



Factors Associated With Antisocial Behavior in Combat Veterans

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and aggressive behaviors [Killgore et al., 2008]. (No other relevant studies for wars subsequent to Vietnam could be found in a PubMed search conducted February 12, 2010.)

Findings that combat veterans are at increased risk for antisocial behavior have led to attempts to understand this relationship. Some researchers have suggested that PTSD may play a role in the association between combat and antisocial behavior. Several studies have found associations between PTSD symptoms or PTSD diagnosis and antisocial behavior [Beckham et al., 1997; Fontana and Rosenheck, 2005; Resnick et al., 1989; Taft et al., 2007]. For example, a study of Vietnam veterans [Beckham et al., 1997] found that combat veterans with PTSD reported a higher rate of interpersonal violence than those who did not have PTSD. Similarly, Resnick et al. [1989] reported that PTSD diagnosis was linked with a greater risk of post-military antisocial behavior in a sample of Vietnam-era veterans. A study that used a mixed sample of war veterans (79% from the Vietnam War) found a positive relationship between PTSD symptoms and elevated rates of antisocial and aggressive behavior [Taft et al., 2007].

An additional factor that may have an impact on antisocial behavior among combat veterans is deployment-related stressors. Although combat exposure is often considered the paramount stressor of war, several researchers have emphasized the importance of noncombat deployment stressors [Bartone et al., 1998; King et al., 1995; Litz et al., 1997a]. Noncombat deployment stressors have been labeled using various terms, including deployment-related stressors, low-magnitude stressors, contextual stressors, and malevolent environment [Engelhard and van den Hout, 2007; King et al., 1995; Litz et al., 1997a,b]. Examples of deployment-related stressors include lack of privacy, concerns or problems with family members at home, problems with supervisors, and excessive heat or cold.

Evidence suggests that a high level of exposure to deployment-related stressors may be a key risk factor for mental disorders (including PTSD) in military populations. This association has emerged in studies of military peacekeepers [Bartone et al., 1998; Litz et al., 1997a,b], Vietnam veterans [Fontana and Rosenheck, 1999; King et al., 1995], Gulf War veterans [Vogt et al., 2005], and veterans of the current conflicts in Iraq and Afghanistan [Booth-Kewley et al., 2010; Engelhard and van den Hout, 2007]. Given prior research suggesting that deployment-related stressors may have a negative impact on mental health, we hypothesized that

deployment-related stressors would be an important risk factor for antisocial behavior. We are not aware of other studies that have examined this association.

There is substantial overlap between symptoms of PTSD and those of mild traumatic brain injury [Kennedy et al., 2007]. Recent studies of military personnel deployed to Iraq or Afghanistan have reported substantial positive associations between symptoms of mild traumatic brain injury and PTSD [Hoge et al., 2008; Schneiderman et al., 2008]. Based on the possible overlap between PTSD and mild traumatic brain injury symptoms, and since PTSD is often associated with antisocial behavior, we sought to determine whether mild traumatic brain injury symptoms are linked with antisocial behavior.

The objective of this study was to identify demographic and psychosocial factors associated with antisocial behavior in Marines who deployed to the current conflicts in Iraq and Afghanistan. We examined 12 demographic and psychosocial factors in relation to antisocial behavior. We hypothesized that exposure to combat, deployment-related stressors, PTSD, and mild traumatic brain injury would be positively associated with antisocial behavior.

METHOD

Participants

The study participants were 1,543 enlisted Marines who had completed at least one war-zone deployment (e.g., Iraq, Afghanistan). The majority of the participants (95%) had been deployed to Iraq. Study participants were drawn from military bases in Southern California ($n = 915$) and Okinawa, Japan ($n = 628$). The surveyed Marines belonged to a wide variety of units, including the 1st Marine Regiment (Camp Pendleton, California), the 4th Marine Regiment (Camp Schwab, Okinawa), the 7th Engineer Support Battalion (Camp Pendleton), and the 9th Engineer Support Battalion (Camp Hansen, Okinawa).

Every participant in the sample had been deployed to a combat zone between 2002 and 2007. Most (94%) had completed their most recent combat deployment between January 2004 and December 2007. Participants were asked to answer all survey questions with their most recent combat deployment in mind. Participants who reported zero combat exposures (on the combat exposure scale discussed below) were excluded. The study was approved by the Naval Health Research Center Institutional Review Board.

Measures

Antisocial behavior scale. Antisocial behavior was measured by asking participants to report the number of times in the past 12 months that they had engaged in nine types of antisocial or aggressive behavior. These items were adapted from items used on the 2005 Department of Defense Survey of Health Related Behaviors Among Military Personnel [Bray et al., 2006]. Respondents rated each item using a four-point scale (0 = zero to 3 = three or more times). Sample items included “I had a physical confrontation during an argument,” “I drove unsafely,” and “I had a disciplinary action taken against me” (see Appendix A). A total scale score was obtained for each participant by summing responses to the 9 items. The coefficient α for this sample was .81, indicating good internal consistency. Participants were classified as engaging in antisocial behavior if their responses summed to ≥ 9 . This cutoff was selected because it allowed respondents who scored in the top quartile to be compared with all other respondents.

PTSD. The PTSD Checklist (PCL) [Weathers et al., 1993] was used to assess PTSD symptoms. This is a very widely used measure of PTSD in civilian and military research. This validated measure contains 17 items corresponding to symptom criteria for PTSD. Respondents rate each item using a five-point scale (1 = not at all to 5 = extremely). The coefficient α for the present sample was .95. The military and civilian versions of the PCL contain identical items; the only difference is that the civilian version of the PCL (PCL-C) instructs participants to respond with their general life experiences in mind (which can include deployments), whereas the military version (PCL-M) asks participants to respond with only their stressful military experiences in mind.

We chose to use the PCL-C because we wanted to gauge participants' reactions to their overall life stressors, both military and nonmilitary. For each participant, a total score was obtained by summing across all scale items. Consistent with recommendations of the creators of the PCL, participants were coded as having possible PTSD if they had a score of 50 or greater [Weathers et al., 1993]. In this article, the terms “possible PTSD” and “screened positive for PTSD” are used interchangeably to refer to individuals who scored ≥ 50 on the PCL.

Combat exposures. A combat exposure scale was adapted from the Army Mental Health Advisory Team combat exposure scale [MHAT, 2008]. The combat exposure scale consisted of

16 items assessing experiences, such as “receiving incoming artillery, rocket, or mortar fire” and “knowing someone seriously injured or killed.” Participants were asked to indicate how often they experienced each exposure using a five-point scale (1 = never to 5 = 10 or more times). An overall combat exposure score was created by summing across all scale items. Coefficient α for this sample was .91. Level of combat exposure was classified into four groups (low, medium, high, very high) based on the quartile distribution of the scale scores.

Deployment-related stressors. A deployment-related stressor scale was constructed for this study. This scale consisted of 11 questions about stressors Marines might experience during deployment, such as “concerns or problems back home,” “problems with supervisor(s) or chain of command,” and “long deployment length” (Appendix B). It was adapted from similar instruments used by other military researchers [MHAT, 2008; Wright et al., 1995]. Participants rated each stressor on a five-point scale (1 = very low concern to 5 = very high concern). An overall deployment-related stressor score was created by summing across all scale items. The coefficient α for the present sample was .88. Deployment-related stressor level was classified into four groups (low, medium, high, very high) based on the quartile distribution of the deployment-related stressor scale scores.

Mild traumatic brain injury symptoms. Mild traumatic brain injury symptoms were assessed using a set of questions that asked participants whether they had received an injury to the head during their most recent deployment that involved “being dazed, confused, or “seeing stars,” “not remembering the injury,” or “losing consciousness (knocked out).” A participant was considered to have had a mild traumatic brain injury if any of the three questions elicited a positive response. This is the same procedure Hoge et al. used in their recent study of mild traumatic brain injury among soldiers returning from Iraq [Hoge et al., 2008]; these questions were based on definitions from the Centers for Disease Control and Prevention and the World Health Organization.

Demographic and military background variables. The questionnaire asked for information on sex, age, marital status, rank/paygrade, military occupational specialty, education level, ethnic background, and active versus reserve status. Participants were also asked to provide dates and locations of their combat deployments and to indicate whether they had deployed with their regular unit or as an individual augmentee. Individual

augmentees are military members who are assigned to a unit other than their own for the purpose of filling in or augmenting that unit.

Procedure

Participants were asked to complete a questionnaire that took about 30 min. The questionnaire was administered to participants in group settings at military bases located in Southern California and Okinawa, Japan. Questionnaires were completed between June 2007 and January 2008. Civilian researchers performed study enrollment and administered the questionnaires.

The questionnaire was not anonymous; participants were asked to provide their social security numbers and names to allow for a possible followup. Potential participants were assured that all data would be kept completely confidential and no one in their chain of command would ever see their data. Participation was voluntary and written informed consent was obtained from all participants. The overall response rate was 78%.

Statistical Analysis

Univariate and multivariate logistic regression were used to assess the associations of the demographic and psychosocial variables with antisocial behavior. The following demographic characteristics were included as covariates in the logistic models: age (18–22, 23–26, or ≥ 27 years), education level (high school or less vs. some college/college degree), race (White or Nonwhite), marital status (never married, married, or divorced), number of deployments (1 or ≥ 2), months since last deployment (time span between end of deployment and study participation), active duty versus reservist status, and deployment status (member of deployed unit or individual augmentee).

Univariate logistic regressions were performed to determine the odds ratio (OR) and 95% confidence interval (95% CI) for each variable. Two multivariate models were estimated: a model that included all variables except PTSD (Model 1), and a model that included PTSD and all other variables (Model 2). Regression diagnostics did not reveal any substantial collinearities among the variables. Statistical significance was set at $P < .05$ (two-sided) for all analyses. Statistical analyses were performed using SPSS for Windows, version 16 (SPSS Inc., Chicago, Illinois).

RESULTS

The participants were primarily male (95%). The main ethnic groups were white (54%) and Hispanic (26%). About half the subjects had a high school diploma or general equivalency diploma (49%); the other half had some college or a college degree (51%). The majority of the subjects (73%) were between ages 20 and 28 years ($M = 25.9$ years). About half of the participants were married (45%). Fifty-six percent of the participants had completed one combat deployment; 44% had completed multiple combat deployments. The most common paygrades were E3–E5 (76%). These levels refer to enlisted pay levels that range from E1 to E9, so most of the participants were at the low and middle enlisted paygrade levels.

About a quarter of the sample (22.9%) scored high (≥ 9) on the antisocial behavior scale. The results of logistic regression analyses to predict antisocial behavior are shown in the Table I.

In the univariate analysis, the variable with the strongest association with antisocial behavior was PTSD ($PCL \geq 50$). Individuals who screened positive for PTSD were over eight times as likely to engage in antisocial behavior as those who did not screen positive (OR = 8.48; 95% CI, 6.06–11.87). Combat exposure, deployment-related stressors, and marital status also had substantial univariate associations with antisocial behavior.

In the multivariate model that excluded PTSD as a predictor (Model 1), the strongest predictor of antisocial behavior was deployment-related stressors. Participants in the highest quartile of deployment-related stressors were nearly three times as likely to engage in antisocial behavior as those in the lowest quartile (OR = 2.90; 95% CI, 1.97–4.26). In Model 1, combat exposure was also related to antisocial behavior. Participants in the highest quartile of combat exposure were nearly twice as likely to engage in antisocial behavior as those in the lowest quartile (OR = 1.81; 95% CI, 1.20–2.73). Mild traumatic brain injury symptoms were also a risk factor for antisocial behavior in Model 1, along with younger age and divorced marital status.

In the multivariate model in which PTSD was included as a predictor (Model 2), screening positive for PTSD had a stronger association with antisocial behavior than any other predictor variable. With all other variables controlled for, participants who screened positive for PTSD were over six times as likely to engage in antisocial behavior as those who screened negative (OR = 6.29; 95% CI, 4.34–9.12). Levels of deployment stressors and combat exposure remained significant predictors of antisocial

TABLE I. Results of Univariate and Multivariate Cox Regression to Predict Antisocial Behavior-Male Marines Deployed During Operations Iraqi Freedom and Enduring Freedom, 2002-2007

Variable	Univariate		Multivariate model without PTSD (Model 1)		Multivariate model with PTSD (Model 2)	
	OR	95% CI	OR	95% CI	OR	95% CI
PTSD						
No PTSD	1.00				1.00	
Possible PTSD (PCL \geq 50)	8.48**	6.06-11.87			6.29**	4.34-9.12
Combat exposure						
Low (reference)	1.00		1.00		1.00	
Medium	1.73**	1.18-2.55	1.45	0.97-2.17	1.31	0.87-1.99
High	2.18**	1.49-3.17	1.77**	1.18-2.64	1.60*	1.06-2.41
Very high	2.62**	1.80-3.81	1.81**	1.20-2.73	1.26	0.81-1.94
Deployment-related stressors						
Low (reference)	1.00		1.00		1.00	
Medium	1.31	0.87-1.96	1.21	0.80-1.83	1.12	0.73-1.71
High	2.13**	1.44-3.14	1.78**	1.19-2.67	1.48	0.97-2.25
Very high	3.76**	2.61-5.43	2.90**	1.97-4.26	2.22**	1.49-3.32
Mild traumatic brain injury symptoms						
No symptoms (reference)	1.00		1.00		1.00	
\geq 1 symptom	1.96**	1.42-2.71	1.50*	1.05-2.14	1.16	0.78-1.71
Age (years)						
18-22	2.13**	1.57-2.90	2.20**	1.43-3.39	2.25**	1.44-3.53
23-26	2.03**	1.47-2.81	2.02**	1.40-2.91	2.05**	1.40-3.00
\geq 27 (reference)	1.00		1.00		1.00	
Education						
High school or less (reference)	1.00		1.00		1.00	
Some college/college degree	0.96	0.75-1.21	1.18	0.89-1.57	1.19	0.89-1.61
Race						
White (reference)	1.00		1.00		1.00	
Nonwhite	1.03	0.81-1.31	1.05	0.81-1.36	1.01	0.77-1.33
Marital status						
Married (reference)	1.00		1.00		1.00	
Never married	1.40**	1.09-1.81	1.02	0.75-1.39	0.93	0.67-1.28
Divorced	2.59**	1.72-3.92	2.46**	1.58-3.81	2.08**	1.30-3.31
Number of deployments						
1 (reference)	1.00		1.00		1.00	
\geq 2	0.85	0.67-1.08	0.98	0.74-1.29	0.96	0.72-1.28
Deployment status						
Member of deployed unit (reference)	1.00		1.00		1.00	
Individual augmentee	1.03	0.74-1.43	1.18	0.82-1.70	1.10	0.75-1.60
Active or reserve						
Active (reference)	1.00		1.00		1.00	
Reserve	1.21	0.92-1.60	1.35	0.90-2.03	1.37	0.90-2.09
Months since last deployment						
\leq 5 months (reference)	1.00		1.00		1.00	
6-14 months	1.03	0.76, 1.39	1.01	0.73, 1.41	1.14	0.81, 1.61
> 14 months	0.78	0.58, 1.04	0.82	0.54, 1.25	0.90	0.58, 1.39

CI, confidence interval; OR, odds ratio; PCL, PTSD Checklist; PTSD, posttraumatic stress disorder.

* $P < .05$; ** $P < .01$.

behavior in this model. Additional predictors of antisocial behavior in Model 2 included younger age and divorced marital status.

DISCUSSION

The objective of this study was to identify factors associated with antisocial behavior in U.S. Marines

who deployed to combat in Iraq and Afghanistan. Of 12 demographic and psychosocial factors that were examined in relation to antisocial behavior in a multivariate model, five factors were positively and significantly related to antisocial behavior: PTSD symptoms, deployment-related stressors, combat exposure, younger age, and being divorced. Of all the variables studied, PTSD

had the strongest association with antisocial behavior.

With all other variables controlled, Marines who screened high on a standardized test for PTSD were over six times as likely to engage in antisocial behavior as those who did not. This link between PTSD and antisocial behavior is consistent with previous research [Beckham et al., 1997; Fontana and Rosenheck, 2005; Taft et al., 2007]. It is also consistent with research by Miller et al. [Miller et al., 2003, 2004] who identified “internalizing” and “externalizing” clusters of combat-related PTSD in samples of Vietnam veterans. Internalizers had high rates prevalence rates of panic and depression, whereas externalizers had high rates of antisocial personality traits, alcohol-related behaviors, and histories of delinquency. Our results suggest that some service members respond to combat trauma by becoming depressed and withdrawn, whereas others respond with antisocial and aggressive behavior.

Additional studies are needed to learn more about externalizing behaviors in veterans with PTSD and to determine, for example, if these behaviors are preceded by higher rates of antisocial behavior before military entry. Research is also needed to determine the best interventions for combat veterans with PTSD who engage in antisocial behavior. Our results also imply that military members who engage in a pattern of aggressive or antisocial behavior should be screened and, if appropriate, treated for psychiatric disorders.

An important finding of this study was the positive association between deployment-related stressors and antisocial behavior. Deployment-related stressors are stressors associated with military deployment itself but not directly related to combat (e.g., concerns or problems with family members at home, lack of privacy). We are not aware of any previous studies that have examined deployment-related stressors in relation to antisocial behavior, although some studies have found a positive association between deployment-related stressors and PTSD [Fontana and Rosenheck, 1999; King et al., 1995; Vogt et al., 2005]. Given evidence that deployment-related stressors have a negative impact on service members’ mental health, it is not surprising that this factor would also elevate their risk for engaging in antisocial behavior. This finding also confirms the idea that has recently emerged in the literature that deployment-related stressors have a more powerful impact on military personnel than was previously thought [Engelhard and van den Hout, 2007; Vogt et al., 2005]. This result is important because deployment-related

stressors are potentially modifiable: the military may be able to address them in concrete ways such as by providing combatants with more time off while in theater, improving support to families at home, improving access and options for communicating with families, and shortening deployments.

Currently, the Marine Corps Combat Operational Stress Control program is taking steps to reduce deployment stressors by developing programs aimed at providing additional support to families of deployed members. Additional research should clarify the nature of deployment-related stressors and their impact on antisocial behavior.

Another key finding was the positive association between combat exposure and antisocial behavior. This finding is consistent with previous research [Barrett et al., 1996; Resnick et al., 1989; Yager et al., 1984]. It is also consistent with the idea that some combatants may develop an “invincibility complex” [Killgore et al., 2008]. Anecdotally, many military service members report coming back from war with feelings of invincibility, which may be expressed through increased risk taking, binge drinking, drug use, getting in fights, and other antisocial behaviors. This phenomenon has been widely recognized by military officials since the start of Operations Enduring Freedom and Iraqi Freedom [Vaughan, 2006]. Killgore et al. [2008] studied this phenomenon and found that specific types of combat experiences were predictive of greater risk taking among service members after homecoming. However, more research is clearly needed to further understand the invincibility complex and to determine whether it is mainly a product of combat experiences, preexisting characteristics of the individual, or other factors.

Marital status also had a substantial association with antisocial behavior. Marines sent to war were at higher risk for engaging in antisocial behavior if they were divorced than if they were never married or currently married. Although we are not aware of any previous studies that obtained this finding, there is evidence that divorced individuals are at greater risk for mental health problems [Simon, 2002; Smith et al., 2008]. It is possible that divorced marital status is actually a “marker” for other characteristics such as low conscientiousness, low constraint, or low impulse control, which, in turn, contribute to antisocial behavior [Kurdek, 1993; Shiner et al., 2002].

Although symptoms of mild traumatic brain injury were associated with antisocial behavior in the univariate regression and in the multivariate model that did not include PTSD, once PTSD was added to the model, this association became

nonsignificant. However, the lack of a significant association in the present study may have been because the measure of mild traumatic brain injury symptoms was brief and did not represent a comprehensive assessment. Longitudinal research involving a more detailed assessment of mild traumatic brain injury symptoms could clarify the nature of the associations between mild traumatic brain injury symptoms, PTSD, and antisocial behavior.

This study had a number of limitations. Because it was cross-sectional, the findings are associational rather than causal, and speculation about cause and effect is premature. Data for the study were based on self-report, with all of its associated limitations (e.g., recall bias, socially desirable responding). The participants' mental health could have biased their reports of combat exposures and deployment-related stressors. Another limitation of the study was our lack of information on participants' premilitary antisocial behavior, which may have played a role in their subsequent antisocial behavior. In addition, it would have been preferable to have objective measures of antisocial behavior to supplement the self-report measures. Finally, the surveys from which data were drawn asked for identifying information. Although confidentiality of responses was emphasized, some degree of underreporting may have occurred.

Overall, the key findings of this study were that PTSD symptoms and greater exposure to deployment-related stressors had substantial associations with antisocial behavior. It is important that military leaders and clinical providers recognize these links when developing policy and planning programs for combatants.

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APPENDIX A: ANTISOCIAL BEHAVIOR SCALE

Here are some statements about things that happen to people. How many times in the past 12 months did each of the following happen to you?

1. I had heated arguments with family or friends
2. I got into a loud argument in public
3. I had trouble on the job
4. I drove unsafely
5. I had a physical confrontation during an argument
6. I neglected my family responsibilities
7. I disobeyed orders from my supervisor or chain of command
8. I had trouble with the police
9. I had a disciplinary action taken against me

The items were presented with the following response options: (1) zero, (2) one, (3) two, and (4) three or more times.

APPENDIX B: DEPLOYMENT-RELATED STRESSORS SCALE

Think about your experiences on your most recent deployment. Rate how much personal trouble or concern has been caused by:

1. Uncertain redeployment date
2. Long deployment length
3. Feeling homesick
4. Lack of privacy or personal space
5. Boredom or monotony
6. Concerns or problems back home
7. Problems with supervisor(s) or chain of command
8. Lack of time off
9. Heat and/or cold
10. Not having right equipment or parts
11. Difficulty in communicating with home

The items were presented with the following response options: (1) Very low concern, (2) Low concern, (3) Medium concern, (4) High concern, and (5) Very high concern.

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12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution is unlimited.

13. SUPPLEMENTARY NOTES

14. ABSTRACT <p>The objective of this study was to identify factors associated with antisocial behavior in 1,543 Marines who deployed to combat zones in support of conflicts in Iraq and Afghanistan during 2002-2007. Five factors were associated with antisocial behavior in multivariate analyses: posttraumatic stress disorder (PTSD) symptoms, deployment-related stressors, combat exposure, younger age, and being divorced. PTSD symptoms had a stronger association with antisocial behavior than any other variable. A unique and important finding of this study was the association between deployment-related stressors and a higher incidence of antisocial behavior. Because deployment-related stressors are potentially modifiable, the military may be able to address them in concrete ways, such as by shortening deployments, and improving communication with home.</p>
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