Resilience During War: Better Unit Cohesion and Reductions in Avoidant Coping are Associated with Better Mental Health Function after Combat Deployment

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Abstract

Objective: The majority of individuals who endure traumatic events are resilient; however we do not yet understand why some individuals are more resilient than others. We used data from a prospective longitudinal study Army National Guard and Reserve personnel to examine how unit cohesion (military specific social support) and avoidant coping relate to resilience over the first year after return from deployment. **Method:** Soldiers (N=767) were assessed at four Phases: pre-deployment (P1), immediately post-deployment (P2), 3 months post-deployment (P3) and 1 year post-deployment (P4). **Results:** After controlling for pre-deployment avoidant coping and overall social support, higher unit cohesion was associated with a reduction in avoidant coping (from P1 to P3). This reduction in avoidant coping (from P1 to P3) mediated the relationship between unit cohesion (P2) and improvement in mental health function (from P1 to P3). **Conclusions:** The results are consistent with the hypothesis that higher unit cohesion may mitigate increases in avoidant coping in military personnel after a combat deployment, and in turn improve mental health function.

Keywords: resilience, veteran, common-sense model, coping, unit cohesion, self-regulation

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Most individuals endore one or more traumatic or highly stressful events within their lifetime. An estimated 60-80% will be relatively resilient, defined as being able to continue to function at or near baseline levels of functioning (Bonanno, 2005; Bonanno & Mancini, 2012). For example, an estimated 80% of veterans returning from Operation Enduring Freedom/Operation Iraqi Freedom (OEF/OIF) do not meet screening criteria for a mental health disorder after their combat deployment (Hoge et al., 2004). Similarly, most OEF/OIF military personnel exposed to combat do not suffer from post-traumatic stress symptoms (Bonanno & Mancini, 2012). Unfortunately, little is known about what confers resilience. One reason for this is that traumatic events (e.g., natural disasters, terrorist attacks) are typically unanticipated and therefore difficult to study prospectively. An exception to this is deployment to combat. The goal of this study was to understand factors that contribute to resilience after war by utilizing a prospective design to assess U.S. soldiers before and after deploying to Iraq or Afghanistan. Improving our understanding of how military personnel are able to maintain mental health functioning after extreme stress or trauma is critical for developing effective preventive interventions and may also contribute to understanding resilience in the general population.

Although research on how some military personnel maintain good mental health function after deployment is still in its infancy, one initial and robust finding is that unit cohesion is cross-sectionally related to better mental health outcomes after combat deployment (Brailey, Vasterling, Proctor, Constans, & Friedman, 2007; Dickstein et al., 2010). Unit cohesion is defined as social support among unit members. In a cross-sectional study of 705 Air Force personnel deployed to Iraq, Dickstein and colleagues (2010) found higher unit cohesion to be associated with fewer post-traumatic stress disorder (PTSD) symptoms. Other studies have

shown a similar concurrent relationship between higher unit cohesion and fewer PTSD symptoms (Armistead-Jehle, Johnston, Wade, & Ecklund, 2011; Pietrzak et al., 2010), lower psychological distress (Gilbar, Ben-Zur, & Lubin, 2010; Mulligan et al., 2010), better self-reported health (Mulligan et al., 2010), less depression (Britt, Dickinson, Moore, Castro, & Adler, 2007), better well-being (Oliver, Harman, Hoover, Hayes, & Pandhi, 1999) and better morale (Britt et al., 2007). These studies suggest there is a consistent cross-sectional relationship between better unit cohesion and a variety of mental health outcomes. This is consistent with research showing a relationship between general social support and better mental health outcomes after combat (Boscarino, 1995; King, King, Foy, Keane, & Fairbank, 1999). These studies are limited by their cross-sectional design. Moreover, no previous study has addressed the mechanisms by which unit cohesion may lead to better outcomes.

The Social Cognitive Processing Model provides a theoretical explanation for how social support contributes to better mental health functioning following trauma (Lepore, 2001). It proposes that individuals who have access to good social support are more willing to face their emotional and cognitive reactions to trauma. According to the Social Cognitive Processing Model, a primary task after trauma or extreme stress is to reconcile differences between how one used to view the world and oneself (e.g., the world is safe, people are good, I am a good person) and how one views the world and oneself following trauma (e.g., the world is unsafe, people are not good, I am not good). When individuals avoid their cognitive and emotional reactions to trauma, this reconciliation of old and new worldviews does not occur. Avoidance also increases intrusive thoughts (Wegner & Zanakos, 1994), leads to difficulty regulating negative emotions (Lepore, 1997; Lepore, Silver, Wortman, & Wayment, 1996), and interferes with finding meaning in the trauma. Importantly, this model proposes that social support helps reduce

avoidance of the trauma related emotions and thoughts, allowing for cognitive processing and leading to better mental health outcomes (Lepore, 2001).

The Social Cognitive Processing Model has primarily been tested among individuals who are experiencing life-threatening chronic illnesses (Lepore, 2001). For example, Cordova, Cunningham, Carlson and Andrykowkski (2001) conducted interviews with 70 individuals with cancer and found that those who felt unsupported by their social networks had higher levels of depression and lower levels of well-being. The primary mechanism for the relationship between poor social support and these outcomes was greater avoidant coping (defined as avoiding the emotions, cognitions and memories associated with the stressor). Devine, Parker, Fouladi, and Cohen (2003) studied 53 patients with cancer who were entering a clinical trial for a vaccine. They found that a strong relationship between higher social support and better mental health function was mediated by less avoidant coping.

We suggest that the Social Cognitive Processing Model also can apply to military personnel coping with combat. Specifically, unit cohesion during deployment constitutes a unique form of social support. In line with the research just reviewed, military personnel who perceive greater unit cohesion may engage in less avoidant coping of combat-related thoughts and emotions, which may contribute to better mental health functioning. We further propose an extension of the Social Cognitive Processing Model. Specifically, that soldiers with high levels of unit cohesion will continue to use less avoidant coping as they reintegrate back into their civilian lives. This is consistent with self-regulation theory which maintains that individuals are active problem-solvers who rely on prior experiences to guide how they deal with future stressors (McAndrew et al., 2008b). In other words soldiers will learn that not using avoidant coping is a successful strategy and continue to not use avoidant coping while they navigate the stressors of reintegration.

Although we know of no study that has examined associations between unit cohesion and avoidant coping, there is evidence that avoidant coping is cross-sectionally associated with worse mental health outcomes after traumatic events (Snyder & Pulvers, 2001). For example, avoidant coping is related to more PTSD symptoms among motor vehicle accident victims, traumatic brain injury patients, injured workers, and police recruits (Bryant & Harvey, 1995; Bryant, Harvey, Guthrie, & Moulds, 2000; LeBlanc, Regehr, Jelley, & Barath, 2008; Matthews, Harris, & Cumming, 2009). A meta-analysis of 39 cross-sectional studies found a relationship between greater avoidant coping in response to a potentially traumatic event and worse mental health outcomes (Littleton, Horsley, John, & Nelson, 2007). In one of the only studies to assess the prospective role of coping style after a major life stressor, Gil (2005) measured coping style among Israeli college students two weeks before a terrorist explosion on a bus and again six months after the attack. Higher levels of avoidant coping before and after the attack predicted more mental health symptoms six months after the attack. This research is consistent with a significant history of connecting avoidance to poorer mental health, and particularly PTSD (Chawla & Ostafin, 2007; Foa, Steketee, & Rothbaum, 1989)

Our goal is to assess if unit cohesion is associated with lower use of avoidant coping which would lead to better mental health function one year after combat deployment. This study is one of the first to use a prospective design to examine situational factors (unit cohesion) that may improve resilience after war (Vasterling et al., 2006). Studying situational factors is critical because they are modifiable. This study will also examine if unit cohesion leads to changes in avoidant coping over time. The idea that there can be benefit (in addition to inherent difficulty) from a traumatic or stressful situation (termed post-traumatic growth) is not new. Retrospective studies have found some benefit from traumatic or very stressful experience (Barskova & Oesterreich, 2009; Janoff-Bulman, 2006), but few have been able to prospectively show benefit.

Importantly, this study would suggest an early mechanism (improve unit cohesion) to improve reintegration, a priority for the Department of Defense and the Veterans Affairs.

To address limitations of previous studies, we used a prospective longitudinal cohort of 767 Army National Guard and Reserve soldiers deploying to Iraq or Afghanistan assessed pre-deployment, immediately after, 3 months after and 1 year after return from deployment. The prospective design allowed us to assess resilience, defined here as better mental health function after controlling for pre-deployment levels of mental health function. This design also allowed us to statistically control for individual variation in multiple predictors before deployment. We hypothesized that: (1) *Higher unit cohesion* would be associated with better *mental health function* after deployment. (2) *Reductions in avoidant coping* from pre-deployment to after deployment would be associated with better *mental health function* after deployment. (3) *Higher unit cohesion* would be associated with a *reduction in avoidant coping* from pre-deployment levels after deployment. We explored how unit cohesion was related to reductions in avoidant coping across time (immediately after, 3 months after, or 1 year after return) and across levels of unit cohesion (low, medium, high). (4) *Reduced use of avoidant coping* immediately after return from deployment would mediate the relationship between *greater unit cohesion and better mental health function* after return from deployment.

Method

Participants

Participants were Army National Guard and Army Reserve enlisted (i.e., non-officer) soldiers who were recruited from two US bases immediately prior to their Iraq or Afghanistan combat deployments. Their deployments generally lasted for 12-13 months with the first month often spent stateside in training. Following short briefings about the study to groups of soldiers, study staff approached soldiers who were waiting for or had just finished their medical

processing. We emphasized the voluntary nature of their participation and that research staff were civilian VA personnel. Soldiers who volunteered to participate were given additional information about the study and then provided informed consent. All study protocols were approved by relevant Institutional Review Boards and Research Development committees.

Participants had to be between the ages of 18 and 60. Soldiers were excluded if they self-reported depression, medications with cardiovascular and/or autonomic effects, a history of schizophrenia or bipolar disorder, had current cancer or high blood pressure, or were pregnant. Initially, 795 soldiers consented to participate in the study. Of these, 28 did not mobilize, were officers, or were killed in action. An additional five people were severely injured and could no longer participate after deployment and therefore were not included in these analyses. To assess volunteer bias, individuals declining to participate in the study (n=410) were asked to anonymously answer a single question on their general health. This health question was the initial item from the SF-36 (Kazis, 2000) which asks respondents to rate their health as *excellent*, *very good*, *good*, *fair*, or *poor*. Interviewers also recorded the person's gender. There was no significant difference in the proportion of males and females in the participant and non-participant groups, $\chi 2$ (1, n=320) = 2.30, p = .13. Fewer individuals reported excellent/very good health in the participant sample (72.1% of participant sample vs. 78.8 % of non-response sample), $\chi 2$ (1, n=319) = 8.25, $p < .01$.

Design and Procedure

The study was a prospective longitudinal cohort study. Data were collected pre-deployment (Phase 1; n=767), immediately after return from deployment (Phase 2; n=422), 3 months after return (Phase 3; n=286) and 1 year after return (Phase 4; n=335).

At Phase 1, participants first completed a set of questionnaires on the computer for 20-30 minutes. Next, a 20-minute stress reactivity protocol was administered, during which

physiological data were collected. Data from these tasks are not reported here. Finally, soldiers completed 20-30 minutes of additional self-report surveys. Phase 2 self-report surveys (45 minutes) were administered at the base immediately (generally within a few days) upon return from deployment. Soldiers who did not return to the military installation were contacted at home when possible. Many of them (289, or 34.7%) were lost to follow-up due to delays in receiving information about participants' return stateside, 23 individuals (3%) declined to participate at Phase 2 and the remainder of the participants were asked survey questions over the phone and through mailed questionnaire packets. Phase 3 and Phase 4 questions used in these analyses were administered through mailed questionnaire packets. At Phase 3, 45 participants declined to participate (6%). At Phase 4, 50 participants declined to participate (7%). The remainder of the participants whose data was missing were lost to follow up and we do not have information on the reasons they were lost to follow up (e.g., moved, decided not to participate by not responding, etc.). Individuals reporting significant mental health symptoms were provided appropriate referrals. Participants could not be paid for participation while on active duty (Phases 1 and 2). Those no longer on active duty were reimbursed for their participation at Phases 3 ($30) and 4 ($45).

Measures

Mental Health Function. Mental health was assessed at all phases using the mental health composite score (MCS) from the Veterans Rand-36 (VR-36;(Kazis, 2000), which was developed from the MOS Short-Form-36 (Ware Jr & Sherbourne, 1992). Participants indicated the degree to which they had experienced psychiatric symptoms (e.g., "feel down in the dumps," "feel nervous") over the past four weeks. They also indicated whether they had problems with work or social activities during the past four weeks because of emotional problems. Several items also assessed the impact of physical health problems. A composite mental health score was

obtained using a standard algorithm which places greater weight on the mental health items and less weight on the physical health items. Standardized and norm-based composite mental health scores are expressed as T-scores, with a mean of 50, standard deviation of 10, and range from 0 to 100. Higher scores denote better functioning. A 2 to 3 point change is considered clinically significant. Cronbach's alpha for the eight domains range from 0.76 to 0.90 and test-retest reliabilities range from 0.73 to 0.96. Construct validity of the SF-36 as a measure of functional health has been confirmed through comparisons with conceptually similar measures (McHorney, War Jr, Lu, & Sherbourne, 1994).

Avoidant Coping. Avoidant coping was measured at all phases using the Coping Responses Inventory (CRI; (Moos, Brennan, Fondacaro, & Moos, 1990). Soldiers were first asked to identify their most significant problem in the last 12 months. They then responded to 36 items assessing different ways that they coped with that problem (e.g., "Did you try to forget the whole thing?", "Did you tell yourself things to make yourself feel better?"). Participants indicated the frequency with which they engaged in each response on a 4-point scale from *not at all* to *fairly often*. Avoidant-related coping styles were assessed using the sum of three subscales: the Cognitive Avoidance, Acceptance/ Resignation, and Emotional Discharge subscales (Moos et al., 1990). Prior studies revealed good internal consistency of the avoidant coping items (0.85;, and we found a Cronbach's alpha of .82 at Phase 1.

We have previously reported the types of "most significant problems in the last 12 months" reported on the CRI by female Veterans and changes in these problems over the course of the study. We found that the types of problems primarily included deployment (e.g., being shot at), interpersonal issues (e.g., relationship problems), daily needs (e.g., financial concerns), death of a close friend or family members, health of self or others, and employment/school (Yan et al., 2013).

Social Support. Social support was measured using the Medical Outcomes Survey - Social Support Survey (MOS-SSS; (Sherbourne & Stewart, 1991). The questionnaire assessed the extent to which respondents felt they had available social support and could seek additional support if needed (e.g., "someone to take you to the doctor if you need," "someone to get together with for relaxation"). We used the overall social support index derived from the sum of the 18 functional social support items on the MOS-SSS and rescaled to a 0-100 range per the original publication (Sherbourne & Stewart, 1991). Principal components analysis has confirmed that all questions load onto one factor. This measure has good convergent and discriminant validity with other established social support measures (Sherbourne & Stewart, 1991). Internal consistency in our sample was excellent (alpha = .96: Phase 1). We included social support measured at Phase 1 as a covariate to control for within-subject factors such as a tendency to seek social support that could account for a relationship between unit cohesion and our dependent variables.

Unit cohesion. Unit cohesion was measured at Phase 2 using a 3-item measure (Wright et al., 2009). The items measuring unit cohesion were: "The members of my unit are cooperative with each other," "the members of my unit know that they can depend on each other," and "the members of my unit stand up for each other." Five-point response options ranged from *strongly disagree* to *strongly agree*. Summed unit cohesion scores ranged from 3-15, with higher scores indicating stronger unit cohesion. This measure of unit cohesion has been previously found to predict mental health outcomes among soldiers deploying to Iraq and Afghanistan (Wright et al., 2009). The internal consistency of this measure was good in our sample (alpha = .91).

Statistical Methods

Missing data were handled using multiple imputation. We created 40 imputed datasets (Graham, 1994) using IVEWare (Raghunathan, 2002), and imputed results were combined using

the SAS MIANALYZE procedure (SAS v9.2). Data was analyzed both without imputation and with imputed missing data. Both broadly produced the same results, and we report here results with the imputed data. Multivariate analyses controlled for age, minority status and gender as these are known to be related to mental health function. We calculated descriptive statistics as well as Pearson's correlation coefficients for the relationships between avoidant coping, unit cohesion and mental health function. One mixed model analysis was used to evaluate the relationships between unit cohesion, change in avoidant coping, and mental health function. In this mixed model analysis, mental health function at Phase 3 and Phase 4 were included as dependent variables, and unit cohesion and change in avoidant coping from Phase 1 to Phase 2 and from Phase 1 to Phase 3 were the independent variables. Gender, age, minority status, social support at Phase 1 and mental health function at Phase 1 were used as covariates in the statistical model. A random intercept was used to account for the correlation between repeatedly measured mental health function from the same person. In addition, two linear regression models were run with the dependent variable at Phase 3 in the first model and the dependent variable at Phase 4 in the second model and independent variables were the same. This produced the same qualitative results as including both dependent variables in one model (it is not reported here but available upon request).

Linear regression was used to assess mental health function at Phase 2, with change in avoidant coping from Phase 1 to Phase 2 and unit cohesion as the independent variables. We adjusted for gender, age, minority status, social support and mental health function at Phase 1. This second model with Phase 2 mental health function as the dependent variable was included because the first model included change in avoidant coping from Phase 1 to Phase 3 which precluded the use of a Phase 2 variable as the dependent variable. To better understand the relationship between unit cohesion and avoidant coping, we used a mixed model analysis.

Changes in avoidant coping from Phase 1 to Phase 2, Phase 1 to Phase 3 and Phase 1 to Phase 4 were the dependent variables, and unit cohesion was the primary independent variable. To provide useful cut offs to guide practical applications, unit cohesion was split into low, average, and high, with low being equal to or greater than one standard deviation below the mean, high being equal to or greater than one standard deviation above the mean, and average being the scores between low and high. This analysis also was adjusted for age, gender, minority status, avoidant coping and social support at Phase 1.

Finally, we tested if a change in avoidant coping mediated the relationship between unit cohesion and mental health function using a bootstrapping methodology (MacKinnon, Lockwood, & Williams, 2004). A "bootstrap sample" consists of N individuals sampled randomly with replacement from the original data set, where N is the size of the original dataset. Five thousand bootstrap samples were created, resulting in an empirical sampling distribution from which 95% confidence intervals can be estimated. Recent simulation studies suggest that the bias-corrected bootstrap method produces more accurate confidence intervals than other bootstrap methods (MacKinnon et al., 2004). Any confidence interval that does not include zero indicates a meaningful effect of mediation. We did not use the imputed data set for the mediation analyses (data was imputed for all previous analyses). In the bootstrapping analysis, we controlled for age, gender, minority status, mental health function, and social support at Phase 1.

Results

Demographics. The mean age of the military personnel in our sample at pre-deployment was 28.0 (range=18-57). Most of the sample was male (89.7%). The majority (77.2%) identified as Caucasian, with 9.0% identifying as African American and 12.4% identifying as Hispanic. Less than 3% identified as American Indian, Asian or Pacific Islander, and 6.3% as other. Most

participants reported being Army National Guard (72.2%) with the remaining being Army Reserve (26.6%) or Active/Other (1.4%).

Descriptive analyses. Unit cohesion scores were measured immediately after deployment and on average were 9.3 ± 3.04 (Mean ± SD; maximum = 15). As previously reported (McAndrew et al., 2013), mental health function scores at pre-deployment were on average 48.0 ± 9.1. Mental health function scores decreased (got worse) a clinically significant 3.1 points from pre-deployment to one year after deployment. Avoidant coping scores increased (more avoidant coping) from pre-deployment to immediately after deployment and went back to pre-deployment levels by 3 months after deployment.

The univariate associations between variables were examined using Pearson's correlation coefficients (see Table 1). As hypothesized, higher unit cohesion was correlated with better mental health function at all post-deployment phases. The strongest relationship was immediately after deployment when unit cohesion and mental health function were measured concurrently. Higher unit cohesion was also related to less avoidant coping at all post-deployment phases, with the strongest relationship immediately after deployment. Greater mental health function and less avoidant coping at pre-deployment were related to higher unit cohesion measured immediately after deployment.

Higher unit cohesion and reductions in avoidant coping are associated with better mental health function (Hypotheses 1 and 2). As hypothesized, there was a strong prospective relationship between better unit cohesion and better mental health function after deployment. There was also a strong prospective relationship between reductions in avoidant coping and better mental health function after deployment. Specifically, in the first model, better unit cohesion and a reduction in avoidant coping (from pre-deployment to 3 months after deployment) predicted better mental health function at three months after deployment and one

year after deployment (controlling for pre-deployment mental health function; see Table 2).[1] Being Caucasian, better social support at pre-deployment and lower avoidant coping at pre-deployment also predicted better mental health function at three months and one year after deployment. A reduction in avoidant coping (from pre-deployment to immediately after deployment) was not associated with better mental health function at three months or one year after deployment. We tested, and did not find an interation effect, which suggests that the effects of the control and independent variables on mental health function were the same for three months and one year after deployment.

In the second model, better unit cohesion and reductions in avoidant coping (from pre-deployment to immediately after deployment) predicted better mental health function immediately after deployment (controlling for pre-deployment mental health function). We conducted this second analysis because the previous model included change in avoidant coping from pre-deployment to three months post-deployment and could not be used to predict avoidant coping immediately post-deployment. This model also showed that better mental health function was predicted by older age, less avoidant coping at pre-deployment and higher social support at pre-deployment (see Table 3).

Higher unit cohesion is associated with a reduction in avoidant coping (Hypothesis 3). Higher unit cohesion was prospectively related to less use of avoidant coping over time as compared to low or average unit cohesion. Specifically, both low and average levels of unit cohesion were related to a statistically significant increase in avoidant coping from pre-deployment to immediately after deployment and no change in avoidant coping from pre-

[1] As a secondary analysis we tested if these relationships were the same for soldiers who experienced trauma as well as combat stress. To test this we examined if combat exposure moderated the relationships revealed by the mixed model. Combat exposure was assessed with the Deployment Response and Resilience Inventory Combat Exposure Scale (DRRI-CE). Combat exposure did not moderate the relationship of unit cohesion or change in avoidant coping to mental health function at Phase 3 or 4. This was not an a priori hypothesis and thus it was not included in the results.

deployment to three months after deployment. High levels of unit cohesion was not related to changes in avoidant coping from pre-deployment to immediately after deployment and was related to a decrease in avoidant coping from pre-deployment to three months after deployment. There was no statistically significant change in avoidace coping from pre-deployment to one year after deployment for any level of unit cohesion.

Reduced use of avoidant coping mediates the relationship between greater unit cohesion and better mental health function after return from deployment (Hypothesis 4). Reductions in avoidant coping mediated the relationship between higher unit cohesion and better mental health function after deployment. Specifically, change in avoidant coping from pre-deployment to immediately after deployment mediated the relationship between unit cohesion and mental health function immediately after deployment (controlling for mental health function at pre-deployment; estimated indirect effect =.17; 95% bias-corrected CI=.06-.31). Change in avoidant coping from pre-deployment to immediately after deployment did not mediate the relationship between unit cohesion and mental health function three months after deployment (controlling for mental health function at pre-deployment; estimated indirect effect =.04; 95% bias-corrected CI=-.11-.21). Change in avoidant coping from pre-deployment to three months after deployment did mediate the relationship between unit cohesion and mental health function three months after deployment (controlling for mental health function at pre-deployment; estimated indirect effect =.22; 95% bias-corrected CI=.02-.53). Change in avoidant coping from pre-deployment to one year after deployment did not mediate the relationship between unit cohesion and mental health function one year after deployment.

Discussion

The majority of military personnel who endure trauma or very stressful life situations are resilient; however the factors that confer resilience are currently unknown. The purpose of this

investigation was to examine unit cohesion as a potential factor related to resilience defined here as better mental health function (controlling for pre-deployment levels of mental health function). Further to examine changes in avoidant coping as a mechansim through which unit cohesion could lead to better mental health function. We used a prospective longitudinal cohort of Army National Guard and Reserve soldiers with measures at one time point before and three time points after a combat deployment. We predicted that those soldiers reporting higher unit cohesion would show reduced avoidant coping. This reduced use of avoidant coping would then lead to better mental health function over time compared to those reporting lower unit cohesion.

Our first hypothesis, which was supported, was that unit cohesion would be associated with better mental health function up to one year after deployment after controlling for mental health function pre-deployment. To our knowledge, this is the first prospective data to show that unit cohesion is associated with mental health resilience over time. These findings extend prior work showing concurrent correlations between higher unit cohesion and better mental health outcomes (Brailey et al., 2007; Dickstein et al., 2010; Fontana & Rosenheck, 1994; Mulligan et al., 2010; Pietrzak et al., 2010). A strength of our study is that we controlled for pre-deployment mental health function, suggesting these effects are not simply a result of pre-existing levels of mental health function. We also were able to control for other pre-deployment factors that could influence a soldier's ability to bond with her/his unit, regardless of a unit's mean level of unit cohesion. Our analyses suggest that there were individual differences in soldiers' abilities to bond with others in their unit. Lower pre-deployment mental health function and higher avoidant coping were related to lower unit cohesion (immediately after deployment). Additionally, there was a modest relationship between social support from family and friends at pre-deployment and unit cohesion ($r=.08$, $p=.08$). By controlling for pre-deployment factors that may relate to reports of unit cohesion our data are the first to suggest that it is not just individual differences in a pre-

existing ability to bond with others that predicts better mental health function, but also likely unit-level differences in unit cohesion that predict better mental health function.

We also found that higher unit cohesion was associated with reduced use of avoidant coping after deployment, which in turn was associated with better mental health function over time (Hypotheses 2 and 3). These findings are consistent with the Social Cognitive Processing Model which proposes that those with access to strong social support within the unit are less likely to avoid their emotional and cognitive reactions to combat and that this will lead to better mental health function. The Social Cognitive Processing Model provides a theoretical explanation for how unit cohesion may lead to better mental health function (less avoidant coping). We extended this model to additionally propose that unit cohesion will lead to less avoidant coping over time. This idea contrasts with much of the historical literature on coping, which characterizes coping style as a relatively stable dispositional factor that is used to predict future outcomes (Schwartz, Neale, Marco, Shiffman, & Stone, 1999). Previous research supports the argument that coping is stable and trait-like during times of low stress and good health (Schwartz et al., 1999). Our prediction that during times of high stress, coping strategies could change and thereby influence coping with future stressors is derived from the Common-Sense Model of Self-Regulation (Leventhal, Brissette, & Leventhal, 2003; McAndrew et al., 2008a). The Common-Sense Model suggests that individuals are problem-solvers who actively try to manage their health, and that individuals will learn from successful management of extreme stressors to cope with future stressors (i.e., don't bottle emotions up). The idea that people can choose different coping styles in stressful new environments is found in other recent research. This research has shown that individuals who can flexibly choose appropriate coping strategies have less distress and higher wellbeing (Cheng, 2003; Cheng & Cheung, 2005). Our data, and Cheng's model of coping flexibility suggest that we need to view coping as having both stable,

and time-varying features, and that it is the ability to change strategies with changing needs that permits an individual to adapt to a changing environment (Cheng, 2003; Ridder, 1997).

We also examined when and for whom unit cohesion was associated with changes in avoidant coping. A closer examination showed that those reporting low or moderate levels of unit cohesion increased their use of avoidant coping from pre- to post-deployment. In contrast, individuals who reported high levels of unit cohesion showed no increase in avoidant coping immediately after deployment, and at three months post-deployment reported levels of avoidant coping that were below pre-deployment levels. At one year post-deployment, individuals at all levels of unit cohesion were at baseline levels of avoidant coping. Although this is contrary to our original hypothesis that people will continue to use less avoidant coping consistently in the future, it is consistent with research on behavioral interventions where behavioral changes are frequently not sustained after a year (Jeffery et al., 2000). Maintenance may require ensuring continued adequate social support or further training and education after deployment.

Our findings suggest that improving unit cohesion may improve resilience after deployment. Improving unit cohesion may be a potential "intervention" within a military context, and has been previously associated with other beneficial outcomes like better military performance. Traditional intervention approaches, such as psychotherapy or psychoeducation, may be difficult for military personnel to use during a combat deployment because of the many competing demands on their time and attention. Importantly these data also suggest the psychological mechanism (reduction in avoidant coping) by which unit cohesion may lead to better mental health function. As an example of where a unit cohesion-based intervention could be used, a recent study of treatment-seeking OEF-OIF veterans found that 20% have contemplated suicide, and that these individuals had higher use of avoidant coping and less psychological resilience than a non-suicidal comparison group (Pietrzak, Russo, Ling, &

Southwick, 2011). Improving unit cohesion and teaching skills to reduce reliance on avoidant coping could have strong potential for reducing severe distress, including perhaps even suicidal ideation.

Our study has several strengths and some limitations. The assessment of military personnel at four time points (before, immediately following, three months after, and one year after deployment) allowed us to control for pre-deployment factors that can influence the relationship between unit cohesion, avoidant coping and mental health function. It also allowed us to examine our mediational hypothesis across time in a way that is more suggestive of causal effects. Additionally, this study has the strength of a relatively large sample size. However, there were limitations. In particular we do not know the generalizability of our results. Not all military personnel approached agreed to participate in the study. We found a small but statistically significant difference between participants and those who declined to participant such that those who declined to participate were more likely to report good or excellent health (72.1% of participant sample vs. 78.8 % of non-response sample). Also, there were few participants who were racial and ethnic minorities and the proportion of women was low, although the sample was representative of the gender distribution in OIF/OEF veterans. Finally, all military personnel in this study were Army National Guard or Reserve soldiers. Thus, our results may not generalize to an active duty population or among military personnel from other branches of the military.

Another limitation of the study is the relatively high level of missing data at the post-deployment time points. There are inherent difficulties in tracking reservist military personnel in a national sample once they return from a deployment and these contributed to our high rate of missing data. We often found out too late that participants had returned stateside to be able to collect data from them. In addition, 15% declined to continue in the study. To address this, we imputed the missing data and found similar results with the imputed and non-imputed data. This

suggests that despite the relatively high rate of loss to follow-up, the results appear to be stable. Another consideration when interpreting these findings is the soldiers are likely experiencing elevated levels of stress at all timepoints and not just during deployment. At baseline, soldiers were assessed as they were in the process of their final training before being deployed to war. Their stress levels were likely higher than a baseline from a person without any upcoming deployment expectations. Similarly, the phase 3 and 4 data were collected during early reintegration which is a difficult adjustment.

In conclusion, most individuals are resilient after combat or significant life stressors. Some individuals, however, fare more poorly. The results of this study are consistent with the hypothesis that high levels of unit cohesion can reduce avoidant coping during times of great stress, which in turn leads to later improved mental health function. Interventions to improve social supports during and after potentially traumatic life events should be investigated for their potential as more generally effective methods for enhancing resilience.

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Table 1. Means, standard deviations and correlation coefficients

	Mean (SD)	1	2	3	4	5	6	7	8
1. Unit Cohesion P2	9.4 (3.0)	1							
2. MCS P1	48.0 (9.1)	.10*	1						
3. MCS P2	45.3 (11.0)	.22**	.41**	1					
4. MCS P3	43.5 (11.8)	.17**	.37**	.53**	1				
5. MCS P4	43.2 (12.8)	.18**	.34**	.51**	.60**	1			
6. AVD P1	7.6 (3.2)	-.13**	-.47**	-.29**	-.26**	-.24**	1		
7. AVD P2	8.4 (3.5)	-.19**	-.32**	-.46**	-.28**	-.25**	.44**	1	
8. AVD P3	7.2 (3.6)	-.16**	-.28**	-.38**	-.48**	-.42**	.31**	.40**	1
9. AVD P4	7.3 (3.7)	-.11*	-.30**	-.34**	-.37**	-. 52**	.34**	.39**	.46**

MCS=mental health function; AVD=avoidant coping, P1=Phase 1 (pre-deployment), P2=Phase 2 (immediately post-deployment), P3=Phase 3 (3 months post-deployment), P4=Phase 4 (1 year post-deployment); **=p<.01, *=p<.05

Table 2: Mixed Model Predicting Mental Health Function at Phase 3 and Phase 4

Effect	Estimate	StdErr	tValue	P
Age	0.07	0.05	1.44	0.18
Minority	-2.96	1.02	-2.92	0.02
Gender	-1.20	1.28	-0.94	0.36
Mental Health Function (P1)	0.44	0.05	8.81	<.01
Social Support (P1)	0.09	0.03	3.49	0.01
Phase	-0.23	0.85	-0.28	0.79
Change in Avoidant Coping (P2-P1)	0.24	0.20	1.18	0.29
Change In Avoidant Coping (P3-P1)	-0.90	0.16	-5.53	<0.01
Unit Cohesion	0.44	0.14	3.03	0.01

P1=Phase 1(pre-deployment), P2=Phase 2 (immediately post-deployment), P3=Phase 3 (3 months post-deployment, P4=Phase (1 year post-deployment).

Table 3: Regression analysis Predicting Mental Health Function at Phase 2

Effect	Estimate	StdErr	tValue	Probt
Age	0.17	0.05	3.17	0.01
Minority	-0.49	1.05	-0.46	0.65
Gender	-3.08	1.52	-2.02	0.06
Mental Health Function (P1)	0.41	0.05	8.02	<0.01
Social Support (P1)	0.11	0.03	4.06	<0.01
Change In Avoidant Coping (P2-P1)	-0.70	0.13	-5.58	<.01
Unit Cohesion	0.49	0.16	3.04	0.01

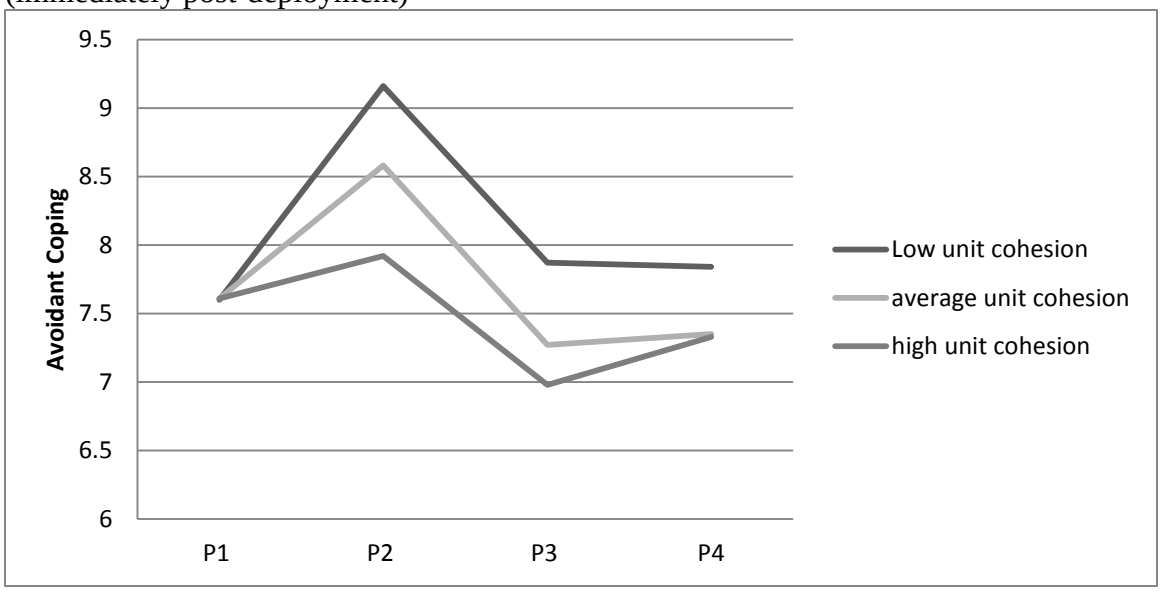
P1=Phase 1(pre-deployment), P2=Phase 2 (immediately post-deployment)

Table 4: Avoidant Coping scores- Adjusted mean and difference relative to Phase 1, stratified by phase and unit cohesion

Phase	Unit Cohesion	Mean*	Standard Error	Difference* relative to Phase 1	Standard Error	t-value	Degrees of Freedom	p-value
2	Low	9.16	0.30	1.56	0.30	5.15	189.97	<.01
	Average	8.58	0.29	0.97	0.29	3.35	264.56	<0.01
	High	7.92	0.31	0.31	0.31	0.99	196.23	0.32
3	Low	7.87	0.36	0.26	0.36	0.73	101.32	0.47
	Average	7.27	0.35	-0.33	0.35	-0.94	113.84	0.35
	High	6.98	0.31	-0.62	0.31	-2.00	203.42	0.05
4	Low	7.84	0.35	0.23	0.35	0.68	114.18	0.50
	Average	7.35	0.35	-0.25	0.35	-0.71	114.64	0.48
	High	7.33	0.32	-0.28	0.32	-0.87	184.19	0.38

* Adjusted for gender, age, minority group, phase 1 avoidant coping and social support. Phase 1 (pre-deployment), Phase 2 (immediately post-deployment), Phase 3 (3 months post-deployment, Phase (1 year post-deployment).

Figure 1 Change in avoidant coping overtime based on level of unit cohesion at Phase 2 (immediately post-deployment)



P1=Phase 1(pre-deployment), P2=Phase 2 (immediately post-deployment), P3=Phase 3 (3 months post-deployment, P4=Phase (1 year post-deployment).