Chapter 13
The Effects of Wounds of War on Family Functioning in a National Guard Sample: An Exploratory Study

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Abstract When a service member is injured in the line of duty, whether the injury is physical, psychological, or a combination, family members and relationships are impacted. This chapter looks at the etiology of self-reported deployment injury among a sample of National Guard service members who deployed to Iraq and Afghanistan between 2006 and 2009. This study explores how physical injuries relates to family functioning and mental health outcomes in the early post deployment phase of reintegration. In particular, we were interested in service members' and spouses' reports of relationship adjustment and parenting stress, and how

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families with a self-reported injury fared in comparison to families without an injury. Preliminary findings with this sample suggest that a deployment injury may have more of an effect on the service members' mental health and parenting stress than on their spouse or significant other at this early readjustment period.

Keywords National Guard • Injury • Family functioning

Understanding Resilience in Wounded Warriors

When a service member is injured in the line of duty, whether the injury is physical, psychological, or a combination, family members and relationships are impacted. While there is a growing body of literature on the effects of service member deployment to war and their related psychological concerns on family functioning (Erbes, Meis, Polusny, Compton, & MacDermid Wadsworth, 2012; Gewirtz, Polusny, DeGarmo, Khaylis, & Erbes, 2010; Gorman, Blow, Ames, & Reed, 2011), little is known about the effects of physical wounds on family functioning. In her comprehensive review of the literature on families in the times of the most recent wars, MacDermid Wadsworth concludes that there are many gaps when it comes to our understanding of family adaptation to physical wounds acquired in war (MacDermid Wadsworth, 2010). She makes the compelling argument an injury to a service member leads to many changes for families that can include a change in family roles and structures as well as the overall family emotional climate. The current exploratory study aimed to identify the impact of a physical injury acquired during deployment on family functioning using two measures (relationship adjustment and parental stress), while also examining psychological symptoms (PTSD, depression, and alcohol use) of the service members and their spouses. A deployment injury was hypothesized to predict lower general family functioning and greater level of psychological distress in both service members and their spouses.

Background

Physical Injury

The injuries sustained by service members during combat can potentially affect all members of the family system. The injuries may have either a physical or psychological etiology or a combination of the two, with varying levels of disability in each category. One method of injury surveillance for Iraq and Afghanistan are the medical evacuation records. Between March 2003 and August 2010, the number of non-hostile injuries (n = 10,383) was greater than the number of evacuees wounded in action (n = 8,954) (Fischer, 2010). Often non-combat related injuries are fractures, inflammation/pain, and dislocation, and causes are sports/physical training, fall/jumps, and motor vehicle-related incidents (Hauret, Taylor, Clemmons, Block, &

Jones, 2010). Amputations represented 1,621 of the evacuees during the same time period (Fischer, 2010). There are no studies we could find that describe the impact of either combat or non-combat related injury on military family functioning.

Psychological Effect of Injury

In contrast to the number of studies looking at injury and family functioning outcomes, there is a good deal of evidence to suggest that injury places service members at risk for psychological difficulties. Grieger and colleagues (2006) examined the rates and predictors of PTSD and depression among injured service members during and following hospitalization. Physical severity at 1 month was associated with both depression and PTSD at 7 months (Grieger et al., 2006). Compared to their peers who were in the same combat situations but were not injured, the prevalence of PTSD in the injured group was significantly higher (Koren, Norman, Cohen, Berman, & Klein, 2005).

Physical injuries that are readily apparent may make it easier for family members to adapt to the inevitable changes surrounding such injuries. Invisible wounds such as TBI or PTSD present military families with different struggles. Service members with these types of injuries often face an array of difficulties including impaired decision making, irritability, memory loss, sleep problems, dizziness, intrusive traumatic memories, reduced processing speed, headaches, tinnitus, and other cognitive deficits (Kelly, Amerson, & Barth, 2012; MacGregor, Dougherty, Tang, & Galarneau, 2012). The psychological injuries are those that cannot readily be identified by non-professionals and have no apparent physical impairments. Often assessed through standardized measures, the service members report the level of psychological symptoms they are experiencing and the interference of these symptoms on daily living. Traumatic brain injury (TBI), the signature service member wound of this era, is the loss of brain function due to an open or closed wound to the head and subsequent biochemical events in the brain (Weinstein, Salazzar, & Jones, 1995). While TBI has a physical component, mild TBI has a strong association with PTSD and physical health problems (Hoge et al., 2008) among returning Veterans. Thus, family difficulties may be compounded by the ways in which such invisible physical injuries affect relationships.

The presence of both physical and psychological injuries is another salient challenge facing thousands of wounded veterans and their families. The asymmetric nature of war currently waged by enemy combatants (e.g., improvised explosive devices, explosively formed penetrators, etc.) coupled with US forces' improved body armor, field trauma care, and evacuation methods have resulted in higher survival rates among US forces; yet these advances have also increased the incidence of long and arduous recoveries from blast injuries. Frequently, survival after such trauma entails physical, neurological, and psychological recuperation that may then interact to exacerbate the underlying injury or prolong treatment. The compounded effects of multiple traumas likely present service members and their families with particularly difficult challenges (Kelly et al., 2012).

Family Adaptation to Injury

Relatively little is known about how military spouses and significant others cope with and adapt to life after the return of a recently wounded service member. Because the severity of impairment varies across injured veterans, the range of responses will likely vary considerably. Similarly, almost nothing is known about the factors that predispose families of wounded service members to increased risk and stress, or about families who may possess or enact certain protective factors. Factors such as parental stress during long deployments as well as dyadic stress before, during, and after deployment are obvious areas of interest when investigating risk factors for impaired family functioning in the face of injuries. But it is also essential to investigate the potentially powerful protective factors some families are able to muster.

In this chapter, we focus on physical wounds as the independent variable and we explore how these physical injuries relate to family and mental health outcomes in the early post deployment phase of reintegration. We are not necessarily excluding the possibility that both physical and psychological injury may coexist. In previous studies including our own, it is evident that psychological difficulties affect families. For example, studies show that depression is a strong predictor of poor family outcomes for both service members and spouses, (Blow et al., 2013), that PTSD affects dyadic adjustment (Allen, Rhoades, Stanley, & Markman, 2010; Meis, Barry, Kehle, Erbes, & Polusny, 2010; Riggs, Byrne, Weathers, & Litz, 1998), and in particular the PTSD cluster of dysphoria (feelings of isolation, loss of interest in activities, irritability, and sleep disturbance) has a negative effect on dyadic functioning (Erbes et al., 2012). PTSD also affects parenting; Gewirtz et al. (2010) found that PTSD affects parenting and that those with higher PTSD symptoms experience more parenting challenges. In spite of the growing body of literature related to the effects of psychological symptoms in combat veterans on family well-being, there is a dearth of studies focused on the impact of physical wounds on family functioning.

Cozza and colleagues have observed child distress in clinical treatment facilities of the moderate and severely injured service members, but far less is known about the family outcomes of those service members who were injured and have now returned to community life. In military treatment facilities, families with distress prior to the injury were at risk for higher levels of child distress and poorer family functioning following a deployment injury (Cozza et al., 2010). Cozza et al. (2010) found that family disruption (changes in living arrangements, schedules, and parenting time) was a greater prediction of child distresses than injury severity. Further, families who had a high level of deployment stress prior to the injury were more likely to have the spouse report high levels of child distress following the injury (Cozza et al., 2010). Even though Cozza and colleagues looked at disruption to child/family schedules, parental discipline, and impact on time spent with children, the study could have been benefited by measuring both parents' perception of parenting stress.

Systems Framework

The systems framework (Broderick & Smith, 1979) is the theoretical guide for our study question and hypotheses. To understand the complexity of a deployment injury on the individual, the couple relationship, and the parent–child dyad, it is necessary to take into account the interconnectedness of members of the family as well as multiple levels of influence. This perspective shows how the family system is a unit of inter-related personalities within a network of systems that can support, interfere with, or damage the family (Loukas, Twitchell, & Piejak, 1998). Strong, mutually supportive linkages between microsystems are needed for optimal negotiation of challenging circumstances, a concept beneficial in guiding research with this population. From a systemic perspective, family processes can reduce the stress of a deployment related injury.

Research Question and Hypotheses

This exploratory study is the first to our knowledge to examine the relationship between the physical wounds of war and family functioning in a sample of National Guard service members who had recently returned from OIF/OEF deployment. We set out to answer/the following question:

What are the effects of combat injury on family functioning? We operationalized combat injury as a physical wound (self-report of a physical injury) and tested the following hypotheses:

H1: Physical injury in a service member will lead to higher levels of family distress for both the service member and his/her spouse.

H2: Physical injury in a service member will lead to higher levels of psychological distress for both the service member and his/her spouse.

Methods

Participants and Procedure

Participants were recruited from National Guard members and their spouses/significant others attending yellow ribbon reintegration events between October 2006 and September 2009. The 2-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). 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.

The participants completing surveys collected between October 2007 and August 2008 received a $10 gift card incentive for participation. There were 327 service members (40 % response rate) and 217 spouses and significant others (36 % response rate) in the first sample of data collected. The study participants who completed a survey in 2009 were paid a higher incentive of $25 with an overall response rate of 72 %. The 2009 sample had 579 service members and 321 spouses/significant others completing the survey. The two samples were combined for the analyses of this study for a total of 906 National Guard members and 538 spouses/significant others (N = 1,444) who were surveyed between 2007 and 2009. While the state where data was collected made every effort to have no more than one year deployment for three years of dwell time at home, it is possible that some participants could have volunteered and completed a survey for two separate deployments.

Because this study was interested in family outcomes, only those service members who had a spouse or significant other completing a survey were included in the subsample for this study; 525 linked couples in committed relationships and 364 linked couples were parents. Table 13.1 summarizes the demographic characteristics. The data set contains the following Military Occupational Specialties: infantry, cavalry, transportation, service personnel, medical support, military police, and security forces with the largest representation from infantry/cavalry. The service member sample was largely male while the spouse sample was overwhelmingly female. Caucasians made up 83 % of the sample with participation of 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

Relationship adjustment and parental stress were the outcome variables related to family functioning. We were also interested in PTSD, depression and alcohol use. Self-report of injury was the independent variable used in analysis.

PTSD Symptoms

PTSD for the service member was measured by the Posttraumatic Stress Disorder Checklist-Military Version (PCL-M) (Weathers, Litz, Herman, Huska, & Keane, 1993) 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

Table 13.1 Service member and spouse demographic variable for data collected in 2007–2008; 2009 and combined for injury analysis

	Service member			Spouse		
Characteristic	2007–2008 (n = 200)	2009 (n = 325)	Combined (n=525)	2007–2008 (n = 200)	2009 (n = 325)	Combined (n = 525)
Age						
18–21, *n* (%)	0 (0)	42 (13.0)	42 (8.0)	7 (3.5)	70 (21.5)	77 (14.7)
22–30, *n* (%)	50 (25.0)	130 (40.5)	180 (34.5)	59 (29.5)	112 (35.0)	171 (32.7)
31–40, *n* (%)	68 (34.0)	89 (28.0)	157 (30.1)	73 (36.5)	94 (29.0)	167 (31.9)
41–50, *n* (%)	68 (34.0)	52 (16.0)	120 (23.0)	47 (23.5)	39 (12.0)	86 (16.4)
51 and over, *n* (%)	14 (7.0)	9 (2.5)	23 (4.4)	14 (7.0)	8 (2.5)	22 (4.2)
Gender						
Female, *n* (%)	5 (2.5)	13(4.0)	18 (3.5)	192(97.5)	310 (95.5)	502 (96.1)
Male, *n* (%)	190 (97.5)	312 (96.0)	502 (96.5)	5 (2.5)	15 (4.5)	20 (3.8)
Ethnicity						
African American, *n* (%)	22 (11.0)	13 (4.5)	35 (7.2)	17 (8.5)	13 (4.5)	30 (6.3)
Caucasian, *n* (%)	158 (80.0)	249 (87.0)	407 (83.9)	165 (83.5)	234 (84.0)	399 (83.3)
Hispanic, *n* (%)	3 (1.5)	12 (4.0)	15 (3.1)	3 (1.5)	16 (6.0)	19 (4.0)
Native American, *n* (%)	5 (2.5)	4 (1.5)	9 (1.8)	2 (1.0)	5 (1.5)	7 (1.5)
Asian American, *n* (%)	4 (2.0)	3 (1.0)	7 (1.4)	4 (2.0)	5 (1.5)	9 (1.9)
Multi-Ethnic, *n* (%)	3 (1.5)	3 (1.0)	6 (1.2)	3 (1.5)	2 (.5)	5 (1.0)
Other, *n* (%)	3 (1.5)	3 (1.0)	6 (1.2)	4 (2.0)	6 (2.0)	10 (2.0)
Education						
≤High School Diploma, *n* (%)	33 (16.5)	106(33.5)	139 (26.9)	40(20)	63(20)	103 (20.2)
≤Associates Degree, *n* (%)	113 (56.5)	160 (50.5)	273 (52.8)	79(49.0)	188 (61.0)	287(56.4)
Bachelor's degree, *n* (%)	41 (20.5)	40 (12.5)	81 (15.7)	47 (24.0)	46 (15.0)	93 (18.3)
≥Graduate degree, *n* (%)	13 (6.5)	11 (3.5)	24 (4.6)	14 (7.0)	13 (4.0)	27 (5.3)
Military Rank						
Enlisted, *n* (%)	161 (80.5)	275 (91.5)	436 (85.5)	N/A	N/A	N/A
Officer (w/WO), *n* (%)	39 (19.5)	27(8.5)	66 (12.9)	N/A	N/A	NA

Missing data—Percentages are calculated based on number of responses for each variable. Not all participants responded to all questions

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. Spouses did not complete the PCL in wave one, but did complete the 17-item PCL-C (Weathers et al., 1993) in wave 2.

Depressive Symptoms

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 that 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. Similar to other studies (Bryant et al., 2008; Segal et al., 2006), 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 et al., 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. In order to standardize analyses for depression in the current study, we created a single standardized variable for depression across the entire sample by standardizing the BDI within sample one and standardizing the PHQ-9 within sample two.

Hazardous Alcohol Use

Alcohol use was assessed with the Alcohol Use Disorders Identification Test (AUDIT; Saunders, Aasland, Babor, de la Fuente, & Grant, 1993). This 10 item instrument is scored on a 5-point Likert scale, with total scores ranging between 0 and 40. An AUDIT score of 8 or higher indicates alcohol misuse. The instrument has good internal consistency, with a Cronbach's alpha of .80.

Physical 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.

Relationship Distress

Relationship distress 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, with a score of 47 and below representing distressed, and a score of 48 and above representing non-distressed couples (Crane, Middleton, & Bean, 2000).

Parenting 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 $\alpha = .83$.

Combat Exposure

Combat exposure was assessed on the service members' most recent deployment experience and a previous deployment experience for those service members with multiple deployments utilizing the four remaining variables of the combat exposure assessment. Combat exposure for the study analysis was computed based on four standardized items. We computed recent deployment exposure and previous deployment exposure utilizing the maximum of these two understanding that for some service members' a previous deployment experience may have been more traumatic or vice versa. The correlation between maximum exposure and the injury variable was .257, $p < .05$.

Analysis

Multilevel modeling (MLM) 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. Since MLM uses all available data in its estimates, missing data were not imputed. The MIXED procedure with SPSS software was used in the analysis. The estimation method was restricted maximum likelihood. 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. The means, standard deviations, and F-tests are reported in the findings.

Results

For this study, 513 service members (M = 49.52, SD = 9.59) and 512 spouses (M = 49.29, SD = 9.85) completed the Revised Dyadic Adjustment Scale (RDAS). Of the participants completing the RDAS, 41 % (n = 211) of service members and 38 % (n = 193) of spouses reported clinically distressed relationships. Of the paired couples, 363 service members (M = 36.40, SD = 9.42) and 360 spouses (M = 35.80,

SD = 9.90) completed the Parental Stress Scale (PSS). This demonstrated that participants were experiencing parenting stress; 46 % of service member (n = 165) who were parents (n = 363) and 43 % of spouses (n = 154) who were parents (n = 360) met the cutoff criteria for parental stress.

For this study, paired-sample *t* tests were conducted to compare the means of service members' and spouses' scores on family functioning variables. There was not a significant difference in the report of dyadic adjustment $t(503) = .752$, *ns* or parental stress $t(342) = .805$, *ns*. Our preliminary analysis suggests that service members and their spouses were similar in the report of dyadic adjustment and parental stress. Scores on family function variables were highly correlated.

A primary aim of the study was to understand how an injury affects family functioning. For this sample, 499 service members responded to the question, "Were you wounded or injured in your most recent deployment?" Eleven percent (n = 55) reported that they had been wounded or injured. Service members were also asked if they had been wounded or injured in a previous deployment with 305 respondents and 220 non respondents. We attribute the missing data to the frequency of service members who were on their first deployment (n = 278). A total of 38 service members reported that they had been injured in a previous deployment. When an additional variable was created to combine these two questions, there were 74 reports of being wounded or injured in any deployment.

Because we were interested in the looking at psychological symptoms as an outcome variable, we also did some frequency analysis of psychological injuries in the entire sample. We found that service members in the sample were experiencing symptoms to meet the cutoff criteria for depression (21 %; n = 109), PTSD (13 %; n = 63), and hazardous alcohol use (27 %; n = 140). Spouses were also experiencing symptoms consistent with depression (21 %; n = 110), PTSD (13 %; n = 62), and hazardous alcohol use (11 %; n = 57). We created a dichotomous variable for psychological injury if the individual met the strict screening criteria for one or more behavioral health issues. Service members (43 %; n = 218) and spouses (33 %; n = 159) indicated clinical ranges of psychological functioning 45–90 days post-deployment.

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

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. The means, standard deviations, and F-tests are reported in Table 13.2.

Table 13.2 Results from a multilevel model to test effects of deployment injury on service members' and spouses' report of relationship adjustment, parental stress, and psychological functioning (alcohol use, depression, and PTSD)

	No injury		Deployment injury					
	Service member	Spouse	Service member	Spouse		Injury main effect	Role main effect	Interaction
Dyadic Adjustment								
M	49.97	49.41	48.17	48.54	*F*	1.31	0.02	0.80
(*SD*)	(9.26)	(9.61)	(11.00)	(10.75)	(*df*)	(471)	(471)	(471)
Parental Stress								
M	35.87	35.91	39.61	35.72	*F*	3.09	4.87*	5.14*
(*SD*)	(9.02)	(9.70)	(10.19)	(11.10)	(*df*)	(354)	(347)	(347)
Alcohol Use								
M	5.52	3.42	7.03	3.17	*F*	1.47	60.46**	5.40*
(*SD*)	(5.59)	(3.81)	(7.28)	(4.53)	(*df*)	(478)	(476)	(476)
Depression (BDI)								
M	7.65	9.01	14.22	8.74	*F*	5.70*	4.21*	11.59**
(*SD*)	(6.79)	(8.93)	(8.86)	(8.02)	(*df*)	(194)	(193)	(193)
Depression (PHQ)								
M	5.49	5.62	7.96	7.52	*F*	12.76**	0.09	0.28
(*SD*)	(5.25)	(4.63)	(5.74)	(5.97)	(*df*)	(298)	(298)	(298)
Zdepression								
M	–0.11	–0.02	0.49	0.19	*F*	18.18**	1.91	5.77*
(*SD*)	(0.95)	(0.98)	(1.11)	(1.10)	(*df*)	(495)	(493)	(493)
PTSD (Sample 1)								
M	29.71	–	46.00	–	*F*	36.82**	–	–
(*SD*)	(11.65)	–	(19.24)	–	(*df*)	(192)	–	–
PTSD (Sample 2)								
M	28.58	27.71	38.40	31.60	*F*	18.24**	6.60*	3.97*
(*SD*)	(13.22)	(12.54)	(14.97)	(16.67)	(*df*)	(279)	(278)	(278)

Couple adjustment as measured by the RDAS (Busby et al., 1995) was the first family functioning variable examined in the study of 525 paired couples. As can be seen in Table 13.2, there were no significant differences for service members or spouses in dyadic adjustment as a function of injury. The MLM analysis was repeated controlling for combat exposure with no change in outcome of dyadic adjustment for injury main effect, role (service member verses spouse), or an interaction between injury and role.

Parental stress was the second family functioning variable of interest. The analysis examining parental stress was restricted to families with children, and included a total of 364 paired 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, $F(1,51) = 4.68$, $p = .035$. As shown in the table,

service members who reported a deployment injury had significantly higher parental stress than their spouses. The MLM analysis of parental stress was repeated controlling for the service members' combat exposure. There were no statistically significant changes in our findings.

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). In addition, the interaction between injury status and role was 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.

As we noted earlier, as can be seen in Table 13.2, three variables were used 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, $F(1,26) = 5.73$, $p = .024$. As shown in the table, service members in sample 1 who reported a deployment injury had significantly higher depression scores than their spouses. When we controlled for combat exposure the main effect of injury dropped to $F(1,194) = 3.73$, $p = .055$, while the main effects for role and interaction remained statistically significant.

However, for sample 2, examination of the means suggests that injury status affected both the spouses', $F(1, 294) = 5.93$, $p = .015$) and the service members depression scores, $F(1,297) = 8.48$, $p = .004$. As seen in the table, the spouses in the non-injured couples 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 analyses 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 $F(1,18) = 6.26$, $p = .022$. As can be seen in the table, if there is no injury the PTSD is low for both service member and the spouse. When there is a deployment injury, PTSD is significantly higher for the service member than the spouse.

Discussion

Findings from this study give us insight into the early reintegration processes for service members who have sustained an injury, in particular, the processes that influence how they relate to their intimate partners and children. An earlier study by our research team (Blow et al., 2013) reported that psychological injuries such as depression have a strong negative effect on both service members and spouses dyadic adjustment post deployment. In the present study, we were interested in understanding how self-reported physical injuries were related to the psychological injuries and family functioning variables. Our findings suggest that physical injuries only had an effect on the psychological adjustment of service members but not spouses at this early readjustment period. This included service members drinking more than their spouses, being more depressed, and having higher levels of PTSD. In addition, service members who experienced a physical injury were more depressed and had more symptoms of PTSD than service members who did not report an injury. When it came to family, a physical injury had no effect on dyadic adjustment; however it did have an effect for service members in terms of parenting stress. Specifically, service members who reported a deployment injury had significantly higher parental stress than their spouses.

These findings suggest that service members are struggling with all of the normal losses and transitions related to adjusting to life after a physical injury, and mental health factors are exacerbated in this process. Spouses on the other hand appear to be relatively unaffected at the 45–90 day post deployment event. This is perhaps because of their compassion for their partner's condition and understanding related to the source of the concern and that the service member has not been home long enough for compassion fatigue to set in. This supposition for compassion and understanding related to the source of concern is based on similar findings of Renshaw et al. (2011) who showed that there is an attribution process related to how spouses interpret mental health symptoms post deployment; they are more understanding if symptoms are attributed to a war injury.

The cross-sectional nature of this study limits our ability to make causal inferences or predict the long-term adjustment of either psychological health or family outcomes for either service members or the spouses and significant others. The existing bodies of literature suggest that there is some burden associated with caring for veterans with PTSD (Calhoun, Beckham, & Bosworth, 2002). In addition to

caregiver burden, Calhoun and associates found spouses of veterans with PTSD had poorer psychological adjustment than did spouses of veterans with PTSD. The spouse who experiences exhaustion and burnout in caring for or wanting to help a distressed partner who has undergone a traumatic even may experience secondary traumatic stress (Dirkzwager, Bramsen, Ader, & van der Ploeg, 2005; Figley, 1998). It is simply too early in the reintegration process for our study sample to know whether spouses will remain unaffected by the service member injury over the life-course. We speculate that difficulties in parenting for service members may be related to life changes as a result of the injury leading to changes in parenting activities.

An obvious limitation of the study was the inability to look at the interface of self-reported injury, family outcomes, and traumatic brain injury (TBI), the signature wound of conflicts in Iraq and Afghanistan. The study team collected TBI self-report data in the 2009 subsample with preliminary analysis showing 3 % of the service members in the subsample met the criteria for likely TBI. Because the sample size was not large enough to ensure adequate power for TBI analyses it was not included in our findings. Future studies should look at the effects of TBI on family outcomes within this population.

Another limitation was that a physical injury was assessed by the service members self-report of being injured or not, but we do not know the extent of these injuries. We do not know if injury was classified as non-combat related or if the participant is a Purple Heart recipient. We do not know if the injury required evacuation or the extent that the service member completed the mission for which they trained. We do not know whether the recovery took place on the forward operating base, at a military treatment facility that required the family to relocate, or if the recovery is ongoing. We also do not know whether the injury resulted in disability compensation or if the injury will delay the service member's ability to return to civilian employment. Finally, we do not know the amount of time that has passed since the injury. Despite the limitation of the study, it identifies some obvious gaps in the literature and the need to better understand the implication of service related injuries on psychological and family outcomes.

Implications

Based on background literature and clinical experiences, we would anticipate that the young amputee seeing his unit buddies for the first time since the improvised explosive device caused him to lose consciousness would be in a very different place at the reintegration event 45–90 day post deployment than his fifty year old counterpart who was evacuated for stress injuries. We would also anticipate that these two service members would vary in present and future familial processes related to their reintegration and long term adjustment. Even though the study is limited in that it contains a spectrum of deployment related injuries without specification, it begins to raise question and shed light onto the need to understand not only those with severe combat related injuries but also other types of deployment related injuries.

On both ends of the spectrum, both the service member and their family/support systems will have to make sense of their experiences and grapple with how the deployment injury will or will not define their subsequent life experiences. The military and civilian supports should be sensitive to ecological factors that influence both psychological and family outcomes of the injured service members. The prevention and intervention strategies should build on positive coping strategies and familial processes that promote individual and family resilience.

Findings from this study suggest that injured service members may need individually oriented interventions as they adjust to life after deployment including interventions for depression, PTSD, and alcohol misuse. In addition, they may need both individual and family based interventions related to parenting and establishing a new parental role post deployment injury. Programs to support wounded warriors and their families often focus on the severely injured service members. However, as Cozza et al. (2010) suggests, identification and intervention with families of combat injured families experiencing distress and disruption is needed regardless of injury severity.

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