


Posttraumatic Stress Disorder Symptom Clusters in Service Members Predict New-Onset Depression Among Military Spouses

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Military operations in Iraq and Afghanistan have brought increased attention to posttraumatic stress disorder (PTSD) among service members and, more recently, its impact on spouses. Existing research has demonstrated that PTSD among service members is associated with depression among military spouses. In the current study, we extended these findings by using data from service member–spouse dyads enrolled in the Millennium Cohort Family Study for which the service member had evidence of PTSD ($n = 563$). Prospective analyses identified the association between PTSD symptom clusters reported by the service member and new-onset depression among military spouses. Over the 3-year study period, 14.4% of these military spouses met the criteria for new-onset depression. In adjusted models, service member ratings of symptoms in the effortful avoidance cluster, odds ratio (OR) = 1.61, 95% CI [1.03, 2.50], predicted an increased risk of new-onset depression among military spouses, whereas reexperiencing symptoms, adjusted $OR = 0.57$; 95% CI [0.32, 1.01], were marginally protective. These findings suggest that PTSD symptom clusters in service members differentially predict new-onset depression in military spouses, which has implications for treatment provision.

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The ongoing military operations in Afghanistan and Iraq have brought considerable attention to the mental health of service members; however, less focus has been given to military spouses and families. In addition to common stressors, military spouses experience unique concerns, such as relocation, frequent deployments, and other family separations, as well as restrictive rules and regulations regarding military life (Drummet et al., 2003; Tanielian et al., 2014). These stressors may contribute to or exacerbate mental health issues among military spouses, particularly depression (Eaton et al., 2008; Mansfield et al., 2010; O'Toole et al., 2010). Major depressive disorder (MDD) is one of the most burdensome disorders both in the general population worldwide and among service members

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and their spouses. Previous findings indicate that between 6% and 12% of U.S. military spouses screen positive for MDD, which is slightly higher than the rate found in the general U.S. population (Eaton et al., 2008; Hasin et al., 2005; Steenkamp et al., 2018). Not only does MDD impact the quality of life and functioning of the military spouse, but there is also strong evidence that the mental health of parents—notably with regard to depression—impacts the mental and behavioral health of their children (Drummet et al., 2003; Gelfand & Teti, 1990; Weissman et al., 2006). Given the rate of MDD among military spouses and the impairment that can result from the disorder, it is critical to understand the specific factors that contribute to these elevated estimates and thus provide clinicians with the necessary evidence to tailor interventions that can reduce the risk of MDD in this population (e.g., Verdelli et al., 2011).

Previous research conducted in a nonclinical sample of service members and spouses has shown that spouses with prior military service, report unemployment, have lower educational attainment, and have four or more children are at an increased risk for probable MDD (Donoho et al., 2018). In addition, service member characteristics, mainly enlisted rank and probable diagnosis of posttraumatic stress disorder (PTSD), were also shown to increase the likelihood of MDD among their spouses (Donoho et al., 2018; O'Toole et al., 2010). Per the fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders Fifth Edition (DSM-5)*; American Psychiatric Association [APA], 2013), the current diagnostic criteria for PTSD, a psychiatric disorder that may occur following a traumatic event, consists of intrusion, avoidance, negative alterations in cognition and mood (NACM), and arousal symptom clusters. Not only is PTSD one of the most common psychiatric disorders in service members (Hoge et al., 2004; Kok et al., 2012), it has also been shown to have larger associations with spousal distress, including depression, in military as compared to civilian samples (Lambert et al., 2012). The way in which PTSD in service members and veterans may affect the spouse's depression is not clearly understood. This is important given that couples with a depressed spouse show a higher frequency of negative verbal and nonverbal behaviors and less positive verbal behavior than couples without a depressed spouse (Ruscher & Gotlib, 1988), implying a potential bidirectional relation between PTSD in one spouse and depression in the other.

Theoretical models with supporting evidence offer various ways to explain how PTSD symptoms in one partner can affect the mental health and distress of the other. For example, the couple adaptation to traumatic stress (CATS) model (Nelson et al., 2005) offers a systemic perspective and posits that the way couples adapt to traumatic stress relies on predisposing factors and the individual functioning of each partner as well as how the couple functions as a unit. The CATS model is bidirectional such that not only can a partner's PTSD symptoms affect the other partner, but one partner's own symptoms and level of functioning can exacerbate the other partner's PTSD symptoms. Another model, the cognitive-behavioral interpersonal model (Monson et al., 2010), proposes that there are common

behavioral and cognitive mechanisms that impact both PTSD symptoms and relationship functioning. Behaviorally, when trauma-related reminders and emotional intimacy are avoided, mutually reinforcing activities occur less, which, in turn, perpetuates PTSD symptoms and diminishes marital satisfaction. Cognitively, PTSD may lead to a perception that others and the environment are more threatening, resulting in disruptions in safety and trust that can interfere with a couple's functioning (Dekel & Monson, 2010). These models highlight the dynamic nature of PTSD in relationships and how symptoms in one partner can affect those in the other.

In addition, PTSD may affect spousal mental health through specific symptom clusters of the disorder. Of the symptom clusters in the fourth edition text revision of the *DSM* (i.e., *DSM-IV-TR*; APA, 2000) that correspond to the four-factor model of PTSD (i.e., reexperiencing, effortful avoidance, emotional numbing, and hyperarousal) presented by King and colleagues (1998) and commonly used in couple and family research, the cluster most often associated with marital distress is emotional numbing, which has been shown among veterans (Campbell & Renshaw, 2013; Cook et al., 2004; Lunney & Schnurr, 2007; Renshaw & Campbell, 2011; Taft et al., 2008) and their spouses (Evans et al., 2003; Riggs et al., 1998). Emotional numbing has also been related to problems related to sexual functioning problems (Nunnink et al., 2010). Several authors have posited that emotional numbing may result in reduced intimate disclosure and communication, thus contributing to relationship distress (Allen et al. 2010; Gerlock et al., 2014; Renshaw & Campbell, 2011).

In addition to emotional numbing, the effortful avoidance symptom cluster may also affect spousal mental health and functioning. Effortful avoidance by a partner with PTSD may lead their spouses to decrease engagement in meaningful and important activities, such as attending children's school programs or social events with family and friends, due to accommodation of their partner's symptoms (Fredman et al., 2014). Furthermore, effortful avoidance could result in fewer mutually reinforcing activities for the couple (Dekel & Monson, 2010), such as going to restaurants, concerts, or sporting events, which could result in not only relationship distress but potentially also depression in the partner.

Although emotional numbing symptoms of PTSD among veterans have shown to be associated with both perceived relationship quality and psychological distress in intimate partners (Lambert et al., 2012) and the effortful avoidance symptoms could be theorized to be related, it is unclear whether these findings generalize to predict new-onset depression in military spouses. Based on the existing theory and literature, we hypothesized that the presence and severity of symptoms in the emotional numbing and effortful avoidance symptom clusters in service members with PTSD would be predictive of new-onset depression in their spouses. This study extends prior research (Donoho et al., 2018) by longitudinally examining the specific PTSD symptom clusters in service members and veterans that predict the development of depression among

military spouses, using data from the Millennium Cohort Family Study, the largest longitudinal study of service members and their families to date. More specifically, we explored whether PTSD symptom clusters as measured at baseline in service members with evidence of PTSD predicted new-onset depression among spouses, assessed at a follow-up time point approximately three years later. Data from the Millennium Cohort Family Study are uniquely suited to address this research question as this nonclinical cohort includes service members from all military branches, both female and male spouses, and dual military couples (i.e., both members of the couple serve in the U.S. military). The current study addressed limitations and gaps of prior research, such as the use of primarily cross-sectional data and a lack of data from male spouses of service members (see Renshaw et al., 2014, for an exception). To our knowledge, this was the first study to prospectively examine the dyadic association between the presence and severity of PTSD symptom clusters in service members and their partner's new-onset depression. As PTSD is one of the most common psychiatric disorders among service members, it is critically important to understand the broader effects of this disorder, especially the impact on military spouses, to prevent stress and psychological health problems before they impair functioning or become chronic problems.

Method

Participants and Procedure

The Millennium Cohort Family Study, hereafter referred to as the "Family Study," was designed to evaluate the impact of military experiences on families' health and well-being (Corry et al., 2017; Crum-Cianflone et al., 2014). The Family Study consists of nonclinical military couple dyads ($n = 9,872$), with data from the military spouse linked to that of the service member. Service members were participants in the fourth enrollment cycle (2011–2013) of the larger Millennium Cohort Study, which began in 2001 and aims to assess the long-term effects of military life on service members' health (Gray et al., 2002). In 2011, personnel with 2–5 years of military service were randomly sampled and invited to participate in the Millennium Cohort Study. Spouses of married service members who enrolled at this time were given the opportunity to participate in the Family Study. After giving informed consent, both individuals in the dyad completed separate surveys at baseline (i.e., 2011–2013) and then again approximately 3–5 years later (i.e., 2014–2016). Herein, the partner who completed the Millennium Cohort Study is referred to as the "service member," and the spouse who completed the Family Study survey is referred to as the "spouse participant." The methodologies of the Family and Millennium Cohort Study are described in-depth elsewhere (Corry et al., 2017; McMaster et al., 2017, 2018; Ryan et al., 2007). All study procedures were reviewed and approved by the institutional review board at the Naval Health Research Center.

The eligible sample for the present study was drawn from enrolled dyads in which the spouse participant completed the

questionnaire at follow-up ($n = 5,835$), irrespective of change in marital status (i.e., separated or divorced). As PTSD clusters are typically assessed and meaningfully interpreted among individuals with the disorder, the study population was restricted to dyads in which the service member had evidence of PTSD during the study period ($n = 910$). Specifically, this inclusion criteria required that service members met one or more of the following criteria: (a) had probable PTSD based on the *DSM-IV-TR* criteria (i.e., a rating of "moderately" or higher for at least one intrusion item, two hyperarousal items, and three avoidance items) on the PTSD Checklist–Civilian Version (PCL-C; Weathers et al., 1994) at baseline or follow-up, (b) self-reported diagnosis of PTSD within the last 3 years at follow-up, or (c) reported seeking care for PTSD within the last 12 months at follow-up. To examine the chronological precedence of service members' cluster-related PTSD symptom endorsement in relation to the development of depression in spouse participants, spouses who had a history of depression at baseline ($n = 298$) or became widowed between baseline and follow-up ($n = 1$) were ineligible. Specifically, to establish a temporal order, spouses were excluded if they had a probable diagnosis of MDD based on the eight-item Patient Health Questionnaire (PHQ-8; Kroenke et al., 2009), self-reported a depression diagnosis, or were missing data from these items at baseline. Finally, of the eligible Family dyads ($n = 610$), those missing exposure (PTSD symptom clusters, $n = 8$), outcome (new-onset depression, $n = 7$), or covariate data ($n = 32$) were excluded from the study; this resulted in a final study sample of 563 couples, which represents 92.2% of the eligible sample.

Among the 563 dyads, spouse participants were primarily female (89.3%) and non-Hispanic White (77.3%; Table 1). The largest proportion of the spouse participants was 25–30 years of age (45.5%) and had at least one child (65.0%). Of the 563 spouses, 5.5% met the criteria for probable PTSD at baseline and 15.0% served in the military. With regard to service member characteristics, they were mostly enlisted (86.2%), active duty personnel (76.2%), and were members of the Army (64.5%). Of the service members, 18.7% reported problem drinking and 20.8% met criteria for probable MDD at baseline. The median time between the baseline survey (i.e., service member) and follow-up (i.e., spouse) was 1,149 days (i.e., 3.1 years).

Measures

New-Onset Depression

The outcome variable was new-onset depression in spouses, which included individuals who met the criteria for probable MDD using the PHQ-8 (Kroenke et al., 2009) or who self-reported a provider-given depression diagnosis at follow-up. The PHQ-8 comprises eight items related to depression symptoms over the past two weeks. Individuals rate items using a scale of 0 (*not at all*) to 3 (*nearly every day*). Participants were considered to have probable MDD if they endorsed at least five of the eight PHQ items with a rating of 2 (*more than half the*

Table 1
Baseline Characteristics of Family Study Dyads, by New-Onset Depression Status of Spouses

Variable	Study Sample	No new-onset depression		New-onset depression	
	<i>N</i> = 563	<i>n</i> = 482		<i>n</i> = 81	
	<i>N</i>	Unweighted %	Weighted ^a %	Unweighted %	Weighted ^a %
Covariates					
Spouse participant characteristics					
Sex					
Male	60	90.00	81.30	10.00	18.70
Female	503	85.09	85.56	14.91	14.44
Age (years)					
19–24	131	82.44	85.83	17.56	14.17
25–30	256	87.11	88.65	12.89	11.35
>30	176	85.80	77.32	14.20	22.68
Race/ethnicity					
White, non-Hispanic	435	85.52	86.13	14.48	13.87
Hispanic	59	91.53	91.03	8.47	8.97
Other	69	81.16	76.32	18.84	23.68
Number of children					
0	197	87.31	91.47	12.69	8.53
1	160	91.25	90.55	8.75	9.45
≥2	206	79.61	74.94	20.39	25.06
Military status					
No service	479	84.97	85.44	15.03	14.56
Dual military	43	90.70	74.46	9.30	25.54
Military veteran	41	87.80	92.22	12.20	7.78
Service member characteristics					
Rank					
Enlisted	485	84.33	84.69	15.67	15.31
Officer	78	93.59	95.40	6.41	4.60
Service component					
Active Duty	429	84.62	83.70	15.38	16.30
Reserve/National Guard	134	88.81	91.20	11.19	8.80
Service branch					
Army	363	83.75	81.24	16.25	18.76
Navy/Coast Guard	70	87.14	90.22	12.86	9.78
Marines	69	91.30	93.62	8.70	6.38
Air Force	61	88.52	88.63	11.48	11.37
Mental health factors					
Spouse participant probable PTSD^a					
No	532	86.65	85.50	13.35	14.50
Yes	31	67.74	78.43	32.26	21.57
Service member problem drinking^b					
No	458	86.90	86.83	13.10	13.17
Yes	105	80.00	78.22	20.00	21.78

(Continued)

Table 1
Continued

Variable	Study Sample	No new-onset depression		New-onset depression	
	<i>N</i> = 563	<i>n</i> = 482		<i>n</i> = 81	
	<i>N</i>	Unweighted %	Weighted ^a %	Unweighted %	Weighted ^a %
Service member probable MDD ^c					
No	446	86.32	85.98	13.68	14.02
Yes	117	82.91	82.34	17.09	17.66

Note. PTSD = posttraumatic stress disorder; MDD = major depressive disorder; PHQ = Patient Health Questionnaire.

^a*p* < .05 for weighted %. ^bPTSD designation based on screening positive (i.e., rating of “moderate” or more for at least one intrusion symptom, three avoidance symptoms, and two hyperarousal symptoms) on the PTSD Checklist–Civilian Version at baseline. ^cBased on the endorsement of one or more alcohol-related Patient Health Questionnaire (PHQ-8) items. ^dDefined as a rating of “more than half the days” or “nearly every day” on at least five of the eight items, with one of the symptoms being depressed mood or anhedonia (based on the PHQ-8) at baseline.

days) or higher, with one of these symptoms being depressed mood or anhedonia. In the present sample, the Cronbach’s alpha value was .90.

Self-reported depression diagnosis was based on the positive endorsement of “depression” to the item, “In the last 3 years, has your doctor or other health professional told you that you have any of the following conditions?” Spouse participants with incident depression may have received mental health care and/or medication between baseline and follow-up that may have improved their symptoms. To capture individuals who had incident depression but not recent symptoms, participants who self-reported a depression diagnosis at follow-up were included in the outcome. Participants who endorsed probable MDD and/or reported a depression diagnosis at follow-up but not at baseline were categorized as having new-onset depression.

PTSD Symptom Clusters

The predictor variables consisted of the PTSD symptom clusters and were assessed at baseline. Service members’ baseline responses to the 17 items on the PCL-C were categorized into four PTSD symptom clusters (reexperiencing, effortful avoidance, emotional numbing, and hyperarousal) that correspond to the four-factor model presented by King and colleagues (1998). This four-factor model is used as a proxy for the DSM-5 PTSD criteria, with the understanding that it is not a perfect representation and does not fully account for the NACM cluster or the additional hyperarousal symptom. Figure 1 displays the specific items, with responses ranging from 1 (*not at all*) to 5 (*extremely*), that make up each of these symptom clusters. Mean baseline PTSD symptom cluster scores were calculated for each of the four clusters by summing the score for each item in the cluster and then dividing by the number of items in the cluster, allowing for comparability between clusters. In the current sample, the Cronbach’s alpha value was .96.

Covariates

Covariates based on factors identified by prior research as being associated with depression were included (Donoho et al.,

2018; O’Toole et al., 2010). As the time between surveys varied, we included a variable to account for the time between the baseline and follow-up surveys. Spouse participant demographic characteristics included self-reported sex, age, race/ethnicity, and the number of children at baseline. Spouses self-reported whether they were currently serving in the military (i.e., dual military), had ever served (i.e., veteran), or never served (i.e., civilian). Service member military characteristics included service component, service branch, and rank, which were obtained from the electronic personnel files of the Defense Manpower Data Center at the time of enrollment.

Mental Health Factors

Probable spouse participant PTSD was based on the DSM-IV-TR criteria (i.e., endorsement with a rating of “moderately” or higher of one intrusion item, two hyperarousal items, and three avoidance items) on the PCL-C (Weathers et al., 1994) at baseline. In the present sample, the Cronbach’s alpha value for the PCL-C was .90. Alcohol-related problems among service members were defined as an endorsement of one or more alcohol-related items on the PHQ alcohol (Kroenke et al., 2009) at baseline. In the present sample, the Cronbach’s alpha value for the alcohol items was .60. Probable service member MDD was determined by at least five of the eight PHQ items with a rating of 2 (*more than half the days*) or higher, with one of these symptoms being depressed mood or anhedonia. Among service members in the present sample, the Cronbach’s alpha value for the PHQ was .91.

Data Analysis

All analyses were weighted to account for sample design and nonresponse at baseline and follow-up (Corry et al., 2017). In particular, spouse participants who were no longer married were less likely to respond at follow-up; thus, the sample weights account for differential attrition by giving greater weight to those who reported being separated or divorced and did participate at follow-up (Abt Associates, 2017). The

weights allow the results to generalize to the population of married spouses of service members with 2–5 years of military experience as of 2011. Descriptive statistics were used to compare characteristics of new-onset depression in military spouses. Chi-square statistics were used to evaluate associations between each independent variable and new-onset spousal depression. Unweighted and weighted means were calculated for each of the PTSD symptom clusters by spouses' new-onset depression status. To estimate the unadjusted and adjusted odds ratios (*OR*) between the independent variables and new-onset depression, we conducted logistic regression analyses. The multivariable logistic model included all variables (i.e., covariates, PTSD symptom clusters, and mental health factors), regardless of significance.

To better understand any differences that may exist between individuals who self-reported a new-onset depression diagnosis compared to those who screened positive for new-onset depression, using *DSM-IV* criteria applied to the PHQ-8, we conducted two additional analyses. Using the same techniques as previously described, the first analysis assessed the new-onset depression outcome as spouse participants who self-reported a professional depression diagnosis, whereas the second analysis restricted the new-onset depression outcome to those with a positive screen based on PHQ-8 score in relation to *DSM-IV* criteria. Multicollinearity was assessed using variance inflation factors (*VIF*), with a *VIF* greater than 4 indicating collinearity between covariates; no covariates were above this threshold. As total missingness across variables was less than 8.0%, listwise deletion was applied to all analyses. All analyses were

performed using SAS (Version 9.4; SAS Institute Inc.; Cary, North Carolina).

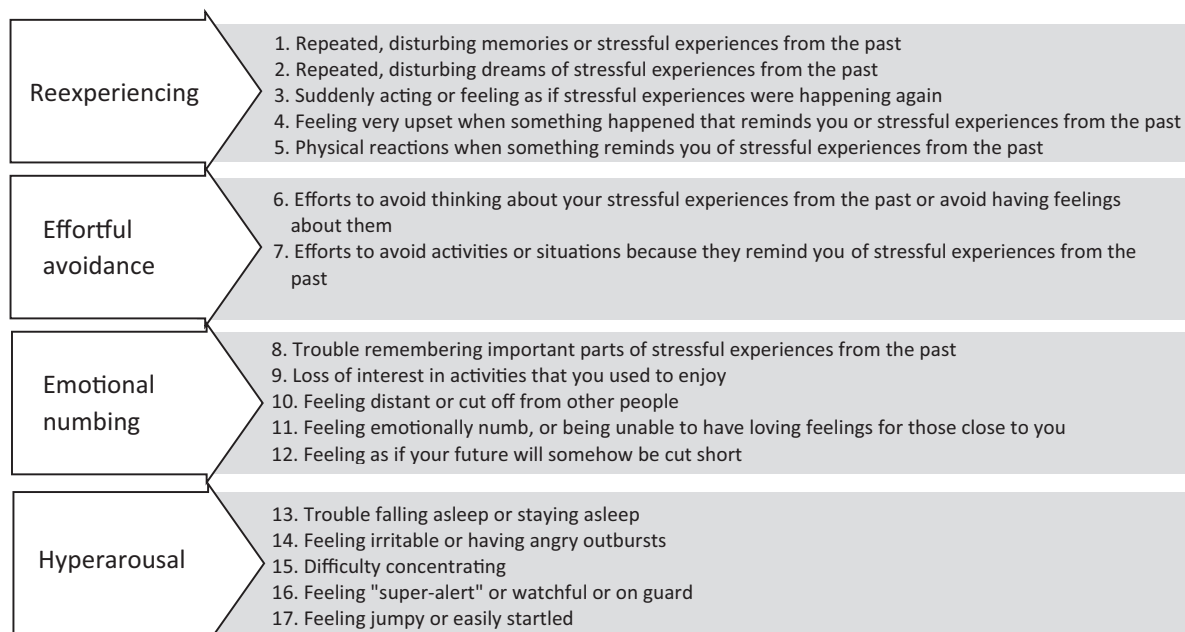
Results

Between baseline and follow-up, 14.4% of the spouse participants developed new-onset depression (Table 1). New-onset depression was the highest among spouses with the following characteristics or factors: over 30 years of age, races/ethnicities other than White non-Hispanic and Hispanic, two or more children, or dual-military household (Table 1). The rate of new-onset depression was highest among spouse participants married to service members who were serving in the Army or screened positive for problem drinking.

Table 2 displays service members' baseline unweighted and weighted mean PTSD symptom cluster scores, stratified by spousal depression status at follow-up. For each symptom cluster, mean scores were higher for individuals with spouses who developed new-onset depression. Weighted results revealed slightly higher mean scores compared with the unweighted results. The weighted PTSD cluster mean scores for reexperiencing, $p = .327$; emotional numbing, $p = .098$; and hyperarousal, $p = .056$, were closer in value and not significantly different between the depression groups. The effortful avoidance cluster exhibited the largest difference and was significantly higher among individuals with new-onset depression, $p < .001$.

In the weighted multivariable models (see Table 3), increased symptoms of effortful avoidance in the service member, adjusted odds ratio (*aOR*) for 1-point mean increase = 1.61, 95%

Figure 1
Posttraumatic Stress Disorder Checklist Items in Each *DSM-IV* Symptom Cluster



Note. *DSM-IV* = Diagnostic and Statistical Manual of Mental Disorders (4th ed.).

Table 2

Baseline Service Member Posttraumatic Stress Disorder (PTSD) Symptom Cluster Scores, by New-Onset Depression Status in Spouses

PTSD symptom cluster	No new-onset depression				New-onset depression			
	<i>n</i> = 482				<i>n</i> = 81			
	Unweighted <i>M</i>	<i>SD</i>	Weighted <i>M</i>	<i>SD</i>	Unweighted <i>M</i>	<i>SD</i>	Weighted <i>M</i> ^a	<i>SD</i>
Reexperiencing	2.27	1.14	2.42	1.18	2.37	1.18	2.55	1.14
Emotional numbing	2.23	1.14	2.34	1.14	2.41	1.13	2.57	1.10
Effortful avoidance	2.17	1.27	2.29	1.34	2.51	1.50	2.83	1.48
Hyperarousal	2.63	1.16	2.80	1.18	2.89	1.22	3.06	1.12

Note. ^aUsing *t* tests to examine differences in the weighted means, only the effortful avoidance cluster was significantly different between the depression groups, *p* < .001.

CI [1.03, 2.50], *p* = .036, predicted an increased risk for new-onset depression among spouses, whereas reexperiencing was marginally protective, *aOR* = 0.57, 95% CI [0.32, 1.01], *p* = .053; likelihood ratio test, *F*(22, 541) = 3.57, *p* < .001. The other two clusters—emotional numbing and hyperarousal—were not significantly associated with new-onset depression. Additional unadjusted and adjusted weighted model results are presented in Table 3. In the adjusted models, spouse participants with two or more children were more likely to develop new-onset depression than spouse participants without any children, *aOR* = 3.82, 95% CI [1.75, 8.34], *p* < .001. Regarding military-related characteristics, spouse participants married to Reserve/National Guard members were less likely to develop new-onset depression, *aOR* = 0.40, 95% CI [0.17, 0.91], *p* = .028, compared to those married to active duty members. In contrast, spouse participants married to enlisted service members were marginally more likely to develop depression compared to those married to officers, *aOR* = 3.06, 95% CI [0.96, 9.77], *p* = .059. For the two additional models that were conducted using differing definitions of new-onset depression, the results were consistent with the main model, but, as expected, the estimates were less precise: reexperiencing, *OR* = 0.57, 95% CI [0.27, 1.19], and effortful avoidance, *OR* = 1.89, 95% CI [1.09, 3.30] for PHQ-8 scoring only; reexperiencing *OR* = 0.73, 95% CI [0.41, 1.30], and effortful avoidance *OR* = 1.41, 95% CI [0.89, 2.23], for self-reported depression diagnosis only.

Discussion

Using a sample limited to couples in which the service member spouse had evidence of PTSD, this study longitudinally examined which specific baseline PTSD symptom clusters reported by service member predicted new-onset cases of depression among military spouses. During the study period of 3–5 years, 14.4% of spouse participants screened positive for new-onset depression. The risk of depression in these spouses was associated with having two or more children, military rank, and service component. Specifically, spouse participants who

had two or more children or were married to an enlisted service member were more than 3 times as likely to experience new-onset depression as those with no children or those married to officers, and spouse participants married to Reservists and National Guardsmen were less than half as likely to develop new-onset depression compared to those married to active duty personnel. These findings are consistent with a recent Family Study cross-sectional analysis that indicated a larger family size was associated with a higher risk of MDD (Donoho et al., 2018). Increased responsibility associated with caring for multiple children may reduce the time for self-care and perhaps lead to the development of depression. Reserve/National Guard personnel typically have more geographic stability than active duty service members; thus, these spouses may experience fewer disruptions in their social networks and have fewer military-related stressors compared to spouses of active duty personnel. Service rank may serve as a proxy for socioeconomic status such that enlisted service members typically have a lower household income and less autonomy compared to officers.

A major contribution of this study was its examination of how specific PTSD symptom clusters in service members were prospectively associated with new-onset depression in military spouses. Although research has often demonstrated an association between the emotional numbing symptom cluster and relationship difficulties (see Campbell & Renshaw, 2018, for an extensive review), our results did not reveal that this cluster predicted new-onset depression in spouse participants. It may be that the emotional numbing symptom cluster directly impacts couple relationship functioning rather than predicting new-onset depression in military spouses. It is also possible that the emotional numbing cluster affects new-onset depression indirectly through relationship difficulties, but it was not possible to evaluate these pathways with the data collected.

Instead, our findings show that increased symptoms of effortful avoidance in the service member participant predicted an increased risk the spouse participant would develop depression over the study period, whereas reexperiencing symptoms were associated with a marginally decreased risk. These results support the CATS model (Nelson et al., 2005) by demonstrating

Table 3
 Weighted Unadjusted and Adjusted Odds Ratios for Predictors of New-Onset Depression Among Spouses

Variable	OR	95% CI	Adjusted OR ^a	95% CI
PTSD symptom cluster				
Reexperiencing	1.10	[0.86, 1.42]	0.57	[0.32, 1.01]
Emotional numbing	1.18	[0.91, 1.54]	0.87	[0.55, 1.38]
Effortful avoidance	1.32	[1.05, 1.65]*	1.61	[1.03, 2.50]*
Hyperarousal	1.21	[0.96, 1.54]	1.32	[0.77, 2.26]
Covariates				
Spouse characteristics				
Sex				
Male	1.00		1.00	
Female	0.73	[0.21, 2.55]	0.97	[0.34, 2.76]
Age (years)				
19–24	1.29	[0.62, 2.69]	1.84	[0.81, 4.20]
25–30	1.00		1.00	
>30	2.29	[1.04, 5.07]*	1.17	[0.52, 2.63]
Race/ethnicity				
White, non-Hispanic	1.00		1.00	
Hispanic	0.61	[0.20, 1.91]	0.49	[0.14, 1.68]
Other	1.93	[0.76, 4.87]	2.17	[0.89, 5.31]
Number of children				
0	1.00		1.00	
1	1.12	[0.48, 2.63]	1.10	[0.44, 2.80]
≥2	3.59	[1.80, 7.14]*	3.82	[1.75, 8.34]*
Military status				
No service	1.00		1.00	
Dual military	2.01	[0.54, 7.54]	1.09	[0.38, 3.10]
Military veteran	0.50	[0.16, 1.57]	0.45	[0.11, 1.86]
Service member characteristics				
Rank				
Enlisted	3.75	[1.38, 10.20]*	3.06	[0.96, 9.77]
Officer	1.00		1.00	
Service component				
Active duty	1.00		1.00	
Reserve/National Guard	0.50	[0.24, 1.02]	0.40	[0.17, 0.91]*
Guard				
Service branch				
Army	1.80	[0.64, 5.09]	1.19	[0.35, 4.02]
Navy/Coast Guard	0.85	[0.24, 2.92]	0.82	[0.19, 3.54]
Marines	0.53	[0.13, 2.22]	0.33	[0.06, 1.81]
Air Force	1.00		1.00	
Mental health factors				
Spouse probable PTSD ^b				
No	1.00		1.00	
Yes	1.62	[0.58, 4.52]	1.93	[0.53, 6.95]
Service member problem drinking ^c				
No	1.00		1.00	
Yes	1.84	[0.84, 4.03]	1.64	[0.76, 3.54]

(Continued)

Table 3
Continued

Variable	OR	95% CI	Adjusted OR ^a	95% CI
Spouse probable MDD ^d				
No	1.00		1.00	
Yes	1.32	[0.62, 2.80]	0.96	[0.41, 2.24]

Note. *N* = 563. PTSD = posttraumatic stress disorder; MDD = major depressive disorder.

^aAdjusted for all variables given in the table as well as the time between baseline and follow-up surveys. Likelihood ratio test: $F(22, 541) = 3.57, p < .001$. ^bPTSD designation based on screening positive (i.e., rating of “moderate” or more for least one intrusion symptom, three avoidance symptoms, and two hyperarousal symptoms) on the PTSD Checklist–Civilian Version at baseline. ^cBased on the endorsement of one or more alcohol-related Patient Health Questionnaire (PHQ-8) items. ^dDefined as a rating of “more than half the days” or “nearly every day” on at least five of the eight items, with one of the symptoms being depressed mood or anhedonia (based on the PHQ-8) at baseline.

* $p < .05$.

the systemic influence of one partner’s symptoms (i.e., specific PTSD symptom clusters) on spousal symptoms (i.e., new-onset depression). Effortful avoidance symptoms in service members with PTSD may lead to difficulties with daily activities, such as running errands in crowded locations, attending social events with family or friends, or leaving conversations when trauma-related information is mentioned, which may, in turn, contribute to new-onset depression in their spouses. Furthermore, consistent with the cognitive behavioral interpersonal model (Monson et al., 2010), less engagement in mutually reinforcing couple activities as a consequence of effortful avoidance can lead not only to relationship distress but also to new-onset depression in the spouse. Avoidance may also be experienced by the spouse participant as the service member may be less willing to share emotional experiences and discuss vulnerable feelings, which could lead to a limited understanding of the service member’s behavior. In a recent longitudinal study of married couples, the findings demonstrated that the wives of men with higher average levels of effortful avoidance symptoms reported lower levels of satisfaction and bonding, whereas the men reported less frequent conflict behavior (Allen et al., 2018). Shared communication with service members about PTSD symptoms may be a positive experience for spouses (Dekel et al., 2005) and possibly protect against depression in individuals married to a service member with PTSD. In addition, behavioral avoidance could not only impact the personal relationship but also impair daily functioning in spouses through accommodating their partner’s symptoms; for example, spouses may not attend social functions, not go to public places or events, or avoid sensitive topics (Fredman et al., 2014), which could increase their risk of developing depression over time.

Somewhat surprisingly, increased reexperiencing symptoms in service members with probable PTSD led to a marginally reduced risk their spouses would develop depression during the study period. Reexperiencing symptoms may typify PTSD and the experience of trauma in a way that may have a different meaning for spouses (e.g., Hooley et al., 1987; Renshaw & Caska, 2012; Renshaw et al., 2014). The other three symptom

clusters—emotional numbing, hyperarousal, and avoidance—may not be clearly identified by the spouse as quintessential PTSD symptoms. Therefore, spouses married to service members who display some of these other symptoms with the absence of reexperiencing symptoms may be more likely to internalize these negative attributions, which may lead to depression. However, these same behaviors in service members who are reexperiencing a traumatic event may more easily be attributed to PTSD and, thus, may be less internalized by spouses. This finding not only supports research indicating that trauma-specific symptoms, such as reexperiencing, account for less variance in relationship impairments than nonspecific PTSD symptoms, such as depression and anger (Campbell & Renshaw, 2018) but further extends the evidence by showing that such symptoms reduce the risk for the development of depression among spouses.

The present results should be interpreted in light of several limitations. Both PTSD and depression were determined by the use of validated, self-report questionnaires and not gold-standard diagnostic interviews. In addition, although the diagnostic criteria for MDD remained constant from *DSM-IV* to *DSM-5*, several criteria for PTSD changed; the present study used *DSM-IV* criteria as data were collected during the respective time period, so results should be replicated using *DSM-5* criteria. We attempted to address this limitation within the parameters by using the four-factor model of PTSD symptom criteria in the *DSM-IV*. There are also some important factors, such as relationship satisfaction and spousal perception of the service member’s PTSD symptoms, that we did not assess, but it would be vital for further understanding the intricate nature among these factors. Study analyses explored how PTSD symptom clusters in service members affect the development of depression in their spouses, but further exploration of the interdependence of this association, using approaches such as the actor–partner interdependence model, is an important avenue for future research. Finally, the sample consisted of only heterosexual, married couples, and the results should be replicated in samples that better reflect couple diversity. It is important to note that data about treatment use were not collected, so it is

unclear how the receipt of care or specific types of care affected new-onset depression.

The present study also offers notable strengths, including a large sample of dyads comprising service members from all military service branches and components, both female and male spouses, and dual-military couples, all of which have been seldom represented in prior samples. Although the PCL-C and PHQ-8 are self-report questionnaires, they assess symptom criteria consistent with the *DSM*, allowing for the determination of probable diagnosis. Furthermore, the study was longitudinal, covering a span of 3–5 years. The longitudinal nature made it possible to evaluate new-onset depression in spouse participants and establish the chronological precedence of service members' symptoms, supporting the likelihood of a causal association. Finally, this study examined the influence of symptom clusters of a disorder common in service members (i.e., PTSD) on a disorder of elevated concern among military spouses (i.e., depression).

In this sample of female and male spouses married to service members with evidence of PTSD, a sizeable minority (14.4%) developed new-onset depression over the course of the study. Of note, effortful avoidance symptoms in service members increased the risk of new-onset depression in spouses, whereas reexperiencing symptoms decreased the risk of depression. These findings suggest that communication about the service member's symptoms may play an important role in spousal depression in that the reexperiencing symptoms may be a more apparent set of symptoms attributed to the trauma exposure compared to more nonspecific avoidance symptoms, although more research is needed to verify this mediating mechanism. Furthermore, the results echo prior recommendations (Campbell & Renshaw, 2018; Monson et al., 2012) that treatment should not exclusively focus on the typified symptoms of PTSD but rather also address the less overt and nonspecific symptoms. Conjoint trauma-focused treatments, such as cognitive behavioral conjoint therapy (CBCT; Monson & Fredman, 2012) may be well suited to address this link between effortful avoidance and spousal depression, as not only is the trauma experience addressed in a conjoint setting but, in addition, sessions directly target communication skills and how to approach thoughts, places, and situations that have been avoided. A critical endeavor for future research is to evaluate whether treating PTSD in service members, either individually or conjointly, reduces the risk of depression and other mental health sequelae in their spouses.

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