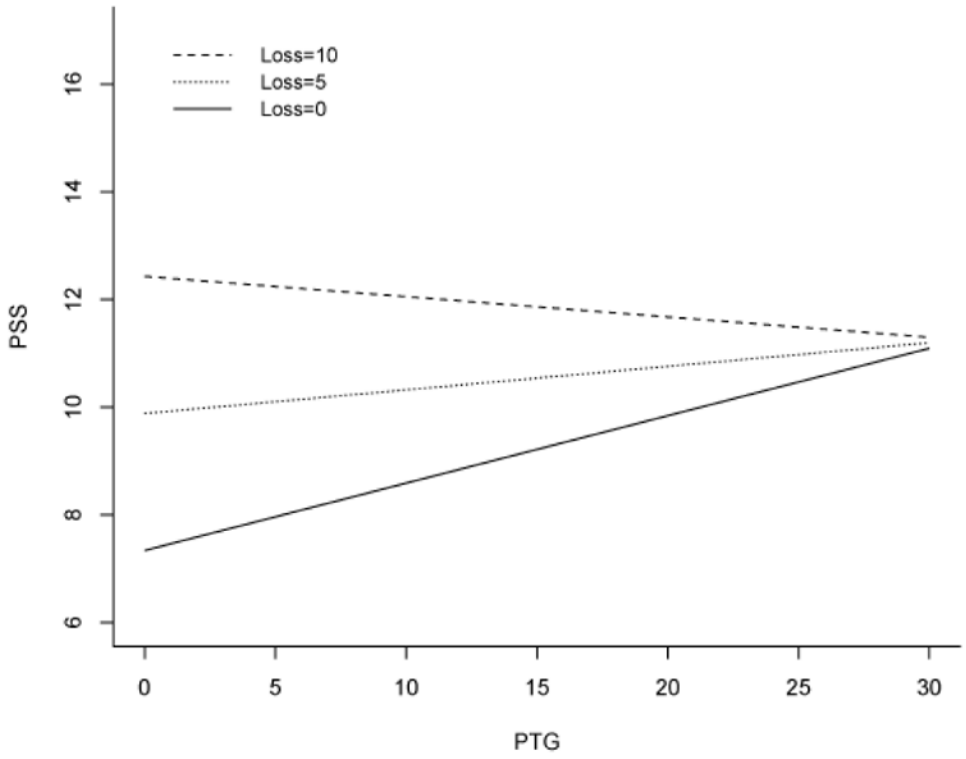

Figure 1. Interaction between PTG and Loss predicting PSS

Note. PTG = posttraumatic growth, Loss = personal and social resource loss, PSS = posttraumatic stress symptoms. Values 0, 5, and 10 represent scores at the 0^{th}, 75^{th} and 90^{th} percentile of loss. Linear contrasts were used to establish whether each of these lines were significantly different from 0: for loss = 0, $p<.0001$; for loss = 5, $p = 0.11$; for loss = 10, $p = 0.34$.

Table 1
Demographic and descriptive characteristics

Characteristic	*n* (%)
Sex (female)	850 (52.4)
Jewish (vs. PCI)	1,365 (84.2)
Immigrated from Russia after 1989 (*n* = 1,365)	281 (20.6)
Married or cohabitating (*n* = 1,619)	1,128 (69.7)
High school education or less (*n* = 1620)	720 (44.4)
Less than average income (<7,500 NIS; *n* = 1,402)	591 (42.2)
Exposed to terrorism	
Wave 1 (lifetime, *n* = 1,614)	608 (37.7)
Wave 2 (past 6 months, *n*=1,292)	62 (4.8)
Wave 3 (past 6 months, *n*=1,191)	56 (4.7)
Any time point	644 (39.7)

Note. N = 1622 unless otherwise specified. PCI = Palestinian Citizens of Israel, NIS = New Israeli Shekel.

Table 2

Descriptive statistics and correlations of measures across 3 waves

	Mean	SD	1	2	3	4	5	6	7	8	9
1. Loss wave 1	2.24	4.42	.900								
2. Loss wave 2	1.68	4.21	.275***	.910							
3. Loss wave 3	2.00	4.68	.234***	.225***	.909						
4. PTG wave 1	5.76	7.48	.401***	.147***	.214***	.923					
5. PTG wave 2	5.14	8.50	.201***	.381***	.314***	.433***	.943				
6. PTG wave 3	4.03	7.20	.129***	.088**	.403***	.357***	.394***	.924			
7. PSS wave 1	7.57	8.70	.503***	.262***	.322***	.441***	.311***	.246***	.907		
8. PSS wave 2	6.03	7.77	.330***	.572***	.301***	.227***	.406***	.204***	.483***	.899	
9. PSS wave 3	5.72	8.87	.212***	.235***	.629***	.188***	.268***	.451***	.369***	.419***	.923

N = 1622. Missing data was handled using multiple imputation. Cronbach's alphas are represented on the diagonal. PSS = posttraumatic stress symptoms, Loss = personal and social resource loss, PTG = posttraumatic growth.

** $p<.01$,

*** $p<.001$

Table 3
Lagged mixed-model predicting posttraumatic stress symptoms over time

Variable	Estimate	S.E.	*p*
Time	-0.137	0.279	0.624
Baseline covariates			
Ethnicity	-0.551	0.544	0.311
Sex	-1.246	-0.338	<0.001
Educational status	-1.273	0.361	<0.001
Income	-2.041	0.366	<0.001
Immigration status	-0.470	0.475	0.322
Time-varying covariates			
Trauma exposure	5.052	0.699	<0.001
Lagged predictors			
PTG	0.125	0.027	<0.001
Loss	0.509	0.068	<0.001
PTG*Loss interaction	-0.016	0.004	<0.001

Note. $N = 1120$. For ethnicity, PCI = 0, Jewish = 1. For sex, female = 0, male = 1. For educational status, high school education or less = 0, greater than high school education = 1. For income, less than average income = 0, average income and above = 1. For immigration status, 0 = not an immigrant from the USSR after 1989, 1 = immigrant from the USSR after 1989. PTG = Self-reported posttraumatic growth. Loss = personal and social resource loss.