Journal of Loss and Trauma, 11:373–388, 2006
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ISSN: 1532-5024 print/1532-5032 online
DOI: 10.1080/15325020600672004

Routledge
Taylor & Francis Group

POSTTRAUMATIC GROWTH AMONG GULF WAR I VETERANS: THE PREDICTIVE ROLE OF DEPLOYMENT-RELATED EXPERIENCES AND BACKGROUND CHARACTERISTICS

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In this study, we identified deployment-related and demographic predictors of several factors of posttraumatic growth in a sample of combat-exposed Gulf War I veterans. Participants were obtained via a Veterans Administration registry of Gulf War I veterans and were mailed a survey containing a number of scales assessing predeployment, deployment, and postdeployment factors from the Deployment Risk and Resilience Inventory and the Posttraumatic Growth Inventory. Military status and perceived threat were significant predictors of appreciation of life. Relating to others, personal strength, and posttraumatic growth as a whole were best predicted by the postdeployment variable of social support. Minority status was the only significant predictor of new possibilities, with ethnic minorities reporting more new possibilities postdeployment. Limitations and suggestions for future research are discussed.

The current conflict in Iraq has contributed to an increased interest in the potential for positive effects of exposure to war-related trauma. While existing research consistently supports a number of adverse psychosocial effects resulting from trauma exposure, a growing body of literature documents growth and positive life changes that may result from exposure to traumatic incidents (Cordova, Cunningham, Carlson, & Andrykowski, 2001; Frazier, Conlon, & Glaser, 2001; Linley & Joseph, 2004; Tedeschi & Calhoun, 1996). Several categories of growth following adversity

Received 30 January 2006; accepted 3 March 2006.
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have been proposed. For example, Tedeschi and Calhoun (1996) empirically demonstrated five categories of growth: appreciation of life, relating to others, new possibilities, personal strength, and spiritual change. Although the mechanism by which individuals grow after experiencing trauma is unclear, posttraumatic growth has been demonstrated for a wide range of potentially traumatic events ranging from medical illnesses (e.g., Maercker & Langner, 2001) to loss of a child (e.g., Polatinsky & Esprey, 2000).

There are also several groups that face regular exposure to traumatic events by virtue of their occupation. Given the magnitude and frequency of soldiers' exposure to stressors and potentially traumatic events during deployment, surprisingly little research has focused on growth following military service. Soldiers, especially those who serve abroad during conflict, are exposed to a wide range of stressors, from generic low-magnitude stressors (e.g., being away from home) to high-magnitude stressors associated with war-zone experiences (e.g., death of a friend on the battlefield, injury to self, exposure to atrocities). Despite these potentially traumatic exposures, there is evidence that participation in the military is an important developmental milestone for many soldiers that often leads to tremendous growth and maturity (Dohrenwend et al., 2004; Elder, Gimbel, & Ivie, 1991; Gade, 1991). However, the nature and antecedents of this growth have not been consistently clear. Particularly confusing is the association between combat participation and growth. For example, Aldwin, Levenson, and Spiro (1994) found a linear relationship between combat exposure and positive developmental outcomes (e.g., coping with adversity, increased self-discipline, and a broader perspective on life) in a sample of World War II and Korean War veterans. However, studies of veterans from more recent wars have found more complex relationships between combat exposure and growth. For example, Card (1983) found that following their service, Vietnam era veterans, but not Vietnam War veterans, reported greater sensitivity to the needs of others. This study seems to indicate that intensive combat experiences may not lead to growth, especially when soldiers are exposed to highly distressing events and circumstances as they were in Vietnam. Nonetheless, it is unclear under what conditions trauma leads to growth, especially with veterans of war. In particular, little is known regarding the differential contributions of predeployment, deployment, and postdeployment

experiences, as well as the relative contribution of deployment factors versus individual factors.

In the present study, we examined levels of posttraumatic growth (PTG) reported by combat-exposed Gulf War I veterans and identified deployment-related and demographic predictors of several factors of PTG (i.e., appreciation of life, relating to others, new possibilities, personal strength, and spiritual change). Soldiers deployed to the Persian Gulf region in 1991 faced several stressors, including combat exposure (e.g., receiving hostile incoming fire, encountering mines and/or traps, attacks by terrorists and/or civilians), acute stressors that may result in the immediate loss of life, and postcombat exposure, including exposure to death and dying (e.g., removing dead bodies after battle, seeing soldiers who were severely wounded or disfigured, seeing bodies of dead civilians).

A review of the literature suggests numerous possible associations between predeployment (e.g., prior trauma), deployment (e.g., combat exposure, perceived threat, and unit support), and postdeployment factors (e.g., postdeployment social support) and PTG. For example, there is some evidence that individuals with a prior trauma history may have a difficult time recovering from subsequent life stressors (Dougall, Herberman, Delahanty, Inslicht, & Baum, 2000; King et al., 1999; Nishith, Mechanic, & Resick, 2000), which may arguably hinder PTG. Although some studies have found a positive relationship between early life trauma and growth, the degree of growth is associated with subsequent adjustment (McMillen, Zuravin, & Rideout, 1995). Overall, findings are mixed regarding whether prior traumatic events lead to enhanced coping or depleted resources (Aldwin et al., 1996). As discussed previously, results regarding the extent to which combat exposure contributes to PTG have been mixed, with some evidence indicating that more intense combat exposure contributes to growth and other evidence indicating that such exposure interferes with growth. Perceived threat may also be associated with PTG, with higher levels of life threat associated with greater growth (Cordova et al., 2001; Fontana & Rosenheck, 1998). More specifically, Tedeschi and Calhoun (1995) suggest that confrontation with mortality can result in a reevaluation and redefinition of life goals and priorities, resulting in several areas of PTG. Finally, resources such as unit support during military service and social support during the postdeployment period may serve as valuable environmental provisions for

soldiers during and after stressful deployments. At least two studies have found associations between social support and PTG (Frazier et al., 2004; Park et al., 1996). More specifically, Frazier and colleagues found that individuals who initially rated their social support networks as helpful reported more positive life changes.

The following questions guided our investigation of the relative contribution of deployment-related and demographic predictors of PTG: (a) Does early life trauma exposure predict the various aspects of PTG following deployment to a war zone? (b) Do more objective measures of exposure (i.e., combat and its aftermath) or subjective measures of exposure (perceived threat) better account for PTG (over and above the variance accounted for by early trauma)? (c) Do external resources (i.e., unit support during deployment) help predict PTG (over and above early trauma and war-zone exposure)? (d) Does postdeployment social support play a role in PTG (over and above early and mission-related variables)? and (e) Are background characteristics (e.g., age, gender, ethnicity, marital status, education, income, and predeployment military status) related to PTG? We predicted that early life trauma would be negatively associated with various indices of PTG, that perceived threat would be a better negative predictor as compared to combat exposure variables, and that unit support and postdeployment support would positively predict PTG. We had no specific expectations regarding associations between background characteristics and PTG.

Method

Survey Procedure and Sample

The sample in this study included a subset of 83 participants from the test-retest component of a larger validation study for the Deployment Risk and Resilience Inventory (DRRI; King, King, & Vogt, 2003; King, King,. Vogt, Knight, & Samper, in press). Participants were obtained via a registry of Gulf War I veterans who had received any type of care at the VA Boston Healthcare System. Of the 83 participants from the test-retest study, 61 completed this portion of the study during the retest phase, which corresponds to a 73% response rate. Mangione's (1998) multistep method was employed to optimize the participant response rate. First, potential participants were mailed a letter

explaining the study's purpose. Confidentiality was assured, and the voluntary nature of participation was emphasized. Second, the original letter was followed by a survey package containing a collection of stressor measures. Third, a reminder card was sent, followed by a remailing of the package to nonrespondents and then a final reminder card. All procedures and measures were approved by the VA Boston Healthcare System Institutional Review Board and conformed to standards for the protection of human subjects.

Fifty-seven percent of the participants were male, and 43% were female. Participants reported the following ethnicities: 85% Caucasian, 8% African American, 5% Latino, and 2% American Indian or Alaskan Native. Fifty-three percent of the participants reported being married at the time of deployment; 47% were deployed from active duty units, 33% were deployed from National Guard units, and 20% were deployed from Reserve units. Highest education levels attained were as follows: 21% high school graduate, 41% some college, 15% college graduate, 7% some graduate school, and 16% graduate degree. Ninety percent of participants reported exposure to warfare, as defined below.

Measures

We assessed a number of demographic and military variables, including age, gender, ethnicity, marital status, education, income, and predeployment military status. All of the deployment stressor measures were from the DRRI, a collection of measures for studying the deployment-related experiences of military personnel and veterans. DRRI measures fall into three broader categories: predeployment/prewar factors (e.g., predeployment traumatic stressors), deployment/war-zone factors (e.g., combat and aftermath of battle experiences, perceived threat, unit support), and postdeployment/postwar factors (e.g., postdeployment social support). Additionally, we included the Posttraumatic Growth Inventory (PTGI), a measure of growth following trauma (Tedeschi & Calhoun, 1996). All measures are described below, beginning with measures from the DRRI:

PRIOR STRESSORS

Exposures to traumatic events before deployment, including community and domestic violence, physical assault, sexual abuse,

previous combat duty, and other highly stressful life events, were measured using a 15-item scale and a dichotomous (yes/no) response format. The alpha coefficients alpha for this scale were .75 in the larger validation study (see King et al., in press) and .65 in this sample.

EXPOSURE TO WARFARE

Combat experiences, defined as stereotypical warfare experiences such as firing a weapon, being fired on by enemy or friendly fire, witnessing injury and death, and going on special missions and patrols, were measured using a 15-item scale and a dichotomous (yes/no) response format. The alpha coefficients for this scale were .85 in the larger validation study and .87 in this sample. Aftermath of battle was defined as exposure to the consequences of combat, including observing or handling human and animal remains, dealing with prisoners of war, and observing other consequences of combat such as devastated communities and homeless refugees. This 15-item scale also used a dichotomous (yes/no) response format. The alpha coefficients alpha for the scale were .89 in the larger validation study and .88 in this sample. For the purposes of these analyses, combat and aftermath experiences were combined into one *exposure to warfare* variable because we were interested in assessing the full range of warfare experiences rather than examining the different effects based on phase of conflict.

PERCEIVED THREAT

Perceived threat was defined as fear for one's safety and well-being in the war zone, especially as a response to exposure to circumstances of combat including nuclear, biological, or chemical agents; missiles; and friendly fire incidents. This 15-item scale had a 5-point response format (1 = *strongly disagree*, 5 = *strongly agree*). The alpha coefficients for the scale were .89 in the larger validation study and .88 in this sample.

DEPLOYMENT SOCIAL SUPPORT

Deployment social support was defined as the amount of assistance and encouragement in the war zone from the military in general (e.g., soldiers felt valued versus expendable), unit leaders (e.g., soldiers believed that superiors were dependable and trustworthy), and other unit members (e.g., feeling a sense of

camaraderie with peers in their unit, felt unit was like family). This 12-item scale had a 5-point response format (1 = *strongly disagree*, 5 = *strongly agree*). The alpha coefficients alpha for the scale were .94 in the larger validation study and .93 in this sample.

POSTDEPLOYMENT SOCIAL SUPPORT

Postdeployment social support was defined as the amount of emotional sustenance (i.e., understanding, companionship, sense of belonging, positive self-regard) and instrumental assistance (i.e., tangible help, material assistance, resources) provided by family, friends, coworkers, employers, and the community. This 15-item scale had a 5-point response format (1 = *strongly disagree*, 5 = *strongly agree*). The alpha coefficients for the scale were .87 in the larger validation study and .81 in this sample.

POSTTRAUMATIC GROWTH INVENTORY

The PTGI (Tedeschi & Calhoun, 1996) is a 21-item measure with a 6-point response format (0 = *no change*, 1 = *a very small degree*, 2 = *a small degree*, 3 = *a moderate degree*, 4 = *a great degree*, 5 = *a very great degree*) that assesses positive outcomes following traumatic events. The PTGI includes five factors: appreciation of life (e.g., "My priorities about what is important in life"), relating to others (e.g., "Knowing that I can count on people in times of trouble"), new possibilities (e.g., "I established a new path for my life"), personal strength (e.g., "Knowing I can handle difficulties"), and spiritual change (e.g., "A better understanding of spiritual matters"). Soldiers were asked to report the degree of change they experienced in each area as a result of their deployment experience. The alpha coefficient for the entire scale was .96 in this sample; however, this should be interpreted with caution due to our small sample size. Alpha reliabilities for each of the factors were as follows: .83 for appreciation of life (3 items), .93 for relating to others (7 items), .89 for new possibilities (5 items), .82 for personal strength (4 items), and .94 for spiritual change (2 items). This was somewhat higher than the internal consistency reported by Tedeschi and Calhoun (1996): an alpha coefficient for the entire scale of .90 and subscale reliabilities of .67 for appreciation of life, .85 for relating to others, .84 for new possibilities, .72 for personal strength, and .85 for spiritual change. Descriptive statistics for the PTGI are presented in Table 1.

TABLE 1 Descriptive Statistics for Each Scale of the PTGI

Scale	No. of items	Mean item score	SD
Appreciation of life	3	3.44	1.35
Relating to others	7	2.20	1.51
Personal strength	4	2.86	1.44
New possibilities	5	2.41	1.46
Spiritual change	2	2.21	1.92
PTGI total	21	2.54	1.34

Note. Items were rated on the following scale: 0 = *no change*, 1 = *a very small degree*, 2 = *a small degree*, 3 = *a moderate degree*, 4 = *a great degree*, 5 = *a very great degree*.

Results

Correlations Among Background Characteristics and Posttraumatic Growth

We first correlated a number of potentially related demographic and military variables (i.e., age, gender, ethnicity, marital status, education, income, and predeployment military status) with the PTGI subscales and the entire posttraumatic growth scale. Two significant correlations emerged from this analysis. First, ethnic minority status was positively correlated with new possibilities ($r = .31$, $p < .05$), with ethnic minorities having higher scores for new possibilities, and predeployment military status (i.e., active duty vs. National Guard and Reserves) was marginally significantly correlated with appreciation of life ($r = .25$, $p = .05$), with those in the National Guard and Reserves having higher scores on appreciation of life than those who were active duty soldiers.

Regression Analyses Examining Predictors of Posttraumatic Growth

In the following series of analyses, our goal was to test our hypotheses regarding associations between deployment factors and several indices of PTG (e.g., appreciation of life), including the posttraumatic growth scale in its entirety. We also incorporated the background characteristics that were related to indices of PTG to examine the contribution of deployment-related factors after accounting for the influence of individual factors. To examine the relative contribution of experiences during different phases of

deployment, we conducted hierarchical regressions in which we evaluated the predictive power of each set of factors (i.e., predeployment, deployment, and postdeployment) sequentially. Each variable was entered by block in the natural order that these events occurred (e.g., predeployment factors first). For deployment factors, we separated risk (exposure to warfare and perceived threat) and resilience (unit support) factors to get a better understanding of each factor's contribution. For the majority of the hierarchical regressions, early life trauma was entered in Block 1. Exposure to warfare and perceived threat were entered in Block 2. In Block 3, we entered unit support and in Block 4, postdeployment social support. The only exceptions were for appreciation of life and new possibilities; because of the significant demographic correlations with each of these two outcomes, for these regressions, the significant demographic or military variable was entered in Block 1, followed by early life trauma in Block 2, exposure to warfare and perceived threat variables in Block 3, unit support in Block 4, and postdeployment social support in Block 5.

Predictors of Appreciation of Life

In the hierarchical regression model predicting appreciation of life, the model specified accounted for 26% of the variance, and the F change approached significance for Block 1 ($p = .06$) and was significant for Block 3 ($p < .05$). In Block 3 and in the final model, both military status ($p < .05$) and perceived threat ($p < .01$) were significant predictors of appreciation of life, $F(6, 52) = 2.97$, $p < .05$. Those who were National Guard members and Reservists (compared to active duty soldiers) and those who perceived greater threat reported more appreciation of life.

Predictors of Relating to Others

The model specified accounted for 26% of the variance in the hierarchical regression model predicting relating to others, and the F change was significant for Block 1 ($p < .05$) and Block 4 ($p < .01$). In Block 1, early life trauma was a significant negative predictor of relating to others ($p < .05$), but this was no longer the case in the final model. In the final model, postdeployment support was the only significant predictor of relating to others, $F(5, 53) = 3.70$,

$p < .01$. Those who reported greater postdeployment support also reported more positive interpersonal relationships with others.

Predictors of Personal Strength

In the hierarchical regression model predicting personal strength, the model specified accounted for 23% of the variance, and the F change was significant for Block 3 ($p < .05$) and Block 4 ($p < .05$). In Block 3, unit support was a significant predictor of personal strength ($p < .05$), but this was no longer the case in the final model. In the final model, postdeployment support was the only significant predictor of personal strength, $F(5, 52) = 3.05$, $p < .05$. Those with greater postdeployment support reported greater personal strength.

Predictors of New Possibilities

The model specified accounted for 31% of the variance in the hierarchical regression model predicting new possibilities, and the F change was significant for Block 1 ($p < .05$), Block 2 ($p < .05$), and Block 4 ($p < .05$) and approached significance for Block 5 ($p = .08$). In Block 1, minority status was significant ($p < .05$). In Block 2, both minority status ($p < .01$) and predeployment trauma ($p < .05$) were significant. In Block 4, minority status ($p < .01$) and unit support ($p < .05$) were significant. In the final model, minority status ($p < .01$) was the only significant predictor of new possibilities, $F(6, 49) = 3.66$, $p < .01$, with ethnic minorities reporting more new possibilities postdeployment.

Predictors of Spiritual Change

In the hierarchical regression model predicting spiritual change, the model specified accounted for 14% of the variance, $F(5, 54) = 1.78$, *ns*. None of the variables specified were significant predictors of spiritual change.

Predictors of PTG

The model predicting the entire posttraumatic growth scale accounted for 23% of the variance, and the F change was

significant for Block 1 ($p < .05$) and Block 4 ($p < .05$) and approached significance for Block 3 ($p = .06$). In Block 1, early life trauma was a significant predictor of personal strength ($p < .05$), but this was no longer the case in the final model. In Block 3, unit support approached significance ($p = .06$). In the final model, postdeployment support was the only significant predictor of PTG, $F(5, 54) = 3.21$, $p < .05$.

Discussion

The focus of this study was to examine the relative contribution of background characteristics and experiences in the predeployment, deployment, and postdeployment periods in accounting for PTG in a combat-exposed sample. Findings revealed a number of differential associations with subscales of PTG in this sample of Gulf War I veterans. Overall, demographic, deployment, and postdeployment variables were most predictive of various aspects of growth, with predeployment variables having little influence in the final models. Although prior exposure to traumatic events was marginally negatively associated with relating to others, it was not significantly related to any other indices of growth.

The strongest predictor of appreciation of life was perceived threat. Those who felt that their lives were in danger may have a greater appreciation for the value of their own life upon returning from abroad and may appreciate each day to a greater extent as a result. Additionally, because perceived threat is a subjective warzone exposure measure, it is consistently more salient in predicting outcomes than more "objective" reports of exposure (e.g., King et al., 1996). Furthermore, National Guard members and Reservists, who do not receive the same type of training as active duty soldiers (e.g., O'Connor, 2004), could have arguably felt less prepared and could have had a greater appreciation of life upon homecoming as a result. They may have also felt that they had more to lose if they did not return; in general, National Guard members and Reservists tend to be older and more likely to be married with families as compared to active duty soldiers.

Relating to others, personal strength, and PTG as a whole were best predicted by the postdeployment variable of social support. It appears that in order to grow in these ways postdeployment, a strong social support network needs to be in place so that

appropriate gains can be made. This is consistent with previous findings (e.g., Frazier et al., 2004; Park et al., 1996) and with Hobfoll's (1998; Hobfoll, Dunahoo, & Monnier, 1995) conservation of resources stress theory, which posits that although resources may be taxed following exposure to stressors, over time individuals may experience resource gains or positive outcomes. Demographic and deployment variables were not significant predictors of any of these three indices.

New possibilities in life were best predicted by minority status. Some have argued that because some minorities may have fewer educational and job opportunities, the military can be an important means for disadvantaged youths to excel (Jones, 1991). As a result, those who may have faced discrimination and have not had adequate resources available to them may feel that upon returning, new possibilities that may not have been available to them otherwise are at their disposal. In turn, these new possibilities may help them establish a new path in life. For example, the military provides training skills, enhanced self-discipline, and structure, all of which may, in turn, help those who may not have had this type of guidance and organizational framework pursue possibilities that may have otherwise been out of their reach. These skills also may provide a foundation for subsequent life decisions, continued education, and future career choices.

As predicted, exposure to warfare was not associated with any index of growth. Prior research supports the finding that direct exposure to combat is not associated with growth or positive change. For example, Schnurr, Rosenberg, and Friedman (1993) found that during the Vietnam War era, peripheral combat exposure was associated with positive change; however, direct combat exposure and no combat exposure seemed to have little effect on change. Using data from the National Vietnam Veterans Readjustment Study, Fontana and Rosenheck (1998) found a quadratic trend (i.e., inverted U) whereby, at the highest levels of exposure, individuals did not derive psychological benefits (e.g., solidarity with others). Suvak et al. (2002) examined coping as a function of combat exposure and found a quadratic interaction between problem-focused coping and lifetime adaptation and achievement, with problem-focused coping being strongly positively related to adjustment at moderate levels of combat exposure. Similarly, there was a quadratic interaction between wishful

thinking (one component of emotion-focused coping) and combat, with the strongest negative association with adjustment at moderate levels of combat exposure. These three studies seem to indicate that perhaps lower grade stressors may lead to growth but highly stressful experiences such as combat may reveal a more intricate relationship with growth.

Schnurr et al. (1993) speculated that growth from combat may result from the potential mastery experiences that can be gained from combat; however, for many soldiers, direct combat may not provide this reinforcement and may overwhelm existing coping capacities, thereby resulting in negative consequences and emotional sequelae. We would add that in line with previous findings, perhaps there is a dose-response curve that exists whereby low-grade exposures during war lead to growth, but once the level of exposure surpasses a certain level, growth is no longer the outcome. Future studies should explore whether a quadratic trend exists between combat exposure and PTG. These findings may also have implications for veterans with posttraumatic stress disorder (PTSD), and future studies should explore the relationship between PTSD symptoms and growth.

An examination of average item scores on the PTGI subscales (Table 1) provides several interesting results that warrant further exploration. PTG was highest in areas related to appreciation of life and personal strength, a finding that is consistent with other results indicating that deployment experiences can impact veterans' lives in positive ways (Dohrenwend et al., 2004). Of course, these findings are based on a sample of convenience and as a result may not be generalizable to all Gulf War I veterans or to veterans of other wars. Studies that employ nationally representative samples and examine PTG among veterans from other wars are needed to better ascertain how soldiers grow as a result of their deployment experiences. In addition, while it is encouraging that we obtained these results with a small sample size, future studies should employ larger sample sizes when examining these questions. Findings concerning ethnic minorities should especially be interpreted with caution, given the even smaller sample size of non-Caucasian veterans.

Furthermore, this study was based on a cross-sectional design, and studies employing longitudinal designs are needed to provide more definite conclusions regarding the directionality

of key relationships. Finally, third variable factors such as personality and dispositional attributes were not measured in this study and may play an important role in explaining some of the variance in PTG. Future studies should examine these factors in a military sample to better understand trait and dispositional contributors in postdeployment growth. Despite these limitations, our findings are important because they suggest a role for deployment experiences, postdeployment experiences, and background characteristics in accounting for PTG among combat-exposed veterans.

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