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PRINCIPAL INVESTIGATOR: Amy McLean, Ph.D.

CONTRACTING ORGANIZATION:
Research Triangle Institute
Research Triangle Park, NC 27709-2194

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14. ABSTRACT The current study aimed to identify the impact of deployment injury on three measures of family functioning (relationship adjustment, parental stress, and family chaos) as well as on three measures of psychological symptoms of the service member (PTSD, depression, and alcohol use). Spouses of returning NG members and the service members both rated family functioning lower in the face of psychological difficulties experienced by the service member. Physical injury was related to psychological distress among service members. Neither the spouses of returning NG members nor the service members themselves reported significantly reduced family functioning in the face of physical dysfunction. Neither the spouses of returning NG members nor the service members themselves reported significantly reduced family functioning in the face of physical dysfunction coupled with psychological difficulties. Thus, at least at this point in the reunification process, although invisible wounds of war are a detriment to family functioning, visible wounds of war appears to be protective against family dysfunction, even when invisible wounds are present.				
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1. Introduction and Objectives

Veterans returning from OIF/OEF are at greatly increased risk for developing psychological problems and suicide (Tanielian & Jaycox, 2008), and the top psychiatrist for the Army states that this is in large part due to the stress on the family (Mental Health Advisory Team (MHAT), 2008). Indeed, returning veterans are two to three times as likely to divorce and twice as likely to be involved in domestic violence toward partners and children as non-deploying military members (Marshall, Panuzio & Taft, 2005). It is suspected that *wounded warriors* are at even greater risk for family dissolution (Manguno-Mire et al., 2007; Norris, Byrne, Diaz, & Kaniasty, 2007). Because of these alarming statistics, there has been increasing focus on assessment and treatment of combat veterans. However there is currently no systematic attempt to understand the distress of families of wounded combat veterans or to assist them in coping with their difficulties. This is problematic, given that these brave families endure great strain while active-duty service members are deployed, and the transition period after reuniting can be difficult, resulting in family strain and negative impact on the service member. These problems are especially difficult for wounded warriors and their families, where psychological and physical injury substantially impact family functioning and, therefore, the recovery of the service member. These problems are reaching such epidemic proportions that existing services are frankly overwhelmed.

The current study aimed to identify the impact of deployment injury on three measures of family functioning (relationship adjustment, parental stress, and family chaos) as well as on three measures of psychological symptoms of the service member (PTSD, depression, and alcohol use). In order to examine both partner effects and actor effects, variables of family functioning were examined independently for service members and their spouses/significant other. A deployment injury was hypothesized to predict lower general family functioning. The relationship of physical and psychological injuries was predicted to exacerbate each factor. The presence of polytrauma (psychological plus physical injury) was expected to lead to worse family functioning than either alone.

2. Body

Procedure

We conducted a secondary analysis from data collected by Michigan State University and the University of Michigan. Participants were recruited from National Guard members and their spouses/significant others attending mandatory (for service members) reintegration weekends between October 2007 and September 2009 at conference centers in the Midwest. The two-day reintegration programs took place approximately 45-90 days following the service member's return home from a 12 month deployment in either Operation Iraqi Freedom (OIF) or Operation Enduring Freedom (OEF). Data collection incorporated two distinct phases. In the first phase participants were paid a \$10 gift card for participation and the response rate was 40% for service members and 36% for spouses/significant others. The number of participants in this phase totaled 327 service members and 217 spouses/ significant others with outcome measures of dyadic adjustment and parenting stress. In the second phase participants were paid a higher incentive of \$25 and the response rate of was 78% for service members and 80% for spouses/significant others. The number of participants in this phase totaled 579 service members and 321 spouses/significant others assessed for dyadic adjustment, parenting stress, and a third outcome variable, family chaos. The study was announced to potential participants during a large meeting during the reintegration weekend and volunteer participants filled out the anonymous/confidential survey which took approximately 30-40 minutes to complete. The study was approved by the Institutional Review Boards at Michigan State University and the University of Michigan.

Participants

A total of 906 National Guard members and 538 spouses/significant others were included in the final data set ($n = 1444$). This group includes 525 linked couples and 364 two parent households. The data set contains the following Military Occupational Specialties: infantry, cavalry, transportation, service personnel, medical, military police, and security forces with the largest representation from infantry. The service member sample was largely male (89%) while the spouse sample was overwhelmingly female (96%). Caucasians made up 83% of the sample followed by African Americans (7%), Hispanics (3.5%), Native Americans (1.5%), Asian Americans (2%), and Multi-ethnic (1%). In comparison to National Guard demographics (DOD, 2006) at the

national level our sample includes more males (89% versus 83% nationally), more married (55.5% versus 51% nationally), and more with children (60% versus 43% nationally).

Measures

Marital Adjustment. Dyadic adjustment was measured with the Revised Dyadic Adjustment Scale (Busby, Christensen, Crane, & Larson, 1995). The RDAS is a 14-item Likert-type scale and has multiple response choices. The total RDAS Cronbach's alpha for this study was 0.88 for both service members and spouses. A criterion cutoff score to distinguish between distressed and non-distressed couples was established for the RDAS (Crane, Middleton, & Bean, 2000), with a score of 47 and below representing distressed, and a score of 48 and above representing non-distressed couples.

Parental Stress. Parental stress was measured using the Parental Stress Scale (Berry & Jones, 1995). The measure contains 18 Likert items with lower total scores reflecting less stress associated with parenting. The test-retest reliability for the scale is $r = .81$ and the internal consistency is $\alpha = .83$.

Family Chaos. The Confusion, Hubbub, and Order Scale (CHAOS; Matheny, Wachs, Ludwig, & Phillips, 1995) is a 15-item, forced-choice questionnaire assessing characteristics of noise, confusion, clutter, frantic activities, and disorganization in the household. Seven items focus on household routines and organization, for example, "Your family can usually find things when they need them") and eight on disorganization, confusion, and noise, for example, "You can't hear yourself think at home" Dumas and colleagues (Dumas, Nissley, Nordstrom, Smith, Prinz, & Laughlin, 2005) found the CHAOS scale to have high internal consistency, with Cronbach's alphas of .81 and .83, and 12-month test-retest stability of .74. In our analyses, a lower score on the measure represents characteristics of a more chaotic, disorganized, and hurried home.

Post-Traumatic Stress Disorder (PTSD). PTSD for the service member was measured by the Posttraumatic Stress Disorder Checklist (PCL) (Weathers, Litz, Herman, Huska, & Keane, 1991) a 17-item self report measure of DSM-IV symptoms of PTSD. The total PCL Cronbach's alpha for this study was 0.94 for service members. Using the reference point of 30 days, respondents were asked to answer each item related to their most distressing military event using a 5-point Likert type. A stringent cut-off score of 50 was used for likely PTSD.

For wave 1, PTSD for the spouse was assessed using the Stressful Life Event Screener to identify and reference traumatic life events of spouses in relation to non-military events. This screening measure was adapted from Goodman et al.'s Stressful Life Events Screening Questionnaire (Goodman, Corcoran, Turner, Yuan, & Green, 1998). Presented with a list of 15 stressful life events, respondents indicated whether they had experienced any of the events as well as which one event was most distressing. In reference to their most distressing life event, spouses completed the Short Screening Scale for DSM-IV PTSD (Breslau, Peterson, Kessler, & Schultz 1999). The instrument was selected because it is a brief 7-item self-report measure of PTSD symptomology. The Cronbach's alpha for the Short Screening Scale in this study was 0.82. Spouses were identified as meeting the criteria for likely PTSD if they met the cutoff score of four or higher (Breslau et al., 1999). For the second wave of data collection, spouses' reported their level of stress on the 17-item PCL-C (Weathers et al., 1993) rather than the PTSD Short Screening Scale (Breslau et al., 1999). The Stressful Life Events Screening Questionnaire (Goodman et al., 1998) was eliminated in the second wave of the study to reduce burden to participants. Subsequently, the PCL-C was given without referencing their most distressing life event. Similar to the service member assessment, a stringent cut-off score of 50 was used on the civilian versions of the PCL.

Depression. Depression was measured using the Beck Depression Inventory Second Edition BDI-II (Beck, Steer, & Brown, 1996) for the first wave and the Patient Health Questionnaire PHQ-9 (Kroenke, Spitzer, & Williams, 2001) for the second wave of data collection. The BDI-II is a 21-item self-report inventory is effective in discriminating among individuals with various levels of depression ranging from minimal to severe. The measure had a high internal consistency with a Cronbach's alpha of 0.91. We used a total score of 14 or greater on the BDI-II as meeting the criteria for likely depression. The PHQ-9 is a self-report instrument that assesses 9 DSM-IV symptoms of depression over a 2-week period, with total scores ranging from 0 to 27 (Kroenke, Spitzer, & Williams, 2001). Cut off scores of 10 or higher indicate depressive symptoms. The PHQ-9 has acceptable reliability with a Cronbach's alpha of 0.84 for this study.

Alcohol Use. Alcohol use was assessed with the Alcohol Use Disorders Identification Test (AUDIT; Saunders, Aasland, Babor, Fuente, & Grant, 1993). This 10-item instrument is scored on a 5-point Likert scale,

with total scores ranging between 0-40. An AUDIT score of 8 or higher indicates alcohol misuse. The instrument has good internal consistency, with a Cronbach's alpha of .80.

Injury. Physical injury was self reported by the service member. Participants responded to a series of questions about their most recent deployment as well as a series of questions about a previous deployment experience. If the service member responded yes to —“Were you wounded or injured?” during the most recent deployment or during a previous deployment they were classified as having a deployment related injury.

Results

Paired-sample *t* test were conducted to compare the means of service members' and spouses' scores on family functioning variables. A significant difference was found between service members' and spouses' self-report of family chaos ($t(197) = -2.50, p < .05$). No significant difference was found between service members' and spouses' report of dyadic adjustment ($t(503) = .752, ns$) or parental stress ($t(342) = .805, ns$). The family chaos measure was added in our data collection after 2009, the parental stress was only collected from parents, and dyadic adjustment was collected from all couples reflecting varying degrees of freedom in the output. Thirty-nine percent of service members and 40% of spouses reported clinically distressed relationships. Scores on family function variables were highly correlated. A weak correlation that was not significant was found ($r(359) = -.009, p = .863$). Service members' parental stress was not related to spouses' dyadic adjustment in the sample.

A primary aim of the study was to understand how an injury effects family functioning. For this sample, 11% reported that they had been wounded or injured in their most recent deployment and 13% reported that they had been injured in a previous deployment. When an additional variable was created to combine these two questions, 15% reported that they had been wounded or injured in a deployment. Since we were also interested in the psychological effects of deployment on family functioning, we created a dichotomous variable for psychological injury if the individual met the strict screening criteria for one or more behavioral health issues which included depression, PTSD, or hazardous alcohol use. Service members (43%) and spouses (33%) indicated clinical ranges of psychological functioning 45-90 days post-deployment.

Testing the effects of Injury on Service Members' and Spouses' Outcomes

Regression Analysis was conducted on whether physical injury predicted lower family functioning. Psychological injuries (depression, substance abuse, and PTSD) was predictive of lowered dyadic adjustment (DAS), parental stress (PSS), and family chaos (CHAOS). Physical Injury was not found to be predictive on these measures of family functioning. However, head injury was found to be related to dyadic adjustment and parental stress measures ($p < .002$). In a multiple regression with PTSD entered into the model, head injury no longer predictive, suggesting that the head injury was either associated with PTSD rather than a physical wound, or that PTSD is so closely related to head injury that it was not possible to tease out these components in this limited sample size of head injured patients.

Multilevel modeling was used to test whether deployment injury predicted lower family functioning or higher levels of psychological distress for service members and their spouses. This data analytic approach allows for non independence between service members' and their spouses' scores, and unlike mixed-model ANOVA, it does not exclude cases in which one partner has missing data. In these analyses we tested whether there were mean differences as a function of injury status, role (i.e., service member versus spouse), and the interaction between injury status and role. There were no significant differences for service members or spouse in dyadic adjustment as a function of injury.

The analysis examining parental stress was restricted to families with children, and included a total of 364 couples. The role main effect suggests that parental stress was higher for service members ($M = 36.40$, $SD = 9.42$) than for spouses ($M = 35.80$, $SD = 9.90$). However, this effect was qualified by a significant interaction with injury status such that there was no role difference in parental stress for couples in the no injury group, $F(1,284) = .01$, $p = .94$, but there was a significant role difference for deployment injury couples, $F(1,51) = 4.68$, $p = .035$. Service members who reported a deployment injury had significantly higher parental stress than their spouses.

Alcohol use also showed a significant role main effect such that on average service members reported higher levels of hazardous alcohol use ($M = 5.78$, $SD = 5.87$), than their spouses ($M = 3.50$, $SD = 4.06$). The interaction between injury status and role was also statistically significant. Examination of the means suggests that injury status did not affect spouses' alcohol use, $F(1,489) = .25$, $p = .62$) but it did affect service members

hazardous alcohol use, $F(1, 492) = 4.08, p = .04$. Injured service members reported higher alcohol use than non-injured service members.

Three variables were used to run analysis to test the effects of deployment injury on depression. The BDI scores for sample 1, the PHQ scores for sample 2, and the z score for the BDI and PHQ of the full data set. In all three analyses there was a significant main effect for injury. The injury main effect suggests that depressive symptoms were higher for individuals within a family where the service member reported a deployment related injury (BDI $M = 11.48, SD = 8.82$; PHQ $M = 7.74, SD = 5.83$) than for individuals in families where there was no deployment injury reported (BDI $M = 8.33, SD = 7.94$; PHQ $M = 5.56, SD = 4.94$). The role main effect in sample 1 suggests that the overall depression scores was higher for spouses ($M = 8.91, SD = 8.76$) than for service members ($M = 8.52, SD = 7.41$). This effect was qualified by a significant interaction with injury status such that there was not a statistically significant role difference in BDI scores for couples in the no injury group, $F(1,168) = 3.60, p = .06$, but there was a significant role difference for deployment injury couples, $F(1,26) = 5.73, p = .024$. Service members in sample 1 who reported a deployment injury had significantly higher depression scores than their spouses. However, for sample 2, examination of the means suggests that injury status affected both the spouses' depressive scores, $F(1, 294) = 5.93, p = .015$ and the service members depression scores, $F(1,297) = 8.48, p = .004$. In the non-injured couples, the spouses had higher levels of depression than the service members. However, within the couples where a service member had reported a deployment injury, the reverse was true, the service members had higher depression scores than the spouses.

The PCL-M was completed by all service members in the study to assess their level of PTSD symptoms, and in the second sample, spouses also received the PCL-C to assess PTSD symptoms. Overall, there was a significant injury effect on PTSD for service members $F(1,478) = 51.33, p = .000$. Service members who reported a deployment injury had higher levels of PTSD ($M = 41.25, SD = 16.98$) than non-injured service members ($M = 29.02, SD = 12.61$). In sample 1, univariate analysis showed a significant main effect for injury on PTSD symptoms for the service members. In addition to the significant main effect for injury, in sample 2 there were also main effects for role. However, this effect was qualified by a significant interaction with injury status such that there was no role difference in PTSD for couples in the no injury group, $F(1,326) = 1.56, p =$

.213, but there was a significant role difference for deployment injury couples $F(1,18) = 6.26$, $p = .022$. If there was no injury, PTSD scores were low for both service member and the spouse. When there was a deployment injury, PTSD scores were significantly higher for the service member than the spouse.

3. Key Research Accomplishments

Presentations

A presentation is being prepared for submission to a national conference.

Publications

A manuscript for submission is being prepared.

4. Reportable Outcomes

None to date

5. Conclusions

Preliminary analysis indicates that:

- Psychological Wounds of War:
 - Spouses of returning NG members and the service members both rate family functioning lower in the face of psychological difficulties experienced by the service member.
- Physical Wounds of War:
 - Physical injury is related to psychological distress among service members
 - Neither the spouses of returning NG members nor the service members themselves reported significantly reduced family functioning in the face of physical dysfunction.
- Polytrauma Wounds of War:
 - Neither the spouses of returning NG members nor the service members themselves reported significantly reduced family functioning in the face of physical dysfunction coupled with psychological difficulties.

Thus, it appears that, at least at this point in the reunification process, although invisible wounds of war is a detriment to family functioning, visible wounds of war appears to be protective against family dysfunction, even when invisible wounds are present.

Based upon the work accomplished thus far (year one of the eighteen month project), it will be of value to develop models (path analysis and Structural Equation Models) of the relationship between psychological injury, physical injury, and family functioning, and considering effect of spouses psychological health on service member's family functioning.

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