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Effects of war exposure on Air Force personnel's mental health, job burnout and other organizational related outcomes

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Abstract

Longitudinal data from a stratified representative sample of U.S. Air Force personnel (N = 1009) deployed to the wars in Iraq, Afghanistan, and other locations were analyzed in this study. Using structural equation models, we examined the effects of war exposure on traumatic experiences, Post Traumatic Stress (PTS) symptoms, resource loss, and on subsequent functioning, perceived health, and on job and organizationally relevant outcomes. The job and organizational outcomes included job burnout, job involvement, job strain, job satisfaction, work-family conflict, organizational commitment, deployment readiness, and intention to reenlist. We found that deployment to the theater of the war increased risk of exposure to trauma, which in turn, predicted elevated PTS symptoms and resource loss. PTS symptoms predicted later loss of resources and deterioration in perceived health and functioning. In turn, resource loss predicted negative job and organizational outcomes. Exposure to trauma fully mediated the effects of deployment to the theater of war on PTS symptoms and resource loss and had additional significant indirect effects on several job and organizational relevant outcomes. For returning veterans, deployment to the theater of war, exposure to trauma, PTS symptoms, and resource loss represents a 'cascading' chain of events that over time results in a decline of health and functioning as well as in adverse job and organizationally relevant outcomes that may affect organizational effectiveness.

Keywords

war exposure; PTSD; PTS symptoms; mental health; functioning; job burnout

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The work submitted conforms to all applicable governmental regulations and discipline appropriate professional ethical standards. The work complied with APA ethical standards in the treatment of the sample. The work was approved by the Institutional Review Boards of the University of Michigan and of the Uniformed Services University established to protect the welfare of human subjects. Participants provided informed consent.

The experience of serving in wartime and being a combatant at war or exposed to an active theater of war is highly stressful. Studies have repeatedly found that military personnel that engage in direct combat are at increased risk for experiencing elevation of Post Traumatic Stress (PTS) symptoms, also known as Combat Stress Reactions (CSR). The PTS symptoms are predictive of diagnosed Post Traumatic Stress Disorder (PTSD). PTSD is a painfully experienced disorder that is often long-term. It is characterized by re-experiencing traumatic thoughts or feelings, avoidance of stimuli related to the original trauma, and hyper-arousal, following exposure to life threatening events. Estimates of psychological casualties, most typically measured in the form of PTSD are estimated to be as high as 30 percent of American troops serving in Iraq and Afghanistan (Lapierre, Schwegler, & LaBauve, 2007). These outcomes, PTS symptoms and PTSD, have been the predominant focus of post-war studies (Friedman, Schnurr, & McDonagh-Coyle, 1994; Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995; Koenen, Stellman, Stellman & Sommer, 2003; Simms, Watson & Doebbeling, 2002).

Persons with PTSD or high levels of PTS symptoms often display impaired role and emotional functioning compared to others who have experienced traumatic events but who do not have PTSD or high symptom levels, and also as compared to the general population (Kessler, 2000; Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995; Zatzick et al., 1997). In turn, this reduced functioning is likely to affect many life domains such as social, emotional, and physical health (Orsillo et al., 1996; Gimbel & Booth, 1994; Prigerson, Maciejewski & Rosenheck, 2001) resulting in a downward spiral that can further exacerbate PTS symptoms. In addition, this negative spiral has the potential to also affect job related outcomes such as job burnout and job retention that are relevant to organizational effectiveness.

In addition to being exposed to the traumatic events of war, military forces also experience other stressful events and conditions as they serve in far away countries. These stressful events include separation from families and communities in a process called deployment. Thus, leaving one's familiar surroundings and stable social networks is fraught with psychological, relationship, economic, and social consequences that must be put aside to deal with the mission of the war. In short, warfare puts soldiers face to face with traumatic events and extraordinary demands that may deplete their adaptive resources and result in poor mental health and deteriorating personal and organizational functioning. At the same time, involvement in the military and the experience of war is often also reported as rewarding, providing enhanced self esteem, a sense of comradery, mastery, courage, and altruism (Aldwin, Levenson, & Spiro, 1994).

The human toll of the wars in Iraq and Afghanistan provides an important context for examining the relationships among stressors, which refer to conditions that undermine the capacity for adaptive responses, and their effects on perceived health, psychological well being and role and emotional functioning. To explore the effects of the causal sequence from deployment to war through exposure to trauma and their effects on mental health and functioning, we longitudinally surveyed Air Force personnel who were either deployed to the theaters of the war such as in Iraq or Afghanistan, or to non-theater regions such as in Europe or Southeast Asia. We employed Conservation of Resources (COR) theory (Hobfoll, 1989; 1998) in framing our study and study instruments. We believe that our study is novel in that it integrates research and theory that has been applied to PTS processes and to burnout and organizational processes, whereas these two have typically been explored separately. Our overall goal was to examine the adverse effects of a stress cycle for soldiers serving at times of war on two distinct types of outcomes. One type of outcome consists of health and functioning (e.g., perceived health, role functioning). The other type consists of personal but relevant organizational variables (e.g., job burnout, organizational commitment).

This stress cycle begins with deployment to the theaters of the war and the exposure to various war traumas in the theater, which in turn, potentially contribute to PTS symptoms, and, in turn, may contribute to further loss of resources. This combination of PTS symptoms and ongoing resource loss, in turn, contributes to compromised role functioning and poor health. As noted, we also examine the possible adverse effects of this cycle on major organizational-relevant outcomes such as job burnout, organizational commitment, deployment readiness, and intention to reenlist. Although these are personal outcomes, they are deemed to have an impact on the effective functioning and readiness of the Air Force as an organization.

In the past 20 years, Conservation of Resource (COR) theory has provided an organizing set of principles that tie together the experiences of stress and coping (Hobfoll, 1989; 2001; 2002). According to COR theory, the major cause of stress is actual loss or a threat of loss of resources. Resources are defined as "... those objects, personal characteristics, conditions, or energies that are valued by the individual or that serve as means for [their] attainment ..." (Hobfoll, 1989, p. 516). Loss and threat of loss are seen by COR theory as precursors to distress and are also hypothesized to activate coping efforts aimed at averting further losses or replenish lost resources. The failure to cope successfully with losses is then manifested in various symptoms of general or specific types of psychological distress (e.g., general anxiety, job strain), difficulties functioning in critical life domains, and diminished physical health. At the same time, COR theory suggests that people are engaged in life and work tasks, in part, to gain and conserve personal, social and material resources, ranging from love and trust on the personal, abstract level, to job security, career advancement and monetary gain on the concrete level. In the current study, we focus on trauma and stressful conditions, but it is important to note that these occur in the context of the study of a healthy, selective and screened population who are actively investing resources not only to offset loss, but to make life gains for themselves, their family, and the nation. Nevertheless, a population deployed to war is at risk of losing important resources due to the deployment that entails separation from family and friends and, for members of the Reserve force, from the civilian job, and other losses of resources such as physical health due to physical injury, and stressful experiences of the engagement in the war itself. Thus the deployment to war endangers not only such vital resources as physical health and well being but also social and family relationships, career and financial resources.

In research on COR theory, loss of resources has been shown to contribute to elevated PTS symptoms (Hobfoll, Canetti-Nisim & Johnson, 2006). However, if the relationship between resource loss and PTS symptomatology is viewed more broadly, it is possible to see the two phenomena as part of a spiraling cycle, where one exacerbates the other with possible reciprocal effects between them (Johnson, Palmieri, Jackson, & Hobfoll, 2007). This possibility has not been addressed in the existing literature. Hence, rather than examining these relationships only unidirectionally, which is what has been done in most prior research, we also examined the longitudinal reciprocal effects of PTS symptoms and resource loss on each other. COR theory would suggest that resource loss and PTS symptoms have downstream impact on social and emotional functioning, perceived health, and organizational-relevant personal outcomes (e.g., job burnout, deployment readiness, intention to reenlist). Given that the sample of respondents used in this study is comprised of U.S. military personnel, organizational-relevant outcomes are of particular importance to the armed forces as an organization that is dependent on maintaining a healthy, well-trained, and ready workforce. With the exception of studies on the relationship of burnout to resource loss, there is a gap in the literature regarding the unique and joint effects of PTS symptoms and resource loss on other relevant organizational outcomes.

Of the various organizational relevant outcomes investigated in this study, we seek to highlight the effects of exposure to war, PTS symptoms and resource loss associated with deployment, on job burnout because COR theory provides a comprehensive approach to explain both burnout (cf. Hobfoll & Shirom, 1993; 2000) and PTS (Hobfoll, 1991). Job burnout is often defined as a psychological strain that results from depletion of personal coping resources in the workplace. And according to COR theory, it is most likely to occur in situations or times when there is an actual or perceived resource loss or a threat of loss, such as during deployment or exposure to the hardship of war which characterize the situations experienced by about half of the sample in this study. Further, according to COR theory, military personnel who are exposed to both trauma related loss and work related loss, as well as the losses related to deployment and being away from families, would be at high risk for experiencing major loss cycles.

In the context of service in the military during the time of Operation Enduring Freedom and of Operation Iraqi Freedom, it is important to consider different groups of military personnel such as those serving in the active duty force versus those serving in the Reserve and the National Guard, henceforth referred to together as the Reserve force. Active duty personnel are full-time members of the armed forces, whereas the members of the Reserve force hold jobs primarily in civilian occupations and participate in the military on a part-time basis. When deployed in support of military operations, members of the Reserve force are placed in active duty status. Compared to airmen (the term used in the military, which also includes women) in the Active Duty force, the airmen in the Reserve force often experience more disruptions in their lives and have been called upon to participate in the recent conflicts much more than in previous ones. When called to military service they leave their civilian job and are separated from their family and civilian community (Grissmer, Kirby, Sze, & Adamson, 1995). These disruptions and separations are fraught with greater risks for incurring various social, career, and financial losses. Despite the multiple disruptions experienced by the members of the Reserve force, it is possible that they may experience deployment as an opportunity to utilize their skills and training in a meaningful and novel way while active duty personnel are more likely to continue to perform their job skills, albeit in a demanding combat environment.

Using a longitudinal data collection from a representative sample of deployed US Air Force personnel that includes members of both Active Duty and Reserve forces we examined the following sets of hypotheses, each preceded by a brief description of the underlying rationale.

First, compared to various deployment locations, the theater of war is where most of the more traumatic events occur. Therefore, it is more likely to expose soldiers to trauma than other locations, and it is more likely to result in various losses including injury and death. Even those in the theater of war who are not exposed directly to trauma may experience high level of PTS symptoms and resource loss due to other more stressful conditions in the theater of war than in other locations (e.g., more stressful work load, longer deployment away from home). However it is possible that all the effects of the theater of war are fully mediated by the degree of exposure to traumatic events.

Hypothesis set 1. Deployment to the theater of war versus other duty stations predicts an increased level of (a) exposure to trauma, (b) PTS symptoms and (c) loss of resources.

Second, as noted earlier, exposure to trauma is a risk factor for exhibiting PTS symptoms and also for the development of PTSD. It is also likely to produce resource loss due to injury and its consequences (e.g., losing the ability to work) and mediate some or all the effects of deployment in the theater of the war on PTS symptoms and loss of resources.

Hypothesis set 2. Exposure to trauma predicts increased level of (a) PTS symptoms and (b) loss of resources, and also predicts (c) to mediate (perhaps fully) the effects of deployment to the theater of war on PTS symptoms and loss of resources.

Third, compared to the members of the Active duty force, members of the Reserve force experience greater disruptions as a result of deployment since they leave their civilian jobs and their communities behind. Thus, for the members of the Reserve force, deployment may be responsible for greater loss of resources than for the members of the Active duty force. In a similar vein, these disruptions may also affect their deployment experience in ways that increase job burnout and job strain and also produce negative attitude toward the Air Force, which could be manifested in such outcomes as lower job satisfaction, organizational commitment and intention to reenlist.

Hypothesis set 3. Compared to service in the Active duty force, service in the Reserve force predicts (a) greater loss of resources, and (b) greater negative impact on organizational relevant outcomes.

Fourth, high level of PTS symptoms and loss of resources are predicted to have a longitudinal adverse effect on each other. Increased PTS symptoms is a risk factor for PTSD, which as noted earlier produces impaired role and emotional functioning that can result in loss of work, and marital or other close relationships. In turn, loss of critical resources (e.g., health due to injury, work, career, marriage) is a risk factor for PTS symptoms.

Hypothesis set 4. (a) Experiencing elevated PTS symptoms predicts loss of resources at a later time, and (b) loss of resources also predicts PTS symptoms at a later time.

Fifth, as noted above, high level of PTS symptoms is associated with impaired mental health and role and emotional functioning. And, in turn, depletion of resources is expected to adversely affect a host of personal but relevant organizational outcomes. The depletion of resources such as health and well being is expected to increase the difficulty in performing one's job adequately and result in such outcomes as job burnout, job strain and work-family conflict, and decrease in job involvement and deployment readiness. In addition, the depletion of resources due to deployment would make the organization, the military, less attractive for the individuals who, according to COR theory, engage in efforts to gain or at least conserve resources. Thus, it is expected that loss of resources will result in a decrease in job satisfaction, organizational commitment, and intention to reenlist.

Hypothesis set 5. Controlling for baseline levels, experiencing PTS symptoms and loss of resources have adverse effects on (a) functioning and perceived health and on (b) organizational-relevant personal outcomes.

METHOD

This study was conducted with the approval of the Institutional Review Boards of The University of Michigan and the Uniformed Services University of the Health Sciences.

Sampling and data collection

The Defense Manpower Data Center (DMDC) of the US Department of Defense provided a probability sample with contact information for 2,250 Air Force men and women who were deployed during the period of October 7, 2001 to the time of the sample request (September, 2004). A random stratified sample was constructed with 52% men, 31% from the Active Duty component of the Air Force, 34% from Reserve, and 35% from the Guard.

Deployment to the theater of war was defined based on the designation of the Department of Defense (DOD) as deployment to at least one of the following locations: Iraq, Afghanistan, Qatar, Kuwait or Saudi Arabia. This DOD designation is used for such benefits as hazardous duty pay, combat-related decorations, and combat veteran status. Deployments to non theater locations included deployment to such regions as Europe, Southeast Asia, or other countries (e.g., Korea, Japan).

All men and women in the probability sample were sent a small incentive with a recruitment letter inviting them to participate in the study. They were then called to complete a short telephone interview (about 20 minutes). Those participating in the interview were then sent another small incentive with a mailed self administered questionnaire (SAQ). The option of completing the SAQ online (on the web) was offered and 40% did so. Of the 2,250 men and women who were invited to the study, 1451 (64%) completed the telephone interview¹, and 1009 (45%) provided data using the mailed SAQ (60%), or its equivalent online (40%). Approximately 14 months later, all participants received an announcement letter and a modest incentive, inviting them to complete a follow-up SAQ. A follow-up period of one year was originally selected since it was thought to provide enough time for changes in the deployment conditions and stresses to show up. A 4-wave longitudinal study that focused on job related constructs such as job demands, job control and mental health by De Lange et al., (2004) demonstrated causal effects using a one-year follow-up period.

Of the 1009 men and women completing the initial time 1 (T1, June 2005) SAQ, 796 (79%) also completed the follow-up time 2 (T2, September 2006) SAQ or its equivalent online (32% and 68%, respectively). The demographic characteristics of the sample including military background information are provided in Table 1.

Measures

Basic demographic information about the respondents was collected with standard questions used in national surveys by the Institute for Social Research. The questions provided data on age, marital status, education, income, ethnic/racial identification, and dependent children.

Military background information. Military background information regarding rank, service component (Active vs. Reserve and Guard), and deployment in theater of war (vs. elsewhere), was obtained from the respondent and from the database provided by DMDC.

Exposure to trauma was assessed using a list of 18 stressful events ($\alpha = .79$) most likely to occur in theater of war such as “come under small arms fire,” “take shelter in a bunker.” This scale was a revised version of similar scales from the war in Vietnam era known as combat exposure scales. The scale has been validated (e.g., Keane, Fairbank, Caddell, Zimering, Taylor, & Mora, 1989) and used in numerous studies on veterans of the war in Vietnam (e.g., Laufer, Gallops, Frey-Wouters, 1984). Our revised version included additional items to incorporate a broader set of traumatic events due to participation in the war effort. Respondents were asked about experiencing the events from October 2001, to the present time and to indicate whether they experienced each event, and if they did, they rated the extent to which they were afraid, horrified, or felt helpless on a 4-point scale ranging from “1= not at all” to “4 = a great deal”. Respondents who did not experience the event received a “0” rating on the scale and the mean of all 18 items on the recoded 5-point scale was used as a measure of exposure to trauma.

¹Of the letters sent to 2,250 men and women, 141, or 6% of the letters were returned due to inaccurate addresses and these individuals could not be located by other searches.

Symptoms of Post Traumatic Stress (PTS) were assessed using a scale with 17 items ($\alpha = .94$) from the PTSD Checklist-Military version (PCL-M) (Weathers, Huska, & Keane, 1991). The items describe various distress symptoms including emotional (e.g., get very upset or anxious), cognitive (trouble keeping your mind on what you are doing) and physical/physiological (heart pound ... begin to sweat) stress reactions. The respondents were asked to rate the frequency of experiencing these symptoms from October 2001 to the present time on a 5-point scale ranging from “1= never” to “5 = very frequently”.

Loss of resources were assessed using 13 items ($\alpha = .88$) preceded by the question “To what extent did you have losses in the following areas of your life as a result of your deployment from October 2001 to the present time?” (Hobfoll & Lilly, 1993). The items were based on COR theory’s definition of resources (Hobfoll, 1998; 1999) and included aspects of losses in family and social relationships (e.g., your relationship with your personal friends), financial matters (e.g., your financial situation or financial resources), career (e.g., your career advancement prospects), and personal matters (e.g., your feeling of pride serving the country). For rating each item, a 5-point response scale was used ranging from “1 = not at all” to “5= large extent.”

Functioning and Perceived Health were assessed by the following measures:

Role and emotional functioning was measured with a 15-item scale ($\alpha = .95$) which was developed by Caplan et al. (1984) and validated in other studies (e.g. Vinokur, Price, & Schul, 1995). Respondents were asked “In the last two weeks, how well have you been doing with respect to the following activities?” They then provided their ratings for each of the 15 activities on 5-point scale ranging from “1 = very poorly” to “5 = exceptionally well.” The activities covered social and emotional tasks such as handling responsibilities and daily demands, staying level-headed and making the right decisions.

Perceived health was assessed with four questions ($\alpha = .78$) that were based on similar items from the Medical Outcome Study (Stewart & Ware, 1992). Participants were asked to answer the following questions: “In general, would you say your health is excellent, good, fair, or poor?” “To what extent do you have any particular health problems?” (“1=never/no extent” to “5= a very great extent”). “Thinking about the past 2 months, how much of the time has your health kept you from doing the kind of things other people your age do?” (“1=none of the time” to “5= all of the time”), and “To what extent do you feel healthy enough to carry out things that you would like to do?” (“1=never/no extent” to “5= a very great extent”).

Organizational-Relevant Personal Outcomes were assessed using the following measures:

Job burnout was assessed using the 12-item ($\alpha = .95$) Shirom-Melamed Burnout Measure (SMBM). This measure has been validated in several studies (Lerman et al., 1999; Melamed, Shirom, Kahana, Lerman & Froom, 1999). The SMBM includes subscales of emotional exhaustion (e.g., “I feel emotionally exhausted”); physical fatigue (e.g., “I feel tired; I feel physically fatigued”); and cognitive weariness (e.g., “I am too tired to think clearly; I feel that I think slowly”). Respondents completing the SMBM were asked to rate the frequency of each feeling while at work in their military occupation during the past month. All items are scored on a 7-point frequency scale, ranging from “1= almost never” to “7- almost always.”

Job strain or distress was assessed using 8 items ($\alpha = .86$) of which 6 were developed by Kandell and colleagues (1985) and also used by Frone, Russell, & Cooper (1992). The two additional items were added in our earlier study (Vinokur, Pierce, Buck, 1999) to represent aspects of distress in military jobs (feeling harassed, intimidated). The items assessed the

degree of experiencing various daily emotional reaction on the job (e.g., relaxed, frustrated, fortunate, bothered or upset, using a 4-point scale ranging from “1= not at all” to “4 = very”). The scores of the answers to the three positive items were reversed.

Work-family conflict included a two-item scale ($\alpha = .84$) used by Frone et al., (1992). Respondents were asked “How often does your Air Force job or career interfere with your responsibilities at home ...?” and “How often does your Air Force job or career keep you from spending the amount of time you would like to spend with your family?” Answers were provided on a 5-point scale ranging from “1= almost never, or never” to “5 = almost always, or always.”

Deployment readiness was an investigator-developed measure based on personal military experience and commentaries in the public media regarding problematic areas reported by troops preparing for deployment. Deployment readiness was assessed with a 5-item scale ($\alpha = .83$) including statements about their preparation for deployment. The statements covered various personal issues that need to be addressed in order to be ready for deployment. Respondents were asked “Should you be deployed again, how strongly you agree or disagree with each of the following statements about deployment for you and your family?”: “My personal life and affairs are organized so that I am ready to deploy with little advance notice,” “I am emotionally prepared for deployment at any time;” “I always keep my legal and financial affairs in order;” “I am physically able to deploy at any time;” and “I am mentally prepared for deployment at any time”. Respondents provided their answer to each statement on 5-point scale ranging from “1 = strongly agree” to “5 = strongly disagree”. Ratings were recoded so that high scores represent greater readiness for future deployments.

Job satisfaction in the Air Force was assessed with an index based on 10 rating scales ($\alpha = .83$) developed by Andrews and Withey (1976). Respondents asked to indicate how they felt about various aspects of their job on scales that vary from “1 = terrible” to “7 = delighted”. The aspects of the job that were covered include co-workers, supervisor, the work itself, the pay, chances for promotion, job security, skill utilization, benefits, and the mission of the Air Force.

Job involvement was assessed with a 5-item scale ($\alpha = .89$) adapted by Frone and colleagues, (1992) from a measure developed by Kanungo (1982). Job involvement items focused on the extent to which the job is central to one's self-concept or sense of identity based on the job. The items included statements such as “my job is a very important part of my life” and “most of my interests center around my job” and required ratings on a 6-point scale ranging from “1 = strongly disagree” to “6 = strongly agree”.

Organizational commitment was assessed using an 8-item measure ($\alpha = .82$) that focused on the affective component of commitment (Allen & Meyer, 1990; Meyer & Allen, 1991). The respondents were asked to rate how much they agree or disagree with a series of statements regarding the role of the Air Force in their life on a 6 point scale ranging from “1 = strongly disagree” to “6 = strongly agree”. The statements included feeling attached to the Air Force, feeling a strong sense of belonging to the Air Force and the like.

Intention to reenlist was assessed with two item scale ($\alpha = .92$) based on Ajzen and Fishbein's theory of reasoned action (Ajzen & Fishbein, 1980). One item asked respondents to rate the likelihood of continuing or leaving the Air Force on a scale ranging from “1 = extremely likely” to “7 = extremely unlikely”. The second item asked them to rate the strength of their intention to continue or leave the Air Force using a scale ranging from “1 = definitely intend to continue” to “5 = definitely intend to leave”. The ratings were scored so that high scores represent stronger intention to continue military service.

Analysis

First, we conducted logistic regression attrition analysis to determine possible bias in the characteristics of respondents who participated versus those who did not participate in the study. For this analysis we used the data obtained from the DMDC on each person's age, gender, parenthood status, rank (officer vs. enlisted), component (Active, Reserve or Guard), deployment location in terms of theater of war (vs. elsewhere), and length of deployment. Second, we conducted the same type of logistic analysis described above to predict attrition at T2 based on the data from T1. Again, the purpose of this analysis was to determine possible bias in the characteristics of respondents who remained in the study at T2.

Third, we conducted structural equation modeling analyses which included the estimations of basically the same ten structural equation models that were constructed to test our five sets of hypotheses. All the ten estimated models were identical, except for the T1 baseline and the corresponding T2 outcome measure, which varied across the models. That is, each of the ten models included a different T1 baseline and its corresponding T2 outcome than the others (cf Table 3, left column). The identical part of the models was constructed to test the first four sets of hypotheses. The changing part across the models, that is, the different T1 and T2 outcomes, was intended to test the fifth hypothesis set. The first two models (cf Table 3, rows 1 and 2) included the functioning and perceived health outcomes, and the remaining eight models (cf Table 3, rows 3 to 10) included the organizationally-relevant outcomes. Finally, in all of the models, each latent factor is indicated by two parcels that were comprised of random half of the items of the respective measure of the construct.

To estimate our models we used EQS software (version 6.1, build 94). The estimation of the models applied the maximum likelihood method with the Yuan and Bentler (2000) EM-ML imputation procedure for missing data. This procedure also included the Jamshidian and Bentler (1999) robust method for adjusting standard errors. The imputation procedure provided a total sample of 1009 respondents. As required in estimating longitudinal models, our models included the correlations between the errors of corresponding variables across T1 and T2 (that is, between T1 and T2 of PTS symptoms, of resource loss, and of T1 and T2 of the respective outcome). In addition, we also included correlations between the error of the T1 respective outcome and T2 PTS symptoms and T2 resource loss. No other correlated errors were included in the model. Finally, to determine model fit, we relied on a standard recommendation to examine several fit measures. We follow Hu and Bentler's (1999) suggestion to consider models with CFI and NNFI indices closer to .95, and RMSEA equal or less than .06 as providing reliable evidence of acceptable fit.

RESULTS

Analyses of Participation at Baseline

Using a logistic regression analysis, including all the demographic and military background variables to predict participation at Time 1 (T1), we found that age, female gender, parental status, rank and component were significant predictors (Odds Ratio = 1.04, 1.20, 1.25, 1.69 and 1.20, respectively, $p < .05$). Higher response rates were found for older participants (mean age 38.2 vs. 33.9), females (46% vs. 43% males), parents (51% vs. 39% non parents), officers (59% vs. 41% non officers), and Reserve and Guard members (48% vs. 37% Active duty). In contrast, deployment in the theater of the war (versus elsewhere) and length of deployment did not significantly predict participation. Hence, there were several demographic and military variables that biased the representation of our overall sample. However, even with this bias, the generalizability of our findings is strengthened by the greater coverage of particular groups in the military, such as females and parents, who are typically underrepresented in research.

Analyses of Attrition at Follow-up

A total of 796 respondents completed the Time 2 (T2) questionnaire for a 79% response rate. Using a logistic analysis to predict attrition at T2 based on the data from T1, we found that only age significantly predicted participation at T2 (Odds Ratio = 1.03; $p < .01$), completers being somewhat older than non-completers ($M = 38.5$ versus 34.6 respectively). Furthermore, we examined attrition at T2 by comparing the T1 reports of the participants and the non-participants that included various mental health and functioning variables such as depression, role functioning, perceived health and job burnout. We found that none of these comparisons yielded a statistically significant difference. Hence, attrition did not play a meaningful role in altering the representativeness of the original sample used for our analyses.

Structural Equation Modeling Analyses

The results of the estimated model that includes job burnout as an outcome are displayed in Figure 1 and the corresponding matrix of correlations of the variables in this model is presented in Table 22. The results of this model and the estimated other nine models are also provided in Table 3.

The estimation of the model in Figure 1 with job burnout as the outcome produced a Yuan-Bentler scaled χ^2 ($df = 83$; $n = 1009$) = 107.34 with NFI, NNFI, CFI = .99 and RMSEA = .00. All the other nine models also provided the same goodness-of-fit and RMSEA values above .98 and RMSEA below .01. Thus, all the ten models fit the data exceedingly well.

Results pertaining to the first four set of hypotheses: Effects on PTS

symptoms and Loss of Resources—Next, we examined the results that pertain to the first four set of hypotheses, namely, the various effects of deployment location, exposure and components on T1 PTS symptoms and resource loss, and the longitudinal effects of PTS symptoms and resource loss on each other. These are effects that are common to all the ten models and can be viewed in Figure 1 for the model that includes job burnout as an outcome. We later examined the effects of these variables on the functioning, health, and organizational outcomes across the ten models (cf Table 3).

As suggested by hypothesis set 1(a), deployment to the theater of war (versus elsewhere) predicted an increased level of exposure to trauma (Hyp.1(a): $\beta = .37$, $p < .001$); but, it did not predict elevated PTS symptoms (Hyp.1(b): $\beta = .03$, ns) or a loss of resources (Hyp.1(c): $\beta = -.07$, ns). At the same time, and unexpectedly, deployment to the theater of war predicted lower levels of job burnout, job strain, and work-family conflict (β s = $-.09$, $-.11$ and $-.09$, respectively; $p < .01$). We speculate that the deployment to the theater of war is associated with increased awareness of the mission importance which may increase motivation and reduce the negative effect of the war environment on these outcomes. However, these appear to be short-term effects that diminish overtime and do not appear at T2.

As suggested by hypothesis set 2, exposure to trauma predicted increased PTS symptoms (Hyp.2 (a): $\beta = .55$, $p < .001$), and greater loss of resources (Hyp.2 (b): $\beta = .30$, $p < .001$). Thus, these results, and those related to Hypothesis 1(b) and Hypothesis 1(c), also support Hypothesis 2c) that exposure to trauma fully mediated the effects of deployment to the theater of war on both T1 and T2 PTS symptoms and resource loss (Sobel test = 7.60 and 3.86, respectively, both $p < .001$, for T1; and, Sobel test = 5.58 and 2.01, $p < .001$, .05,

²The means, standard deviations and correlations of all measured variables for our ten models are available from the first author upon request.

respectively, for T2). Furthermore, as shown on the left side of Table 3, exposure to trauma predicted lower levels of functioning and perceived health at T1 (Hyp.2(c): β s = $-.13, -.25$, $p < .01$) and a negative impact on several organizational variables such as job burnout, job strain, work-family conflict, and job satisfaction also at T1 (Hyp.2(d): β s = $.20, .20, .23, -.09$; respectively, $p < .001, .05$). But, unexpectedly, exposure predicted higher job involvement ($\beta = .11$, $p < .01$). Again, we speculate here that in the context of war, jobs which are more engaging or more directly related to the war effort are those associated with greater risk of exposure to trauma.

We also examined the indirect effects of exposure to trauma on our ten outcome variables at T2. We found that exposure had statistically significant indirect negative effect on T2 functioning and perceived health (β s = $-.19, -.25$, $p < .001$) as well as on job burnout, job strain, work family conflict, deployment readiness and job satisfaction (β s = $.19, .18, .20, -.09, -.10$, respectively, $p < .01$). It therefore appears clear that exposure to trauma is the key mechanism that cascades into PTS symptoms, loss of resources which in turn adversely affect important health and organizationally-relevant outcomes.

Next we examined the results pertaining to Hypothesis set 3. The results did not support Hypothesis 3 (a) in that compared to membership in the Active duty force, membership in the Reserve force did not predict greater loss of resources ($\beta = -.06$, n.s.). Furthermore, and contrary to the prediction stated in Hypothesis 3(b), the results demonstrated that compared to the members of the Reserve force, the members of the Active duty force experienced statistically significant poorer organizational relevant outcomes (except deployment readiness). (cf left side of Table 3). A possible reason for these unexpected results is discussed later.

As predicted by Hypothesis set 4(a), experiencing a higher level of PTS symptoms at T1 predicted increased loss of resources at T2 ($\beta = .23$, $p < .001$). And, as predicted by Hypothesis 4(b) loss of resources at T1 predicted increased PTS symptoms at T2 ($\beta = .09$, $p < .05$). We also tested an alternative model with the diagonal effects from PTS symptoms to resource loss and resource loss to PTS symptoms replaced with reciprocal paths at T2. The alternative model had virtually the same fit with χ^2 ($df = 83$; $n = 1009$) = 134.24, and with NFI, NNFI and CFI = .99, respectively, and RMSEA = .01. This alternative model also demonstrated that PTS symptoms predicted increase in loss of resources ($\beta = .33$, $p < .001$), and loss of resources also appear to increase PTS symptoms ($\beta = .15$, $p < .05$). The findings related to Hypothesis set 4 suggests that elevated level of PTS symptoms triggers the cascading negative effects resulting in resource losses, and as shown later, in other important sequelae as well.

Results pertaining to the fifth Hypothesis set: Effects on functioning, health and organizational outcomes—Our final set of results pertain to Hypothesis set 5, which describes the aftermath of elevated PTS symptoms and loss of resources, that is, their hypothesized effects on (a) functioning and perceived health, and on, (b) organizationally relevant outcomes. The first set of these results with respect to job burnout is displayed in Figure 1. Again, these and all other results pertaining to the additional nine outcomes are displayed on the left side of Table 3. As can be seen, T2 PTS symptoms (Hyp. 5(a)), but not loss of resources, predicted a deterioration in role and emotional functioning and in perceived health (β s = $-.43, -.25$, respectively, both $p < .001$). In a similar vein, as suggested by Hypothesis 5(b), T2 PTS symptoms also predicted an increase in job burnout, job strain, work-family conflict (β s = $.21, .19, .09$; $p < .001, .001, .05$, respectively), and a deterioration in deployment readiness ($\beta = -.16$, $p < .001$). In Figure 1 we also observe the path from T1 PTS symptoms to T2 job burnout as $-.08$ ($p < .05$) which according to Maassen and Bakker (2001) represents a suppression effect. And according to Kessler and

Greenberg (1981), this effect is interpreted, counter-intuitively according to the negative sign of the parameter, as a change (increase) in PTS symptoms producing a change (increase) in job burnout.

In the same vein, also as suggested by Hypothesis 5b, T2 loss of resources predicted a statistically significant deterioration in all the organizationally-relevant outcomes. More specifically, resource loss predicted an increase in job burnout, job strain, work-family conflict (β s = .16, .12, .23, respectively), and a decrease in deployment readiness, job satisfaction, job involvement, organizational commitment and intention to reenlist (β s = -.20, -.15, -.23, -.13, -.08, respectively). These results largely support Hypothesis set 5 in that the PTS symptoms predicted a decrease in functioning and perceived health, as well as having adverse impact on several organizational relevant outcomes at T2. Although not predicting poor health and functioning, loss of resources predicted deterioration in all the organizational relevant outcomes at T2. Therefore, it appears that the adverse impact of PTS symptoms is more pronounced with respect to health and functioning outcomes and the adverse impact of resource losses is more pronounced with respect to the organizationally relevant outcomes.

DISCUSSION

Using data from a sample of US Air Force Active Duty and Reserve personnel we found support of our hypotheses predicting that deployment to the theater of the war increased risk of exposure to trauma, which in turn, predicted elevated PTS symptoms and resource loss. Furthermore, PTS symptoms predicted later loss of resources and deterioration in functioning and perceived health. Resource loss, in turn, predicted increases in PTS symptoms and negative job and organizational relevant outcomes such as job burnout, decreased organizational commitment and deployment readiness.

The results documented here broadly support the theoretical and empirical predictions of COR theory. Yet, in the presence of PTS symptoms loss of resources did not have independent effects on functioning or perceived health. That said, PTS symptoms and resource loss were moderately intercorrelated (r = .41 to .48), and hence our results can be interpreted as indicating that PTS symptoms and resource loss are related, where at times it is the symptomatology of PTS symptoms that predominates and at other times, it is resource loss that predominates in the cascading sequence. These results extend those of previous studies based on COR theory in that they demonstrate the adverse effects of loss of resources, on both mental health outcomes such as job burnout, and also on the decline in various positive outcomes including organizational commitment, job involvement, and job satisfaction. These findings suggest that those who have more resources, and those that can best replenish their depleted resources, fare better following trauma in terms of their job and organizational functioning. They also illustrate that resource losses affect both the traditional trauma outcome of PTS symptoms and outcomes that have been previously not considered when looking at traumatic events, but that have been found to be relevant to work and organizational settings.

For the most part, the results of the study supported our hypotheses. But some results were unexpected and contrary to the predictions as stated in hypothesis 3(b). That is, we found that compared to the members of the Reserve force who were thought to have endured greater disruptions and resource loss, the members of the Active duty force experienced significantly greater job burnout, job strain, work-family conflict, and significantly lower job satisfaction, job involvement, organizational commitment and intention to reenlist.

We can offer only a reasonable but speculative explanation for this pattern of results. It is possible that a selection bias into the Reserve force can explain these results. A significant number of the members of the Active duty force in the last 10 years may have exhausted their coping resources due to the high operational tempo in the war in Iraq and Afghanistan leaving them vulnerable to the experience of burnout and other adverse outcomes. Consequently they may be less likely to reenlist with the Active force, and also are less likely to enlist in the Reserve force. In contrast, the Reserve force may include for the most part those former members of the Active duty, and others who enlist with the Reserve force, whose resources have not been depleted by the experience of high operational tempo and therefore possess more positive attitude toward the armed forces as demonstrated by high organizational commitment and intention to reenlist. In other words, our sample of the Active duty force includes a significant proportion of those who are 'burned out' and do not have the necessary resources to continue and withstand the rigor required by service in the military and war and would therefore quit the Active duty force and would not enlist in the Reserve force. Thus we surmise that the Reserve force composed of older more experienced and resourceful personnel than the Active duty force. Indeed, we found that the mean age and mean years of service were significantly and substantially higher for Reserve than for Active duty force (respectively for age, 39.7 vs. 31.8 years, and for years of service 16.4 vs. 10.7 years). However, the validity of this explanation would require further investigation based on additional data.

While this study highlighted several important mental health consequences exposure to traumatic events experienced in wartime, other hidden or delayed consequences of participation in war also take a toll on the lives of war veterans. Although the literature is only beginning to emerge with respect to the current operations, evidence from the Vietnam and Persian Gulf War indicate that compromised mental health is associated with poor physical health, drug and alcohol abuse, homelessness, violence, unemployment, divorce, inadequate parenting and an alarming rate of suicide (Friedman et al., 1994; Keane, Marshall & Taft, 2006; Kulka et al., 1990/or 1988; Marshall, Panuzio & Taft, 2005). Concerns are mounting about how returning veterans who are leaving the military, or reservists returning to civilian life, will fare in finding employment in the current downturn of our economy (NY TIMES, New Veterans hit hard by Economic Crisis, November 18, 2008). Unemployment and financial hardship often leads to depression, substance abuse, spouse and child abuse, and disintegration of the family (e.g., Barling, 1990).

Certain limitations to our study must be noted. First, the participation response rate was limited to 45%. Given the information received with the sample frame, we found biased response rate in that participants were older, and more of them were females, parents and officers than their counterparts. However, these were relatively small biases with odd ratios that did not exceed 1.69. And, most importantly, deployment in the theater of the war (versus elsewhere) and length of deployment did not significantly impact participation. Participation rate in the T2 follow-up was high (79%) and was biased only by age, but not by any of the T1 baseline measures. Second, our assessment of PTS symptoms was also limited; it included a several-year time frame and cannot be considered diagnostic of PTSD, yet allowed for assessment of PTS symptoms during a longer time frame. Third, in some instances the possibility of reverse causation cannot be ruled out. For example, it is possible that job burnout at time 1 increased the vulnerability of the respondents to the trauma of exposure to war stressors. Fifth, possible effects of confounding factors such as negative affectivity or neuroticism on our study variables were not controlled and cannot be ruled out.

Last but not least, another limitation of this study pertains to the absence of a comprehensive assessment of some of the positive benefits that are often reported generally in relation to serving in the armed forces or specifically of service during times of war. Such benefits may

include enhancement of various work related skills, the creation of close bonding ties with fellow soldiers, increase in self esteem, pride of serving one's country and the like. Nevertheless, our study included several outcome variables that could fully capture effects of positive benefits such as, role and emotional functioning, job satisfaction, job involvement, and organizational commitment. Yet, our results show the negative impact of war exposure on some of these variables (role and emotional functioning and job satisfaction) and the negative impact of PTS symptoms and resource loss on all of them. Thus, even in the presence of positive benefits due to service at times of war our study demonstrated that the effects of war exposure on mental health, role and emotional functioning and an array of important personal but relevant organizational outcomes were by and large negative.

Despite the study limitations, our study is one of the first to focus on deployed members of the Air Force including the rarely studied Reserve and Guard components, which taken together, represents 25% of the total force (Sollinger, Fisher & Metscher, 2008). Further, the study was based on a large and diverse sample with a longitudinal design and analyses that controlled for all the baseline outcome measures. The results provided a much-needed exploration of wartime deployment outcomes of Air Force personnel and showed consistent support for four of our five sets of hypotheses using several diverse outcome measures some of which were designed to capture positive effects (e.g., job satisfaction, organizational commitment) while others focused on negative effects (e.g., job burnout, work family conflict). Furthermore, the generalizability of our findings is strengthened by coverage of particular groups in the military, such as women and parents, who are a growing demographic in today's military, but typically underrepresented in research. Our conclusion is that for returning veterans, deployment to the theater of war, exposure to trauma, PTS symptoms and resource loss represent a 'cascading' chain of causes that over time results in a decline of health, and of personal and organizational functioning that has costs to the individuals and to the military's ability to fulfill its mission with experienced and healthy veterans. These findings suggest that intervention to limit resource loss should begin with early assessment of such loss, and organizational efforts to limit, offset, or counter resource losses. As military personnel will inevitably be exposed to high risk traumatic circumstances, focusing on psychosocial and material resource losses is a much needed direction for intervention. This can be included in commander/leader training, organizational structures to support and replace resources, and planning, in particular, for those likely to be exposed to trauma and multiple deployments. As many of these resources also concern how families are affected by deployment, interventions that target and enrich family connections and challenges that military families face will also be valuable.

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Figure 1. Longitudinal effects (standardized coefficients) of service in theater of war and exposure to trauma on Post Traumatic Stress (PTS) symptoms and on loss of work/economic and psychosocial resources. All solid line paths are statistically significant at .05. Curved lines represent correlations among errors. Yuan-Bentler scaled χ^2 (83, n = 1009) = 107.34. NFI, NNFI and CFI = .99, and RMSEA = .00.

Table 1

Demographic and Military Background of Sample Respondents (N = 1009)

Characteristics	Percent (n)	Characteristics	Percent (n)
Age (M = 38.2 yrs)		Race	
30 & younger	27.2 (274)	White	76.5 (772)
31 – 40	31.9 (322)	Non-White	22.0 (222)
41 & older	40.9 (413)	Dependent Child (During deployment)	
Education (Md=14.9 yrs)		Yes	42.4 (428)
13 yrs & below	23.2 (234)	No	52.5 (530)
14 yrs	23.7 (239)	Rank	
15 yrs & above	52.4 (529)	Officer	25.5 (257)
Gender		Enlisted	73.4 (741)
Male	50.1 (506)	Component	
Female	49.9 (503)	Active	25.5 (257)
Household Income (Md=\$55,365.00)		Reserve	39.0 (394)
39,999 & below	29.2 (295)	Guard	35.5 (358)
40,000 – 59,999	4.4 (246)	Deployment Location	
60,000 & above	42.3 (427)	Theater of War ¹	65.1 (657)
Marital Status		Elsewhere ²	34.9 (352)
Married	53.1 (536)		
Unmarried	46.3 (467)		

¹Theater locations include Iraq, Kuwait, Qatar, Afghanistan and Saudi Arabia. Participants in the theater of war may have also served in other locations.

²Participants deployed “elsewhere” were not deployed in any location defined as “in theater.”

Table 2
Correlations, Means and Standard Deviations of the Measures displayed in Figure 1

Variable	1	2	3	4	5	6	7	8	9
1. Deployment Location	-								
2. Exposure to Trauma	.34	.79							
3. Component	.03	.04	-						
4. PTS symptoms, T1	.18	.48	.07	.94					
5. PTS symptoms, T2	.14	.37	.09	.64	.95				
6. Resource Loss, T1	.04	.23	-.01	.45	.35	.88			
7. Resource Loss, T2	.06	.22	.05	.42	.59	.58	.91		
8. Job Burnout, T1	.01	.13	.21	.35	.31	.32	.25	.95	
9. Job Burnout, T2	.01	.11	.16	.28	.39	.22	.33	.55	.96
Mean	.64	.36	.23	1.42	1.51	1.52	1.53	2.88	2.82
SD	.50	.40	.47	.58	.58	.60	.55	1.23	1.10

Note. N = 1009. Correlation coefficients larger than .06 are statistically significant at .05. The bold face figures in the diagonal are the Cronbach reliability coefficients for the multi-item measures. Deployment Location: Theater of War = 1, Elsewhere = 0; Component: Active Duty = 1, Reserve/Guard = 0

Table 3

Standardized regression coefficients of Time 1 (T1) and Time 2 (T2) Predictors of Study Outcomes and R²s

Variable	Predictors of T1 Outcomes				Predictors of T2 Outcomes					
	Location ^b	Exposure	Component ^c	R2	Outcome, T1	PTS ^d T1	Loss, T1	PTS, T2	Loss, T2	R2
Health Outcomes										
1. Functioning	.04	-.13**	.03	.02*	.52***	.13*	-.02	-.43***	.00	.49***
2. Perceived Health	.08*	-.25***	-.03	.05*	.63***	.06	-.02	-.25***	.00	.65***
Organizational Relevant Outcomes										
3. Job Burnout ^e	-.09**	.20***	.17***	.06**	.59***	-.08*	-.04	.21***	.16***	.49***
4. Job Strain	-.11**	.20***	.16***	.06**	.59***	.09**	-.01	.19***	.12**	.47***
5. Work-Family Conflict	-.09**	.23***	.15***	.07**	.63***	-.05	-.08*	.09*	.23***	.50***
6. Deployment Readiness	.06	-.07	.01	.01*	.67***	.11**	-.09**	-.16***	-.20***	.52***
7. Job Satisfaction	.05	-.09*	-.13***	.02*	.72***	.02	.07	-.05	-.15***	.58***
8. Job Involvement	.03	.11**	-.15***	.04*	.62***	-.05	.17***	.13**	-.23***	.62***
9. Organiz. Commitment	.02	.00	-.18***	.03*	.70***	-.04	.10**	-.02	-.13**	.50***
10. Intention to Reenlist	-.01	-.02	-.19***	.04*	.68***	.04	.07*	-.09**	-.08*	.47***

^aThe results for each outcome are based on a structural model (e.g. Figure 1 for job burnout). The Yuan-Bentler χ^2 (df = 83; n = 1009) for all the models varied from 106.32 to 140.13. NFI, NNFI and CFI are for all models greater than .98 and RMSEA = 0.01.

^bTheater of War = 1, Elsewhere = 0;

^cActive Duty = 1, Reserve/Guard = 0;

^dPost Traumatic Stress (PTS) symptoms;

^eThe results for job burnout are also displayed in Figure 1.

* p<.05

** p<.01

*** p<.001.