

MARGARET TANKARD, ANDREW R. MORRAL, TERRY L. SCHELL

# Symptoms of Depression and Posttraumatic Stress Disorder as Predictors of Separation from the U.S. Military

**P**opulations affected by psychological distress are at risk of adverse career outcomes. Depression has been associated with work absenteeism, reduced productivity, and unemployment, although the magnitude of these effects is unclear (Lerner and Henke, 2008). In this report, we clarify the association between symptoms of depression and posttraumatic stress disorder (PTSD) and subsequent workforce separation through a large-scale prospective study that uses self-reported symptoms rather than medical records, which cannot typically be used to evaluate subclinical mental health symptoms. We contribute new insights to the literature (Hoge, Auchterlonie, and Milliken, 2006; Hoge et al., 2002; Schmied et al., 2013; Schmied,

Highfill-McRoy, and Larson, 2012; Vasterling et al., 2015; Wright et al., 2012) by using mental-health measures that evaluate psychological distress on a continuum rather than as merely present or absent, by controlling for a more complete set of characteristics that may be correlated with career outcomes, and by focusing on a large, representative sample of active-component members serving in the U.S. Army, Navy, Air Force, and Marine Corps.

## KEY FINDINGS

- Twenty-eight months after baseline, 16.5 percent of active-component members had separated from the military.
- Symptoms suggestive of mental-health disorders more than doubled service members' odds of separating from the military over the 28-month observation period.
- Service members with symptoms suggestive of clinical depression were more likely to separate (22.5 percent) than service members with no symptoms were (12.3 percent).
- Service members with symptoms suggestive of clinical PTSD were also more likely to separate (23.1 percent) than service members with no symptoms were (14.2 percent).

## Abbreviations

AOR	adjusted odds ratio
CI	confidence interval
DMDC	Defense Manpower Data Center
PC-PTSD-5	Primary Care PTSD Screen for DSM-5
PHQ-8	Patient Health Questionnaire (for symptoms of depression)
PTSD	posttraumatic stress disorder
RMWS	RAND Military Workplace Study

## Methods

### Data and Sample

Data used for these analyses include administrative personnel records collected by the Defense Manpower Data Center (DMDC) and survey data collected as part of the 2014 RAND Military Workplace Study (RMWS), which was approved by RAND's institutional review board.

*Administrative Records.* In April 2014, we constructed a sample frame for the RMWS consisting of all 1,317,561 individuals then serving in the active component who were below flag or general officer rank. Subsequently, DMDC provided linked data indicating which of the original sample frame members remained in the active component 28 months later (August 2016).

*RMWS Survey Responses.* RMWS used a representative sample of 477,513 active-component members, including a census of all women and a 25 percent probability sample of men. A 30.4-percent response rate resulted in 145,300 completed confidential surveys, of which 17,502 had been randomized to include the psychological distress scales examined in this report. Our primary results examine the separation status of the 16,199 respondents with valid PTSD scale scores and the 16,173 respondents with valid depression scale scores, using the survey design of the broader RMWS (Morral, Gore, and Schell, 2014, 2015, and 2016) and sampling weights developed to represent the full active-component population that has been described extensively elsewhere (Morral, Gore, and Schell, 2016).

## Measures

*Personnel Characteristics.* Our models of separation from the military used 21 personnel characteristics maintained in DMDC's administrative database: gender, age, ethnic identification, race, education, marital status, number of dependents, service branch, pay grade or rank, occupational group, Armed Forces Qualification Test score, military accession program, date active-component service began, end date for current service term, lifetime months of active-duty service, past-year months deployed, total months deployed, duty unit location, time in current pay-grade (z-score normalized against others in the same pay grade), time in previous pay grade (z-score), and strength accounting code.

*Symptoms of PTSD and Depression.* The RMWS measured PTSD symptoms using the five-item Primary Care PTSD Screen for DSM-5 (PC-PTSD-5; Prins et al., 2016) and depression symptoms using the eight-item Patient Health Questionnaire (PHQ-8; Kroenke et al., 2009). Both are widely used measures with excellent and established construct validities (Prins et al., 2016; Kroenke et al., 2009).

*Separation.* We defined separation from the military as ending service in the active component without immediately joining the reserve component at any time during the 28-month period between April 2014 and August 2016.

## Analytic Approach

We used a two-stage modeling approach to estimate the effect of psychological symptoms on separation, after accounting for potentially correlated separation risk factors.

*First-Stage Model.* We modeled separation in the full sample frame of 1,317,561 active-component members using generalized boosted regression (the "gbm" package for the R statistical programming language) with five-fold cross-validation. The model used the 21 personnel characteristics described previously as predictors.

*Second-Stage Models.* We tested whether and by how much psychological distress scales explained separation beyond what could be explained with the first-stage model, using just the sample of RMWS

respondents with PTSD and depression scores. Specifically, we used SAS SURVEYLOGISTIC to perform a survey-weighted logistic regression of separation status on psychological distress scales, using the predicted separation risk from the first-stage model as an offset, and included service, gender, age, pay grade, end date for current service term, and lifetime months of active-duty service as covariates. Subsequent models included interactions to test whether the association between distress and separation varied by gender (main effect and interaction term included in model) or by racial/ethnic group (main effect and interaction term included simultaneously for each of seven independent, dichotomous categories: American Indian or Alaska Native, Asian, Native Hawaiian or other Pacific Islander, Black or African American, Hispanic, White, or other).

## Results

Twenty-eight months after baseline, 16.5 percent of active-component members (217,410 out of 1,317,561) had separated from the military. The first-stage model fit the data well. Each individual received a probability of separation between 0 and 1. Those who left the military had, on average, a predicted separation probability of 0.39, while those who did not leave had a predicted probability of 0.12. This corresponds to an in-sample pseudo- $R^2$  of 0.27. More than half of the explained deviance reduction in the model was

The second-stage models for each subsample of depression and PTSD scores showed large and significant associations between symptoms and separation status 28 months later.

attributable to months of active-duty service, end date of current term, and age.

The second-stage models for each subsample of depression and PTSD scores improved the model fit and showed large and significant associations between symptoms as a continuous variable and separation status 28 months later (see Table 1). These models provide the odds ratio of separation as a

TABLE 1  
Depression and PTSD Symptom Levels as Predictors of 28-Month Separation Status

	Depression (PHQ-8)	PTSD (PC-PTSD-5)
AOR: diagnostic cutoff vs. no symptoms	2.62 (2.12, 3.22)	2.14 (1.82, 2.51)
Predicted separation rate by symptom level		
No symptoms <sup>a</sup>	12.3%	14.2%
Diagnostic cutoff <sup>b</sup>	22.5%	23.1%
<i>N</i>	16,173	16,199

NOTE: AOR = adjusted odds ratio. The 95-percent confidence intervals (CIs) are provided in parentheses.

<sup>a</sup> Indicates a score of 0 on either scale.

<sup>b</sup> Indicates a score of 10 out of 24 on the PHQ-8 scale and a score of 3 out of 5 on the PC-PTSD-5 scale.

function of each additional point on each of these two symptom-severity scales. This scaling is arbitrary. To make these model coefficients more interpretable, we rescaled the underlying measures so that a score of zero (0) corresponds to no symptoms and one (1) corresponds to the standard diagnostic cutoff on each scale. Thus, our reported effect sizes represent the effect on separations for a ten-point shift on the PHQ-8 scale and a three-point shift on the PC-PTSD-5 scale.

Service members with symptoms suggestive of clinical depression (i.e., with a score of 10 on the PHQ-8 scale) were more likely to have separated (22.5 percent) than service members with no symptoms were (12.3 percent; adjusted odds ratio [AOR] = 2.62; 95-percent CI = 2.12, 3.22). Service members with symptoms suggestive of clinical PTSD (i.e., with a score of 3 on the PC-PTSD-5 scale) were also more likely to have separated (23.1 percent) than service members with no symptoms were (14.2 percent; AOR = 2.14; 95-percent CI = 1.82, 2.51). For both groups with PTSD and depression symptoms,

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Psychological distress, whether from depression or PTSD, is much more strongly associated with military separation status than all the other predictors of separation that we evaluated.

neither gender nor any of the racial/ethnic identities interacted significantly with symptoms to predict separation.

## Discussion

Among the active-component service members in our sample frame as of April 2014, both symptoms of depression and symptoms of PTSD consistent with clinical disorders among all U.S. military service members were significantly associated with separation from the military 28 months later, after controlling for extensive demographic information. Symptoms suggestive of mental-health disorders more than doubled individuals' odds of separating from the military over the 28-month period. Our models suggest that psychological distress, whether from depression or PTSD, is much more strongly associated with military separation status than all the other predictors of separation that we evaluated. We find no evidence, however, that the relationship between psychological distress and separation differs by gender or racial/ethnic group.

The large difference in separation rates for service members with clinical symptom levels compared with those with no reported symptoms highlights the importance of psychological distress. In the absence of symptoms of clinical depression, we would expect the overall observed separation rate of 16.5 percent to be lower by 4.2 percentage points, corresponding to 55,000 fewer separations over the 28-month period. In the absence of clinically significant symptoms of PTSD, we would expect separation rates 2.3 percentage points lower than observed, corresponding to 33,000 fewer separations over the same period. Although it is unknown when service members would otherwise have separated from the military, separating within this 28-month period represents a potentially earlier end of employment.

This research provided a large-scale prospective study of the relationship between mental-health

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Improved care for employees experiencing psychological distress in settings such as the U.S. military could improve not only health outcomes but also career outcomes. From the military's perspective, such care could increase retention and reduce costly employer losses.

symptoms and separation from the military, using self-reported symptoms as opposed to medical diagnoses. Our models accounted for important predictors of separations that could be confounded with mental-health symptoms (such as the end date for current service term, the second-strongest predictor) but have not been controlled for in previous studies. Although causal inferences cannot be drawn, our analyses improve upon previous research in ruling out other explanations for this association.

Improved care for employees experiencing psychological distress in such settings as the U.S. military could improve not only health outcomes but also career outcomes. From the military's perspective, such care could increase retention and reduce costly employer losses.

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## **About This Report**

We use data from the 2014 RAND Military Workplace Study and administrative personnel records of 17,502 U.S. military service members from 2014 to 2016 to evaluate the relationship between self-reported symptoms of depression and posttraumatic stress disorder in the U.S. military and subsequent service member separation rates. More information on the RAND Military Workplace Study, including links to volumes documenting the study methodology and other related topics, is available at [www.rand.org/rmws](http://www.rand.org/rmws).

### **RAND National Security Research Division**

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