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Couple Functioning and Post-Traumatic Stress Symptoms in US Army Couples: The Role of Resilience

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Abstract: The purpose of this study was to investigate combat-related post-traumatic stress symptoms (PTSS) and couple relationships in Army couples. US Army combat veteran couples ($N = 66$ couples) completed self-report questionnaires on couple functioning, coercion, resilience, and PTSS. In 23% of the couples ($n = 15$), both members had PTSS above the clinical cut-off for suspected Post-traumatic Stress Disorder (PTSD). Higher levels of PTSS were associated with lower couple functioning and resilience. Individuals with high resilience scores reported higher couple functioning scores, regardless of PTSS ($p = .004$). Future researchers should focus on the role of resilience in relation to couple functioning, and ways to amplify resilience in military couples. Published 2011. This article is a U.S. Government work and is in the public domain in the USA. Res Nurs Health 35:164–177, 2012

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Deployments refer to military duty away from home, usually to an overseas location. There have been over 1.7 million deployments from the United States (US) to support Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF) in Afghanistan (Tanielian

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et al., 2009), with many of these representing multiple deployments for the same service member. Diagnosable Post-Traumatic Stress Disorder (PTSD), based on severity of post-traumatic stress symptoms (PTSS), is estimated to affect at least 12% of soldiers returning from OIF/OEF deployments (Milliken, Auchterlonie, & Hoge, 2007). Not only does PTSS negatively influence the military mission, but it also has profound secondary effects on the military family. For instance, in families of service members with elevated PTSS, there are increased divorce rates (Karney & Crown, 2007) as well as an increased incidence of intimate partner violence (IPV) and child abuse (Gibbs, Martin, Kupper, & Johnson, 2007; Rentz et al., 2006). In a 2008 survey of over 49,000 military spouses, 23% reported marital problems after deployment, compared with 6% reporting problems prior to deployment (Department of Defense, 2009).

Combat deployment is an expected source of stress for service members and their spouses, but recent increases in length and frequency of deployment, related to the wars in Iraq (OIF) and Afghanistan (OEF), have further strained military couples (Allen, Rhoades, Stanley, & Markman, 2010; Mansfield et al., 2010; Wheeler & Torres Stone, 2009). The OIF and OEF conflicts, presumably because of the asymmetrical and elusive nature of the enemy, have also been shown to produce higher rates of PTSS and other mental health concerns in soldiers than seen in previous wars (Fontana & Rosenheck, 2008), even in soldiers in military occupations previously regarded as safe, such as lawyers and supply clerks (Tanielian et al., 2009). In addition, PTSS in the combat veteran, with or without a diagnosis of PTSD, has been found to increase stress in military spouses (Monson, Taft, & Fredman, 2009; Sayers, 2011). Findings from a recent study in Army couples showed an inverse relationship between PTSS and couple functioning (Allen et al., 2010). This relationship has yet to be investigated while controlling for the interdependence of spouses, and potential moderators of this relationship are yet to be identified and explored. The purpose of the current study was to investigate the effect of combat-related PTSS on couple functioning in Army OIF/OEF veteran couples and the role of resilience as a moderator of this effect.

To date, few studies have been conducted to directly investigate the prevalence of stress related symptoms in spouses of OIF/OEF combat veterans; there is no agreement among reported rates of PTSS or presence of secondary traumatic stress (STS). STS is defined as clinically significant levels of PTSS without a history of direct trauma (Dekel & Solomon, 2007; Figley, 1995; Ting, Jacobson, Sanders, Bride, & Harrington, 2005). In a study of female spouses of OIF/OEF veterans conducted by Nelson-Goff, Crow, Reisbig, and Hamilton (2007, 2009), STS was found in 61% of the wives ($n = 45$). Findings from other studies, however, have shown much lower rates of STS in military spouses. For example, in a study of 295 spouses of recently returned National Guard OIF veterans, investigators found a 12.5% prevalence rate of STS (Renshaw, Rodrigues, & Jones, 2008). This lower reported rate in National Guard or Reserve families compared to active duty service member families could be due to concerns about mental health stigma upon returning to civilian jobs (Milliken et al., 2007). Alternately, there could be other confounding variables not yet explored that might affect these relationships, such as the presence of previous trauma in the wives, or of individual and/or couple resilience.

Resilience has been defined as an ability to spring back from adversity (Jacelon, 1997; Richardson, 2002; Watson Wiens & Boss, 2006), returning to the previous level of functioning or even higher (Watson Wiens & Boss, 2006). It has been conceptualized as a protective factor against adverse outcomes from traumatic events (Tusaie & Dyer, 2004). Originally conceptualized as a trait in children, resilience has more recently been defined as a dynamic process across the lifespan that can be modified and fostered through various interventions, such as cognitive behavioral therapy (Davidson et al., 2005) and training in positive coping skills (Meredith et al., 2011). Palmer (2008) proposed a theoretical pathway of risk and resilience in military families, positing that individual resilience acts as a protective factor against PTSS and other adverse mental health outcomes in military parents, which in turn protects the children from adverse outcomes. This theoretical pathway has not yet been tested.

As a preliminary step toward a better understanding of the role of resilience in levels of functioning in military families, we examined individual spouse resilience for its potential role in modifying the relationship between individual level of PTSS and couple functioning, building on the promising findings from previous studies in which individual resilience was identified as a possible protective factor in

military service members (Maguen et al., 2008). This investigation is the first that we are aware of to explore the role of resilience in couple functioning in combat veteran couples from the conflicts in Iraq and Afghanistan. We chose to approach resilience as a moderator rather than a mediator because we were not sure of the causal and/or temporal nature of its relationship with PTSS. To be a mediator, a variable must occur in a specific temporal location, between the predictor and the outcome variables (Zhao, Lynch, & Chen, 2010). In our evaluation of current literature, we were unable to determine whether resilience was present in soldiers and spouses before exposure to trauma, or whether it developed as a result of adjustment to PTSS.

Conceptual Framework

A modified version of the Couple Adaptation to Traumatic Stress (CATS) model (Nelson-Goff & Smith, 2005) was used as the framework guiding the selection of variables for this study (see Fig. 1). We acquired verbal permission from the original author to modify the model (B. Nelson-Goff, personal communication, July 23, 2009) to be more specific to the research questions in this study. The CATS model was developed in the field of marital and family therapy and has been partially tested in female military spouses (Nelson-Goff et al., 2007, 2009). The role of resilience in couple adaptation has not been tested in previous studies, however. Nelson-Goff and Smith (2005) originally conceptualized resilience as ''adaptability,'' 1 of 10 couple traits that comprised couple functioning. In this study, we simplified the concept of couple functioning to represent couple satisfaction, communication, conflict, and cohesion, as percieved by each partner. We assessed resilience as an individual partner dynamic process of adaptation that can be nurtured and developed, as demonstrated in at least one PTSD intervention study (Davidson et al., 2005). As a potentially alterable variable (Meredith et al., 2011), resilience may provide a target for future intervention development for military couples.

In the CATS model, predisposing factors such as age, gender, rank of the soldier, and history of previous mental or physical trauma, as well as current violence or coercion in the couple, are proposed as additional moderators of the relationship between the individual's level of functioning (PTSS) and the couple functioning. Younger age has been associated with a higher risk for developing PTSS and other mental health problems after combat exposure

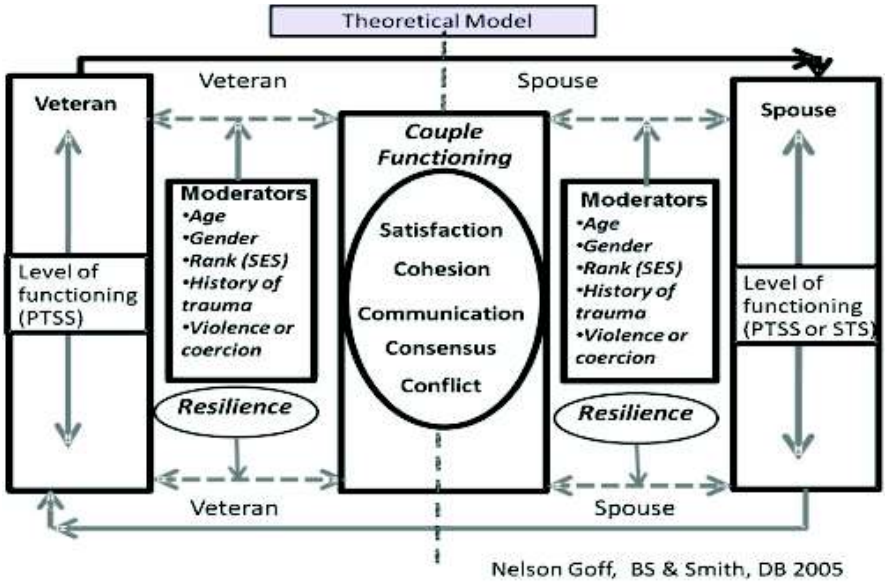

FIGURE 1. Couple adaptation to traumatic stress (CATS) model, modified version. *Note*: Model modified with the permission of the original author (Nelson-Goff & Smith, personal communication, July 23, 2009) to be more specific to a military population and to answer the specific questions for this research study. Veteran = spouse who experienced combat exposure, Rank = military rank, SES = socio- economic status, Coercion = coercion or violence in the current marriage, PTSS = post-traumatic stress symptoms, STS = secondary traumatic stress. Reprinted with permission of author and publisher.

(LeardMann, Smith, Smith, Wells, & Ryan, 2009). Military rank has shown an inverse relationship with divorce rates among service members (Karney & Crown, 2007), perhaps because higher ranking service members may have postponed marriage during the early years of their military career. Because salary and education are tied to military rank, it is also an accepted proxy measure for socio-economic status (SES; MacLean & Edwards, 2010).

Differences between males and females have been shown in previous PTSD research, with females having a higher risk for developing PTSD than males, resulting from both sexual- and combat-related trauma (Tolin & Foa, 2006). This gender difference may be related to the higher lifetime risk of sexual-related trauma exposure in females than males (Campbell et al., 2003; Institute of Medicine, 2010). In addition, having a pre-combat history of trauma, such as sexual abuse, being abused as a child, or past or current IPV, has been shown to increase the risk of developing PTSD (Nemeroff et al., 2006).

The outcome variable, level of functioning, was assessed as PTSS rather than the diagnosis of PTSD for two reasons. First, symptom levels have been shown to be associated with a PTSD diagnosis (Weathers, Litz, Herman, Huska, & Keane, 1993), and second, symptom levels have been widely used in PTSD research, enabling comparison of prevalence rates across the literature.

The specific aims of the study were to: (a) investigate the relationship between individual level of PTSS and couple functioning, (b) test the moderating effects of age, gender, military rank (proxy for SES), previous trauma, violence or coercion in the marriage, and resilience, (c) explore gender differences by examining whether dual military couples (where both spouses are service members) differ on PTSS and couple functioning scores from couples where only the male spouse has been deployed, and (d) determine the prevalance of STS in civilian spouses. In this study we addressed the gaps in previous research by recruiting Army combat veteran couples from the National Guard and Reserves, in addition to active duty and retiree status soldiers deployed in OIF and OEF. Efforts also were made to recruit female soldiers and dual military couples, both because they have been unrepresented in previous research and to better understand whether their experiences differed from those of male-soldier couples.

Hypotheses

Based on the CATS model and previous research, we hypothesized that (a) couple functioning as percieved by each member of the couple would be negatively associated with PTSS in one or both members of the couple, and that this relationship would be increased in magnitude by (b) lower level of resilience, younger age, female gender (regardless of whether the woman was combat exposed), lower military rank, and increased levels of trauma exposure and marital conflict resolution problems. We also examined (c) differences in perceptions of couple functioning between male and female or dual military soldier couples. Because there was a dearth of literature on married female soldiers, we did not hypothesize whether female or dual military soldier couples would exhibit more or less distress in their marriage compared to male soldier couples, but we examined and explored for differences. Based on the wide range of STS prevalence reported in the literature, we also predicted (d) the presence of STS in 12–70% of civilian spouses in our study.

Method

Participants

Inclusion criteria were (a) one or both members of the couple had been deployed to OIF or OEF while serving in the US Army, (b) both members could read and speak English, and (c) both members had been in a self-defined ''committed relationship'' for at least 1 year. In addition, both members of the couple had to be willing to consent to participate in the study.

Army OIF/OEF soldier couples were recruited using a variety of local and national methods, including Facebook, veteran service organization blog sites, veteran targeted publications, and fliers placed at military medical treatment facilities in the Baltimore/Washington, DC area. Interested couples made initial contact with the first author via telephone or electronic mail. Both members of the couple were screened for eligibility, with each spouse asked separately whether they were interested in participating. Surveys were mailed to both members of the couple, in separate envelopes, with instructions that questions should be answered independently and answers should not

be discussed prior to returning the surveys in the pre-addressed, stamped envelope provided. Based on a power of 0.80, and an effect size of 0.70 between "distressed" and "non-distressed" couples, using couple functioning (RDAS) scores, we sought to recruit at least 45 couples.

Survey packets were mailed to 85 eligible couples. After using a maximum of four mailed reminders, 66 couples (132 respondents) returned completed surveys, for a response rate of 77.6%. Although several unmarried couples were screened, all respondent couples were married. Respondents represented all types of military status, as presented on Table 1, with over 13% identified as National Guard or Reserve soldiers. Self-identified retirees and former soldiers did not report the type of military status (e.g., active duty, reserve) during their service.

Surveys were returned by couples in which the male was the service member ($n = 39$) and in which both members of the couple were in the military ($n = 27$). Seven packets were returned by only one member of the couple and therefore were not included. To more fully explore differences between types of service, we compared active duty ($n = 38$ individuals), National Guard or reserve ($n = 18$ individuals), and soldiers who had left the Army and returned to civilian life after their most recent deployment ($n = 35$ individuals).

Measures

Post-traumatic stress symptoms (PTSS). For this study, PTSS was operationalized as an individual's endorsement of symptom items on the PTSD Checklist (PCL; Weathers et al.,

Table 1. Sample Characteristics

Category	Response	*M* (*SD*) (*N* = 132)
Age	Years	38.91 (9.1)
Length of marriage	Years	11.30 (7.7)
Marriages	Number of times married	1.48 (0.77)
Category	**Response**	**% (*n*)**
Race	African-American/Black	3.8 (5)
	Asian/Pacific Islander	0.7 (1)
	Caucasian/White	90.1 (119)
	Other	3.7 (5)
	Unknown	1.4 (2)
Ethnicity	Hispanic	3.7 (5)
	Non-Hispanic	87.8 (116)
	Unknown	6.0 (16)
Education	High school diploma	37.9 (50)
	2- or 4-year degree	31.8 (42)
	Graduate school or more	30.3 (40)
Military status	Active duty	28.8 (38)
	Retired	8.3 (11)
	Left service	18.2 (24)
	National guard	7.6 (10)
	Reserves	9.0 (8)
	Civilian (spouse)	29.5 (39)
	Other service (spouse)	1.5 (2)
Rank	Civilian	31.1 (41)
	Junior enlisted	18.2 (24)
	Senior enlisted	25.0 (33)
	Warrant officer	1.5 (2)
	Commissioned officer	24.2 (32)
Parity	No children	7.5 (20)
	1	21.2 (28)
	2	45.0 (54)
	3 or more	22.7 (30)

M, mean; *SD*, standard deviation; *N*, total sample; *n*, number of individual participants with this characteristic.

1993) including problems with sleep, avoidance, memory, concentration, emotional connections, or mood. This measure consists of 17 items, scored on a 5-point Likert-type scale, regarding severity of various symptoms diagnostic of PTSD. The PCL has been widely used in both military and civilian populations to measure the prevalence of presumed PTSD and for group comparisons on levels of PTSS. Cronbach's α reliabilities have ranged from 0.92 in civilians to 0.97 in military populations. Validity has been supported by the statistically significant correlations between PCL scores and the Clinician-Administered PTSD Scale (CAPS; Blake et al., 1995; Elhai, Gray, Docherty, Kashdan, & Kose, 2007; Keen, Kutter, Niles, & Krinsley, 2008). The PCL scores range from 17 to 85, with higher scores indicative of greater PTSS. Recent research supports a clinical cut-off of 30 when used in military primary care settings to screen for levels of PTSS high enough to cause interpersonal problems (Bliese et al., 2008). In many studies the clinical cut-off of 50 has been used (Terhakopian, Sinaii, Engel, Schnurr, & Hoge, 2008; Wright et al., 2007). Although the higher cut-off is more specific to the diagnosis of PTSD, we chose to use the more sensitive lower number for this study, to capture more variability in levels of PTSS. The Cronbach's α was 0.96 in our sample.

Resilience. We conceptualized resilience as a dynamic, modifiable process. We used the Revised Connor–Davidson Resilience Scale (R-CD-RISC; Campbell-Sills, Forde, & Stein, 2009; Connor & Davidson, 2003), a 10-item scale measuring participants' perceptions of their own resilience. The R-CD-RISC is scored based on the respondent's level of agreement with items such as, ''Able to adapt to change'' and ''Think of self as a strong person.'' The abbreviated scale correlated well ($r = .90$) with the original 25-item CD-RISC and showed consistently good reliability ($\alpha = .94$) in civilian populations (Campbell-Sills et al., 2009). The original version of the CD-RISC showed sensitivity to treatment effects when applied to PTSD treatment groups (Connor & Davidson, 2003). Possible scores range from 0 to 50, with a higher score indicating greater resilience. The Cronbach's α was .91 in our study sample.

Couple functioning. For the purposes of this study, couple functioning was defined as the degree to which the individual members of the couple were satisfied with their relationship (satisfaction), were able to successfully resolve conflict (communication, consensus, and conflict), and identified themselves as a couple (cohesion). All of these concepts were measured using the Revised Dyadic Adjustment Scale (RDAS; Heyman, Sayers, & Bellack, 1994). The RDAS is a 14-item survey that uses a 6-point Likert-type scale with options ranging from 0 to 5, providing a total range of 0–70. In addition to being much shorter than the original 32-item Dyadic Adjustment Scale (DAS; Spanier, 1976), the RDAS has shown a 0.97 correlation with the original instrument and good discrimination between distressed and non-distressed couples in civilian populations (Busby, Chistensen, Crane, & Larson, 1995). Although this measure was not previously tested in military couples, it has performed well in civilian populations. The Cronbach's α was 0.84 in our study sample.

Coercion and violence. Disagreement and arguments are normal in couples, but some couples may have difficulty resolving these conflicts. Difficulties may be situational and temporary, or they may relate to a power imbalance and coercion in the relationship (Johnson, 2006). Relational coercion can include social isolation, rejection, or threat of physical or mental harm (Houry et al., 2008). For this study, the Women's Experience of Battery (WEB; Smith, Earp, & DeVellis, 1995) was used as a measure of coercion and violence; it reflects self-reported feelings of being controlled, manipulated or coerced, or afraid of what a partner does or will do. The WEB is a 10-item Likert-type scale. Scale scores can range from 10 to 60, with higher scores indicating more distress, and includes items such as, ''I felt ashamed of the things my partner did to me'' and ''I hid the truth from others because I was afraid not to.'' The WEB has excellent sensitivity and specificity in identifying abused women (Coker, Pope, Smith, Sanderson, & Hussey, 2001; Houry et al., 2008; Smith et al., 1995) and correlates strongly with measures of physical violence. The adapted, gender neutral version of this measure was used for this study (Houry et al., 2008). The Cronbach's α was 0.88 in our study sample.

History of previous trauma. Past trauma—including child abuse, natural disasters, sexual abuse, IPV, major illnesses, or injuries—has been shown to be associated with increased risk for development of PTSD. These experiences were all measured using the Traumatic Experience Questionnaire (TEQ; Vrana & Lauterbach, 1994), a self-report measure of exposure to

previous trauma. Response options are counts, scoring 1 point for each exposure response, or number of years experiencing IPV or child abuse, up to a maximum of 3 points for each of the 11 items. A score of zero is possible for those with no history of trauma exposure, with a potential maximum score of 33. This survey has been used in military couples research (Hamilton, Nelson-Goff, Crow, & Reisbig, 2009; Nelson-Goff et al., 2007), but validity data are not yet available for civilian or military populations (Norris & Hamblen, 2004). All respondents completed this measure, regardless of deployment history. Cronbach's α for the TEQ was 0.46. Given the low reliability obtained for this measure, responses to the TEQ were dichotomized to reflect presence or absence of trauma rather than using the cumulative score.

Procedures

Demographic data were collected at the initial contact with one or both spouses, and included self-reported age, gender, military status (e.g., active duty, Reserves), military rank (if applicable), race, ethnic status, current relationship status and duration, total number of marriages, number of children, and educational level. Study recruitment method also was documented (e.g., Facebook, newspaper, snowball).

The OIF/OEF soldier respondents were asked the following questions: dates of deployment, location (Iraq or Afghanistan) and job while deployed. The order of survey measures was kept constant to ensure that respondents answered questions about their lifetime history of trauma prior to answering questions about PTSS.

Analysis

All data were entered into STATA 11 (StataCorp, 2009), with quality check of all entries by a data quality specialist. Instruments were each tested for reliability, using Cronbach's α. Respondents and non-respondents were compared on all demographic data collected during the screening process. Couples were contacted regarding missing answers, when possible. Continuous data were examined for normality.

The main outcome, couple functioning as measured by the RDAS, was evaluated in relation to hypothesis 1, using a general linear mixed model, predicted by PTSS as measured by the PCL score. Within couple correlation was accounted for by using a random effect for couple, via the xtmixed function in STATA (StataCorp, 2009). This produces a nested model, where the individual level is nested within the couple level. Moderation, as noted in hypothesis 2, was assessed using a general linear mixed model and testing for interactions.

Results

Participants

To examine whether couple respondents differed from those who did not return surveys, sociodemographic variables were compared between responding and non-responding individuals. There were no statistically significant differences, although non-respondents were more likely to have missing data in regard to race ($p = .002$).

When exploring the data by the gender of the respondent, several differences became evident, as shown in Table 2. More males were combat exposed than females ($p < .01$), and they reported higher trauma scores on the trauma history measure (TEQ). In addition, when comparing only combat-exposed soldiers, males had been deployed more times and for more total months than female soldiers.

Relationship of PTSS With Couple Functioning

To investigate the first hypothesis, that couple functioning would be negatively associated with PTSS in both members of the couple, PCL scores were regressed on couple adjustment (RDAS) scores while controlling for couple effects using a general linear mixed model. Because both spouses completed separate surveys, yet were describing the same marital relationship, this interdependence can produce significant correlations in survey scores. Therefore, our chosen analysis method accounted for interdependence of couple measures. The level of PTSS was a significant predictor of couple functioning such that higher scores on the PCL were predictive of lower scores on the RDAS ($z = -2.82$, 95% CI $[-0.17,-0.03]$, $p = .005$). This finding supports the first hypothesis.

Table 2. Comparison of Study Variables by Gender of Individual Participant

	Gender					
	Males ($n = 66$)		Females ($n = 66$)			
Variable	*M*	*SD*	*M*	*SD*	Statistic	*p*
RDAS couple functioning score	48.9	6.7	50.9	6.9	−1.47	.14
R-CD-RISC resilience score	30.8	6.7	30.6	6.4	0.15	.88
PCL post-traumatic symptoms	37.6	16.9	30.3	15.1	2.68	.008*
WEB violence and coercion	13.5	6.5	15.5	8.3	−0.84	.40
TEQ trauma exposure history	9.9	5.9	6.6	6.0	3.33	<.001*

	Gender					
	Males ($n = 64$)		Females ($n = 20$)			
Deployed Participants	*M*	*SD*	*M*	*SD*	Statistic	*p*
Total deployments	1.6	1.0	0.39	0.7	9.54	<.001*
Total months deployed	18.3	1.0	12.7	1.3	9.67	<.001*
Months since last deployed	34.6	3.1	51.2	6.4	1.05	.017*

M = mean, *SD* = standard deviation. Statistic = test statistic, independent sample t test used. Variables: RDAS = Revised Dyadic Adjustment Scale (Heyman et al., 1994), R-CD-RISC = Revised Connor–Davidson Resilience Scale, PCL = PTSD Checklist (Weathers et al., 1993), WEB = Women's Experience of Battery, gender neutral version (Smith et al., 1995), TEQ = Traumatic Experience Questionnaire (Vrana & Lauterbach, 1994).
*p-value $< .05$.

Moderators of the Relationship Between PTSS and Couple Functioning

The second hypothesis—that the relationship between PTSS and couple functioning would be increased in magnitude by younger age, female gender, lower rank, lower levels of resilience, increased levels of trauma exposure, and the report of coercion or violence between the spouses—was investigated using a general linear mixed model. Forward and backward stepwise selection were used, retaining only those variables with statistically significant effects. Resilience remained significant after controlling for couple effects ($z = 2.9$, $p = .004$), with resilience acting inversely on the relationship. That is, individuals with high resilience (CD-RISC) scores were less likely to have low couple functioning (RDAS) scores, regardless of PTSS (PCL) scores. Gender was also significant after controlling for couple effects ($p = .02$), such that males with high PTSS scores were likely to have lower couple functioning scores than females with the same PTSS score. Coercion and violence (WEB) remained significant ($p = .001$) and acted to increase the statistical relationship between PTSS and couple functioning, so that individuals reporting higher levels of violence and coercion reported lower couple functioning scores.

The next step in our analysis was to test for moderation by examining the statistical interaction of each proposed moderator with PTSS score and couple functioning. Interaction effects failed to reach statistical significance for any of the proposed moderators, indicating that none of these predictors acted to change the slope of the regression line of PTSS on couple functioning. The results from these analyses therefore failed to support the hypothesis for the moderating effects of resilience, age, gender, rank, trauma exposure, or reports of coercion or violence in the marriage.

Comparisons of Male Soldier and Dual Military Couples

The data were examined in several ways to determine whether couple functioning differed between male soldier and dual military couples. First, the data were explored for gender differences by individual respondents as previously discussed (Table 2). Because this initial analysis did not address the presence or absence of clinical levels of distress, all respondents were then sorted into high or low scores for couple functioning, resilience, and PTSS, based on the clinical cut point of 30. To examine the couples as dyadic units, respondent couples

were then sorted into groups based on their scores. Two couple adjustment groups were created: (a) both male and female having high couple adjustment (RDAS scores) and (b) at least one spouse reporting low couple adjustment (RDAS score <48). Similarly, couple groups were created for high and low levels of coercion, using WEB scores >20 in one or more spouses to delineate the abused versus non-abused groups and for PTSS, using PCL scores >30 (see Table 3). Chi-square analysis was used to examine group membership relationships; the results showed there were no significant differences between male and dual military couples on the likelihood of reporting lower couple functioning, higher coercion, or higher PTSS.

Prevalence of Secondary Traumatic Stress (STS)

We investigated the presence and prevalence of STS in non-deploying spouses, with STS defined as an elevated PCL score in the absence of a history of trauma exposure. This analysis was limited to the 39 female civilian spouses, because only 2 males in this sample had not deployed to either OIF or OEF. To determine whether symptoms endorsed on the PCL were attributable to STS or could be primary PTSS, we used a two-step analysis process. First, we determined the prevalence of PTSS symptoms above the cut point of 30 on the PCL, then we controlled for the presence of trauma history in the female spouses. The prevalence of STS in the non-deployed female spouses in this study was 34%. That is, 16 of the 47 female spouses who had never deployed reported PCL scores above 30. However, when presence of previous trauma history, as reported on the TEQ, was entered into the analysis, the prevalence of STS in the female spouses in this study was reduced to 2% ($n = 1$). All other female, non-soldier spouses with PCL scores above the cut-point reported previous traumas that could have accounted for their elevated PCL scores.

Discussion and Conclusions

The results of this study support and expand upon recent findings that individuals with higher PTSS experience lower couple functioning (Allen et al., 2010). We also found evidence that (a) the relationship between PTSS and couple functioning remained even after controlling for the interrelated scores within couples, (b) resilience was a positive predictor of couple functioning even when individual post-traumatic stress levels were high, (c) female gender and violence or coercion in the relationship were negatively associated with couple functioning, and (d) dual military couples were at no greater risk of developing couple distress than male soldier couples. In addition, because most non-

Table 3. Study Measure Comparisons by Male or Dual Military Couple

	Male ($n = 39$)		Dual ($n = 27$)		Totals ($n = 66$)	
Couple Groups, by Distress Cut Points	*n*	%	*n*	%	*n*	%
Low couple functioning (<48 on RDAS)						
Male and female both high	19	48.7	12	44.4	31	47.0
At least one spouse low	20	51.3	15	55.5	35	53.0
	$\chi^2 = 0.06$, $p = .81$					
High conflict (>20 on WEB)						
Male and female both negative	28	71.8	21	77.8	49	74.2
At least one spouse positive	11	28.2	6	22.2	17	25.8
	$\chi^2 = 0.22$, $p = .63$					
High PTSS (>30 on PCL)						
Male and female both negative	10	25.6	10	37.0	20	30.3
At least one spouse positive	29	74.4	17	58.7	46	69.7
	$\chi^2 = 0.98$, $p = .32$					

RDAS, Revised Dyadic Adjustment Scale (Busby et al., 1995); WEB, Women's Experience of Battery scale, gender neutral version (Houry et al., 2008); PCL, Post-traumatic Stress Disorder Checklist (Weathers et al., 1993).
n = number of couples.

military female spouses with high PTSS scores had prior histories of trauma, our findings cast some doubt regarding the concept of STS.

Findings from this study are consistent with recent research indicating that PTSS in service members can interfere with their closest relationship, that of couplehood (Allen et al., 2010). Including both members of the couple, and controlling for the interdependence, was a strength of the current study and adds to our confidence in these findings.

The finding that couples with high resilience also had higher couple functioning despite high levels of PTSS provides a starting place for the development of preventive interventions. Investigating differences between military couples with high resilience and those with low resilience, and finding ways to increase or amplify individual and couple resilience, should be the focus of future research studies. That resilience appears to be a positive protective factor in couple functioning also sets the stage for investigating whether high levels of resilience can prevent PTSS from occurring. The findings indicate that resilience is related to PTSS and couple functioning, but they do not offer much clarity on *how* resilience affects these important indicators of stress and marital relationships. The eventual goal should be to develop a pre-deployment intervention or training for military couples that will help them develop or expand upon existing protective factors prior to and during deployment. However, more research is needed. Significant investments are being made in interventions designed to bolster resilience in military personnel and their families, despite the fact that we do not have a universal definition for resilience or understand much about how it is best nurtured (Meredith et al., 2011).

The investigation of moderating variables in this study adds considerably to the limited literature on the topic. The finding of increased vulnerability for PTSS and increased influence of PTSS on the couple relationship in females warrants further investigation using a larger sample of healthy female combat veterans, because previous studies of female veterans have been mostly limited to clinical populations (Feczer & Bjorklund, 2009; Nunnink, Goldwaser, Heppner, & Pittman, 2010; O'Campo et al., 2006).

Coercion and inter-personal violence, as measured by the WEB, was also a significant independent predictor of lower couple functioning in the couples in this study. Given the cross-sectional design, there is no way of knowing which variables preceded couple functioning, making mediation testing inappropriate for these data (Zhao et al., 2010). Determining the directionality of these relationships is an important goal for future research. Nonetheless, this finding suggests that we should be screening for signs of violence in clinical settings so that we can intervene as early as possible to protect both members of the couple and their children from further problems.

A finding from this study not previously reported is that PTSS demonstrated a similar effect on couple functioning in both male and dual military couples who have deployed. Approximately 11% of OIF/OEF Army soldiers are female, yet exploration of the role of PTSS in couple functioning in combat veterans of the current conflicts has been limited to a small number of studies, each with few, if any, female soldiers (Basham, 2008; Monson et al., 2009; Sayers, 2011). We sought to address this gap by over-sampling female soldiers, with 41% of our couples self-identifying as dual military (both partners in the military); 27% of the females in our sample (18 of 66) had deployed to OIF or OEF themselves. In our sample, all female soldiers were in couple relationships with male soldiers, creating a dual military partnership. Investigation of potential differences in couple functioning of female soldier and dual military couples is an important step toward developing interventions for all military couples.

The prevalence of STS in this sample was extremely low (approximately 2%). This suggests that STS may be over-estimated in studies where investigators omit measurement of primary trauma in the spouses. Measuring trauma history is important in studies of PTSS due to the possibility of retriggering symptoms as well as the risk of confounding findings.

Our findings related to low reliability of the Trauma Events Questionnaire (TEQ; Vrana & Lauterbach, 1994) in this sample warrant further investigation in larger military couple samples. We did not have a sufficient sample size to further explore the instrument through factor analysis. It is possible that our sample had higher levels and more types of trauma exposure than most military couples. A future psychometric investigation may determine whether the instrument needs to be revised for military populations.

The complex nature of how couples are affected by combat-related PTSS cannot be fully explained in this sample for several

reasons. First, no male civilian spouses were recruited into this study, making it difficult to compare gender differences in secondary traumatic symptoms. A goal of future researchers in this field should be to include more civilian male spouses. Second, spouses who reported PTSS levels exceeding the clinical cut point for PTSD all reported a personal history of primary trauma, precluding our ability to determine whether their spouses' combat exposure had been the source of their symptoms. Thus, we cannot determine whether the symptoms that spouses report were (a) transmitted as STS from their combat exposed partner, (b) chronically present and linked to their own personal trauma, (c) a retriggering of previously unresolved traumatic symptoms, or (d) a combination of sources. Only a longitudinal approach to investigating military couples, with data collected at least once prior to combat exposure, could provide the information needed to determine the temporality, etiology, and transmission of PTSS.

Prevalence of PTSS in this sample (50% of civilian and 48% of combat veteran spouses met this cut in our sample) can be compared to studies using the presumptive cut off for PTSD of >30 on the PCL, as recommended for clinical settings by Bliese et al. (2008). When using the less sensitive, but more specific, cut point of 50 on the PCL, our prevalence rate was 18% for civilian and 17% for combat veteran spouses. This closely mirrors rates in a large longitudinal study of OIF/OEF veterans with positive PTSD screening rates of 16.7% for active duty and 24.5% for reserve combat veterans (Milliken et al., 2007). Our use of the more sensitive cut point of PCL >30 was consistent with our study focus on symptom level rather than PTSD diagnosis. We did not include a measure of depressive symptoms, but previous researchers have found that these symptoms often overlap or are co-morbid with PTSS, especially at low levels (Hoge, Auchertonie, & Milliken, 2006; Nemeroff et al., 2006; O'Campo et al., 2006). Therefore, the lower cut point probably captured spouses with either clinically significant depression, or a mixture of PTSS and depressive symptoms.

Cross-sectional data cannot be used to demonstrate causality, only to explore relationships between variables at a single time. The relationships described in this study should be further explored using other methods, such as longitudinal data collected before and after deployment, to better evaluate causality patterns and the presence of mediators. It is also possible that the predictor variables, such as gender, resilience, and coercion or violence, which acted as significant predictors of couple functioning in this sample, may demonstrate significant moderator effects in future studies with larger samples. For this study, sample size and power calculations were based on only the major predictor (PTSS) and outcome variable (RDAS score), and may not have been robust enough for multiple moderation testing. There also may not have been enough variability in this sample to detect differences related to resilience scores. The histograms and standard deviations showed low variability in CD-RISC scores, with a mean of 31 and standard deviation of 6.5, with scores tending toward the high end of resilience.

This sample included primarily Caucasian, non-Hispanic volunteer couples. Inferences about other racial groups should be made with caution. In addition, the recruitment methods, which required consent from both members of the couple, may have favored married couples with stronger marital relationships, as evidenced by high scores in couple satisfaction and adjustment. These couples may have been more secure in their relationship than the average military couple and more open to answering questions about their marriage. Conversely, this could be seen as a strength of the study, because couples who are doing well have the most to teach us about how to help couples who are struggling in their relationship.

Investigation of other post-combat problems, such as depression and traumatic brain injury, and their potential for affecting the couple relationship would be a logical next step in the dyadic exploration of combat veteran couples. It would be important to learn whether resilience can be protective against a range of traumas secondary to combat that are known to affect mental and physical health, couple relationships, parenting quality, and child well-being. In the meantime, nurses can best serve military couples by asking both military and civilian spouses about combat and other trauma exposures, PTSS, and violence or coercion in their relationships. Nurses and other health care professionals should also ensure accurate documentation of trauma history and referrals for treatment during interactions with military couples, as indicated.

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