



Postdeployment Suicide Risk Increases Over a 6-month Period: Predictors of Increased Risk among Midwestern Army National Guard Soldiers

HYUNGJIN MYRA KIM, ScD, DEBRA SIEGEL LEVINE, PhD, PAUL N. PFEIFFER, MD, ADRIAN J. BLOW, PhD, CHRISTOPHER MARCHIONDO, PhD, HEATHER WALTERS, MS, AND MARCIA VALENSTEIN, MD

National Guard (NG) soldiers returning from deployments in Iraq and Afghanistan were surveyed at 6 and 12 months following their return ($N = 970$). The overall prevalence of suicide risk at 6 and 12 months following their return was assessed, as were changes in suicide risk among soldiers initially at high or low risk. Factors associated with changes in risk were assessed. The percentage of NG soldiers with high suicide risk increased from 6.8% at 6 months to 9.2% at 12 months (odds ratio = 1.7, $p = .02$). In the 882 soldiers initially at low risk, 5.9% (52/882) became high risk at 12 months; in the 64 soldiers initially at high risk, 46.9% (30/64) became low risk at 12 months. Initial levels of depressive symptoms were predictive of changing to high risk; this association appeared to be partially explained by soldier reports of increased search in the meaning in life and higher levels of perceived stress. Because suicide risk increases over the first 12 months, continued risk assessments during this time period should be considered. Supporting soldiers to find meaning in their life after deployment and enhancing their capacity to cope with perceived stress may help prevent increases in suicide risk over time.

National Guard (NG) Army soldiers have served beside active component service members during the conflicts in Iraq and Afghanistan. However, NG soldiers have

unique reintegration challenges following their return from deployments, including a rapid transition back to civilian communities that may lack relevant services

HYUNGJIN MYRA KIM, Consulting for Statistics, Computing and Analytics Research, University of Michigan, Ann Arbor, MI and VA Center for Clinical Management Research, Ann Arbor Health Care System, Ann Arbor, MI, USA; DEBRA SIEGEL LEVINE, Department of Veterans Affairs, VA Center for Clinical Management Research, Ann Arbor, MI, USA; PAUL N. PFEIFFER, Department of Psychiatry, University of Michigan, Ann Arbor, MI and Department of Veterans Affairs, SMITREC/HSR&D, Ann Arbor, MI, USA; ADRIAN J. BLOW, Department of Human Development and Family Studies, Michigan State University, East Lansing,

MI, USA; CHRISTOPHER MARCHIONDO, U.S. Department of Veterans Affairs, Albuquerque, NM, USA; HEATHER WALTERS, Department of Psychiatry, University of Michigan, Ann Arbor, MI, USA; MARCIA VALENSTEIN, Department of Psychiatry, University of Michigan, Ann Arbor, MI and VA Center for Clinical Management Research, Ann Arbor Health Care System, Ann Arbor, MI, USA.

Address correspondence to Hyungjin Myra Kim, Consulting for Statistics, Computing and Analytics Research, 3550 Rackham Bldg., University of Michigan, Ann Arbor, MI 48109-1070, USA; E-mail: myrakim@umich.edu

and resources to aid in reintegration (Riviere, Kendall-Robbins, McGurk, Castro, & Hoge, 2011). They also must return quickly to competitive civilian employment, with a potential for unemployment or underemployment. Studies have reported higher rates of posttraumatic stress disorder (PTSD) and depressive symptoms and interpersonal difficulties in NG soldiers compared with active component service members postdeployment (Milliken, Auchterlonie, & Hoge, 2007; Thomas et al., 2010). NG soldiers also have poorer outcomes when faced with unemployment or difficult interactions with coworkers (Thomas et al., 2010). In 2011, suicide rates among NG soldiers surpassed those of active component soldiers (National Center for Telehealth & Technology, 2014).

Although much is known regarding risks and risk factors for suicide ideation, behaviors, and death among service members and veterans (Griffith, 2012b; Ursano et al., 2014), less is known about whether these risks change over time among NG soldiers following return from deployments to combat zones. Even less is known about the predictors of potential temporal changes in suicide ideation and behaviors among returning soldiers. One study by Griffith (2012a) examined changes in suicide ideation/behaviors during the time of deployment to postdeployment and assessed associations with negative moods, PTSD symptoms, and social support in Army NG soldiers. In the study by Griffith, suicide ideation/behaviors were assessed at 60–90 days following soldiers' return, and because anonymous surveys were used, data on soldier age, gender, and race were not available. Griffith found little change in suicide ideation/behaviors from deployment to this immediate postdeployment period and noted that negative mood was an important mediating factor between PTSD and suicidality. In this study, we evaluated predictors of potential temporal changes in suicide ideation/behaviors among returning soldiers, including risk and resilience factors that might affect developing suicide risk in those initially at low suicide risk or of

resolution of suicidal thoughts and behaviors among those soldiers initially at high suicide risk. Changes in suicide risk are of particular interest because many efforts have been made by the Department of Defense, the Army, the National Guard Bureau, and the Veterans Administration to develop programs to assist returning NG soldiers with reintegration challenges, secure mental health services when needed, and reduce suicide risk (Bowles & Bates, 2010; Cornum, Matthews, & Seligman, 2011).

In this study we used data collected from samples of NG soldiers who completed surveys at both 6 and 12 months following their return from overseas deployments. Our goal was to assess overall suicide risk in newly returning NG soldiers at 6 and 12 months, describe within-soldier changes in suicide risk from 6 to 12 months, and evaluate factors associated with either moving from high to low risk or from low to high suicide risk. In addition to mental health symptoms, we assessed soldier self-reported cognitions that may be related to risk and resilience, including perceived stress and search for meaning of life. The longitudinal data allowed us to identify factors that predated increased suicide risk, including factors potentially amenable to intervention.

Because suicide is a complex outcome influenced by many factors, including individual characteristics (Griffith, 2012b; Ilgen et al., 2010; Pfeiffer, Ganoczy, Ilgen, Zivin, & Valenstein, 2009), relationships with family, peers, and others, and the broader social and environmental context (Miller, Lippmann, Azrael, & Hemenway, 2007; Nock et al., 2013; Zivin et al., 2007), we used the framework of the social ecological model developed by the National Council for Suicide Prevention for study analyses. This model was developed as part of the 2012 National Strategy for Suicide Prevention (U.S. Department of Health & Human Services, 2012), and identifies risk and resilience factors for suicide in four interacting elements including the individual, relationships, community, and society at large.

METHODS

Participants and Procedures

The study participants were NG soldiers in a midwestern state who returned from deployments to Iraq or Afghanistan between April 2011 and November 2012. All deployed state NG soldiers who returned during this period were approached for participation. Surveys were fielded at 6 and 12 months following these soldiers' return as part of a study to assess the outcomes of NG veterans and implementation of a peer outreach program (Valenstein et al., 2014). Briefly, soldiers were recruited in person during drill weekends approximately 6 and 12 months following their return from overseas deployments. Identical surveys were used at both waves. Soldiers not contacted during drill weekends received the survey by mail as outlined in the Dillman method (Dillman, Smyth, & Christian, 2009). Response rates were 55% at 6 months and 51% at 12 months. The Department of Veterans Affairs Ann Arbor Health System internal review board approved data collection. Data were collected under an approved waiver of written informed consent.

Measures

The primary outcome was suicide risk as assessed by the Suicide Behavior Questionnaire-Revised (SBQ-R), which has four items tapping four dimensions of suicide ideation and behaviors, including the following: lifetime suicide ideation and/or suicide attempt, the frequency of suicide ideation over the past 12 months, the threat of suicide attempt, and self-reported likelihood of suicidal behavior in the future. Responses could range from 0 to 15, with scores ≥ 7 having a sensitivity of 93% and a specificity of 95% in identifying at-risk individuals in the adult general population (Osman et al., 2001). The internal consistency of SBQ-R in our study sample was high, with Cronbach's α of 0.80 at 6 months and 0.83 at 12 months.

To assess the robustness of our results, we used Item 9 of the Patient Health Questionnaire (PHQ-9) as a secondary measure of suicide risk (Kroenke & Spitzer, 2002). Item 9 asks about the frequency in the last 2 weeks of thoughts that one would be better off dead or of hurting oneself in some way, and a response of either "more than half the days" or "nearly every day" was used as representing higher risk. Consistent findings with this secondary measure of suicide would provide further validation of the main findings based on SBQ-R.

The primary predictor of change in suicide risk was time: 12 versus 6 months. As noted, we used the social ecological model (U.S. Department of Health & Human Services, 2012) for identifying factors for suicide in four interacting elements. We adapted the model by combining the relationship and community factors (the characteristics of the social and physical settings where social relationships occur) due to conceptual overlap for available variables. Thus, potentially predictive factors of suicide risk were organized into three levels: individual, relationship/community, and society at large.

Individual factors included demographic characteristics and measures of health and psychological well-being, particularly mental health symptoms. Demographic characteristics included age, gender, race, education, marital status, and military rank. Mental health symptoms included PTSD, depressive, and anxiety symptoms. PTSD symptoms were assessed using the Post-Traumatic Stress Disorder Checklist-Military Version (PCL-M), a self-report measure of the 17 *DSM-IV* PTSD symptoms (Blanchard, Jones-Alexander, Buckley, & Forneris, 1996; Bliese et al., 2008), with scores ≥ 50 considered as significant PTSD symptoms.

Significant depressive symptoms presence was assessed with the PHQ-9 summary ≥ 10 (Lowe, Unutzer, Callahan, Perkins, & Kroenke, 2004). An alternative five-level depression severity categorization was also considered on PHQ-9 scores in addition to

the dichotomized measure of PHQ-9. In this multilevel categorization, the PHQ-9 scores of 1–4 indicated no or few symptoms, 5–9 mild symptoms, 10–14 moderate symptoms, 15–19 moderately severe symptoms, and 20–27 severe symptoms. Anxiety symptoms were assessed by the Generalized Anxiety Disorders Scale (GAD-7), a brief self-report questionnaire that identifies probable cases of generalized anxiety disorder (Spitzer, Kroenke, Williams, & Löwe, 2006). A cut point score ≥ 10 has a sensitivity of 89% and specificity of 82% for a diagnosis of generalized anxiety disorder. In this study, significant anxiety symptom presence was operationalized as having a GAD-7 score ≥ 7 , and a four-level anxiety severity on GAD-7 scores was also considered, with 0–4 indicating minimal symptoms, 5–9 mild symptoms, 10–14 moderate symptoms, and 15–21 severe symptoms.

Hazardous alcohol use was determined using the Alcohol Use Disorders Identification Test-Consumption Scale (AUDIT-C; Bradley et al., 2007). Risky drinking was designated as a score of 3 for women and 4 for men. For a measure of physical health and well-being, physical health composite scores (PCS) were calculated based on the Short-Form 12 (SF-12) Health Survey (Ware, Kosinski, & Keller, 1996).

Additional constructs related to suicide (Clum, 1975) included cognitions regarding the perceived meaning and purpose in one's life, as measured by the Meaning in Life Questionnaire (MLQ; Steger, Frazier, Oishi, & Kaler, 2006), and the degree of perceived stress in one's life as measured by the Perceived Stress Scale (PSS-4; Cohen, Kamarck, & Mermelstein, 1983; Cohen & Williamson, 1988). The MLQ is a 10-item measure assessing two dimensions of meaning in life: the presence of and search for the meaning in life. The PSS-4 has four items and asks about feelings and thoughts during the last months and is designed to assess how unpredictable and controllable a person appraises his or her life.

Relationship and community factors included social support assessed using the

Interpersonal Support Evaluation List-12 Item (ISEL-12; Cohen, Mermelstein, Kamarck, & Hoberman, 1985), giving an overall score, and three functional support dimension subscales representing appraisal, belonging, and tangible social support. Military unit social support was assessed using 10 items from the Deployment Risk & Resiliency Inventory (DRRI, Vogt, Proctor, King, King, & Vasterling, 2008), and the sum of the item scores (DRRI-sum) was used to measure the perceived unit support level. Two measures assessing the unit leadership environment included leadership support for getting help on reintegration difficulties when needed and for getting help for emotional symptoms when needed. We considered marital status as a demographic factor rather than a relationship factor as marital status does not indicate for a supportive relationship.

Societal factors included the health, economic, educational, and social policies that help create a climate in which suicide is more or less likely. We included whether the soldier reported they had any private health insurance or health care plan coverage in addition to their eligibility for coverage under the Veterans Affairs Healthcare System.

Data Analysis

McNemar's test was used to determine whether suicide risk changed from 6 to 12 months, with odds ratio (OR) as a summary measure. To assess the potential role that different factors might play on changes in suicide risk status, we divided the study sample into two groups: low suicide risk ($SBQ-R < 7$) and high suicide risk ($SBQ-R \geq 7$) at 6 months. We then used separate logistic regressions to evaluate factors predictive of becoming high risk among those initially at low suicide risk, and with becoming low risk among those identified initially as at high suicide risk. We sequentially considered the potential predictors, starting with individual, followed by relationship/community, and lastly

societal factors based on the social ecological model. The analytic approach based on the model was to allow us to evaluate whether individual-level measures remain predictive of a change in suicide risk after controlling for relationship/community and societal measures available in the survey. Within individual factors, we first evaluated the relationship between age (initially as five age groups), gender, and race (initially as White, Black, or other) and fixed them in each sequential step. We also considered the symptom measures prior to other cognitive constructs, as mental health conditions may both affect and act through these other cognitive constructs, such as the search for meaning or perceived stress. For both depression and anxiety symptom measures, we first considered two-level groups based on a single threshold or cutoff score as potential predictors of change in suicide risk. However, to allow for more complex functional relationships between the symptom severity and suicide risk, we also considered a multilevel categorization of symptoms severity as outlined in the Measures section. This assessed additional relationships between levels of symptoms and suicide risk than allowed by a single cutoff value or by linearly incrementing symptom levels. The choice between the alternate measures was made by comparing the Akaike information criterion (Burnham & Anderson, 2004). In order not to inflate the risk of capitalizing on chance variation of the data, the choice of variables at each sequential step was made carefully by inspecting the correlation across potential predictors to reduce redundant predictors. On the basis of this exploration, we decided not to include one measure, the mental health composite score of the SF-12, because it is a general scale that was correlated with many of our specific mental health symptom scales for depression, anxiety, and PTSD. To account for potential within-unit correlation, we also included NG units as random intercepts in our models for the analysis predicting increasing suicide risks over time. At each sequential

step, significant ($p < .05$) and marginally significant ($p < .20$) predictors with coefficients of moderate magnitude (e.g., adjusted OR > 1.5 for binary predictors) were retained. Lastly, we separately evaluated the extent of mental health treatments received by soldiers included in this study. All analyses were completed using Stata 14.0.

RESULTS

Surveys were completed by 1,474 soldiers at 6 months, and by 1,448 soldiers at 12 months following their return. Of the 6-month responders, 970 (65.8%) completed surveys at both time points, and this longitudinal subset is the primary analytic cohort. The distributions of the individual, relation/community, and social factors are presented for soldiers completing surveys at 6 months and for the longitudinal cohort (Table 1). The longitudinal cohort appears representative of the 6-month responders, except for a slightly higher proportion of White soldiers and lower proportion of officers. Over 80% of the soldiers were White, less than 20% had a bachelors or higher level of education, and over 60% were either married or in a committed relationship. Approximately 15% reported clinically significant PTSD symptoms, 19% clinically significant depressive symptoms, and 49% hazardous alcohol use.

Suicide Risk and Changes in Suicide Risk with Time

Mean SBQ-R total score was 3.6 ($SD = 1.7$) in all 6-month responders, and in the longitudinal cohort, the mean increased from 3.6 to 3.8 ($p = .01$, paired t test). In the longitudinal cohort, 6.8% of soldiers were high risk for suicide at 6 months, which increased to 9.2% at 12 months based on the ≥ 7 cutoff for SBQ-R (OR = 1.7; 95% CI = 1.1–2.8; $p = .02$, McNemar's test). PHQ-9 also showed significant increases in suicide risk between waves with 2.3% of participants reporting

TABLE 1

Distribution of Individual, Relationship/Community, and Social Factor Variables Assessed at 6 months in National Guard Soldiers Who Responded to 6-month Surveys and the Subset of Longitudinal Cohort that Responded to Both 6- and 12-month Surveys

| | 6 Months (N = 1,474) | Longitudinal Cohort ^a (N = 970) |
|--|-------------------------|---|
| Individual Factors | | |
| Male | 92.5 (1,373) | 92.6 (898) |
| Age group in years | | |
| 18–21 | 7.8 (114) | 8.4 (81) |
| 22–30 | 43.4 (637) | 43.1 (416) |
| 31–40 | 23.8 (349) | 23.4 (226) |
| 41–50 | 20.3 (298) | 20.0 (193) |
| Over 50 | 4.7 (69) | 5.2 (50) |
| White | 82.9 (1,212) | 84.5 (812) |
| Black | 6.2 (91) | 5.3 (51) |
| Education | | |
| High school/GED or less | 25.7 (377) | 25.6 (247) |
| Some college/Associates | 55.3 (813) | 55.6 (537) |
| ≥Bachelor's degree | 19.0 (279) | 18.8 (182) |
| Military rank | | |
| Junior enlisted | 87.0 (1,282) | 88.8 (861) |
| Noncommissioned officers | 2.8 (41) | 2.4 (23) |
| Officers | 10.2 (150) | 8.9 (86) |
| Has children | 55.2 (768) | 55.2 (507) |
| Marital status | | |
| Married/committed | 61.1 (897) | 62.4 (609) |
| Divorced/separated | 11.0 (162) | 10.0 (97) |
| Single, never married | 27.6 (405) | 27.2 (263) |
| Other/widowed | 0.3 (5) | 0.4 (4) |
| Mental health symptoms | | |
| PTSD (PCL-M ≥ 50) | 15.1 (211) | 15.3 (141) |
| Depression (PHQ-9 ≥ 10) | 18.7 (273) | 19.0 (183) |
| Anxiety (GAD-7 ≥ 7) | 15.3 (224) | 15.6 (150) |
| PHQ-9 | | |
| 0–4 (none or few) | 52.6 (769) | 53.4 (514) |
| 5–9 (mild) | 28.7 (419) | 27.6 (266) |
| 10–14 (moderate) | 10.1 (148) | 10.5 (101) |
| 15–19 (moderately severe) | 5.8 (85) | 5.7 (55) |
| 20–27 (severe) | 2.7 (40) | 2.8 (27) |
| GAD-7 | | |
| 0–4 (minimal) | 58.0 (849) | 58.9 (568) |
| 5–9 (mild) | 28.0 (410) | 26.9 (259) |
| 10–14 (moderate) | 9.5 (139) | 9.5 (92) |
| 15–21 (severe) | 4.4 (65) | 4.7 (45) |
| No. of mental health symptoms ^b | | |
| 0 | 75.9 (1,112) | 75.5 (729) |
| 1 | 8.8 (129) | 8.8 (85) |
| 2 | 6.6 (97) | 7.0 (68) |
| 3 | 8.7 (128) | 8.7 (84) |

(continued)

TABLE 1
(continued)

| | 6 Months (<i>N</i> = 1,474) | Longitudinal Cohort ^a (<i>N</i> = 970) |
|--|---------------------------------|---|
| Hazardous alcohol use | 48.6 (711) | 49.3 (475) |
| Head injury during deployment | 3.5 (51) | 3.1 (30) |
| Physical Component Scale (PCS), mean (<i>SD</i>) | 50.6 (9.1) | 50.4 (9.2) |
| Other cognition constructs | | |
| MLQ Presence, mean (<i>SD</i>) | 25.9 (6.4) | 25.9 (6.4) |
| MLQ Search, mean (<i>SD</i>) | 20.6 (7.7) | 20.6 (7.7) |
| Perceived Stress, mean (<i>SD</i>) | 5.3 (3.4) | 5.2 (3.4) |
| Relationship/Community Factors | | |
| ISEL-12 | | |
| Appraisal, mean (<i>SD</i>) | 9.0 (2.8) | 9.0 (2.8) |
| Belonging, mean (<i>SD</i>) | 8.9 (2.7) | 8.9 (2.7) |
| Tangible, mean (<i>SD</i>) | 9.2 (2.5) | 9.2 (2.5) |
| Overall, mean (<i>SD</i>) | 27.0 (7.1) | 27.0 (7.1) |
| DRRI-sum, mean (<i>SD</i>) | 34.6 (9.5) | 34.8 (9.4) |
| Leadership support ^c for | | |
| Reintegration difficulty, mean (<i>SD</i>) | 3.6 (1.1) | 3.6 (1.1) |
| Emotional symptoms, mean (<i>SD</i>) | 3.6 (1.1) | 3.6 (1.1) |
| Interested in me, mean (<i>SD</i>) | 3.3 (1.2) | 3.3 (1.2) |
| Neither working nor going to school | 21.7 (320) | 21.1 (205) |
| Social Factors | | |
| Have private health insurance | 32.0 (472) | 32.9 (319) |

Note. Cell values are percent (*N*), unless otherwise stated; percentages are out of those with nonmissing values for each variable. Perceived stress is based on 4-item Perceived Stress Scale (PSS-4) (range 0–16), higher scores correspond to greater stress. PTSD, posttraumatic stress disorder; PCL-M, Post-Traumatic Stress Disorder Checklist-Military Version; PHQ-9, 9-item Patient Health Questionnaire; GAD-7, 7-item Generalized Anxiety Disorder; PCS, physical health composite score (based on Short-Form 12 and normalized to have a mean of 50 and a standard deviation of 10 in the general population); MLQ Presence and MLQ Search, subscales of the Meaning in Life Questionnaire (each can range from 5 to 35); ISEL-12, 12-item interpersonal support evaluation list with three subscales (range 0–12) and overall scores (range 0–36), higher scores correspond to better social connection; DRRI-sum, based on 10-item Deployment Resiliency Inventory Section F and (range 10–50), higher scores correspond to greater unit relationship.

^aAll values are from 6-month assessments in soldiers who participated in both 6- and 12-month surveys.

^bCan range from 0 to 3, counting the total number of presence of symptoms of depression (PHQ-9 \geq 10), anxiety (GAD-7 \geq 7), and PTSD (PCL-M \geq 50).

^cResponses are each obtained using a 5-point Likert scale, with higher scores corresponding to strongly agreeing with positive leadership support.

suicidal thoughts “more than half the days” or “nearly every day” at 6 months, and 4.3% reporting this level at 12 months (OR = 2.5; 95% CI = 1.3–5.3; p = .005).

Bivariate Analyses

The distributions of various factors in the longitudinal cohort with nonmissing

SBQ-R scores (n = 946, 97.5% of the longitudinal cohort; Table 2) are shown separately for soldiers whose risk for suicide was low at 6 months (n = 882) and high at 6 months (n = 64). We further grouped soldiers by whether they maintained versus changed their initial risk status. Of the soldiers initially low risk, 5.9% (52/882) became high risk at 12 months, and of the

soldiers initially high risk, 46.9% (30/64) became low risk at 12 months.

In soldiers initially at low risk, increasing to high risk was associated with being divorced or separated; having PTSD, depression, and anxiety symptoms; and having hazardous alcohol use. Soldiers whose risk increased to high also had lower initial MLQ Presence scores, higher MLQ Search scores, and higher levels of perceived stress. The distributions of various relational, community, and social factors also showed scores indicating poorer social support across all functional domains in those whose risk increased to high. In soldiers at initially high risk, remaining at high risk was associated with lower physical health (PCS) and lower military unit social support (DRRI-sum). Although not statistically significant, being in a married or committed relationship was potentially associated with resolving high risk, with 53.3% of soldiers who were in a married/committed relationship moving to lower risk compared to 35.3% of those who were not in a committed relationship remaining at high risk (unadjusted OR = 2.1; $p = .15$).

Predictors of Suicide Risk Increase in Soldiers Initially at Low Risk in Multivariable Analyses

No socio demographic variables were predictive of becoming high risk at 12 months, except race (OR = 2.1 for Black vs. White) and officers with less than bachelor's degree relative to other education/rank combinations (OR = 5.0; Model 1, Table 3). In adjusted models, PTSD and hazardous drinking were also no longer significant predictors of becoming high risk. However, mild-to-moderate and moderately severe-to-severe depressive symptom levels remained significantly predictive of becoming high risk.

When other cognitive constructs were added, higher Search for Meaning in Life (MLQ Search) and higher Perceived Stress (PSS-4) were significantly associated with becoming high risk (Model 2,

Table 3). For completeness, Model 2 included Presence of Meaning of Life, which consistently showed a negative association with becoming high risk, although it was not statistically significant. Importantly, adding other cognitive constructs attenuated the ORs for depression, indicating that depression's association with suicide was largely explained by these constructs. We explored further to see whether changes in either PSS-4 or MLQ Search over time were associated with becoming high risk in suicide, and found an increase in PSS-4 to be independently predictive of becoming high risk in suicide (OR = 1.3, $p < .001$; Table 3). No relationship, community, or social factors were predictive of becoming high risk whether included with or without measures in the cognitive domain.

Predictors of Suicide Risk Decrease in Soldiers Initially at High Risk in Multivariable Analyses

Given the small number of soldiers who were initially at high risk, we present findings showing clinically meaningful association, even if they were not statistically significant. Higher levels of physical health (PCS) and unit support (DRRI-sum) continued to show positive associations with becoming low risk at 12 month, although neither was statistically significant when both were included (Table 4, Model 2). Soldiers in a committed or married relationship were also more likely to become low risk (OR = 4.1; $p = .07$). The three measures of unit support, DRRI-sum, leadership support for reintegration difficulty, and leadership support for emotional symptoms, were highly correlated with pairwise correlations ranging from 0.74 to 0.87, and although not significant, each showed that more positive community support was associated with becoming low risk at 12 months.

Mental Health Treatments Received

In soldiers initially at low risk, 26.1% (230/882) reported having received any type

TABLE 2

Distribution of Individual, Relational/Community, and Social Factor Variables at 6 months by Changes in Suicide Risk Status: Suicide Risks are Assessed at 6 and 12 months by Suicide Behavior Questionnaire-Revised (SBQ-R), and High Suicide Risk is Defined as ≥ 7 on SBQ-R

| At 6 months | Low Risk (N = 882) | | High Risk (N = 64) | |
|--------------------------------|---------------------|---------------------|---------------------|--------------------|
| | Low Risk n = 830 | High Risk n = 52 | High Risk n = 34 | Low Risk n = 30 |
| At 12 months | | | | |
| Male | 92.4 | 94.2 | 88.2 | 100 |
| Age Group in Years | | | | |
| 18–21 | 8.5 | 9.6 | 8.8 | 10.0 |
| 22–30 | 43.3 | 44.2 | 26.5 | 43.3 |
| 31–40 | 22.9 | 26.9 | 29.4 | 26.7 |
| 41–50 | 20.0 | 15.4 | 32.4 | 16.7 |
| Over 50 | 5.4 | 3.9 | 2.9 | 3.3 |
| White | 85.2 | 80.8 | 78.8 | 82.8 |
| Black | 4.9 | 9.6 | 6.1 | 6.9 |
| Education | | | | |
| High School/GED or less | 25.4 | 28.9 | 23.5 | 23.3 |
| Some college/Associates | 55.0 | 61.5 | 52.9 | 60.0 |
| \geq Bachelor's degree | 19.6 | 9.6 | 23.5 | 16.7 |
| Military Rank | | | | |
| Junior enlisted | 88.7 | 84.6 | 88.2 | 90.0 |
| Noncommissioned officers | 2.4 | 5.8 | 0 | 0 |
| Officers | 8.9 | 9.6 | 11.8 | 10.0 |
| Has Children | 55.7 | 58.0 | 45.2 | 58.6 |
| Marital Status | | | | |
| Married/committed | 64.7 | 55.8* | 35.3 | 53.3 |
| Divorced/separated | 8.3 | 21.2 | 23.5 | 16.7 |
| Single, never married | 26.6 | 23.1 | 41.2 | 26.7 |
| Other/widowed | 0.4 | 0 | 0 | 3.3 |
| Mental Health Symptoms | | | | |
| PTSD (PCL-M ≥ 50) | 11.7 | 36.7** | 42.2 | 39.3 |
| Depression (PHQ-9 ≥ 10) | 14.0 | 39.2** | 64.7 | 70.0 |
| Anxiety (GAD-7 ≥ 7) | 11.2 | 34.6** | 47.1 | 60.0 |
| No. of MH Symptoms, mean (SD) | 0.4 (0.8) | 1.1 (1.3)** | 1.5 (1.2) | 1.7 (1.2) |
| Hazardous Alcohol Use | 47.5 | 65.4* | 64.7 | 60.0 |
| Head Injury During Deployment | 2.3 | 5.8 | 2.9 | 10.0 |
| PCS, mean (SD) | 50.6 (8.9) | 50.8 (11.2) | 46.4 (12.6) | 53.0 (6.8)* |
| MLQ Presence, mean (SD) | 26.7 (6.0) | 21.8 (6.4)** | 19.5 (7.1) | 19.2 (6.0) |
| MLQ Search, mean (SD) | 20.2 (7.8) | 23.9 (6.7)** | 21.6 (7.4) | 24.2 (5.4) |
| Perceived Stress, mean (SD) | 4.8 (3.2) | 7.6 (3.2)** | 8.2 (3.5) | 8.6 (2.8) |
| Relationship/Community Factors | | | | |
| ISEL-12, mean (SD) | | | | |
| Appraisal | 9.2 (2.6) | 7.9 (3.1)** | 6.7 (3.1) | 6.9 (2.8) |
| Belonging | 9.1 (2.6) | 7.9 (2.7)* | 6.6 (3.3) | 7.5 (2.4) |
| Tangible | 9.4 (2.4) | 8.2 (2.7)** | 7.3 (3.0) | 7.6 (2.3) |
| Overall | 27.6 (6.8) | 24.0 (7.4)** | 20.7 (8.2) | 22.0 (5.7) |
| DRRI-sum, mean (SD) | 35.2 (9.1) | 32.8 (9.9) | 27.0 (10.8) | 32.1 (8.6)* |

(continued)

TABLE 2
(continued)

| At 6 months | Low Risk (N = 882) | | High Risk (N = 64) | |
|-------------------------------------|--------------------|-----------|--------------------|-----------|
| | Low Risk | High Risk | High Risk | Low Risk |
| At 12 months | n = 830 | n = 52 | n = 34 | n = 30 |
| Leadership support for, mean (SD) | | | | |
| Reintegration difficulty | 3.7 (1.1) | 3.5 (1.2) | 2.9 (1.4) | 3.4 (1.0) |
| Emotional symptoms | 3.7 (1.1) | 3.5 (1.2) | 2.8 (1.2) | 3.3 (0.9) |
| Interested in me | 3.4 (1.2) | 3.2 (1.3) | 2.7 (1.1) | 2.8 (1.0) |
| Neither working nor going to school | 20.1 (167) | 21.2 (11) | 20.6 (7) | 33.3 (10) |
| Social Factors | | | | |
| Have private health insurance | 33.9 (281) | 30.8 (16) | 26.5 (9) | 33.3 (10) |

Note. Cell values are percentages, unless otherwise stated; percentages are calculated out of those with nonmissing values for each variable. PTSD, posttraumatic stress disorder; MH, mental health; PCL-M, Post-Traumatic Stress Disorder Checklist-Military Version; PHQ-9, 9-item Patient Health Questionnaire; GAD-7, 7-item Generalized Anxiety Disorder; PCS, physical health composite score (based on Short-Form 12 and normalized to have a mean of 50 and a standard deviation of 10 in the general population); MLQ Presence and MLQ Search, subscales of the Meaning in Life Questionnaire (each range from 5–35); ISEL-12, 12-item interpersonal support evaluation list with three subscales (each range 0–12) and overall scores (range 0–36), higher scores correspond to better social connection; DRRI-sum, based on 10-item Deployment Resiliency Inventory Section F (range 10–50), higher scores correspond to greater unit relationship. For number of mental health symptoms, although mean (SD) is reported, the tests are carried out by chi-square tests. * $p < .05$, ** $p < .001$, based on two-sample mean test, chi-square test, or Fisher's exact test as appropriate.

of mental health services (e.g., medication, group or individual therapy, and family/marital counseling) in the prior 12 months, while in those initially at high risk, 51.6% (33/64) received treatment (OR = 3.0; $p < .001$). In the 830 soldiers who remained low risk, 25.2% and 26.6% reported receipt of a treatment when surveyed at 6 and at 12 months, respectively; while in 52 soldiers who became high risk at 12 months, 40.4% and 51.9% reported treatment when surveyed at 6 and 12 months, respectively. Treatment participation reported at 6 months was significantly higher in those who became high risk than those who remained low risk (OR = 1.26; $p = .02$), and treatment participation increased from 6 to 12 months in those who became high risk (OR = 2.5; $p = .11$). In the 34 soldiers who remained at high risk, 52.9% and 58.8% reported having received any treatment when surveyed at 6 and at 12 months, respectively, while in 30 soldiers who became low risk, 50.0% and

63.3% reported having received any treatment when surveyed at 6 and 12 months, respectively.

DISCUSSION

In this large sample of NG soldiers, prevalence of high suicide risk at 6 month was 6.7%, and suicide risk increased significantly between 6 and 12 months. This is concerning, considering that many efforts have been made to assist with reintegration, screen veterans for mental health problems, and facilitate mental health treatment among those in need (Bowles & Bates, 2010; Cornum et al., 2011; Hoge, Auchterlonie, & Milliken, 2006). These rates are higher than those reported by Griffith (2012a), based on a survey completed in 2010 in deployed Army NG soldiers, where 4.2% were considered to have suicide intentions at 60 to 90 days after returning from deployment based on responding "yes" to

TABLE 3

Adjusted Odds Ratios Based on a Hierarchical Logistic Regression Model Predicting High Suicide Risk at 12 Months among National Guard Soldiers with Low Suicide Risk at 6 months, with National Guards Units as Random Intercepts (N = 882)

| | Model 1 | | Model 2 | | Exploratory Model | |
|--|---------|-------------|---------|-------------|-------------------|-------------|
| | AOR | 95% CI | AOR | 95% CI | AOR | 95% CI |
| Female (ref: Male) | 0.84 | 0.24, 2.99 | 0.86 | 0.23, 3.13 | 0.87 | 0.22, 3.39 |
| Age 18–21 years (ref: ≥22 or older) | 1.55 | 0.54, 4.47 | 1.46 | 0.51, 4.21 | 1.33 | 0.46, 3.89 |
| Black (ref: White or other) | 3.12* | 1.01, 9.69 | 2.80 | 0.90, 8.69 | 3.54* | 1.14, 10.94 |
| Officer ^a & less than Bachelor's Degree | 4.97* | 1.15, 21.58 | 8.67* | 1.76, 42.79 | 8.18* | 1.45, 46.12 |
| Divorced or Separated (yes vs. no) | 1.55 | 0.62, 3.89 | 1.60 | 0.63, 4.04 | 1.28 | 0.49, 3.36 |
| PTSD (yes vs. no) | 1.84 | 0.79, 4.30 | 1.40 | 0.58, 3.39 | 0.99 | 0.39, 2.52 |
| Depression: Mild or Moderate ^b | 2.65* | 1.21, 5.82 | 1.46 | 0.63, 3.41 | 1.17 | 0.48, 2.82 |
| Depression: Moderately Severe or Severe ^b | 9.00** | 2.98, 27.20 | 2.56 | 0.72, 9.07 | 2.31 | 0.63, 8.42 |
| Hazardous Drinking (yes vs. no) | 1.59 | 0.82, 3.09 | 1.42 | 0.72, 2.82 | 1.45 | 0.71, 2.94 |
| SF-12 Physical Health Composite Score | 1.03 | 0.99, 1.07 | 1.03 | 0.99, 1.07 | 1.02 | 0.99, 1.06 |
| Head Injury (yes vs. no) | 2.13 | 0.54, 8.37 | 2.91 | 0.70, 12.05 | 3.30 | 0.78, 13.97 |
| MLQ Search, range 5–35 | – | – | 1.06* | 1.01, 1.12 | 1.06 | 1.01, 1.12 |
| MLQ Presence, range 5–35 | | | 0.96 | 0.91, 1.02 | 0.96 | 0.91, 1.02 |
| Perceived Stress, range 0–16 | | | 1.22* | 1.05, 1.41 | 1.42** | 1.20, 1.68 |
| Change ^c in Perceived Stress | | | | | 1.31** | 1.15, 1.49 |

PTSD, posttraumatic stress disorder; AOR, adjusted odds ratio; MLQ Search and MLQ Presence, subscales of the Meaning in Life Questionnaire (range 5 – 35).

^aCombining both noncommissioned and commissioned officers

^bReferent level is no or few depressive symptoms; depression severity categories are based on PHQ-9 scores (0–4 is none or few; 5–14 is mild or moderate symptoms; 15–27 is moderately severe or severe symptoms).

^cCalculated as 12-month value minus 6-month value; positive scores reflect an increase in stress level. * $p < .05$, ** $p < .001$.

any one of the three items: thoughts of suicide, planned suicide, and attempted suicide.

Soldiers at high risk of suicide initially were more likely to receive mental health services in the past 12 months than those at low risk initially, although only 51.6% of those initially at high suicide risk received any treatment. The finding that initially low-risk soldiers who became high risk at 12 months received significantly more mental health treatment than those who remained at low risk suggested that soldiers and their providers recognized their treatment needs during the time period when suicide risk increased. Among soldiers initially at high risk, treatment participation increased from 52.9% to 58.8% in those who remained high

risk, and from 50.0% to 63.3% in those who became low risk.

Important factors associated with soldiers becoming high risk included depressive symptom severity levels, which is congruent with past cross-sectional studies showing a link between depressive symptoms and suicidal thoughts and reporting that depression diagnoses are among the most potent risk factors for suicide. Our finding that presence of PTSD symptoms and hazardous alcohol use are not significantly associated with becoming high suicide risk once depressive symptoms are taken into account is also congruent with past studies indicating that the impact of PTSD diagnosis on suicide risk is reduced or even protective once concurrent

TABLE 4

Adjusted Odds Ratios Based on a Logistic Regression Model Predicting Low Suicide Risk at 12 months Among Soldiers at High Suicide Risk At 6 months (N = 64)

| | Model 1 | | Model 2 | |
|--------------------------|---------|-------------|---------|-------------|
| | AOR | 95% CI | AOR | 95% CI |
| Age 18–21 years | 1.0 | – | 1.0 | – |
| 22–30 years | 1.97 | 0.26, 14.78 | 2.49 | 0.29, 21.59 |
| 31 and older | 0.38 | 0.05, 3.03 | 0.36 | 0.04, 3.19 |
| Race | | | | |
| Other | 1.0 | – | 1.0 | – |
| White | 0.90 | 0.16, 5.13 | 0.62 | 0.10, 3.81 |
| Black | 1.91 | 0.13, 27.19 | 1.80 | 0.12, 27.18 |
| Married/Committed | 3.94 | 0.95, 16.39 | 4.12 | 0.92, 18.56 |
| Physical Composite Score | 1.07* | 1.00, 1.13 | 1.05 | 0.98, 1.12 |
| DRRI-sum, range 0–50 | | | 1.07 | 0.99, 1.16 |

AOR, adjusted odds ratio 05% CI, 95% confidence interval; DRRI-sum, based on 10-item Deployment Resiliency Inventory Section F (range 10–50), higher scores correspond to greater unit relationship.

* $p < .05$.

depression diagnoses are taken into account (Zivin et al., 2007).

Higher levels of search for meaning in life and perceived stress were both significantly associated with becoming high in suicide risk, and the strength of the association between depressive symptoms and suicide risk was diminished after accounting for these measures. Search for meaning in life and perceived stress levels may represent core cognitive components of depression that are particularly associated with suicide risk (Kleiman & Beaver, 2013). Further exploratory analyses showed that increases in perceived stress over time were significantly associated with becoming high risk. These findings point to the importance of identifying the sources of stress, actively providing support to reduce stress, and increasing soldier capacity to cope with stress. It also suggests that it is important to recognize increases in stress during the year following soldiers' return. Our findings also suggest developing or finding meaning in their life may be important for soldiers following their return from deployments. These findings are consistent with the themes identified in a qualitative study of Operation Enduring

Freedom and Operation Iraqi Freedom (OEF/OIF) veterans' experiences with suicidal ideation (Denneson, Teo, Ganzini, Helmer, Bair, & Dobscha, 2015). The investigators found that reports of feeling overwhelmed by stressors and lacking life purpose or meaning were two of four main themes in postdeployment adjustment challenges among veterans with depression or PTSD and suicide ideation.

We also found officers without a bachelor's degree to have significantly higher odds of becoming high suicide risk. This is a very unusual group as most officers have bachelor's degrees, and the finding may be spurious, although it was robust across the different models we considered. For NG soldiers, protracted deployments can disrupt their work and education in ways that might distinctly affect their mental health and well-being (Riviere et al., 2011). Officers in the military have high levels of responsibility and are afforded a high level of prestige. One possible explanation might be that transitioning from military to civilian employment without a college degree after having served as an officer may be associated with particularly high levels of stress.

In summary, in this study we found suicide risk increased for returning NG soldiers between 6 and 12 months following their return from either the Iraq or Afghanistan conflicts. Fully 6% of soldiers who were at low risk at 6 months developed suicide risk at 12 months, suggesting that suicide screenings and interventions may be needed throughout the reintegration process, at least for the first 12 months following soldiers' return. High suicide risk persisted in the majority of soldiers (53%) who were initially at high risk. Potentially, particular attention might be paid to low physical status which was associated with continuing to be at high risk.

Our analyses implied that efforts may be needed to increase capacity to cope with perceived stress in NG soldiers, potentially through resiliency or affect regulation training. Reintegration programs might need to provide resources for soldiers to recognize and reduce stress. Adding tools to help returning soldiers to reflect on meaning in their own life may also seem important. It will be ideal to ultimately develop an intervention designed specifically for returning soldiers that addresses these important cognitive components. Future research is also needed to determine longer-term trajectories of high suicide risk and whether interventions can prevent increasing risk of suicide over time.

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Limitations

Our study included only NG soldiers who recently returned from overseas conflicts. Thus, study findings may not be generalizable to the general population or to soldiers who have not recently returned from deployments or who have not deployed. Our study is based on longitudinal data using validated self-reported measures, which is a strength, but our main analytic cohort included only the subset of those who participated in both 6 and 12 months surveys. Although all deployed soldiers were invited to participate in our study, only slightly over 50% responded at both 6 and 12 months. However, soldiers in the longitudinal subset did not show meaningful differences in various core demographic characteristics or symptom levels from the 6 months participants. Finally, the absolute number of soldiers at high risk of suicide is small, limiting the ability to demonstrate statistical significance when examining resolution of suicide risk among soldiers initially at high risk. More research is needed on specific cognitions and changes to a high suicide risk and potentially on the unique group of officers who do not have higher levels of education.

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