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Posttraumatic Growth and Perceived Health: The Role of Posttraumatic Stress Symptoms

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The contested discourse regarding the nature of posttraumatic growth (PTG) includes 2 main competitive claims. The first argues that PTG reflects authentic positive transformation while the second posits that PTG reflects illusory defenses that could be maladaptive in the long run. The present study assesses these competing claims by investigating secondary PTG in relation to the somatic domain. Specifically, this study investigates: (a) the association between PTG, and perceived health (PH), as measured by 3 indices of somatic complaints, self-rated health (SRH) and a number of health problems; (b) the association between PTG, posttraumatic stress symptoms (PTSS) and PH over time; and (c) the mediating role of PTSS between PTG and PH, among wives of former prisoners of war (ex-POWs) and wives of control veterans. Assessments were conducted 30 (T1) and 38 (T2) years after the Yom Kippur War. Results showed that wives of ex-POWs endorsed higher PTSS, higher PTG and poorer PH, compared to control wives. Higher PTG was associated with higher PTSS and poorer PH. PTG at T1 predicted an increase in PTSS between T1 and T2, which in turn was correlated with poorer PH. PTSS at T2 as well as changes in PTSS from T1 to T2 mediated the association between T1 PTG and T2 PH measures. The present findings imply that PTG might have negative implications on PH through the amplification of PTSS, among secondary trauma victims. It seems that although spouses of trauma victims describe benefits resulting from vicarious trauma exposures, their body indicates differently.

Although there is an abundance of evidence for the existence of posttraumatic growth (PTG; Tedeschi & Calhoun, 2004), its nature as well as long term implications remain very partially understood. The present study works within this dearth to shed light on the nature of PTG and its long-term associations. To this end the associations between PTG, perceived health (PH) and posttraumatic stress symptoms (PTSS) are examined among wives of former prisoners of war (ex-POWs) and wives of comparable combatants who were not held captive. Moreover, the mediating role of PTSS within the PTG-PH relationship was likewise investigated.

Posttraumatic Growth

War captivity is among the most extreme traumatic events in existence, typically following active combat which may be devastating and traumatic in its own right. Prisoners of war are often subjected to harsh physical and psychological abuse, torture, severe deprivation of basic needs (i.e., food, water, sleep), as well as repeated humiliation and degradation at the hands of their captors (e.g., Herman, 1992). As a result, ex-POWs are at high risk for physical and psychiatric disorders, most notably posttraumatic stress disorder (PTSD; e.g., Dikel, Engdahl, & Eberly, 2005).

The implications of war captivity are not limited to primary trauma survivors (i.e., ex-POWs), and may be transmitted to significant others, a phenomenon known as secondary traumatization (e.g., Figley, 1986). Moreover, it has recently been incorporated within the *Diagnostic and Statistical Manual of Mental Disorders*, fifth edition (DSM-V; American Psychiatric Association, 2013) that learning about a close family member's traumatic event constitutes a firsthand trauma. Wives of ex-POWs whose husbands' lives were at-risk while they were held captive, are clearly answer to this criterion and are hence at-risk themselves. Indeed, research has indicated that wives of ex-POWs endorse more PTSS and more severe psychological distress than wives of comparable combat veterans (e.g., Greene, Lahav, Bronstein, & Solomon, 2014).

Having an intimate relationship with an ex-POW, however, may also lead to positive gains or transformations, characterized as PTG (e.g., Tedeschi & Calhoun, 1996). According to Tedeschi and Calhoun (2004) PTG is exhibited in three domains: elevated positive self-perception, improved interpersonal relationships, and a more optimistic world view. Research has documented PTG among survivors of various traumatic events including disasters,

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war, sexual assault, and illness (for review see Calhoun & Tedeschi, 2014; Linley & Joseph, 2004).

A growing body of evidence has documented PTG among family members of trauma survivors who have been vicariously exposed to traumatic events. PTG has been reported among mothers of children with acquired disabilities (Konrad, 2006), husbands of breast cancer survivors (e.g., Manne et al., 2004; Weiss, 2004), spouses of myocardial infarction patients (Şenol-Durak & Belgin Ayvaşik, 2010), and wives of war veterans (e.g., McCormack, Hagger, & Joseph, 2011). Research among wives of ex-POWs has found reported higher PTG rates compared to wives of comparable combat veterans (e.g., Dekel, 2007; Greene, Lahav, Kanat-Maymon, & Solomon, 2015).

Although PTG has been repeatedly reported in numerous psychosocial studies, there remains a controversy regarding its nature and long-term implications. On the one hand, PTG is viewed as a genuine transformation in basic beliefs about the self and the world, resulting from struggles with trauma effects (e.g., Calhoun & Tedeschi, 2014; Schaefer & Moos, 1998). On the other hand, in an alternative perspective, PTG is contested as a phenomenon that reflects illusory defenses that may be maladaptive and hinder coping in the long term (e.g., Davis & McKearney, 2003; Hobfoll et al., 2007; McFarland & Alvaro, 2000). The Janus-face model (Maercker & Zoellner, 2004), suggests that PTG simultaneously includes both a constructive aspect and an illusory maladaptive aspect. Whereas the constructive component of PTG is purportedly associated with functional cognitive restructuring and adjustment, the self-deceptive component is linked to denial, avoidance, wishful thinking, self-consolidation, or palliation in the long run.

The controversy concerning the nature of PTG and its implications is accentuated by mixed empirical findings concerning the relationship between PTG and well-being. For instance, considering the relation of PTG and psychological distress, as studies and researchers varied, so did findings, indicating a positive, negative, and no relation between the two (for review see Helgeson, Reynolds, & Tomich, 2006; Linley & Joseph, 2004; Zoellner & Maercker, 2006). The meta-analytic review by Helgeson et al. (2006), for instance, has found PTG to be related to lower depression, but greater avoidance and intrusive thoughts. Notwithstanding, the studies in the review using well-established measures, indicated that PTG was related to more global distress and intrusive-avoidant thoughts.

A similar trend of mixed findings has been found with regard to the association between PTG and PTSS (e.g., Helgeson et al., 2006; Linley & Joseph, 2004). Whereas some studies revealed negative association between the two (e.g., Frazier, Conlon, & Glaser, 2001), with lower levels of distress associated with greater growth, others have found the exact opposite (e.g., Dekel, Ein-Dor, & Solomon, 2012), with higher posttraumatic symptoms associated with greater growth. Others still have uncovered a curvilinear relationship between trauma and PTG (Levine, Laufer, Hamama-Raz, Stein, & Solomon, 2008). Additionally, longitudinal studies have pointed at opposite directions of association over time. A longitudinal study among ex-POWs, for instance, has found that initial PTSS predicted subsequent PTG, implying that distress either reduces or triggers subsequent growth (Dekel et al., 2012). However, another recent study conducted among the same sample of wives of ex-POWs, found that PTG preceded PTSS and not vice versa, thereby indicating that growth may exacerbate PTSS severity over time (Greene et al., 2015).

The lack of clarity concerning the nature of PTG raises questions not only in regards to the effects of PTG on psychological well-being and PTSS, but also regarding the relationship between PTG and physical health, and particularly perceived health (PH)—an association examined in the current study.

Perceived Health

PH refers to individuals' appraisal and evaluation of their own physical health, and is typically operationalized by self-reports of physical symptoms or global self-rated health (SRH; e.g., Schnurr & Green, 2004). In the present study PH is measured via three indices: self-report of somatic complaints, self-report of number of health problems, and self-rated health.

Secondary exposure to combat and war captivity has been implicated in poor PH. Studies of spouses of war veterans and ex-POWs revealed that they exhibit high rates of health complaints (Solomon et al., 1992), more psychosomatic symptoms (Hall & Simmons, 1973), and altogether negative SRH (Zerach, Greene, & Solomon, 2013). Moreover, poor PH has been found to be most prominent among wives of ex-POWs, compared with wives of combatants who were not held captive (Hall & Simmons, 1973; Zerach et al., 2013).

One of the most widely accepted mechanisms underlying poor PH among trauma survivors is PTSS. According to Schnurr and Green (2004), PTSS leads to poor PH by affecting psychological (e.g., depression, anxiety, dissociation), biological (e.g., hypothalamic—pituitary—adrenal axis dysregulation), behavioral (e.g., substance abuse, unprotected sex) and attentional (e.g., altered symptom perception) factors, which interact with one another. Research has consistently supported this claim with studies documenting that PTSS works as a mediator in the relationship between trauma exposure and poor PH (e.g., Kimerling, Clum, & Wolfe, 2000; Wagner, Wolfe, Rotnitsky, Proctor, & Erickson, 2000).

Posttraumatic Growth, Perceived Health, and Posttraumatic Symptoms

The poor perceived health among trauma survivors may not only be related to PTSS, but also to reports of more favorable PTG. A meta-analytic review of the relationship between PTG and PH indicated that PTG was related to worse subjective health (Helgeson et al., 2006). However, scrutiny of previous studies indicated some important limitations. First, many studies referred to functional difficulties as health indicators while failing to include self-reports of physical symptoms or global health (Helgeson et al., 2006). Second, given that the traumatic events in these studies were mostly cases of disease (Helgeson et al., 2006), it is difficult, if not impossible, to discern the somatic consequences associated with a traumatic reaction and those originating in the underlying medical condition at hand. Hence, results concerning the association to PTG are much confounded and questionable. Last, these studies did not investigate the mechanisms underlining the association between PTG and health. By investigating the association between PTG and PH outcomes, as well as the mediating role of PTSS within these associations, the present study aims to fill this gap.

Investigating the relationship between PTG and PH among secondary trauma survivors has clinical as well as theoretical importance. Examining this issue may illuminate the role PTG plays concerning the somatic domain, and indicate whether PTG acts as a protective factor, which may ease the somatic implications among secondarily exposed victims, or, alternatively, does PTG harbor deleterious effects leading to deteriorations in health. Moreover, casting light on this issue may further our understanding of PTG's essence. Given that the somatic path often acts as an alternative channel for the individuals' expression of well-being (e.g., McDougall, 1989), investigating PTG with respect to health may help reveal its plausible defensive qualities.

The controversy regarding PTG raises two competing hypotheses concerning the interplay between PTG, PH and PTSS. The first assumes that if PTG reflects positive transformation (Tedeschi & Calhoun, 2004) it will be linked to positive PH. Holding positive beliefs may act as a resource that reduces distress and, in turn, leads to improved health (Bower, Kemeny, Taylor, & Fahey, 1998; Taylor, Kemeny, Reed, Bower, & Gruenewald, 2000). Moreover, if PTG reflects positive schemas resulting from struggles with the traumatic event (e.g., Tedeschi & Calhoun, 2004) then it is reasonable to assume that it will reduce PTSS in the long term, which consequently is expected to improve health.

However, the alternative hypothesis assumes that if PTG reflects maladaptive illusory defenses, it will be linked to poor PH. This is guided by the notion that holding false beliefs regarding traumatic experiences is likely to require considerable efforts and energy (Weinberger & Davidson, 1994), thereby depleting emotional resources and thus exacerbating health deterioration (Tosevski & Milovancevic, 2006). In addition, denial or repression of distress and losses fostered by trauma may lead to somatization via displacement of psychological distress (Waitzkin & Magana, 1997). Furthermore, if PTG reflects a maladaptive illusory defense mechanism it could prevent "working through" the trauma and worsen PTSS, leading to negative alterations in psychological, biological, behavioral, and attentional paths (Schnurr & Green, 2004), and thus undermining PH.

The present study investigates the above competing perspectives. To assess precedence in time of PTG and PTSS, the present study investigates the bidirectional relationship between PTG and PTSS over time and prediction of subsequent PH. More importantly, the current study explores the mediating role of PTSS at T1, T2, and the change over time in PTSS in its association with PTG and PH. Specifically, the present study, conducted among wives of ex-POWs and wives of comparable combat veterans, investigates the above competing perspectives by testing: (a) the differences between the groups of wives in PTG, PTSS and PH measures; (b) the associations between PTG, PTSS and PH measures; (c) the bidirectional associations between PTG and PTSS over time and prediction of subsequent PH; and (d) the mediating role of concurrent, prospective and difference over time in PTSS within the relationships between PTG and PH measures.

Method

Procedure and Participants

Data were collected at two time points: 2003 through 2004 (T1) and 2010 through 2011 (T2) from two groups of wives of Israeli veterans from the 1973 Yom Kippur War. Wives of ex-POWs were matched with wives of comparable combat veterans who were not held captive. Both groups were located through their husbands, who also participated in a larger longitudinal study (Dekel et al., 2012; Greene et al., 2014). Using Israel Defense Forces (IDF) files, letters were sent to the potential participants including an introduction to the study and informing them that research assistants (licensed social workers) would contact them in the following days. After receiving an explanation of the aim of this study, the wives who agreed to participate were offered the option of filling out the research questionnaires either in their homes or at a location of their choice. Informed consent was obtained for all participants. This study was approved by the Tel Aviv University Ethics Committee.

Ex-POWs' wives. One hundred eleven of the ex-POW participants from the larger study were married at T1; 90 of their wives participated at T1. One hundred forty-seven of the ex-POWs were married at T2; 116 of their wives participated at T2. Of the 90 ex-POWs wives who participated at T1, 61 participated at T2 (67.8%) and 29 dropped out (32.2%). At T2, 55 wives participated who had not participated at T1.

Control wives. One hundred two combat veterans who participated in the larger study were married at T1; 76 of their wives participated at T1. One hundred three combat veterans were married at T2; 56 of their wives participated at T2. Of the 76 control wives who participated at T1, 30 participated at T2 (39.5%) and 46 dropped out (60.5%). Twenty-six participated at T2 who had not participated at T1.

Background variables. No significant differences were found at T1 between ex-POWs' wives and controls' wives in terms of birthplace, $\chi^2(2, N = 89) = 3.37$, $p = .143$, Cramer's $V = .14$, years of marriage/cohabitation, $t(164) = .84$, $p = .404$, $d = .30$ and psychological treatment in the past, $\chi^2(1, N = 163) = 2.67$, $p = .212$, Cramer's $V = .13$. No differences between the groups were found in employment status, $\chi^2(2, N = 172) = 4.28$, $p = .118$, Cramer's $V = .16$, number of prior traumatic events, $t(124.81) = -.49$, $p = .625$, $d = -.08$, and if they were a second generation Holocaust survivor, $\chi^2(1, N = 169) = 2.52$, $p = .113$, Cramer's $V = .12$, at T2.

Handling Missing Data

Substantial attrition, and in several cases, addition are very common in longitudinal designs (Collins, Schafer, & Kam, 2001). In the current study, both of these occurred from T1 to T2. To handle the missing data and create a reliable dataset, wives were included only if they participated in at least one wave of measurement ($n = 165$, 171 at T1 and T2, respectively). Overall, 30% to 41% of data was missing across waves. To decide whether the data had missing values in a pattern that was random, we conducted analyses of differences between these groups in all of the variables, using Little's Missing Completely at Random (MCAR) test (Collins et al., 2001). The analysis revealed that the data was missing completely at random, chi square (273) = 257.10, $p = .75$. Although the mechanism of missing data was proven to be missing at random and not related to the observed data, we decided to use

the more advanced method of maximum likelihood (ML) using SPSS 21 and AMOS 21. As the current data is longitudinal, the ML method was considered to be the optimal method for both attrition and addition of participants over time (Collins et al., 2001). This method is optimal to avoid biased data (Schafer & Graham, 2002), as compared with conventional methods such as arithmetic mean, listwise, or pairwise deletion. Use of ML in regards to missing responses is deemed as very effective when conducted in a longitudinal model that borrows information from across waves to serve as auxiliary variables (Schafer & Graham, 2002). This study utilized variables measured for wives across waves to increase the likelihood for optimal estimations of missing values. Two hundred forty-five participants were included, 102 of them were control wives and 143 wives of ex-POWs.

Measures

PTG and PTSS were measured at both T1 and T2. PH was measured at T2 only (except somatic complaints, which were measured at T1 and T2).

The Post Traumatic Growth Inventory (T1 and T2; PTGI; Tedeschi & Calhoun, 1996). This scale was used to assess PTG. The prompt and the items are linked to the specified traumatic event; in this case it read: "For each of the statements below, please indicate the extent to which this change occurred in your life as a result of your husbands' captivity or your husbands' participation in the war" (according to participant's group). Based on this 21-item self-report scale, the total score is computed according to five subscales: relating to others, new possibilities, personal strength, spiritual change, and appreciation of life. Each item was scored on a 4-point scale (1 = *I didn't experience this change at all*; 4 = *I experienced this change to a very great degree*). The PTGI has good internal consistency, construct, and convergent and discriminant validity (Tedeschi & Calhoun, 1996). The inventory was found to have acceptable internal consistency (Cronbach's alpha = .96, .87, .88, .86, .56, .75 at T1, and .94, .79, .86, .88, .64, .83 at T2, for relating to others, new possibilities, personal strength, spiritual change, appreciation of life, total score, respectively).

PTSD Inventory (T1 and T2; PTSD-I; Solomon et al., 1993). Wives' PTSS was assessed via the PTSD-I, a well-validated, 17-item, self-report questionnaire. The items on the PTSD-I correspond to the *DSM–IV–TR* diagnosis for PTSD (American Psychiatric Association, 2000). Respondents rated symptoms experienced in the previous month on a scale ranging from 0 (*not at all*) to 4 (*almost always*). Wives rated their symptoms as relating to their husbands' experiences of captivity or combat to obtain their PTSS score. The number of positively endorsed symptoms was calculated by the items answered as 3 (*often*) or 4 (*almost always*), as these responses best capture the *DSM–IV–TR* criteria of a persistent experience of trauma symptoms. The PTSD-I has proven psychometric properties and convergent validity (e.g., Solomon et al., 1993). The inventory had high internal consistency (Cronbach's alpha = .88, .77, .84, .91 at T1, and = .91, .86, .75, .85 at T2, for intrusion, avoidance, hyperarousal, subscales as total score, respectively).

Perceived Health Measures

Self-rated health (T2; Benyamini & Idler, 1999). SRH was assessed by the commonly used question: "How would you define your physical health status at present?" (rated on a 6-point scale from 1 = *very bad* to 6 = *excellent*). Researchers have found significant associations between scores on this scale and morbidity and mortality (see Gatz, Harris, & Turk-Charles, 1995).

Number of health problems (T2). Participants were presented with a checklist of 11 health problems and requested to mark each problem from which they suffered. The list was based on common health problems of the main body systems suggested by experienced general physicians and has been used in previous studies of war veterans (Ohry et al., 1994). The list includes allergies, hypertension, heart disease, cancer, diabetes, stroke, neurological diseases, and arthritis. The score was computed based on the total number of conditions checked.

Somatization subscale symptoms checklist-90-R (T1 and T2; SCL-90–R; Derogatis, 1977). We used the SCL-90–R to assess somatic complaints. This subscale comprised of 12 items. For each item the respondent was asked to rate, on a 5-point scale, the degree to which she suffered from the symptom during the preceding two weeks. The mean score reflects the respondent's level of somatic complaints with higher scores reflecting greater somatic complaints. The subscale was found to have high internal consistency (Cronbach's alpha = .90, .86 at T1 and T2, respectively).

Results

Initially the correlations between age, education, and income were examined vis-à-vis the main study measures of PTG, PTSS, and PH. The analyses failed to reveal any significant correlation between study variables and sociodemographic variables.

Group Differences in PTG, PTSS, and PH

ANOVAs of PTG and PTSS at T1 and T2 as the dependent variables revealed a significant effect for the research group. Similarly, ANOVAs of PH measures as the dependent variables also revealed significant effects for group (See Table 1). Wives of ex-POWs reported higher PTG and PTSS total scores and subscales scores, compared to control wives. Poorer PH was also reported by wives of ex-POWs as manifested in higher somatic complaints and negative SRH, compared to control wives. No difference was found regarding the number of health problems measured between the groups.

Associations Between PTG, PTSS, and PH

The univariate associations between PTG total score on the one hand, and PTSS total score as well as PH measures, on the other hand were examined (see Table 2). Analyses revealed positive associations between PTG, PTSS, and PH measures. The higher the PTG, the more PTSS, the more somatic complaints and health

Table 1. *PTG, PH, and PTSS as a Function of Study Group*

Variable	Wives of ex-POWs (n = 143)		Control wives (n = 102)			
	M	*SD*	*M*	*SD*	$F(1, 243)$	η^2
PTG – Total score						
T1	2.46	.71	1.98	.80	24.53***	.09
T2	2.38	.76	1.97	.73	18.03***	.07
PTG – Relating to others						
T1	2.34	.75	1.87	.80	22.16***	.08
T2	2.22	.83	1.85	.70	14.20***	.06
PTG – New possibilities						
T1	2.37	.79	1.96	.88	14.75***	.06
T2	2.27	.81	1.91	.77	12.02***	.05
PTG – Personal strength						
T1	2.69	.91	2.10	.99	23.22***	.09
T2	2.68	.92	2.16	.90	19.21***	.07
PTG – Spiritual change						
T1	1.99	.85	1.64	.77	10.50***	.04
T2	1.96	.95	1.66	.98	3.23**	.03
PTG – Appreciation of life						
T1	2.87	.88	2.30	.92	24.61***	.09
T2	2.79	.95	2.30	.99	15.51***	.06
PTSS – Total score						
T1	2.75	3.95	2.10	2.37	36.38***	.13
T2	4.90	3.99	2.79	2.51	22.07***	.08
PTSS – Intrusion						
T1	1.27	1.51	.32	.63	36.23***	.13
T2	1.42	1.51	.50	.70	33.44***	.12
PTSS – Avoidance						
T1	1.40	1.49	.69	1.04	16.92***	.07
T2	1.43	1.56	.93	1.05	8.02**	.03
PTSS – Hyperarousal						
T1	2.08	1.55	1.09	1.30	27.30***	.10
T2	2.04	1.64	1.37	1.36	11.58***	.05
Somatic complaints						
T1	.79	.69	.55	.54	8.74**	.04
T2	1.14	.76	.79	.53	16.01***	.06
SRH (T2)	2.81	.90	2.48	.86	8.45**	.03
Health problems (T2)	2.54	1.64	2.50	2.02	.03	.00

Note. Ex-POWs = ex-prisoners of war; PTG = posttraumatic growth; PTSS = posttraumatic symptoms; SRH = self-rated health.
** $p < .01$. *** $p < .001$.

problems, and the more negative the SRH. Interestingly, the association between PTG at T1 and number of health problems proved to be nonsignificant.

PTSS, PTG, and PH

To examine the bidirectional relationships between PTG and PTSS and to predict the PH measures over time, we used autoregressive cross-lagged modeling (ARCL; e.g., Anderson, 1960) to assess precedence in time between PTSS and PTG and to predict PH measures at T2. ARCL provides an indicator of temporal precedence in the absence of an experimental design. Autoregressive cross-lagged designs allow for simultaneous assessment, enabling the examination of whether earlier measurement of PTG predicts later measures of PTSS and vice versa. This modeling strategy incorporates two main components. First, later measures of a construct are predicted by earlier measures of the same construct, thus giving rise to the term "autoregressive." Second, the "cross-lagged" component is created by which later measures of a construct are predicted by earlier measures of other constructs.

The analysis was conducted via structural equation modeling (SEM). Specifically, we used AMOS statistics and estimated the model's fit by using several fit indices. A model is judged as fitting well if the comparative fit index (CFI) that considers sample sizes, normed-fit index (NFI), and the Tucker-Lewis index (TLI) exceed .95 while root mean square error of approximation (RMSEA) remains equal or lower than .05. Chi-square was computed; however, because it is sensitive to sample size (e.g., Kline, 1998), we used the ratio of chi square to degrees of freedom. Values between 1 and 5 indicate a satisfactory fit between the theoretical model and empirical data, a more severe cutoff of 3 is ideal (Kline, 1998).

Fit indices indicated that the theoretical model, $\chi^2(7) = 7.58$, $p = .37$, $\chi^2/df = 1.082$, CFI = .99, NFI = .98, TLI = .99, RMSEA = .02, was a good representation of the data. We wanted to estimate a simpler and parsimonious model, containing only the significant paths found. Then we compared its fit indices to the general model arguing for multiple paths of impact. If this comparison favors the simpler (nested) model (e.g., the difference of the two chi-squares is not significant), we proceed with the simpler model (Ledermann, Macho, & Kenny, 2011). Fit indices of the simpler model indicated that the model, $\chi^2(12) = 15.9$, $p = .19$, $\chi^2/df = 1.328$, CFI = .99, NFI = .96, TLI = .97, RMSEA = .04, was an excellent representation of the data. No significant difference was found between the models, $\chi^2(5) = 8.36$, $p = .14$. Hence, we proceeded with the more parsimonious simple model and the same effects were found.

Figure 1 displays the standardized coefficients and significant paths for the nested model. The analysis revealed high stability of PTG and PTSS: those with high levels of PTG or PTSS at T1 tended to have high levels of PTG or PTSS at T2. More importantly, the analysis revealed that while PTSS at T1 did not significantly predict PTG at T2 ($\beta = .05$, $p = .62$), PTG total score at T1 predicted an increase in PTSS between T1 and T2 beyond the stability of PTSS ($\beta = .18$, $p = .04$). PTSS at T2, in turn, predicted poorer SRH, more health problems, and more somatic complaints at T2.

Multistep Mediation of PTSS in the Relation Between PTG and PH

Next, to examine whether PTSS at T1 and T2 mediated the link between T1 PTG and T2 PH measures, we used Hayes, Preacher, and Myers (2011) multiple step mediation. Specifically, we examined: (a) whether T1 PTG directly affected PH at T2, controlling for PTSS at T1 and T2; (b) whether T1 PTG indirectly affected PH via PTSS at any of the time points (i.e., T1 and T2, separately); and (c) whether T1 PTG indirectly affected PH via a two-step mediation process (i.e., via PTSS at T1 -T2). We controlled for study group in all three models. We also controlled for somatic complaints at T1, in the mediation model predicting somatic complaints at T2.

To examine whether these indirect paths were significant, we employed accelerated bias-corrected bootstrap analyses. Missing data were handled with the maximum likelihood estimation. Boot-

Table 2. *Intercorrelations Between Main Study Measures*

Measure	1	2	3	4	5	6	7	8	9
1. Study group	—								
2. PTG (T1)	.30***	—							
3. PTG (T2)	.26***	.83***	—						
4. PTSS (T1)	.36***	.55***	.44***	—					
5. PTSS (T2)	.29***	.56***	.50***	.81***	—				
6. Somatic complaints (T1)	.19**	.46***	.37***	.71***	.75***	—			
7. Somatic complaints (T2)	.25***	.39***	.30***	.62***	.75***	.66***	—		
8. SRH (T2)	.18**	.44***	.40***	.37***	.50***	.49***	.43***	—	
9. Health problems (T2)	.01	.08	.19**	.25***	.30***	.34***	.31***	.28***	—

Note. Study Group values: coded 0 = control wives, coded 1 = wives of ex-POWs. PTG = posttraumatic growth; PTSS = posttraumatic symptoms; SRH = self-rated health.
** $p < .01$. *** $p < .001$.

strap solutions are presented in Table 3, and unstandardized coefficients are presented in Figures 2 through 4.

The analyses supported the multiple step mediation. As can be seen in Table 3 and Figures 2 through 4, the analyses revealed that PTG had a direct effect on SRH. In addition, PTG had an indirect effect on PH measures (SRH, number health problems and somatic complaints). PTG indirectly predicted the wives' PH measures via PTSS at T2: higher PTG at T1 predicted higher PTSS at T2, which in turn predicted poor PH at T2. Moreover, PTG indirectly predicted the wives' PH measures via both PTSS at T1 and T2. Higher PTG at T1 predicted higher PTSS at T1, which in turn increased the levels of PTSS between T1 and T2. Next, higher levels of T2 PTSS were associated with poor PH at T2 (negative SRH, more somatic complaints, more health problems).

Discussion

The present study explored the association between PTG and PH measures and the role of PTSS within these associations. Wives of ex-POWs endorsed higher PTG, higher PTSS, and poorer PH as manifested by more somatic complaints and poorer SRH, compared to control wives. Earlier measurement of PTG was associated with subsequent higher PTSS, and not vice versa. The elevated PTSS, in turn, predicted more somatic complaints and health problems, and poorer SRH. A multistep mediation analysis revealed that the association between T1 PTG and T2 PH measures was mediated by T2 PTSS, as well as by the change in PTSS over time.

The findings that ex-POWs' wives reported higher PTSS, higher PTG and poorer PH compared to control wives, are consistent with empirical literature (e.g., Dekel, 2007; Galovski & Lyons, 2004; Zerach et al., 2013). The present results suggest that being in a close relationship with survivors of war captivity has vast and multidimensional ramifications, and go hand-in-hand with the recent claim that exposure to close family member's traumatic event constitutes firsthand trauma (APA, 2013).

The poor PH among wives of ex-POWs may reflect actual medical problems. Living with an ex-POW may be a source for prolonged stress (Dekel & Solomon, 2006) that can undermine the immune system (Tosevski & Milovancevic, 2006) and increase probability for morbidity. Alternatively, the poor PH among wives of ex-POWs may reflect the process of somatization, whereby

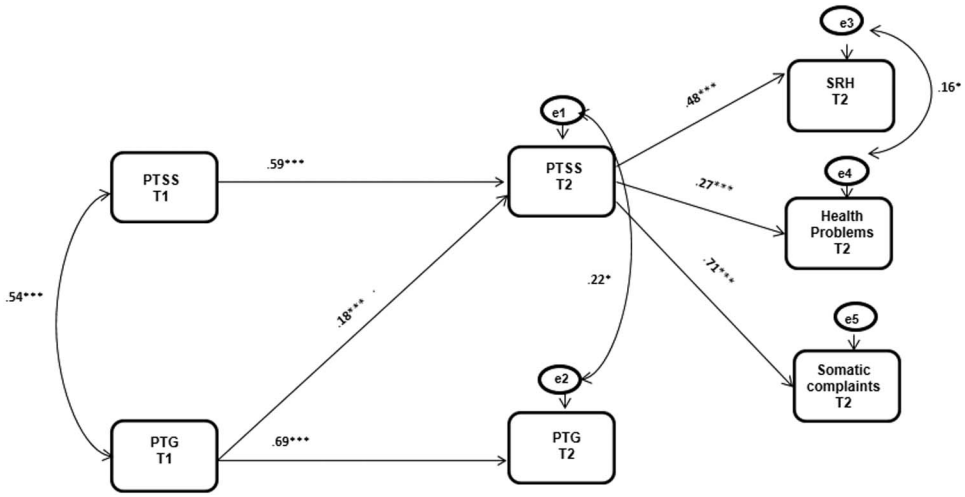

Figure 1. Autoregressive cross-lagged model (nested model) assessing relationships between PTG and PTSS and in predicting PH measures. Curved lines represent covariates between constructs. * $p < .05$. *** $p < .001$.

Table 3. *Unstandardized Regression Coefficients and Bootstrap 95% Confidence Intervals for Predicting PH by PTG Through PTSS in Time 1 and Time 2*

Measure	SRH	Somatic complaints	Health problems
Direct	[.1372, .4420]*	[−.1498, .0310]	[−.6401, .0495]
Indirect through T1 PTSS	[−.2125, .0193]	[−.0464, .0265]	[−.1448, .3351]
Indirect through T2 PTSS	[.0481, .1693]*	[.0289, .1275]*	[.0481, .2699]*
Indirect through T1 and T2 PTSS	[.1015, .3182]*	[.0342, .1123]*	[.1020, .4685]*

Note. 95% confidence intervals are presented in brackets. Confidence intervals that do not include 0 (null association) are significant. PTG = posttraumatic growth; PTSS = posttraumatic symptoms; SRH = self-rated health.
* Significant at .05.

emotional distress is expressed and manifests through the physical channel (Waitzkin & Magana, 1997).

The main contribution of the present study is in the assessment of the associations between PTG, PTSS, and PH measures and the mediating role of PTSS within the PTG-PH relation. The results above suggest that PTG not only predicts PTSS exacerbation over time, but is also linked to poorer PH (more somatic complaints and health problems, as well as negative SRH) through this exacerbation. Given that the empirical literature indicates that positive thinking enhances health (e.g., Taylor et al., 2000), even if illusory, one might wonder how to explain the finding concerning the association between PTG and poor PH above.

One potential explanation is that PTG reflects the individual's coping efforts with the traumatic event. A significant other for a trauma survivor may hold growth beliefs that might act as a source of comfort and hope, enhancing feelings of self-competence and reducing the helplessness and horror arising in the face of trauma. In this manner, the reliance on PTG by wives of ex-POWs, as well as wives of combat veterans, is a way to detach themselves from the multiple losses often accompanying their husbands' trauma, consequently reducing their overwhelming pain.

Alternatively, PTG may reflect the wives' efforts to limit cognitive dissonance (Festinger, 1962). Wives of ex-POWs and combat veterans are often heavily invested in their marriages, but at the same time might suffer from the day-to-day difficulties resulting from living with traumatized husbands (e.g., Greene et al., 2014). Hence, it may be suggested that some wives maintain a cognitive bias and hold optimistic beliefs regarding their growth as a coping strategy designed to overcome this dissonance.

Although PTG may be seen as a phenomenon with the potential of helping wives cope in the short term with either cognitive dissonance or the emotional pain resulting from the trauma, in the long term it might prove to be maladaptive. Holding growth beliefs may act as an avoidant strategy (e.g., Zoellner & Maercker, 2006) entailing high costs, not only in the psychological domain but also in the somatic domain. The present study conducted 30 and 38 years after the war demonstrates this trend in uncovering poorer PH associated with elevated PTG over time. The following offers three primary explanations underlying these results.

First, it might be that trauma survivors who hold growth beliefs invest high energy in order to remove intrapsychic threats, as in the case of repression (e.g., Pennebaker, 2000; Weinberger & Davidson, 1994). This, in turn, reduces their ability to cope effectively with external demands. Thus, holding growth beliefs is stressful for the body in that it exerts physiological demands on the autonomic nervous system. In this respect, in their study on traumatic

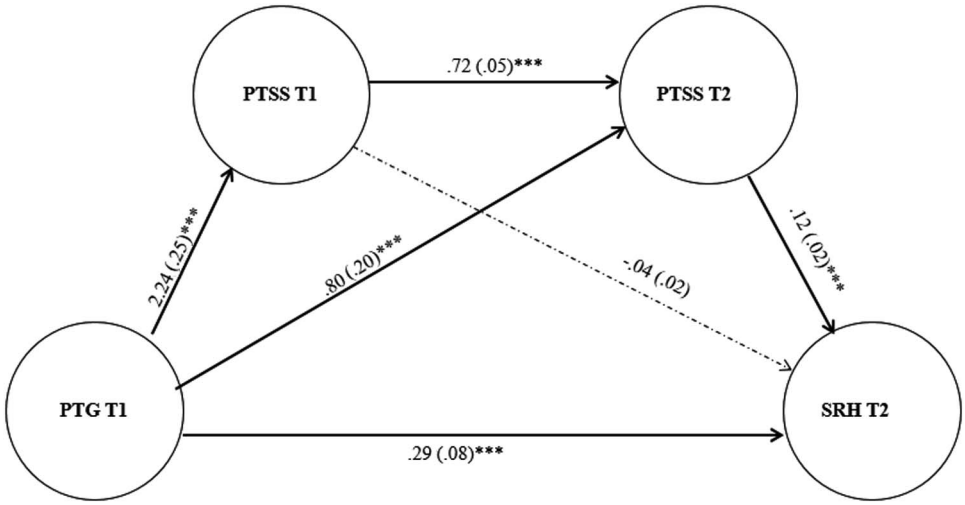

Figure 2. Multiple sequential mediation analysis. Study group has been controlled for at the analysis. PTG = posttraumatic growth; PTSS = posttraumatic symptoms; SRH = self-rated health. *** $p < .001$.

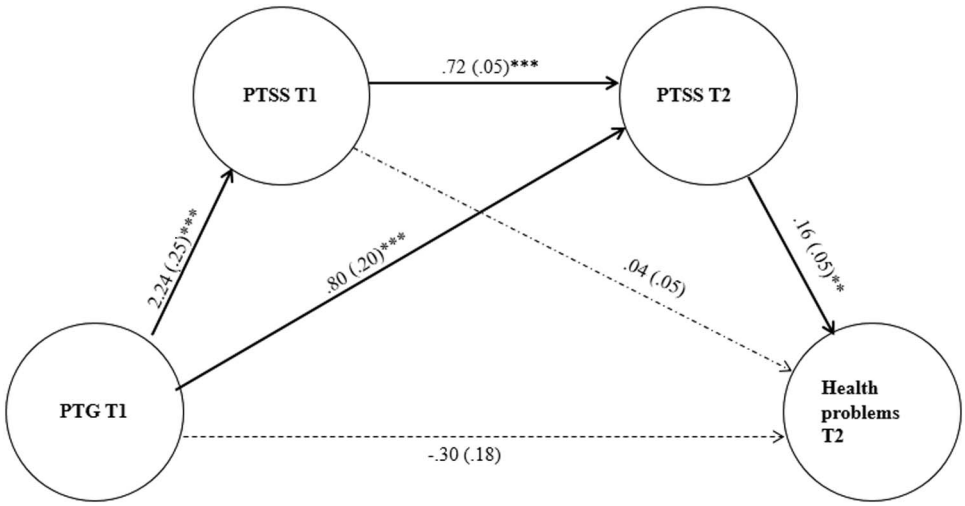

Figure 3. Multiple sequential mediation analysis. Study group has been controlled for at the analysis. PTG = posttraumatic growth; PTSS = posttraumatic symptoms. ** $p < .01$. *** $p < .001$.

experiences, Pennebaker, Hughes, and O'Heeron (1987) found that long term inhibition of behavior, thoughts, and feelings requires more physiological work for the autonomic nervous system, resulting in increased physical problems and complaints.

Another possible explanation for the aforementioned association between PTG and poor PH may involve the process of somatization (e.g., Lipowski, 1988; Pennebaker, 2000). While trauma survivors hold growth beliefs as a defensive effort enabling some detachment from their psychological pain or as a strategy implicitly devised to minimalize cognitive dissonance, the repressed or dissociated distress may yet manifest in the alternative somatic route. Hence, although secondary trauma survivors report positive changes, their body seems to indicate the contrary.

Finally, the mediating role of PTSS found in the current study suggests that PTG bears deleterious effects for PH by detrimentally amplifying PTSS over time. According to the psychoanalytic perspective, maintaining beliefs that rely on repression or denial provokes potential anxiety due to the welling fear that one's defenses may falter (e.g., Weinberger & Davidson, 1994). In this case, holding growth beliefs involves the use of defense mechanisms that may fuel distress in the long term, thereby increasing PTSS. Likewise, according to cognitive–behavioral conceptualizations, trauma survivors' avoidance efforts prevent modification of the fear structure that is responsible for intensified PTSS (Foa, Steketee, & Rothbaum, 1989). Hence, holding growth beliefs as an avoidant strategy could lead to increased PTSS. This, in turn, hinders PH.

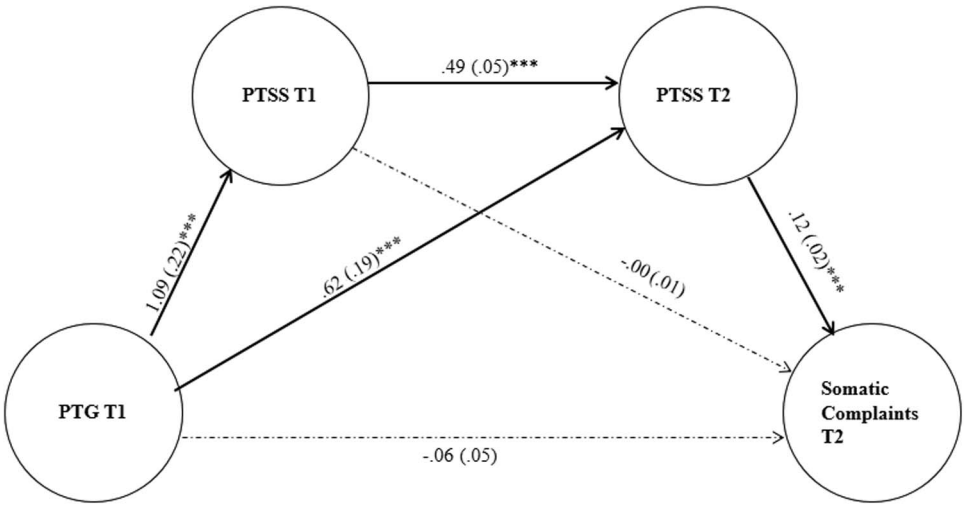

Figure 4. Multiple sequential mediation analysis. Study group and somatic complaints at T1 have been controlled for at the analysis. PTG = posttraumatic growth; PTSS = posttraumatic symptoms. *** $p < .001$.

Limitations

The current study suffers from several limitations that must be acknowledged. First, the present study was based on self-report measures, which may be subjected to response biases and shared method variance. Second, because we did not administer objective medical examinations, we cannot distinguish between the perceived and actual level of health. Lastly, the present study did not include prospective data regarding PTG immediately after the trauma, but rather relied on data that was collected 30 and 38 years after the trauma. In this last respect, research indicates that individuals' might find it difficult to accurately assess personal change over time, including positive change after adversity (i.e., PTG; e.g., Frazier et al., 2009). The measurement of PTG so many years after the traumatic event then raises the question whether the phenomenon as measured reflects actual growth or a distorted recording of past experience. In addition, the lack of PTG measurement in proximity to the traumatic event made it practically impossible to assess whether the implications associated with PTG depend on the time it is in effect.

Clinical Implications

The present findings have important implications for the theory and treatment of secondary victims of trauma. The results above call attention to the possible role of PTG with regard to negative PH. Wives of ex-POWs and wives of combat veterans who report high PTG could be particularly vulnerable, not only for elevated PTSS but also for poor PH, which is a powerful indicator of ill health (e.g., Hennessy, Moriarty, Zack, Scherr, & Brackbill, 1994) and high mortality (Idler & Angel, 1990). This calls for a particular awareness on the part of the therapist in this regard when treating secondary trauma survivors who report high PTG.

Specifically, the present results imply the need for clinical interventions that help wives of ex-POWs and combat veterans to limit the use of PTG as a coping strategy aimed to avoid pain and distress, and instead encourage them to acknowledge their traumatic experience and day-to-day difficulties resulting from living with traumatized husbands. This, hopefully, may help them work through the traumatic events toward a better resolving of their aftermath, and decrease the risks for psychological and somatic distress in the future.

Suggestions for Future Research

Although the present study presents an important contribution to the extant literature, its limitations as well as the complexity of PTG mandate the need for further studies before any definitive conclusions can be drawn. Future research should explore PTG stemming from a variety of traumatic events, and its effect on physical health among both direct and indirect trauma survivors, at different points in time. In this way, implications of PTG in the short term and long term could be examined, as well as other potential mechanisms, aside from PTSS, that may explain the relationship between PTG and PH.

Keywords: perceived health; posttraumatic growth; posttraumatic symptoms; prisoners of war; secondary traumatization

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