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Purpose in Life and Conscientiousness Protect Against the Development of Suicidal Ideation in U.S. Military Veterans With PTSD and MDD: Results From the National Health and Resilience in Veterans Study

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Abstract

Background: Although several studies have examined risk factors for suicidal ideation among veterans, little is known about risk and protective factors for suicidal ideation in high-risk veteran samples. Thus, this study examined a broad range of risk and protective factors associated with the development of suicidal ideation in a high-risk sample of U.S. veterans who screened positive for current posttraumatic stress disorder (PTSD) and/or major depressive disorder (MDD).

Methods: Data were analyzed from the National Health and Resilience in Veterans Study, a nationally representative, prospective cohort study of U.S. veterans. Veterans completed self-report measures to screen for PTSD and MDD and to assess for risk and protective factors. The sample included 222 veterans with PTSD and/or MDD who did not endorse suicidal ideation at baseline and completed at least one assessment over a seven-year follow-up period. A multivariable binary logistic regression analysis was conducted to examine baseline factors associated with incident suicidal ideation.

Results: Nearly one in three (27.1%) of veterans with PTSD and/or MDD developed suicidal ideation over the seven-year follow-up period. Non-Caucasian race and lower scores on measures of purpose in life, conscientiousness, and frequency of religious service attendance were independently associated with incident suicidal ideation. Lower purpose in life (52.3%) and conscientiousness (33.2%) explained the vast majority of variance in incident suicidal ideation.

Conclusion: Nearly 30% of veterans with PTSD and/or MDD who did not endorse suicidal ideation at baseline developed suicidal ideation over a seven-year period. Prevention and treatment efforts designed to bolster purpose in life and conscientiousness may help mitigate risk for suicidal ideation in this high-risk population.

Keywords

posttraumatic stress disorder, major depressive disorder, risk factors, protective factors, suicidal ideation

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Introduction

Suicide is a growing public health crisis in the United States, with up to 44,000 individuals dying from suicide in 2016 alone.[1] Military veterans are at particular risk, with suicide rates 50% greater than in the civilian population.[2] Among veterans, the risk of suicide is even greater in those who have been diagnosed with posttraumatic stress disorder (PTSD) and/or major depressive disorder (MDD).[3–7] Although the relationship between

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PTSD and/or MDD and suicide risk is well established,[8–11] less is known about other factors that may influence the development of suicidal ideation (SI) in veterans with these disorders. Identifying modifiable factors that contribute to the development of SI, a significant risk factor for suicide attempts,[3] in veterans with PTSD and/or MDD is thus critical to informing preventative approaches and reducing suicide risk in this vulnerable subset of the veteran population.

Risk factors for SI and attempts that have received the most attention to date have been sociodemographic (e.g., younger and older age, male sex, combat status)[5,12] and clinical characteristics (e.g., presence and severity of psychiatric and medical diagnoses).[5,13,14] Few factors have emerged as strong predictors of risk and some researchers have suggested that research on suicide risk has remained relatively stagnant, focusing largely on a similar set of risk factors.[13,15] Indeed, a recent meta-analysis found small effect sizes when examining longitudinal risk factors of both SI and attempts and concluded that the prediction of suicide risk has not improved over the past 50 years.[13] A number of factors have likely contributed to this stagnation. For instance, while SI is a complex phenomenon and likely results from a multitude of diverse factors, studies on suicide risk frequently examine only a small number of factors.[15] In addition, many studies have examined risk factors utilizing cross-sectional designs, despite the fact that risk factors precede an outcome.[16] As a result, there has been a call to examine both risk and protective factors associated with SI.[13,15]

Although relatively few studies have examined protective factors for SI, recent findings suggest that there are modifiable factors that may help buffer SI risk.[7,14,17–19] Research from the National Health and Resilience in Veterans Study (NHRVS), a prospective cohort study of a nationally representative sample of U.S. veterans, has revealed that greater social connectedness (i.e. structural social support, perceived social support), and psychosocial protective characteristics (e.g., perceived resilience, purpose in life) were negatively related to the development of SI.[14,17] Specifically, among veterans surveyed who did not endorse SI at Wave 1, greater social support, curiosity, perceived resilience, and acceptance-based coping were associated with reduced risk of incident SI over a four-year follow up period.[17] Together, these factors accounted for over 40% of the variance in predicting risk of incident SI. Another NHRVS study revealed that among veterans with PTSD and/or MDD, greater purpose in life, curiosity, and optimism were inversely associated with SI.[20] This study was cross-sectional, however, and no studies of which we are aware have examined protective factors associated with incident SI over a long-term follow-up period in veterans with PTSD and/or MDD.

Given the state of the research on determinants of SI, researchers have recommended prospectively examining a comprehensive range of factors that may influence the development of SI, including both risk and protective factors.[13] It is of particular importance to examine such factors in veterans with PTSD and/or MDD given the prevalence of these disorders in the veteran population and the fact that both disorders are associated with a heightened risk for SI.[4–6,21–23] This study sought to address this gap in the literature by examining how a broad range of risk and protective factors related to incident SI risk over a seven-year period in a nationally representative sample of U.S. military veterans who screened positive for current PTSD and/or MDD and who did not endorse SI at a baseline assessment.

Methods

Participants and Procedure

The NHRVS sample was drawn from KnowledgePanel®, a probability-based online survey panel maintained by GfK Knowledge Networks, Inc. (now Ipsos, Menlo Park, California), which includes over 50,000 households representing approximately 98% of the U.S. adult population. Panel members who endorsed a history of military service were asked to participate in the NHRVS. Wave 1 of the NHRVS was completed in 2011 by 3157 veterans and consisted of an anonymous, 60-min online survey. A total of 2157 veterans (68.3% of the Wave 1 cohort) completed Wave 2 in 2013, 1538 veterans (71.3% of the Wave 2 cohort) completed Wave 3 in 2015, and 1310 veterans (85.2% of the Wave 3 cohort) completed Wave 4 in 2018. The effective sample for this study included 222 veterans who screened positive for current PTSD and/or MDD and did not endorse SI at Wave 1 and completed at least one follow-up assessment. Veterans provided informed consent prior to participation, and the VA Connecticut Health Care System Human Subjects Subcommittee approved this study.

Assessments

A range of sociodemographic (e.g., age, gender, race/ethnicity) and military characteristics (e.g., military branch, enlisted status, number of years in military) were assessed (see Table 1).

Suicidal Ideation. The Patient Health Questionnaire-9 (PHQ-9)[24] assessed for the frequency of SI over the past two-weeks using a two-part question[25]: ''How often have you had thoughts that you would be better off dead?'' (''passive SI'') and ''How often have you had thoughts of hurting yourself in some way?'' (''active SI''). Response options include: 0 = not at all, 1 = several days,

Table 1. Sociodemographic, health, and psychosocial characteristics of U.S. veterans with PTSD and/or MDD who did and did not develop suicidal ideation over a seven-year follow-up period.

	No Incident SI (N = 166) (weighted 72.9%)	Incident SI (N = 56) (weighted 27.1%)	
	N (weighted %) or weighted mean (SD)	N (weighted %) or weighted mean (SD)	Test of difference t or X^2, p
Age	56.5 (16.7)	57.3 (15.6)	0.31, 0.75
Male sex	137 (83.7%)	43 (77.4%)	1.04, 0.31
Caucasian	**132 (78.7%)**	**40 (53.8%)**	**11.67, 0.001**
Bachelor's degree or higher education	66 (31.2%)	18 (23.1%)	1.22, 0.27
Married/partnered	123 (67.4%)	40 (79.2%)	2.62, 0.11
Currently employed	68 (39.0%)	25 (41.5%)	0.10, 0.75
Income > $60 K/year	81 (44.7%)	20 (34.6%)	1.58, 0.21
Branch of military			7.30, 0.063
Army	68 (29.8%)	27 (45.0%)	
Navy	28 (21.3%)	15 (27.5%)	
Air Force	40 (25.5%)	10 (15.7%)	
Marines/Other[a]	30 (23.4%)	4 (11.8%)	
Combat veteran	76 (46.8%)	23 (38.5%)	1.07, 0.30
Number of years in military	7.8 (7.5)	6.6 (6.0)	1.04, 0.30
VA is primary source of healthcare	52 (31.2%)	21 (40.4%)	1.43, 0.23
Trauma/stress			
Number of lifetime traumas	6.5 (3.3)	7.0 (4.0)	0.72, 0.47
Child physical or sexual assault	67 (38.8%)	23 (32.7%)	0.61, 0.43
Perceived stress	**6.2 (2.2)**	**8.0 (3.4)**	**4.26, < 0.001**
Physical health			
Number of medical conditions	3.3 (2.2)	3.1 (2.1)	0.68, 0.50
Somatic complaints	5.0 (4.7)	5.3 (4.6)	0.66, 0.73
Any ADL disability	10 (7.1%)	5 (9.4%)	0.30, 0.59
Any IADL disability	40 (31.2%)	22 (34.6%)	0.20, 0.65
Traumatic brain injury	2 (0.7%)	0 (0%)	0.37, 0.54
Substance use disorder history			
Lifetime alcohol use disorder	90 (50.4%)	35 (65.4%)	3.46, 0.06
Lifetime drug use disorder	40 (17.7%)	13 (19.2%)	0.06, 0.81
Lifetime suicide attempt	**17 (11.3%)**	**10 (26.9%)**	**7.02, 0.008**
Religiosity/spirituality			
Frequency religious service attendance	**3.1 (1.8)**	**2.3 (1.4)**	**2.85, 0.005**
Frequency private spiritual activities	3.6 (2.2)	3.2 (2.2)	0.87, 0.38
Intrinsic religiosity	10.1 (4.0)	9.3 (4.2)	1.25, 0.21
Protective psychosocial characteristics			
Perceived resilience	27.6 (6.1)	25.9 (10.8)	1.32, 0.19
Purpose in life	**21.0 (4.7)**	**17.3 (6.8)**	**4.24, <0.001**
Dispositional optimism	4.5 (1.4)	4.1 (1.9)	1.60, 0.11
Dispositional gratitude	**6.1 (1.2)**	**5.4 (1.8)**	**2.96, 0.003**
Curiosity/exploration	**5.3 (1.4)**	**4.7 (1.9)**	**2.63, 0.009**
Community integration	**3.9 (1.9)**	**3.0 (1.9)**	**2.79, 0.006**

(continued)

Table 1. Continued.

	No Incident SI (N = 166) (weighted 72.9%)	Incident SI (N = 56) (weighted 27.1%)	
	N (weighted %) or weighted mean (SD)	N (weighted %) or weighted mean (SD)	Test of difference t or X^2, p
Social connectedness			
Number of close friends/relatives	**8.0 (11.4)**	**4.8 (4.6)**	**1.97, 0.049**
Secure attachment style	78 (47.5%)	18 (38.5%)	1.26, 0.26
Perceived social support	**18.2 (5.5)**	**15.3 (6.3)**	**3.13, 0.002**
Loneliness	**5.0 (1.8)**	**6.0 (2.0)**	**3.31, 0.001**
Personality characteristics			
Extraversion	3.9 (1.5)	3.9 (1.9)	0.36, 0.72
Agreeableness	4.9 (1.2)	4.7 (1.8)	0.79, 0.43
Conscientiousness	**5.7 (1.2)**	**4.9 (1.3)**	**4.15, <0.001**
Emotional stability	4.7 (1.3)	4.4 (1.6)	1.34, 0.18
Openness to experiences	5.0 (1.2)	4.7 (1.5)	1.82, 0.071
Coping strategies			
Self-distraction	80 (51.1%)	29 (53.8%)	0.12, 0.73
Active coping	35 (18.4%)	8 (15.1%)	0.30, 0.58
Denial	**14 (7.1%)**	**9 (20.8%)**	**7.45, 0.006**
Substance use	28 (17.0%)	13 (21.2%)	0.44, 0.51
Use emotional support	35 (13.5%)	7 (11.5%)	0.13, 0.72
Use instrumental support	8 (5.7%)	1 (1.9%)	1.25, 0.26
Behavioral disengagement	18 (13.5%)	8 (11.3%)	0.16, 0.69
Venting	26 (19.9%)	8 (9.6%)	2.81, 0.09
Positive reframing	24 (12.8%)	4 (13.5%)	0.02, 0.90
Planning	18 (11.3%)	7 (9.6%)	0.12, 0.73
Humor	27 (19.1%)	14 (32.1%)	3.67, 0.06
Acceptance	81 (44.0%)	21 (34.0%)	1.59, 0.21
Religion	50 (32.6%)	17 (30.8%)	0.06, 0.81
Self-blame	25 (14.9%)	9 (11.5%)	0.35, 0.55
Ever received mental health treatment	70 (40.0%)	26 (40.4%)	0.002, 0.96
Currently receiving mental health treatment	36 (19.9%)	12 (15.1%)	0.58, 0.45
Psychotropic medication	26 (12.1%)	10 (11.5%)	0.01, 0.91
Psychotherapy or counseling	22 (14.9%)	8 (9.6%)	0.91, 0.34

Note: Significant predictors of incident SI are highlighted in bold. SI: suicidal ideation; PTSD: posttraumatic stress disorder; MDD: major depressive disorder; SD: standard deviation.

[a]Other military branches include Coast Guard and National Guard.

2 = more than half the days, and 3 = nearly every day. Veterans who responded with a score of 1 or more to either item were considered to screen positive for SI. Cronbach's αs for active and passive SI items at baseline as well as two-, four-, and seven-year follow-up assessments were 0.77, 0.71, 0.79, and 0.83, respectively.

Posttraumatic Stress Disorder. The PTSD Checklist-Specific (PCL-S)[26] was administered to assess past-month Diagnostic and Statistical Manual of Mental Disorders, fourth edition (DSM-IV) PTSD symptoms based on veterans' "worst" traumatic event as assessed using the Trauma History Screen.[27] The PCL-S is comprised of 17-items, with scores ranging from 17 to 85. Probable PTSD was operationalized as ≥ 30 based on previous studies on the diagnostic utility of the PCL among population-based, nontreatment seeking samples.[28,29] Cronbach's α in the current sample was 0.84.

Major Depressive Disorder. The PHQ-2[30] screened for MDD over the previous two weeks based on two core symptoms of MDD—depressed mood and anhedonia.

Scores range from 0 to 6, with scores ≥ 3 indicative of a positive screen for MDD.[30,31] Cronbach's α in the current sample was 0.78.

Psychiatric and Physical Health Difficulties. Lifetime alcohol and drug use disorders were assessed using a self-report version of the Mini Neuropsychiatric Interview (MINI).[32] The MINI assesses for substance use disorders based on DSM-IV criteria. Multiple scales and items assessed for physical health difficulties, including number of medical conditions (i.e., ''Has a doctor or healthcare professional ever told you that you have any of these conditions [e.g., arthritis, cancer, diabetes, heart disease, asthma, kidney disease, traumatic brain injury'']); impairment in activities of daily living (i.e., ''At the present time do you need help from another person to do the following [e.g., bathe, walk around home or apartment'']);[33] and instrumental daily living activities (i.e., ''At the present time do you need help from another person to do the following [e.g., pay bills or manage money]'').

Protective Factors. The following protective social factors were assessed: (1) structural support (i.e., ''About how many close friends and relatives do you have [people you feel at ease with and can talk to about what is on your mind]''); (2) perceived social support (Medical Outcomes Study Social Support Scale)[34]; and (3) secure attachment style (i.e., ''Feeling that it is easy to get close to others and feeling comfortable with them'').[35]

The following protective psychosocial characteristics were assessed: (1) perceived resilience (Connor-Davidson Resilience-Scale-10)[36]; (2) purpose in life (Purpose in Life Test-Short Form)[37]; (3) dispositional optimism (i.e., ''In uncertain times, I usually expect the best'')[38]; (4) dispositional gratitude (i.e., ''I have so much in life to be thankful for;'')[39]; (5) curiosity (i.e., ''I frequently find myself looking for new opportunities to grow as a person [e.g., information, people, resources'']);[40] and (6) community integration (i.e., ''I feel well integrated in my community'').

Religiosity. The Duke University Religion Index[41] is a five-item measure that assesses religious involvement and includes three subscales: (1) frequency of attendance at religious services (i.e., ''How often do you attend church or other religious meetings''); (2) frequency of private religious activities (i.e., ''How often do you spend in private religious activities, such as prayer, meditation or study''); and (3) intrinsic religiosity (e.g., ''I try hard to carry my religion over into other dealings in life'').

Personality Traits. The Ten-Item Personality Inventory[42] is a 10-item self-report brief measure of the ''Big Five'' personality traits of Emotional Stability (i.e., anxious versus confident and calm), Extraversion (i.e., outgoing versus reserved), Openness to Experience (i.e., imaginative and inventive versus cautious and routine-like), Agreeableness (i.e., friendly and cooperative versus detached), and Conscientiousness (i.e., efficient and organized versus careless). Respondents rate these items on a seven-point Likert-type scale (1 = disagree strongly to 7 = agree strongly). Items are paired into five sets of two items. The scale is scored by taking the average of the item pairs after the reversal of the appropriate items. The subscale scores were utilized in the analyses in this study.

Coping Style. Individuals were given a list of 14 coping styles selected from the Brief-COPE[43] which assesses coping reactions and were asked to rank the three that they ''most commonly use'' to deal with their PTSD symptoms. These coping styles include active coping (active steps to deal with the stressor or its effects), use of emotional support (moral support, sympathy or empathy from others), use of instrumental support (advice, information and help from others), planning, positive reframing (interpreting a stressful situation in positive terms), acceptance of the reality of the stressor, humour, tendency to turn to religion in times of stress, self-distraction, denial, substance use, behavioural disengagement (reducing effort and giving up), venting of feelings, and self-blame.[43–45]

Mental Health Treatment. Mental health treatment utilization was assessed with the following question: ''Have you ever received mental health treatment (e.g., prescription medication or psychotherapy for psychiatric or emotional problems)?''. Veterans who replied ''yes'' to this question received two follow-up questions: ''Are you currently taking prescription medication for a psychiatric or emotional problem?'' and ''Are you currently receiving psychotherapy or counselling for a psychiatric or emotional problem?''.

Data Analysis

Data analyses proceeded in three steps. First, we conducted independent-samples t-tests and chi-square analyses to compare sociodemographic, health, and psychosocial characteristics by incident SI status. Second, we conducted a multivariable binary logistic regression analysis to examine sociodemographic, health, and psychosocial characteristics that were independently associated with incident SI. Independent variables included in this analysis were those that were significantly associated with incident SI ($p < 0.05$) in bivariate analyses; given the large number of potential predictors of incident SI that met this significance threshold, a stepwise estimation approach (Forward Wald) was employed. Third, we conducted a relative importance

analysis using R to determine the relative importance of each independent variable (i.e., each factor's relative variance explained (RVE)) in the logistic regression model.[46]

Results

A total of 27.1% of veterans with PTSD and/or MDD who did not endorse SI at Wave 1 developed SI over the seven-year study period. Table 1 shows sociodemographic, health, and psychosocial characteristics of veterans with PTSD and/or MDD who did and did not develop SI over a seven-year period. Relative to veterans who did not develop SI, those who developed SI were more likely to be non-Caucasian and to have attempted suicide in their lifetimes; scored higher on measures of perceived stress and loneliness; and lower on measures of frequency of religious service attendance, purpose in life, dispositional gratitude, curiosity/exploration, community integration, perceived social support, and conscientiousness. They also reported having fewer close friends/relatives and were more likely to report using denial to cope with their ''worst'' traumatic event.

Results of a multivariable binary logistic regression analysis revealed that non-Caucasian race/ethnicity (Wald $X^2 = 9.52$, $p = 0.002$; OR = 3.52, 95% confidence interval [CI] = 1.58–7.87), and lower scores on measures of frequency of religious service attendance (Wald $X^2 = 5.26$, $p = 0.022$; OR = 0.75, 95%CI = 0.58–0.96), purpose in life (Wald $X^2 = 4.38$, $p = 0.036$; OR = 0.89, 95%CI = 0.80–0.99), and conscientiousness (Wald $X^2 = 4.09$, $p = 0.043$; OR = 0.73, 95%CI = 0.54–0.99) were independently associated with incident SI; Nagelkerke's R^2 for full model = 0.25.

Relative importance analysis results revealed that purpose in life (52.3% RVE) and conscientiousness (33.2% RVE) explained the majority of the variance in incident SI, with frequency of religious service attendance (9.2% RVE) and non-Caucasian race/ethnicity (5.3% RVE) explaining relatively less variance in this outcome.

Discussion

This study extends the literature on suicide risk by prospectively examining how a broad range of risk and protective factors may contribute to the development of SI over a seven-year follow-up period in a nationally representative sample of U.S. military veterans with PTSD and/or MDD. A total of 27.1% of these veterans with PTSD and/or MDD who did not endorse SI at baseline developed SI over the seven-year study period, which is substantially higher than prior studies across diverse general population and veteran samples, which have ranged between approximately 2% and 7.5%.[14,17,47] This finding is consistent with prior studies suggesting that individuals with PTSD and/or MDD are at increased risk for SI[5,6] and underscore the importance of routinely assessing, monitoring, and treating suicidal thoughts in this high-risk population.

Several baseline risk and protective factors were independently associated with incident SI. With regard to sociodemographic risk factors, however, only non-Caucasian race was associated with the development of SI, although the relative variance in SI attributable to this variable was small. The fact that only non-Caucasian race emerged as a predictor of incident SI is consistent with a recent meta-analysis on suicide risk, which found that few sociodemographic factors are linked to suicide risk.[13] However, previous findings have been mixed with regard to racial/ethnic status and suicide risk. For example, a review on racial/ethnic differences in SI indicate that while some studies have found that Caucasians are at greater risk of experiencing SI than non-Caucasians, others reveal that level of risk is similar across racial/ethnic groups.[48] It may be that non-Caucasian race was associated with incident SI in this study as a function of the sample characteristics, such as veteran status and trauma history. For instance, a recent study found that among trauma-exposed individuals, Asian Americans had a greater risk of experiencing SI than other groups, including Caucasians.[49] Taken together, these findings underscore the complex relationship between race/ethnicity and SI and the likely interplay of additional individual characteristics in determining suicide risk.

Lower scores on multiple measures of protective factors, including purpose in life, conscientiousness, and frequency of religious service attendance, were most strongly associated with incident SI. Although additional factors have emerged as protective factors when examining SI in general veteran samples (e.g., curiosity, resilience, social connectedness), including in the National Health and Resilience in Veterans Study (NHRVS),[14,17] these findings are consistent with other studies of at-risk populations. Indeed, previous studies have found that low levels of purpose and meaning in life, conscientiousness, and religious service attendance characterize individuals with PTSD and comorbid diagnoses[50] and those who endorse SI or suicide attempts.[14,19,51–54] For example, in a study of veterans with PTSD, difficulty finding purpose or meaning in life was associated with SI,[55] even after controlling for severity of PTSD and depression symptoms. Similarly, lower attendance at religious services has been associated with a greater likelihood of completed suicide attempts in a nationally representative sample.[56] These findings indicate that individuals with PTSD and/or MDD with lower levels of these protective factors may be at greater risk of experiencing or developing SI.

Although these protective factors are diverse and multidimensional, they may help mitigate SI risk by promoting adaptive coping strategies to manage

psychological distress. For instance, aspects of conscientiousness, such as self-discipline and self-control, may reduce impulsivity and other risky behaviors, while enhancing positive coping skills, such as problem-solving.[57,58] Similarly, purpose in life has been inversely associated with known risk factors for SI, such as hopelessness, and positively related to other protective factors, including satisfaction with life and more adaptive regulation of the stress response system.[59–61] Thus, greater levels of certain protective factors may help reduce risk of SI through multiple and overlapping pathways. Additional research is needed to elucidate biopsychosocial mechanisms underlying the relationship between protective factors and SI in veterans with PTSD and/or MDD and other populations at increased risk for suicide.

Unexpectedly, social support variables did not prospectively predict incident SI in this sample. However, religious service attendance, which may be an important source of social support, did prospectively predict SI. It may be that different forms of social support vary in their predictive ability. Indeed, while social support has been negatively related to SI in prior general population-based studies of veterans using the National Health and Resilience in Veterans Study (NHRVS),[14,17] other findings suggest that certain aspects of social support are not associated with SI. For instance, in an Air Force sample, different functions of social support (i.e., tangible, esteem, belonging, and appraisal) did not distinguish service members with and without SI, although SI was associated with lower tangible support in those with high emotional distress.[62] Furthermore, a study of treatment-seeking Iraq/Afghanistan veterans found that screening positive for PTSD or depression significantly diminished the protective effect of social support on SI,[63] suggesting that the buffering effect of social support on SI risk may diminish once individuals reach threshold levels of PTSD or depressive symptoms. Collectively, these findings suggest that social support may be less effective than individual characteristics, such as purpose in life and conscientiousness, in mitigating prospective SI risk in veterans with PTSD and/or MDD. Further research is needed to directly evaluate whether PTSD and MDD status, as well as other disorders linked to SI risk such as alcohol and drug use disorders, may influence the strength of social support and other protective factors in buffering SI risk.

The finding that lower levels of certain protective factors accounted for significant variance in future incident SI supports the ongoing evaluation of protective factors in addition to risk factors when assessing for suicide risk. For instance, within the VA healthcare system, clinical providers routinely monitor SI, and both risk and protective factors are assessed for within the safety evaluation. Current gold-standard treatments for PTSD, such prolonged exposure (PE) and cognitive processing therapy (CPT), as well as interventions for MDD, such as cognitive behavioral therapy (CBT) and acceptance and commitment therapy for depression (ACT-D), may also help reduce SI.[64–67] For instance, in a study that examined changes in SI during PTSD treatment and up to 5 to 10 years posttreatment, results suggested that both PE and CPT were associated with a reduction in SI.[64] Further research is needed to examine the mechanisms underlying the relationship between PTSD and MDD treatment and changes in SI. Given that some studies have demonstrated small to moderate effect sizes; however, adjunctive treatments which directly target certain protective factors may also benefit veterans at risk of suicide.

Results of this study suggest that certain modifiable protective factors, specifically purpose in life and conscientiousness, may be critical targets for suicide prevention efforts in veterans with PTSD and MDD. To this end, researchers have begun to examine whether purpose or meaning in life may be an effective target of treatment for individuals at risk of suicide.[68,69] For instance, the Virtual Hope Box, a smartphone app, aims to instill reasons for living and improve coping skills in veterans at risk for suicide.[70] Conscientiousness may also be enhanced through existing cognitive interventions.[71] Two cognitive techniques, mental contrasting (i.e., imagining future goals and challenges which must be addressed to achieve goals) and implementation intentions (i.e., outlining potential scenarios that may arise during pursuit of goal), have been developed to facilitate goal pursuit, an important aspect of conscientiousness.[71,72] Further research is needed to examine the efficacy of novel intervention strategies aimed at fostering protective factors in veterans with PTSD and/or MDD in mitigating suicide risk.

A number of limitations should be taken into consideration when interpreting results of this study. First, while nationally representative, the NHRVS sample is comprised predominantly of older, male, Caucasian noncombat veterans; thus, results may not generalize to more diverse veteran samples. Second, certain factors were assessed using brief scales and, in some cases, single items. While this allowed for the assessment of a broad range of risk and protective factors, it is possible that certain aspects were not captured given the multidimensionality of the constructs included in this study. Relatedly, the PHQ-9 items assessed SI over the past two weeks, and thus we were not able to capture the dynamic fluctuations associated with SI over the seven-year study period, such as remission from SI. Furthermore, the PCL-S assessed for PTSD using DSM-IV criteria, and thus it is unclear whether our results will replicate when using measures that assess for PTSD according to DSM-5. Third, while this study examined prospective factors associated with incident SI, it was not possible to examine predictors of suicide

attempts given the low incidence of suicide attempts in this sample. Similarly, given the sample size constraints, we were also not able to examine whether risk and protective factors differed based on the type of SI experienced (i.e., active versus passive SI) or whether risk and protective factors for SI differed based on diagnostic status (i.e., PTSD or MDD alone versus comorbid PTSD/MDD). Further research in larger samples would be helpful in addressing these questions.

Notwithstanding these limitations, results of this study have implications for the management of suicide risk, including the importance of evaluating both risk and protective factors in suicide risk assessment, and directly targeting protective factors within suicide prevention and treatment efforts. Further research is needed to examine whether similar risk and protective factors emerge in other at-risk veteran subgroups; to prospectively examine dynamic fluctuations in SI over time; to identify prospective risk and protective factors for suicide attempts; and to develop and evaluate the efficacy of novel suicide prevention and treatment approaches aimed at enhancing modifiable protective factors, such as purpose in life and conscientiousness.

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