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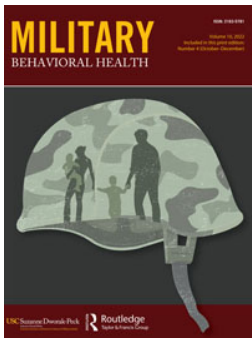
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RESEARCH ARTICLE



Associations of Warzone Veteran and Intimate Partner PTSD Symptoms with Child Depression, Anxiety, Hyperactivity, and Conduct Problems

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ABSTRACT

Warzone deployment increases risk for posttraumatic stress disorder symptoms (PTSS), including among service members who have children. Parental PTSS are associated with child depression, anxiety, hyperactivity, and conduct problems, yet few studies of child behavioral health outcomes in military populations have accounted for PTSS in both warzone veterans and their partners. Fewer still incorporate non-clinically-recruited samples of nationally dispersed warzone veterans and their families. The current research examines whether children whose parent(s) have higher levels of PTSS exhibit more behavioral health symptoms. One hundred and thirty-three Iraq and Afghanistan War veterans and their cohabitating partners completed clinical interviews and self-report questionnaires. Higher intimate partner PTSS, more extensive child exposure to stressful life events, and being an adolescent were significantly associated with child depression after adjusting for warzone veteran PTSS, demographics, and recent warzone veteran absence from the household. Greater child exposure to stressful life events was also associated with child conduct problems. Treatment of PTSD symptoms experienced by warzone veterans' intimate partners, and preventative interventions aimed at helping the children of warzone veterans cope with stress, may ultimately yield positive benefits for the behavioral health of children in military families.

KEYWORDS

Posttraumatic stress; depression; conduct problems; military; children; adolescents; stressful life events; veterans; warzone; deployment

Introduction

Among the over 2.77 million U.S. service members who were deployed in support of combat operations in Iraq and Afghanistan since September 11th, 2001 (Wenger et al., 2018), many have developed posttraumatic stress disorder (PTSD) (Ramchand et al., 2015). Although PTSD adversely affects both the individual and their family, much remains unknown about the behavioral health of the family members of those experiencing PTSD as a function of warzone service. The psychological well-being of the children of warzone veterans (WZVs) is an important clinical concern, as behavioral health problems secondary to warzone deployment, including PTSD symptoms

(PTSS), may increase the risk of psychopathology among these children (Leen-Feldner et al., 2013).

Children of parents with PTSD/PTSS are at increased risk of developing PTSS (Ramchand et al., 2015; Roberts et al., 2012), as well as depression and anxiety (Leen-Feldner et al., 2013; O'Toole et al., 2018). Across civilian (e.g., Aisenberg, 2001) and military (DeVoe et al., 2018; Krešić Ćorić et al., 2016) samples, parental PTSD/PTSS have also been associated with disruptive, impulse control, and conduct problems among their children. Moreover, DeVoe et al. (2018) found that more severe PTSS among Operation Enduring Freedom (OIF)/Operation Iraqi Freedom (OEF) veterans were linked with greater child aggressive behaviors and attentional problems.

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Although prior research has examined associations between parental PTSD and child psychopathology (DeVoe et al., 2018), several gaps in this literature remain. First, although parental PTSD/PTSS increase risk of child psychopathology among families in which children and parents were exposed to the same traumatic event (e.g., Feldman & Vengrober, 2011), few studies have examined the effects of parental PTSD/PTSS on behavioral health symptoms in children exposed to stressful life events (e.g., aggression by other children) that are not necessarily the source of PTSS in their military parent (e.g., warzone trauma). The effects of non-shared events may be particularly relevant to military populations, in which the child is not typically directly exposed to a parent's warzone trauma. Second, few studies have accounted for PTSD/PTSS in both WZVs and their intimate partners, yet military partners may have a trauma history unshared with the WZV. It is important to consider the behavioral health of each parent, as prior civilian studies have indicated that maternal (historically, more often the non-WZV partner in military samples) PTSD has been more consistently associated with child behavioral health compared to paternal PTSD (e.g., Sack et al., 1995). Third, much prior research was conducted using regional treatment-seeking samples (for notable exceptions, see Briggs et al., 2020; Fairbank et al., 2018). Examination of nationally dispersed samples recruited from non-clinical settings will increase the findings' generalizability.

The current study, Family Foundations, includes families of a nationally dispersed sample of WZVs (including current service members and military veterans) who were originally recruited at random from military units selected on the basis of broadly representative military characteristics prior to warzone deployment. The present study examines associations of child behavioral health symptoms (i.e., depression, anxiety, hyperactivity, conduct problems) with the PTSS of both WZVs and their intimate partners. Moreover, the study extends knowledge of the well-being of military families by investigating associations of child stressful life events, thought to be a potent mechanism through which vulnerability to child psychopathology occurs (Brand et al., 2011), with child outcomes. Finally, in contrast to most prior research on military families, this study recognizes changing family structures by including both married and unmarried intimate partners.

We hypothesized that children in families in which the WZV and/or the WZV's intimate partner report greater PTSS would express more severe symptoms of depression, anxiety, hyperactivity, and conduct

problems compared to children in families in which parents had less severe PTSS. We further predicted that stressful contextual factors in the child's life, including child-experienced stressful life events and separation from the military parent, would be associated with adverse child behavioral health outcomes independently of parental PTSS.

Materials and methods

The Veterans Affairs (VA) Boston Healthcare System and Boston University Medical Center institutional review boards approved procedures. Informed consent was obtained by phone from all individual participants; written documentation of consent was waived.

Participants

The analytic sample included 133 families. WZVs were drawn from the Neurocognition Deployment Health Study (NDHS; Vasterling et al., 2006), a cohort of U.S. Army soldiers followed longitudinally since 2003, prior to their first OEF/OIF deployment for the majority of the sample, and most recently reassessed for a 6- to 8-year follow-up as part of VA Cooperative Study Program (CSP) #566 (Aslan et al., 2013). At the time of recruitment to the current study, the NDHS cohort included both current and former service members; when initially sampled, all were current service members who were sampled at random within Army battalions that were selected to capture heterogeneous deployment experiences, operational functions (e.g., combat, combat support, service support), and duty status (i.e., regular active duty, activated reservists) and that were located at two major military installations and multiple Army National Guard armories representing units across three states. Eligibility criteria for NDHS cohort members to participate in Family Foundation included: (a) prior consent to be contacted for future research, (b) consent to access archived NDHS and/or CSP#566 assessment data, (c) an English- or Spanish-speaking intimate partner with whom they had cohabitated for ≥ 1 year, and (d) military operational deployment for ≥ 30 days to an OEF and/or OIF warzone. The current study required at least one child, age 6–17 years old, to have lived at least 50% of the time in the WZV's household during the past year. WZVs were contacted for Family Foundations recruitment following their participation in CSP#566; partners were approached after obtaining WZV consent. See [Supplementary Figure 1](#) for sample derivation.

Procedures

Because participants were nationally dispersed, study procedures were conducted remotely. WZVs and partners each completed PTSD assessments separately by phone; partners completed all other psychometric measures and demographic questions. We used archived PTSD assessment data for WZVs who completed CSP#566 procedures within 180 days of participation in Family Foundations. Partners chose whether to complete the written survey by mail or a secure web-based platform (PsychData, <http://psychdata.com>). Among the 130 partners who provided questionnaire data, the majority (67.7%; $n = 88$) completed questionnaires electronically. Doctoral level psychologists conducted all interviews.

We randomly selected a single “focus child” per family to reduce respondent burden among families with multiple children (Vasterling et al., 2015). To achieve as equal representation of children and adolescents as possible, we stratified the focus child selection by age group (6–12 vs. 13–17 years). Adolescents were oversampled due to the preponderance of younger children in study families.

Measures

WZV and partner PTSS

The Clinician Administered PTSD Scale (CAPS; Blake et al., 1995), a structured clinical interview based on *Diagnostic and Statistical Manual, Fourth Edition, Text Revision* (DSM-IV-TR; American Psychiatric Association, 2000) criteria, was used to assess PTSS among WZVs. The CAPS demonstrates strong reliability and validity (Weathers et al., 2001). In our sample, inter-rater reliability for CAPS summary scores (potential range: 0–136), calculated from a randomly selected subset of WZV interviews (14%), was high ($r = .95$). To minimize burden on the partner (who also reported on child variables), partner PTSS (past month) was assessed by phone using the 17-item PTSD Checklist, civilian version (Weathers et al., 1994) (range: 17–85). The PCL-C demonstrates good reliability and favorable convergent and discriminant validity (Coneybeare et al., 2012).

Stressful contextual variables

Child stressful life events (past year) were assessed with the parent-report version of the Life Events Scale (LES; Brand & Johnson, 1982; Coddington, 1972), a 25-item checklist of life events (e.g., parental divorce, saw crime or accident). The LES has adequate test–retest reliability (Brand & Johnson, 1982).

Partners also reported the number of months the WZV had been away from the household over the past year.

Child outcomes

Partners completed written questionnaires about child outcomes. Child depression severity (past 2 weeks) was assessed using the parent-report version of the 17-item Child Depression Inventory-2 (CDI-2; Kovacs, 2010) (range: 0–51). The CDI-2 demonstrates acceptable to high levels of internal consistency and discriminative and convergent validity (Bae, 2012). Child anxiety severity (past 3 months) was assessed using the parent-report version of the 41-item Screen for Child Anxiety Related Emotional Disorders (SCARED; Birmaher et al., 1999) (range: 0–82), which has strong psychometric properties (Hale et al., 2005). Child hyperactivity severity and conduct problems (past six months) were assessed using the parent-report version of the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997), which has demonstrated good convergent and discriminant validity (Goodman et al., 2010). Each scale consists of five items (range: 0–10). The CDI-2, SCARED, and SDQ are validated for children of ages represented in our sample (Birmaher et al., 1999; Goodman, 1997; Kovacs, 2010).

Data analysis

Descriptive and bivariate correlation analyses were performed using SPSS; multivariate regressions were conducted in Mplus v.8.1 (Muthén & Muthén, 2015). Less than 6% of data were missing across variables, with the exception of Child Stressful Life Events, which was added later in the study ($n = 110$). Missing data were addressed with full-information maximum likelihood.

We conducted hierarchical linear multivariate regressions to examine associations between parental PTSS and child depression, anxiety, and conduct problem severity. For each model, Step 1 included demographic factors (child sex, child age, highest parent education). Step 2 included parental PTSS (WZV and partner). Step 3 included potentially stressful contextual factors (number of child stressful life events, past year; number of months WZV was away, past year).

Results

Sample characteristics

Among the 133 families in the analyses, approximately 30% ($n = 38$ dyads) included at least one parent (most

Table 1. Sample characteristics ($N=133$ families).

Characteristics	WZV		Partner		Family	
	<i>n</i> or <i>M</i>	% or SD	<i>n</i> or <i>M</i>	% or SD	<i>n</i> or <i>M</i>	% or SD
Age	36.84	5.70	35.19	5.10		
Sex						
Male	125	96.2%	5	3.8%		
Female	5	3.8%	128	3.8%		
Missing	3	2.3%	0	–		
Race						
Caucasian	102	82.3%	107	82.9%		
African-American	14	11.3%	10	7.8%		
Other	8	6.5%	12	9.3%		
Missing	9	6.8%	4	3.0%		
Hispanic ethnicity	17	13.3%	14	10.7%		
Missing	5	3.8%	2	1.5%		
Education						
High school graduate/GED or below	21	16.4%	24	18.3%		
Some college/Associates	73	57.0%	67	51.1%		
College graduate or above	34	26.6%	40	30.5%		
Missing	5	3.8%	2	1.5%		
Military status WZV, current						
Active Duty	42	32.8%	–	–		
National Guard/Reserve	17	13.3%	–	–		
Separated from service	69	53.9%	–	–		
Missing	5	3.8%	–	–		
Ever served in military, partner	–	–	23	17.6%		
Missing	–	–	2	1.5%		
# of deployments, WZV						
1	48	31.5%	–	–		
2	44	28.8%	–	–		
3 +	38	33.9%	–	–		
Missing	3	2.3%	–	–		
Months away, past year, WZV	1.37	2.12	–	–		
Married					125	95.4%
Missing					2	1.5%
Relationship duration, years					12.09	5.94
Highest education across dyad (\geq college degree)					57	45.2%
Missing					7	5.3%
Children in household					2.30	.90
PTSS						
WZV PTSS					29.95	29.87
Partner PTSS					24.76	8.40
Child sex (male)					53	40.2%
Missing					1	0.8%
Child age					10.94	11.00
Child biological status						
Biological child of WZV and partner					82	62.6%
Biological child of WZV only					13	9.9%
Biological child of partner only					3	26.0%
Biological child of neither WZV nor partner					2	1.5%
Missing					2	1.5%
CDI-2 child depression severity					10.89	6.63
SCARED child anxiety severity					16.04	14.84
SDQ child hyperactivity severity					4.27	2.75
SDQ child conduct problems					1.40	1.62
Child stressful life events					1.55	1.00

Note. WZV=Warzone Veteran; GED=General Education Diploma; PTSS=Posttraumatic Stress Disorder Symptoms; CDI-2=Child Depression Inventory-2; SCARED=Screen for Child Anxiety Related Emotional Disorders; SDQ=Strengths and Difficulties Questionnaire. *N*s across continuous study variables ranged from 129 to 133, with the exception of Child Stressful Life Events, which was added after the start of data collection, resulting in an *N* of 110.

commonly the WZV; $n=25$; 19.8%) who met case definition for current PTSD. Nearly 1/5 of children met cutoff criteria for probable anxiety (18.6%) or depressive (19.4%) disorder. Similarly, 22.1% of the children expressed clinically significant hyperactivity symptoms; fewer met the cutoff for probable conduct disorder (13.0%). See Table 1 for sample characteristics.

Associations of demographic factors, parental PTSS, and stressful contextual variables with child psychiatric symptoms

Results of bivariate analyses are shown in Supplementary Table 1. Results of the final steps for each regression model (child depression, anxiety, hyperactivity, and conduct problems) are presented in Table 2. After adjusting for demographics and PTSS

Table 2. Final step (Step 3) of regression analyses examining child anxiety, depression, and externalizing outcomes.

Variable	CDI-2 depression severity N = 129				CDI-2 anxiety severity N = 129				SDQ hyperactivity N = 131				SDQ conduct N = 131			
	B	SE	t	p	B	SE	t	p	B	SE	t	p	B	SE	t	p
Child sex	-.58	1.00	-0.58	.56	0.70	2.61	0.27	.79	-.91	0.50	-1.83	.07	-.14	0.28	-.51	.61
Child age	0.36^o	0.14	2.63	.01	-.57	0.32	-1.80	.07	-.11	0.06	-1.81	.07	0.02	0.04	0.47	.64
Parent education	2.40*	0.99	2.39	.02	-2.40	2.70	-.89	.37	0.45	0.48	0.94	.35	0.35	0.27	1.31	.19
WZV PTSS	0.02	1.23	0.02	.22	0.00	0.05	0.10	.93	0.00	0.01	0.16	.87	-.00	0.00	-.09	.36
Partner PTSS	0.21*	0.10	2.22	.03	0.04	0.18	0.20	.84	0.03	0.03	0.76	.45	0.01	0.02	0.39	.70
Child SLE	16.70*	7.51	2.22	.03	28.25	17.34	1.63	.10	2.54	2.80	0.91	.37	4.24	1.75	2.42	0.02
Months WZV away	0.03	0.18	0.19	.85	0.01	0.78	0.01	.99	0.14	0.11	1.27	.21	-.10	0.05	-1.78	.08
Adjusted R ²	0.28[†]	0.09	3.13	0.00	0.06	0.04	1.59	.11	0.08	0.04	1.82	.07	0.10	0.04	2.17	0.03

Note: Unstandardized estimates. Estimated with maximum likelihood estimation. CDI-2 = Child Depression Inventory-2; SCARED = Screen for Child Anxiety Related Emotional Disorders; SDQ = Strengths and Difficulties Questionnaire; PTSS = Posttraumatic Stress Disorder Symptoms; SLE = Stressful Life Events; WZV = Warzone Veteran.

* $p < .05$. ^o $p < .01$. [†] $p < .001$.

in each partner, more severe partner PTSS (Step 2; $B = 0.28$, $SE = 0.09$, $p < .01$), but not WZV PTSS ($B = 0.03$, $SE = 0.02$, $p = .15$), were significantly associated with child depression severity, explaining 23% of the variance ($p = .006$). This association remained significant (Step 3; $B = 0.21$, $SE = 0.10$, $p < .05$) when stressful contextual variables were added, the final model explaining 28% of the variance ($p = .002$). Older child age and higher parent education were also significantly associated with more severe child depression in the final step.

Contrary to hypotheses, after adjusting for demographics, neither WZV nor partner PTSS were significantly associated with child anxiety (Step 2; WZV: $B = 0.01$, $SE = 0.04$, $p = .76$; partner: $B = 0.16$, $SE = 0.15$, $p = .30$), child hyperactivity (Step 2; WZV: $B = 0.00$, $SE = 0.01$, $p = .96$; partner: $B = 0.04$, $SE = 0.03$, $p = .25$), or child conduct problems (Step 2; WZV: $B = -0.001$, $SE = 0.004$, $p = .78$; partner: $B = 0.03$, $SE = 0.02$, $p = .13$). In Step 3, child exposure to more stressful life events was significantly associated with greater conduct problems (Step 3; $B = 4.24$, $SE = 1.75$, $p < .05$)—with the final model explaining 10% of the variance ($p = .03$)—but not with child anxiety or hyperactivity.

Discussion

This study examined associations between parental PTSS and their children's behavioral health in a non-clinically recruited, nationally dispersed sample of WZVs and their families. Consistent with hypotheses, in fully adjusted analyses, WZV partners' PTSS, and children's greater past year exposure to stressful life events were associated with more severe child depression symptoms. Further, after adjusting for demographic variables and parental PTSS, greater exposure to child stressful life events predicted greater child conduct problems.

The association observed between parental PTSS and child depression symptoms is consistent with literature across both military (O'Toole et al., 2018) and civilian (Leen-Feldner et al., 2011) samples and suggests that having a parent with more severe PTSS may increase risk for specific psychological symptoms among children. This study extends the current literature by examining the effect of each parent's PTSS (vs. one parent's PTSS) on the mental health of one randomly selected child in the household, and using well-validated clinical interviews and self-report questionnaires within the context of a nationally dispersed military sample originally recruited on the basis of diverse military functions rather than clinical referral. Although WZV PTSS were unrelated to child

behavioral health in adjusted analyses in our study, observed associations between military partner PTSS and child depression are consistent with studies demonstrating stronger associations between maternal, rather than paternal, PTSS and child psychopathology (e.g., Sack et al., 1995), as the vast majority of military partners in our study were mothers. Our cross-sectional analyses precluded examination of potential mechanisms between parental PTSS and child depression; however, consistent with the family systems perspective, which posits that stress experienced by one member of the family has an effect on the entire family system (Riggs & Riggs, 2011), parental PTSD has been repeatedly shown to increase the likelihood of maladaptive parenting, including parental hostility, poorer parent-child relationship quality, and greater parental disengagement (Christie et al., 2019), which may underlie associations between parental PTSS and childhood behavioral health problems. It is also possible, however, that shared genetic vulnerability increases risk for psychopathology among both parent and child.

In our study, child exposure to stressful life events was associated with both child depression and conduct problems. This finding is consistent with literature demonstrating that children who experience stressful life events are at risk for negative behavioral health outcomes, including more severe depression and conduct problems (Evans et al., 2015; Young & Dietrich, 2015). Our results also support recent findings from a large-scale, prospective cohort study of military service members, their spouses, and their children, which found that family-related military stressors were associated with increased risk of behavioral health conditions in children (Briggs et al., 2020); however, our findings extend this existing research by using random selection to identify a single, age-stratified child in each household, rather than aggregating scores across all children in the household, enabling investigation of the effects of individual child exposures to stressful life events on the mental health outcomes of the specific child. Children exposed to more stressful life events may have difficulty coping effectively, which may in turn increase risk of depression (Evans et al., 2015). Further, also consistent with the results of Briggs et al. (2020), parents of older children in our sample were more likely to report higher child depression symptoms.

Whereas prior research documented relationships between parental PTSD and both child anxiety symptoms as well as behavioral problems (DeVoe et al., 2018; Krešić Ćorić et al., 2016; Leen-Feldner et al., 2013), neither WZV nor intimate partner PTSS were significantly associated with child anxiety, hyperactivity,

or conduct problems in our sample. Notably, several prior investigations have documented stronger effects of parental PTSD on child depression compared to the effects on child anxiety (e.g., Al-Turkait & Ohaeri, 2008), and stronger associations between parent PTSD and child internalizing symptoms compared to associations with externalizing symptoms (Leen-Feldner et al., 2013). Thus, it is possible that we did not detect associations between parental PTSD and child anxiety or externalizing problems in the current sample due to the relatively smaller effects that might be expected for these problems. Further, some prior studies with military families assessed children from a more restricted age range (e.g., DeVoe et al., 2018), whereas the current study examined a sample of nationally dispersed parents and children representing a broader age range. These design and sampling differences may help to explain why our study did not replicate some prior research finding associations between parental PTSD/PTSS and children's anxiety, hyperactivity, or conduct problems.

Limitations and future directions

Due to relatively few observations of child trauma exposure, we could not examine child PTSD symptoms as an outcome. Future studies incorporating larger samples allowing for more observations of PTSD will enable examination of the effects of parent behavioral health on child PTSD. Measurement could be expanded in future research to include both parents' reports of their child's behavioral health functioning, as well as teacher reports and direct observation. Further, although WZV PTSS was assessed with a structured clinical interview, which is an uncommon feature in the context of nationally dispersed samples, we assessed PTSS in intimate partners using an interviewer-administered PCL-C. Although the PCL-C is well-validated against gold standard structured interviews and the interview format allowed for clarification of any respondent questions about specific items, future research would benefit from incorporation of structured clinical interviews to assess PTSS in both partners. In addition, our sample was comprised primarily of participants who identified as non-Hispanic and Caucasian. We did not oversample for women veterans and thus had relatively few women participants. As a result, we were unable to examine the influence of these sociocultural/demographic factors. Our study was also conducted with only one U.S. military branch and may not fully generalize to military contexts beyond the U.S. Army. Finally, future studies will benefit from longitudinal measurement, as our cross-sectional design precludes causal conclusions.

Our study's limitations are offset by several strengths, which, in combination, reflect a unique contribution of this study. These strengths, including a non-clinically selected, nationally dispersed sample of WZVs (both current service members and military veterans) and their partners, examination of children's exposure to stressful life events not necessarily shared with their parents, use of diagnostic clinical interviews to assess WZV PTSD, examination of the independent effects of WZV and military partner PTSS on child psychopathology, and inclusion of both married and unmarried intimate partners, importantly extended the research in this area. In addition, this study's randomized selection of a child stratified by age enhanced adequate age representation, decreased parental biases in choosing a child to report on, and avoided parents reporting on the overall well-being across all of their children.

Conclusions

Our study found children's greater exposure to stressful life events and higher parental PTSD symptoms to be associated with specific behavioral health symptoms in the children of families in which a parent has deployed to a warzone. Findings suggest that identifying and treating PTSS among military intimate partners may benefit not only partner well-being, but may also promote the behavioral health of their children. Research supports the efficacy of behavioral health prevention and early intervention efforts targeting children from military families (Ohye et al., 2016), as well as parenting interventions aimed at military/military veteran families (Gewirtz et al., 2011). Our results point to the possible benefit of screening military children for stressful life events and underscore the use of coping strategies to enhance child resilience in the aftermath of stressful life events.

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Disclosure Statement

The authors declare that they have no conflict of interest.

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