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Posttraumatic Stress Disorder (PTSD) and Positive and Negative Social Support as Components of the Interpersonal Psychological Theory of Suicide in the United States Military Veterans

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POSTTRAUMATIC STRESS DISORDER (PTSD) AND POSITIVE AND NEGATIVE SOCIAL SUPPORT AS COMPONENTS OF THE INTERPERSONAL PSYCHOLOGICAL THEORY OF SUICIDE IN UNITED STATES MILITARY VETERANS

by

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ABSTRACT

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by

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Veterans are at a heightened risk for suicide compared to the general population. Suicide risk further increases for veterans with posttraumatic stress disorder (PTSD). The Interpersonal Psychological Theory of Suicide (IPTS) states that a combination of higher perceived burden and lower thwarted belonging increases risk for suicidal ideation (SI), and when SI is present, higher acquired capability for suicide (ACFS) increases risk for suicide attempt. The IPTS is well supported in civilian samples, but understudied in military samples. The current study tested the IPTS, using PTSD severity as a proxy for perceived burden, bothersomeness of negative social support (BNSS) and satisfaction of positive social support (SPSS) as proxies for thwarted belonging, and the original measure of ACFS in 290 military service members/veterans. We observed that higher PTSD and BNSS and lower SPSS were associated with SI and higher suicide risk. BNSS

demonstrated a nearly equivalent association to both SI and total suicide risk compared to SPSS. Neither the combined effect of PTSD severity and BNSS/SPSS on SI nor the combined effect of PTSD severity, BNSS/SPSS and ACFS on suicide risk were significant. Findings suggest that PTSD and SPSS/BNSS may not be useful proxy variables for the IPTS, but that they are useful individual indicators of suicidal behavior. Moreover, given the nearly equivalent association of BNSS and SPSS with suicide risk observed in the current study, clinicians and researchers should attend to both the positive and negative facets of social support in place of measuring social support as a unitary, positive construct.

(54 pages)

PUBLIC ABSTRACT

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Veterans are at a greater risk for suicide compared to the general population. Suicide risk further increases for veterans with posttraumatic stress disorder (PTSD). The Interpersonal Psychological Theory of Suicide (IPTS) states that a combination of higher perceived burden and lower thwarted belonging increases risk for suicidal ideation (SI), and when SI is present, higher acquired capability for suicide (ACFS) increases risk for suicide attempt. The IPTS is well supported in samples of the general population, but understudied in military samples. The current study tested the IPTS, using PTSD severity in place of perceived burden, and bothersomeness of negative social support (BNSS) and satisfaction of positive social support (SPSS) in place of thwarted belonging, and the original measure of ACFS in 290 military service members/veterans. We observed that higher PTSD and BNSS and lower SPSS were associated with SI and higher suicide risk. BNSS demonstrated a nearly equivalent association to both SI and total suicide risk compared to SPSS. Neither the combined effect of PTSD severity and BNSS/SPSS on SI nor the combined effect of PTSD severity, BNSS/SPSS and ACFS on suicide risk were significant. Findings suggest that PTSD and SPSS/BNSS may not be useful variables for testing the IPTS, but that they are useful individually to assess suicidal behavior.

Moreover, given the nearly equivalent association of BNSS and SPSS with suicide risk observed in the current study, clinicians and researchers should attend to both the positive and negative facets of social support in place of measuring only aspects of positive social support.

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CHAPTER I

INTRODUCTION

Within the U.S. Military, suicide is the second leading cause of death with approximately 7,403 veterans completing suicide annually (U.S. Department of Veterans Affairs [V.A.], 2016). In contrast, suicide is the 10th leading cause of death in the U.S. among the general population, with approximately 44,965 Americans completing suicide annually (American Foundation for Suicide Prevention, 2016). Despite representing only 8.5% of the general population, veterans account for over 18% of adult suicides in the U.S. (V.A., 2016). A population-based study of 1.3 million veterans of the Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF) wars observed that deployed veterans were 61% and 41% more likely to commit suicide than nondeployed service members and civilians, respectively (Kang et al., 2015). Given these alarming statistics, it is critical to better understand factors related to suicide in this population. The *Interpersonal Psychological Theory of Suicide* ([IPTS] Joiner, 2005; Van Orden et al., 2010) provides one framework with which to understand the notably high rate of suicide within the military.

The IPTS states that the simultaneous presence of three interpersonal factors, perceived burden, thwarted belonging, and acquired capability for suicide (ACFS), are the mechanisms that drive suicidal ideation (SI) and attempted suicide (Van Orden et al., 2010). Perceived burden is defined as feeling that one does not contribute to the well-being of the group, or that one threatens the well-being of the group. Thwarted belonging is defined as lacking social connectedness with others or perceiving an unmet need of

reciprocal social interaction. ACFS is defined as a sense of fearlessness regarding death and/or pain, or the degree to which a person is capable of tolerating the pain associated with suicidal behavior (Joiner, 2005; Van Orden et al., 2010). The IPTS states that higher perceived burden and lower thwarted belonging are the mechanisms of SI, whereas ACFS is the primary mechanism of the suicide attempt (Van Orden et al., 2010). The interplay of the components of the IPTS are displayed in the Venn diagram shown in Figure 1. The presence of any individual component does not result in suicidal behavior, but rather the combined presence of both components of SI and the capability to complete suicide results in a lethal or near lethal suicide attempt (Joiner, 2005; Van Orden et al. 2010). The IPTS is strongly supported in civilian populations (Christensen, Batterham, Soubelet, & Mackinnon, 2013; Joiner et al., 2009; Van Orden, Witte, Gordon, Bender, & Joiner, 2008), but has received limited research attention in veteran samples, despite the high rates of suicide in this population.

The few studies that tested the IPTS in veteran samples found mixed support. A case study comprised of two military service members observed full support of the IPTS, such that the combined effect of high perceived burden and low thwarted belonging was associated with SI, and the combined effect of high perceived burden, low thwarted belonging, and high ACFS were associated with the greatest risk for a suicide attempt (Anestis, Bryan, Cornette, & Joiner, 2009). A subsequent larger study of 934 military service members/veterans corroborated these preliminary findings, such that acute SI was associated with a combination of high perceived burden and low thwarted belonging, and that suicide attempts were associated with a combination of high perceived burden, low

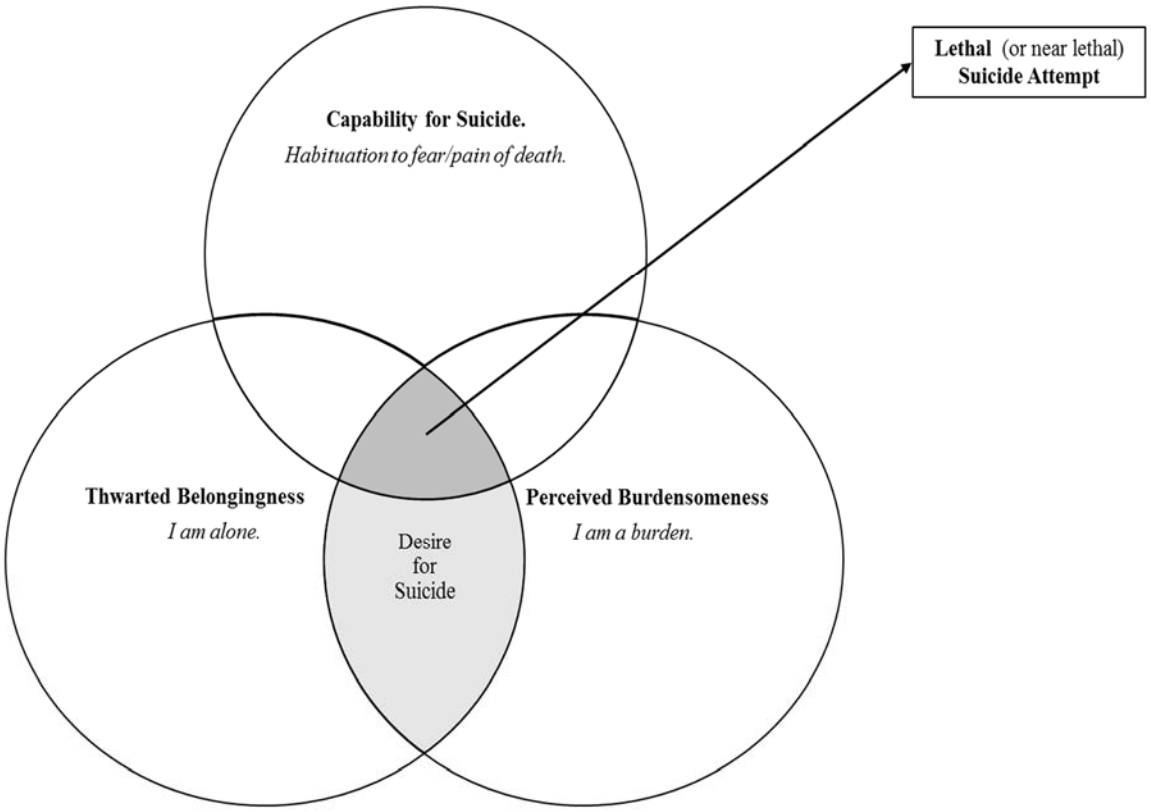

Figure 1. Assumptions of the interpersonal theory of suicide.

thwarted belonging, and high ACFS (Anestis, Khazem, Mohn, & Green, 2015). In contrast, in a sample of 92 female veterans with a history of sexual assault, higher perceived burden and higher ACFS, but not thwarted belonging, were associated with SI (Monteith, Bahraini, Menefee, 2017), suggesting only partial support of the IPTS. Another study found a similar pattern of results in a sample of 133 active duty service members: higher perceived burden and higher ACFS, but not thwarted belonging, were associated with higher risk for suicide (Bryan, Clemens, Hernandez, 2012). The discrepant findings described above may be due to methodological differences in testing the IPTS. Indeed, each study operationalized the three components of the IPTS according to two measures originally developed to empirically test the IPTS (Joiner, 2005; Van

Orden, 2010), though each study statistically tested these associations differently. Another explanation for the discrepant findings observed in military samples is that mental health disorders common in the military, such as posttraumatic stress disorder (PTSD), have symptoms that are associated with impaired interpersonal functioning (Beck, Grant, Clapp & Palyo, 2009; Brewin, Andrews & Valentine, 2000; Cox, Bakker, & Naifeih, 2017; Olatunji, Cisler, &Tolin, 2007; Ozer, Best, Lipsey, & Weiss, 2003) and suicide (Boscarino, 2006; Jakupcak et al., 2009; Wisco et al., 2014), and as such, may have relevance when explaining suicide risk. Such symptoms have not been accounted for in studies examining the IPTS in this population, which may be producing mixed support for this theory.

PTSD is a complex psychological stress disorder that is associated with several symptoms that negatively impact physical health (Olatunji et al., 2007; Sareen et al., 2007), emotion regulation (Cox et al., 2017) social relationships (Brewin et al., 2000; Ozer et al., 2003) and overall quality of life (Olatunji et al., 2007), which may increase perceived burden in veterans. The *Diagnostic and Statistical Manual of Mental Health Disorders* V (DSM-5; American Psychiatric Association [APA], 2013) states that PTSD is a mental health disorder that occurs following exposure to actual or threatened death, serious injury, or sexual violence (APA, 2013). Symptoms of PTSD include re-experiencing, avoidance, negative alterations in mood or cognitions, and reactivity (APA, 2013). Estimates of probable PTSD in Iraq/Afghanistan service members range from 11-18%, which is higher than the 3.5% prevalence estimate observed in civilian samples (Hoge et al., 2004; National Institute of Mental Health, 2016). PTSD is associated with

interpersonal difficulties that significantly diminish quality of life for the individual with PTSD and those that support the individual (Erbes, Meis, Polusny, & Compton, 2011; Gradus, Smith, & Vogt, 2015; Hassija, Jakupcak, & Gray, 2012; Meis et al., 2017). Indeed, those with PTSD may come to view themselves as a burden on those around them. As such, PTSD symptoms may function similarly to perceived burden. Although extant literature has not tested PTSD as perceived burden in veterans, research in 3,157 U.S. veterans observed that those with PTSD are at a heightened risk for SI and suicide attempts compared to veterans without PTSD (Boscarino, 2006; Jakupcak et al., 2009; Wisco et al., 2014). Thus, it may be helpful to evaluate the relative contribution of PTSD symptoms in the IPTS as a proxy for perceived burden.

Veterans with more severe PTSD symptoms consistently report lower perceptions of social support (Brewin et al., 2000; Ozer et al., 2003), which may be related to another component of the IPTS: thwarted belonging. Extant research shows a consistent negative relationship between lower social support and PTSD severity (Ozer & Weiss, 2004; Possemato, Mckenzie, McDevitt-Murphy, Williams, & Ouimette, 2014). Studies of PTSD and social support in which social support is used as the dependent variable consistently find that the interpersonal symptoms of PTSD decrease the availability and helpfulness of social support in veterans. For example, a longitudinal study of 2,249 Gulf War veterans found that higher PTSD symptoms lead to diminishing social support scores over time, with a small effect size (King, Taft, King, Hammond, & Stone, 2006). Several other longitudinal studies with smaller sample sizes and cross-sectional studies also found that more severe PTSD symptoms were negatively related to lower perceived

social support (Barrera, Graham, Dunn & Teng, 2013; Brancu et al., 2014; Brewin et al., 2000; Erbes et al., 2011; Gradus et al., 2015; Iversen et al., 2008; Meis et al, 2017; Ozer et al., 2003).

However, perceiving effective social support can also protect against PTSD severity in veterans. Specifically, many studies show that high social support buffers against the development of PTSD. Studies in which PTSD severity is used as the dependent variable consistently find that high social support is associated with lower PTSD severity. For example, a longitudinal study with 1,008 OEF/OIF veterans found that high levels of social support during deployment and during the post-deployment period were associated with lower levels of newly onset PTSD symptoms (Han et al., 2014). Another longitudinal study of 522 OEF/OIF veterans found support for the buffering effect of social support, with results that showed high levels of social support protected against PTSD symptom severity (Polusny et al, 2009). Several cross-sectional studies corroborated these findings (Debeer, Kimbrel, Meyer, Gulliver, & Morissette, 2014; Goldman et al, 2011; Jakupcak et al., 2010; Pietrzak et al., 2011; Pietrzak, Johnson, Goldstein, Malley, & Southwick, 2009; Sripada et al, 2015; Tsai, Harpez-Rotem, Pietrzak, & Southwick, 2015; Welsh, Olson, Perkins, Travis, & Ormsby, 2015).

Prior research examining the association of PTSD and social support has primarily measured social support as a unitary construct that is positive in nature (see reviews, Brewin et al., 2000; Ozer et al., 2003). However, social support is a multifaceted construct that includes both positive and negative components (Rook et al., 1997). Few studies have examined the negative components of social support and its association with

physical and mental health outcomes, and these studies are circumscribed to civilian samples. Findings show that negative social support is associated with lower perceived physical health (Croezen, Picavet, Haveman-nies, & Verschuren, 2012; Lish et al., 1996; Newsom, Rook, Nishishiba, Sorkin & Mahan, 2005; Newsom, Mahan, Rook, & Krause, 2008), which is a correlate of both suicide risk and PTSD in military populations (Sareen et al., 2007; Wendell et al., 2016). One study of 606 VA-enrolled veterans in a primary care setting found that those who reported more frequent negative social exchanges also reported higher SI (Mavandadi, Rook, Newsom, & Oslin, 2013). Collectively, these results suggest that negative social support may be an important interpersonal variable to consider when examining SI in veterans. Further, in an attempt to better understand the mixed support of the IPTS in military samples, examining both positive and negative components of social support may lead to clarity regarding how thwarted belonging relates to suicidal behavior.

The purpose of the current study was to examine the associations of PTSD severity (i.e., perceived burden), BNSS and SPSS (i.e., thwarted belonging) and ACFS with SI and total suicide risk in male veterans, after accounting for established covariates of suicide in current or past military service members. Covariates of military suicide included age (Miller et al., 2009), race (Leardman et al., 2013), service in the Army (Reger et al., 2015), junior rank (Bryan et al., 2010), and low annual income (Kaplan, Huguet, McFarland, & Newsom, 2007). We hypothesized that (1) the combination of higher PTSD severity and higher BNSS would be associated with the presence of acute SI; (2) the combination of higher PTSD severity and lower SPSS would be associated

with the presence of acute SI; (3) the combination of higher PTSD severity, higher BNSS and higher ACFS would be associated with higher risk for suicide; (4) the combination of higher PTSD severity, lower SPSS and higher ACFS would be associated with higher risk for suicide; (5) the combination of higher PTSD severity, higher BNSS, lower SPSS and higher ACFS would be associated with the greatest risk for suicide.

CHAPTER II

METHODS

Participants

Data were extracted from a larger "parent" dataset (n = 556) that was collected to explore the associations of sexual functioning, military sexual trauma (MST), relationship satisfaction, and physical health in male service members/veterans. As the focus of the current study was suicidal behavior and its associations with proxy variables of the IPTS, only participants who provided data on PTSD severity, bothersomeness of negative social support (BNSS), satisfaction of positive social support (SPSS), acquired capability for suicide (ACFS), acute suicidal ideation (SI), and total suicide risk were included. Of the 556 who consented to participate, 388 (69.8%) completed the measure of PTSD severity. Of those 388, 319 (56.7%) reported data on BNSS and SPSS, and 315 (56.6%) completed both measures of suicide. Twenty-five (4.4%) participants had missing responses across various measures, resulting in a final sample of 290 (52.2%). We explored potential differences between the parent sample and the current sample with regard to demographic variables of age, race (White, non-White), branch of service (Army, other), rank (senior rank/officer, other), annual income (greater than or equal to $50,000/year, less than or equal to $49,999/year), marital status (married, other), and education (at least associates degree, less than associates degree). No significant differences were observed (see Table 1).

Procedure

Participants were recruited using targeted advertisements on Facebook. Participants interested in the study were directed to a secure, anonymous and confidential website (Qualtrics) where they completed preliminary screening items confirming history of military service, relationship status, male sex, and age (18 or higher). Those who passed the initial screening criteria were advanced to an Institutional Review Board Letter of Information, a demographic inventory, and all study measures. No identifying information was collected for the purposes of this study, however to facilitate payment for participation, participants were directed to a separate and confidential online website where they entered their name and address to receive $15 compensation for their participation. The identifying information that was provided for compensation as not linked to the study data in any way.

Measures

Acute SI, one of the outcome variables, was assessed using Item 9 of the *Patient Health Questionnaire-9* (PHQ-9; Kroenke & Spitzer, 2002), which asks "During the previous two weeks, how often have you been bothered by thoughts that you would be better off dead or hurting yourself in some way?" Participants indicated their response using an ordinal scale with the following anchors: 0 (*not at all*), 1 (*some of the days*), 2 (*more than half the days*), and 3 (*nearly every day*). This item was used as a reliable screener for SI in previous studies (Louzon, Bossarte, McCarthy, & Katz, 2016; Simon et al., 2013; Walker et al., 2010), and extant literature indicates that a cutoff score of "1" is

sufficient for detecting SI (Bauer, Chan, Huang, Vannoy & Unützer, 2013; Louzon et al., 2016; Walker et al, 2010. As only 76 (26.2%) participants in the current sample reported any SI, Item-9 was transformed into a binary variable, so that all scores greater than "1" were considered an endorsement of SI.

Total suicide risk for suicidal behavior, the other outcome variable, was assessed using *The Suicidal Behaviors Questionnaire* (SBQ; Osman et al., 2001). The SBQ is a 4-item measure that evaluates established risk factors for future suicidal behavior, such as frequency and intensity of suicidal ideation, previous suicide attempts, and the likelihood of attempting suicide in the future. A sample item includes "Have you told someone that you were going to commit suicide, or that you might do it?" Each response corresponds to a score 1-6, with higher scores indicating greater risk of suicide. Responses were summed for a total score, ranging from 3-18, with scores greater than 7 indicating clinically severe suicide risk (Osman et al., 2001). Previous research examining the psychometric properties of the SBQ shows that the SBQ has good internal consistency, adequate test-retest reliability, and good construct validity (Osman et al., 2001). The SBQ demonstrated acceptable internal reliability in our sample, Cronbach's $\alpha = .81$.

Perceived burden was measured via PTSD symptom severity, which was assessed using *The PTSD Checklist 5* (PCL-5; Weathers et al., 2013). The PCL-5 is a widely used assessment of PTSD symptom severity. A sample item from the PCL-5 includes: "In the past month how much were you bothered by feeling distant or cut off from other people?" Participants indicated the degree to which they were bothered by the 20 symptoms of PTSD as a result of their military experience within the last month using a

Likert scale that ranged from 1 (*not at all*) to 5 (*extremely*). Total scores range from 0-80, with higher scores indicating greater PTSD symptom severity. Scores greater than 31 indicate a probable PTSD diagnosis (Bovin et al., 2015). Extant research examining the psychometric properties of the PCL-5 shows that the measure has excellent internal consistency, adequate test retest reliability, and adequate construct validity (Wortman et al., 2016). The PCL-5 demonstrated excellent internal reliability in our sample, Cronbach's $\alpha = .97$.

Thwarted belonging was measured via BNSS and SPSS, which were assessed using *The Positive and Negative Social Exchanges Scale* (PANSE; Newsom et al., 2005). The PANSE is a 30-item measure used to evaluate the frequency, satisfaction, and bothersomeness of positive and negative social support. Only the eight items that correspond to the BNSS (four total items) and SPSS (four total items) subscales were used in the current study. No frequency items were used in the current study. A sample item from the BNSS subscale is "Over the past month, how bothered were you when someone failed to provide you with help?" A sample item from the SPSS subscale is "Over the past month, how satisfied were you with companionship from your friends and family?" The items were rated using a 4-point Likert scale, with 1 (*not at all bothered/not at all satisfied*) and 4 (*very bothered/very satisfied*). Scores ranged from 0-12 on both the BNSS and SPSS subscales, with higher scores indicating a greater degree of bothersomeness or satisfaction. Extant research on the PANSE demonstrated excellent internal consistency (Newsom et al., 2005). The BNSS and SPSS subscales of the PANSE demonstrated acceptable internal reliability in our sample, with Cronbach's $\alpha =$

.81 and .84, respectively.

ACFS was measured via scores on the *Acquired Capability for Suicide Scale* (ACSS; Van Orden et al., 2008). The ACSS is a 7-item scale that assesses attitude towards death and perceived pain tolerance. Participants were instructed to rate the degree to which each item describes them. A sample item includes "The pain involved in death frightens me." Items were rated using a 5-point Likert scale, with 0 (*not at all like me*) and 4 (*very much like me*). Item responses were summed for a total score and averaged, with scores ranging from 0-5 with higher scores indicated higher capability for suicide. Extant research examining the psychometric properties of the ACSS shows that the ACSS demonstrated adequate internal consistency and good construct validity (Ribeiro et al., 2014). The ACSS demonstrated adequate internal reliability in our sample with Cronbach's $\alpha = .76$.

An inventory designed for the parent study assessed demographic variables of age, race, and total annual income, as well as military service characteristics, including military branch and rank. In our sample, the majority of participants identified as White (83.8%, $n = 243$), reported an annual income greater than or equal to $50,000 (64.1%, $n = 186$), served in the Army (56.2%, $n = 163$), and were senior enlisted service members (64.1%, $n = 186$). For ease of comparison, we transformed these variables into binary categories; race (White, non-White), total annual income (greater than or equal to $50,000, less than or equal to $49,999), military branch (Army, other military branch), and rank (senior enlisted or officer, junior enlisted). Additional demographic information for the sample is available upon request to the first author.

Analytic Plan

Sample characteristics were calculated using descriptive statistics. Bivariate tests assessing the association of PTSD severity, BNSS, SPSS, ACFS, and covariates with acute SI (binary: present/absent) or total suicide risk (linear) were calculated using correlations, independent samples *t* tests, or and chi-square tests where appropriate. A total of five regression analyses were conducted to test the hypotheses described above. In each regression model, PTSD severity, BNSS, SPSS, and ACFS were mean-centered to account for multicollinearity and ease of interpretation when using interactions (Aiken & West, 1991). Covariates included age, race, rank, military branch and annual income. Interaction terms, which were computed by calculating the product of one mean-centered variable by another mean-centered variable, were created to assess the combined association of PTSD severity with BNSS, SPSS, or ACFS as correlates of acute suicide and/or total suicide risk. All analyses utilized a hierarchical regression structure, in which all interactions were entered into the model in subsequent steps to assess their additive effect. Change in model R^2 was examined at each step of every model.

To assess whether PTSD severity, BNSS or SPSS and their interaction were associated with acute SI (Hypotheses 1, 2), two binary logistic regression analyses were conducted using SI as the outcome variable. In Model 1, which tested Hypothesis 1, main effects for PTSD severity and BNSS, as well as covariates were included in Step 1. Step 2 included the interaction term of PTSD severity and BNSS. In Model 2, which tested Hypothesis 2, main effects for PTSD severity and SPSS, as well as covariates were entered in Step 1. Step 2 included the interaction term of PTSD severity and SPSS. To

assess whether PTSD severity, BNSS or SPSS, ACFS, and their interactions were associated with total suicide risk (Hypotheses 3, 4, and 5), three linear regression analyses were conducted using total suicide risk as the outcome variable. Model 3, which tested Hypothesis 3, included main effects for PTSD severity, BNSS, and ACFS, as well as covariates in Step 1. Step 2 included the 2-way interaction terms of PTSD severity and BNSS, PTSD severity and ACFS, and BNSS and ACFS. Step 3 included the 3-way interaction term of PTSD severity, BNSS and ACFS. Model 4, which tested Hypothesis 4, included main effects of PTSD severity, SPSS, and ACFS, as well as covariates in Step 1. Step 2 included the 2-way interaction terms of PTSD severity and SPSS, PTSD severity and ACFS, and SPSS and ACFS. Step 3 included the 3-way interaction term of PTSD severity, SPSS and ACFS. Model 5, which tested Hypothesis 5, included main effects for PTSD severity, BNSS, SPSS, and ACFS, as well as covariates in Step 1. Step 2 included the 2-way interaction terms of PTSD severity and BNSS, PTSD severity and SPSS, PTSD severity and ACFS, BNSS and SPSS, BNSS and ACFS, and SPSS and ACFS. Step 3 included the 3-way interaction terms of a) PTSD severity, BNSS, and ACFS, b) PTSD severity, SPSS, and ACFS, c) PTSD severity, BNSS, and SPSS, and d) BNSS, SPSS, and ACFS. Step 4 included the 4-way interaction term of PTSD severity, BNSS, SPSS, and ACFS.

For each regression analysis, randomness of residuals, multicollinearity, and possible outliers were assessed. Multicollinearity was assessed by examining tolerance statistics and variance inflation factor (VIF) statistics, with values greater than .40 and 2.5, respectively, indicating problematic multicollinearity (Belsley, Kuh & Welsch,

1980). Influential values were determined through close inspection of standardized DFBETAs, with any values greater than 1.0 on primary variables indicating an influential case for that analyses. In cases where influential values were detected, the analysis was rerun with those cases excluded. All analyses were conducted in SPSS V25 (IBM corporation, 2017).

CHAPTER III

RESULTS

The majority of participants in the current study identified as White, reported an annual income greater than or equal to $50,000, reported service in the Army, and being of senior enlisted rank or in the officer class (see Table 1). Average age for the study sample are shown in Table 1. Approximately one-quarter of our sample reported acute suicidal ideation (SI; see Table 2). Further, roughly one third of the study sample reported total suicide risk scores that were above the clinical cutoff for probable suicide risk (Osman et al., 2001; see Table 3). Acquired capability for suicide (ACFS) scores in our sample were comparable to the average item responses in the extant literature in military populations, which shows that military samples report higher ACFS overall than non-military samples (Anestis et al., 2015; Bryan, Morrow, Anestis, & Joiner, 2010; Monteith, Menefee, Pettit, Leopoulos, & Vincent, 2013).

Independent sample *t* tests and chi-square statistics were conducted to examine the bivariate associations of SI with PTSD severity, BNSS, SPSS, ACFS and covariates (see Table 2). Those who endorsed SI reported higher PTSD severity and BNSS, as well as lower SPSS compared to those without SI. There were no significant differences on ACFS, age, race, military branch, rank, or total income for those who endorsed SI compared to those who did not (see Table 2). Correlations between total suicide risk and PTSD severity, BNSS, SPSS, ACFS and age revealed that total suicide risk was positively associated with PTSD severity, BNSS and ACFS with small-to-large effect sizes. SPSS was negatively associated with total suicide risk with a medium effect size.

Table 1

Descriptive Characteristics and t Tests or Chi-Square Statistics for Demographic Variables Comparing the Parent Sample and the Study Sample

	Parent sample (N = 556)				Study sample (n = 290)					
Variable	*n*	%	*M*	*SD*	*n*	%	*M*	*SD*	Chi square	*t* test
Age			38.64	10.44			39.23	11.09		$t(503) = .60, p = .55$
White Race (dummy code = 1)	184	83.60			243	83.80			$\chi^2(507) = .01, p = .91$	
Army Branch (dummy code = 1)	95	57.58			163	56.20			$\chi^2(455) = .08, p = .78$	
Senior Rank/Officer (dummy code = 1)	106	63.80			186	64.10			$\chi^2(456) = < .01, p = .95$	
Annual Income $\geq$ $50,000 (dummy code = 1)	149	67.42			186	64.10			$\chi^2(511) = .60, p = .44$	
Married (dummy code = 1)	159	72.60			226	77.93			$\chi^2(509) = 1.92, p = .17$	
College Educated (dummy code = 1)	121	55.25			178	61.38			$\chi^2(509) = 1.93, p = .16$	

Table 2

Means, Standard Deviations, t Tests or Chi-Square Statistics of PTSD Severity, BNSS, SPSS, ACFS, Age, Race, Military Branch, Rank, and Total Income with Suicidal Ideation

	Endorsed (n = 76)				Not endorsed (n = 214)					
Variable	*n*	%	*M*	*SD*	*n*	%	*M*	*SD*	Chi square	*t* test
PTSD severity			42.49	19.82			16.39	16.59		$t(288) = 11.18, p = <.001$
BNSS			5.71	2.87			3.35	2.87		$t(288) = 6.39, p = <.001$
SPSS			4.43	2.60			6.91	2.48		$t(288) = -7.36, p = <.001$
ACFS			2.69	.92			2.53	.86		$t(288) = 1.33, p = .19$
Age			39.18	10.51			39.24	11.31		$t(288) = -.04, p = .97$
Race									$\chi^2(290) = .95, p = .33$	
White	61	21.03			182	62.75				
Non-White	15	5.17			32	11.03				
Military Branch									$\chi^2(290) = .21, p = .64$	
Army	41	14.14			122	42.07				
Other Military Branch	35	12.06			92	31.72				
Rank									$\chi^2(290) = 1.09, p = .30$	
Senior Enlisted/Officer	45	15.51			141	48.62				
Junior Enlisted	31	10.69			73	25.17				
Annual Income									$\chi^2(290) = 2.56, p = .11$	
≥ $50,000	43	14.82			143	49.31				
≤$49,999	33	11.37			71	24.48				

*N*ote. PTSD = posttraumatic stress disorder; BNSS = bothersomeness of negative social support; SPSS = satisfaction of positive social support; ACFS = acquired capability for suicide.

Table 3

Correlations, Means, and Standard Deviations of PTSD Severity, BNSS, SPSS, ACFS, and Age with Total Suicide Risk

Variable	1	2	3	4	5	6
1. Total suicide risk	--					
2. PTSD severity	.52**	--				
3. BNSS	.37**	.38**	--			
4. SPSS	-.36**	-.41**	-.44**	--		
5. ACFS	.12*	.04	-.06	.03	--	
6. Age	-.03	-.02	-.04	-.05	-.04	--
M	5.93	23.23	3.97	6.26	2.57	39.23
SD	3.23	20.90	2.95	2.74	.88	11.09

Note. PTSD = posttraumatic stress disorder; BNSS = bothersomeness of negative social support; SPSS = satisfaction of positive social support; ACFS = acquired capability for suicide.

* $p = \leq .05$.

** $p = \leq .01$.

*** $p = \leq .001$.

Age was unrelated to with total suicide risk (see Table 3). Independent sample *t*-tests of the dichotomously-coded covariates (i.e., race, military branch, rank, and total income) with total suicide risk revealed that race was negatively associated with total suicide risk, such that non-White participants reported higher total suicide risk compared to White participants. There was no association between total suicide risk and military branch, rank or total income (see Table 4).

Hypothesis 1: SI as a Function of Higher PTSD Severity and BNSS

The overall binary logistic regression of SI on PTSD severity, BNSS, and covariates (Step 1), as well as the interaction of PTSD severity and BNSS (Step 2) was

Table 4

Means, Standard Deviations, and t Tests of Race, Military Branch, Rank, and Total Income with Total Suicide Risk

	Total suicide risk		
Variable	*M*	*SD*	*t* test
Race			$t(288) = -2.00$, $p = .05$
White	5.76	3.13	
Non-White	6.79	3.65	
Military branch			$t(288) = -1.29$, $p = .20$
Army	5.71	2.96	
Other military branch	6.21	3.54	
Rank			$t(288) = -1.50$, $p = .14$
Senior enlisted/officer	5.72	3.24	
Junior enlisted	6.31	3.24	
Total income			$t(288) = -.55$, $p = .58$
$\geq$ $50,000	5.85	3.25	
$\leq$ $49,999	6.07	3.22	

significant, $\chi^2(8)=107.75$, $p = < .001$ (see Table 5). The main effects of PTSD severity and BNSS with SI were significant, such that higher PTSD severity and BNSS were associated with endorsement of SI. None of the covariates in this model were significantly associated with SI. When the interaction of PTSD and BNSS was added into the model in Step 2, model fit improved slightly (see Table 5). The two-way interaction term only approached significance with SI ($p = .09$; see Table 5), suggesting that the combination of PTSD and BNSS was unrelated to suicidal ideation.

Hypothesis 2: SI as a Function of Higher PTSD Severity and Lower SPSS

The overall binary logistic regression of SI on PTSD severity, SPSS, and covariates (Step 1), as well as the interaction of PTSD severity and SPSS (Step 2) was

Table 5

Odds Ratios (OR) and Confidence Intervals (CI) For PTSD, Bothersomeness, Their Interaction and Covariates with Suicidal Ideation

	Step 1		Step 2	
Variable	*OR*	*CI*	*OR*	*CI*
PTSD Severity	1.07*	1.05, 1.09*	1.07*	1.05, 1.09*
BNSS	1.19*	1.06, 1.33*	1.24*	1.10, 1.40*
PTSD x BNSS	--		1.00	.99, 1.00
Age	1.00	.97, 1.04	1.00	.97, 1.04
White Race (dummy code = 1)	.72	.31, 1.65	.75	.32, 1.73
Army Branch (dummy code = 1)	.60	.30, 1.19	.60	.31, 1.19
Senior Rank/Officer (dummy code = 1)	1.17	.55, 2.45	1.20	.57, 2.51
Annual Income ≥ $50,000 (dummy code = 1)	.56	.28, 1.14	.56	.27, 1.13
Nagelkerke R^2	.44		.45	
$R^2\Delta$	--		.01	

Note. PTSD = posttraumatic stress disorder; BNSS = bothersomeness of negative social support; CI = 95% confidence interval; X = interaction term for the specified variables.

* $p = \leq .05$.

significant, $\chi^2(8) = 113.08$, $p = < .001$ (see Table 6). The main effects of PTSD severity and SPSS with SI were significant, such that higher PTSD severity and lower SPSS were associated with endorsement of SI. When the interaction of PTSD severity and SPSS was added into the model in Step 2, model fit did not significantly change (see Table 6). The two-way interaction term was not significantly associated with SI, suggesting that the combination of PTSD and SPSS was unrelated to SI (see Table 6).

Hypothesis 3: Suicide Risk as a Function of Higher PTSD Severity, BNSS and ACFS

The overall linear regression of total suicide risk on PTSD severity, BNSS,

Table 6

Odds Ratios (OR) and Confidence Intervals (CI) For Satisfaction, PTSD Severity, Their Interaction and Covariates with Suicidal Ideation

	Step 1		Step 2	
Variable	*OR*	*CI*	*OR*	*CI*
PTSD Severity	1.07*	1.05, 1.08*	1.06*	1.04, 1.08*
BNSS	.75*	.66, .87*	.76*	.66, .88*
PTSD x SPSS	--	--	1.00	.99, 1.01
Age	1.00	.97, 1.04	1.00	.97, 1.04
White Race (dummy code = 1)	.63	.27, 1.50	.64	.27, 1.51
Army Branch (dummy code = 1)	.61	.31, 1.22	.61	.30, 1.22
Senior Rank/Officer (dummy code = 1)	1.13	.53, 2.40	1.12	.53, 2.39
Annual Income ≥ $50,000 (dummy code = 1)	.53	.26, 1.11	.53	.26, 1.11
Nagelkerke R^2	.47		.47	
$R^2\Delta$	--		.00	

Note. PTSD = posttraumatic stress disorder; BNSS = bothersomeness of negative social support; CI = 95% confidence interval; X = interaction term for the specified variables.

* $p = \leq .05$.

ACFS, and covariates (Step 1), the two-way interactions of PTSD severity and BNSS, PTSD and ACFS, and BNSS and ACFS (Step 2), as well as the three-way interaction of PTSD severity, BNSS and ACFS (Step 3) was significant (F[12,277]=13.17, p = <.001; see Table 7). Inspection of standardized DF betas revealed one outlier within this model. The analysis was conducted without the outlier, which did not change the overall trend of these results. As such, the results presented include the outlier. The main effects of PTSD severity and BNSS with total suicide risk were significant, such that higher PTSD severity and BNSS were associated with higher total suicide risk. ACFS was unrelated to total suicide risk. Those who reported service in a branch other than the Army reported higher total suicide risk. When the two-way interactions of PTSD severity and BNSS,

Table 7

Unstandardized Coefficients and Confidence Intervals (CI) For PTSD Severity, Bothersomeness, Acquired Capability, Their Interaction, and Covariates with Suicide Risk

	Step 1		Step 2		Step 3	
Variable	*b*	*CI*	*b*	*CI*	*b*	*CI*
PTSD severity	.07*	.05, .09*	.07*	.05, .09*	.07*	.06, .09*
BNSS	.22*	.10, .33*	.23*	.12, .35*	.22*	.11, .34*
ACFS	.45*	.09, .80*	.39*	.04, .75*	.31	-.06, .67
PTSD x BNSS	--		.00	-.01, .00	.00	-.01, .00
PTSD x ACFS	--		.01	.00, .03	.01	-.01, .03
BNSS x ACFS	--		.09	-.04, .21	.11	-.01, .23
PTSD x BNSS x ACFS	--		--		.01	.00, .01
Age	-.01	-.04, .02	-.01	-.04, .03	.00	-.03, .03
White race (dummy code = 1)	-.81	-1.65, .03	-.78	-1.62, .07	.80	-1.64, .04
Army branch (dummy code = 1)	-.81*	-1.45, -.17*	-.83*	-1.47, -.19*	-.76*	-1.40, -.13*
Senior rank/officer (dummy code = 1)	-.10	-.81, .61	-.19	-.90, .52	-.24	-.95, .47
Annual income ≥ $50,000 (dummy code = 1)	-.02	-.71, .67	.06	-.64, .75	.06	-.62, .75
R^2	.34		.35		.36	
$R^2\Delta$, *p*			.01, $p = .11$		.01, $p = .05$	

Note. PTSD = Posttraumatic Stress Disorder; BNSS = bothersomeness of negative social support; ACFS = acquired capability for suicide; b = unstandardized coefficient; CI = 95% confidence interval; X = interaction term for the specified variables.

* $p = \leq .05$.

PTSD severity and ACFS, and BNSS and ACFS were entered into the model in Step 2, model fit did not significantly improve (see Table 7). None of the two-way interactions included were significantly associated with total suicide risk, suggesting that the combination of PTSD and BNSS, PTSD and ACFS and BNSS and SPSS were unrelated to total suicide risk. When the three-way interaction of PTSD severity, BNSS and ACFS was entered into the model in Step 3, model fit improved slightly (see Table 7). The interaction of PTSD severity, BNSS and ACFS only approached significance (p = .052), suggesting that the combination of PTSD severity, BNSS and ACFS was not related to total suicide risk. As the p value for the three-way interaction increased with the removal of the outlier, b = .01, 95% CI (.00-.01), p = .06; the three-way interaction was interpreted as nonsignificant (see Table 7).

Hypothesis 4: Suicide Risk as a Function of Higher PTSD Severity, Lower SPSS, and Higher ACFS

The overall linear regression of total suicide risk on PTSD severity, SPSS, ACFS, and covariates (Step 1), the two-way interactions of PTSD severity and SPSS, PTSD and ACFS, and ACFS and SPSS (Step 2), as well as the three-way interaction of PTSD severity, SPSS and ACFS (Step 3) was significant, $F(12,277) = 12.08$, p = <.001 (see Table 8). Inspection of standardized DF betas revealed one outlier within this model. The analysis was conducted without the outlier, which did not change the overall trend of these results. As such, the results presented include the outlier. The main effects of PTSD severity and SPSS with total suicide risk were significant, such that higher PTSD severity

Table 8

Unstandardized Coefficients, and Confidence Intervals (CI), For PTSD Severity, Satisfaction, Acquired Capability, Their Interaction and Covariates with Suicide Risk

	Step 1		Step 2		Step 3	
Variable	*b*	*CI*	*b*	*CI*	*b*	*CI*
PTSD Severity	.07*	.05, .09*	.07*	.05, .09*	.07*	.05, .09*
SPSS	-.23*	-.35, -.10*	-.22*	-.35, -.10*	-.22*	-.35, -.10*
ACFS	.43*	.07, .78*	.41*	.06, .77*	.38	-.01, .77
PTSD x SPSS	--	--	.00	-.01, .01	.00	-.01, .01
PTSD x ACFS	--	--	.01	-.01, .03	.01	-.01, .03
SPSS x ACFS	--	--	.00	-.14, .14	.00	-.14, .14
PTSD x SPSS x ACFS	--	--	--	--	.00	-.01, .01
Age	-.01	-.04, .02	-.01	-.04, .02	-.01	-.04, .02
White Race (dummy code = 1)	-.90*	-1.75, -.06*	-.87*	-1.72, -.03*	-.88*	-1.74, -.03*
Army Branch (dummy code = 1)	-.83*	-1.47*, -.19*	-.84*	-1.49, -.20*	-.83*	-1.48, -.18*
Senior Rank/Officer (dummy code = 1)	-.15	-.86, .55	-.20	-.91, .52	-.20	-.92, .51
Annual Income $\geq$ $50,000 (dummy code = 1)	-.08	-.78, .61	-.07	-.76, .63	-.07	-.77, .62
R^2	.34		.34		.34	
$R^2\Delta$, *p*	--	--	.01, $p = .55$		.00, $p = .69$	

Note. PTSD = Posttraumatic Stress Disorder; SPSS = satisfaction of positive social support; ACFS = acquired capability for suicide; *b* = unstandardized coefficient; CI = 95% confidence interval; X = interaction term for the specified variables.

* $p = \leq .05$.

and lower SPSS were associated with higher total suicide risk. Those who were non-White and those who reported service in a branch other than the Army reported higher total suicide risk. When the two-way interactions of PTSD severity and SPSS, PTSD severity and ACFS, and SPSS and ACFS were entered into the model in Step 2, model fit did not significantly improve (see Table 8). None of the two-way interactions were associated with total suicide risk, suggesting that the combination of PTSD severity and SPSS, PTSD severity and ACFS, and SPSS and ACFS were unrelated to total suicide risk. When the three-way interaction of PTSD severity, SPSS and ACFS was entered into the model in Step 3, model fit did not significantly improve (see Table 8). The three-way interaction term was not significantly associated with total suicide risk (see Table 8), suggesting that the combination of PTSD severity, SPSS and ACFS was not related to total suicide risk.

Hypothesis 5: Suicide Risk as a Function of Higher PTSD Severity, BNSS, ACFS, and Lower SPSS

The overall linear regression of total suicide risk on PTSD severity, SPSS, BNSS, ACFS, and covariates (Step 1), the two-way interactions of PTSD severity and BNSS, PTSD severity and SPSS, PTSD severity and ACFS, BNSS and SPSS, BNSS and ACFS, and SPSS and ACFS (Step 2), the three-way interactions of PTSD severity, BNSS, and ACFS, PTSD severity, SPSS and ACFS, PTSD severity, BNSS and SPSS, BNSS, SPSS and ACFS (Step 3), as well as the four-way interaction of PTSD severity, BNSS, SPSS and ACFS (Step 4) was significant, $F(20,269) = 8.43$, $p = <.001$ (see Table 9). Inspection

Table 9

Unstandardized Coefficients, and Confidence Intervals (CI), For PTSD Severity, Bothersomeness, Satisfaction, Acquired Capability, Their Interaction and Covariates with Suicide Risk

	Step 1		Step 2		Step 3		Step 4	
Variable	*b*	*CI*	*b*	*CI*	*b*	*CI*	*b*	*CI*
PTSD severity	.06*	.05, .08*	.06*	.05, .08*	.07*	.05, .09*	.07*	.05, .09*
BNSS	.17*	.05, .29*	.18*	.06, .30*	.20*	.07, .33*	.21*	.08, .34*
SPSS	-.17*	-.30, -.04*	-.17*	-.30, -.03*	-.19*	-.33, -.05*	-.19*	-.33, -.05*
ACFS	.46*	.11, .81*	.40*	.04, .75*	.36	-.05, .76	.35	-.06, .75
PTSD x BNSS	--	--	.00	-.01, .00	.00	-.01, .01	.00	-.01, .01
PTSD x SPSS	--	--	.00	-.01, .01	.00	-.01, .00	.00	-.01, .00
PTSD x ACFS	--	--	.01	-.01, .03	.01	-.01, .03	.01	-.01, .03
BNSS x SPSS	--	--	-.00	-.04, .04	.00	-.04, .05	.01	-.04, .05
BNSS x ACFS	--	--	.10	-.03, .23	.13	-.01, .27	.14	-.01, .28
SPSS x ACFS	--	--	.02	-.13, .16	.01	-.14, .16	.00	-.15, .15
PTSD x BNSS x ACFS	--	--	--	--	.01	.00, .01	.01	.00, .02
PTSD x SPSS x ACFS	--	--	--	--	.00	.00, .01	.00	-.01, .01
PTSD x BNSS x SPSS	--	--	--	--	.00	.00, .00	.00	.00, .00
BNSS x SPSS x ACFS	--	--	--	--	-.01	-.05, .04	.00	-.05, .05
PTSD x BNSS x SPSS x ACSS	--	--	--	--	--	--	.00	.00, .00
Age	-.01	-.04, .02	-.01	-.04, .02	-.01	-.04, .02	-.01	-.04, .02
White race (dummy code = 1)	-.85*	-1.68, -.01*	-.80	-1.65, .04	-.80	-1.65, .05	-.81	-1.66, .04
Army branch (dummy code = 1)	-.81*	-1.44, -.18*	-.83*	-1.46, -.19*	-.82*	-1.47, -.18*	-.82*	-1.47, -.18*
Senior rank/officer (dummy code = 1)	- .05	-.76, .65	-.13	-.84, .58	-.22	-.93, .50	-.22	-.94, .49
Annual income $\geq$ $50,000 (dummy code = 1)	-.05	-.73, .63	.04	-.65, .73	.09	-.60, .77	.09	-.60, .78
R^2	.35		.37		.38		.38	
$R^2\Delta$, *p*	--		.01, $p = .41$		.02, $p = .15$		.00, $p = .62$	

Note. PTSD = posttraumatic stress disorder; BNSS = bothersomeness of negative social support; SPSS = satisfaction of positive social support; ACFS = acquired capability for suicide; *b* = unstandardized coefficient; CI = 95% confidence interval; X = interaction term for the specified variables.

* $p = \leq .05$.

of standardized DF betas revealed two outliers within this model. The analysis was conducted without each outlier, which did not change the overall trend of these results. As such, the results presented include both outliers. The main effects of PTSD severity, BNSS, and SPSS with total suicide risk were significant, such that higher PTSD severity and BNSS and lower SPSS were associated with higher total suicide risk. Those who reported service in a branch other than Army reported higher total suicide risk. When the two-way interactions of PTSD severity and BNSS, PTSD severity and SPSS, PTSD severity and ACFS, BNSS and SPSS, BNSS and ACFS, and SPSS and ACFS were entered into the model in Step 2, model fit did not improve, and none of the two-way interactions were associated with total suicide risk, suggesting that the combination of PTSD severity and BNSS, PTSD severity and SPSS, PTSD severity and ACFS, BNSS and SPSS, BNSS and ACFS, and SPSS and ACFS were not related to total suicide risk. When the three-way interactions of PTSD severity, BNSS, and ACFS, PTSD severity, SPSS and ACFS, PTSD severity, BNSS and SPSS, BNSS, SPSS and ACFS were entered into the model in Step 3, model fit did not improve (Table 9), and none of the three-way interactions were associated with total suicide risk, suggesting that the combination of PTSD severity, BNSS, and ACFS, PTSD severity, SPSS and ACFS, PTSD severity, BNSS and SPSS, BNSS, SPSS and ACFS were unrelated to total suicide risk. When the four-way interaction of PTSD severity, BNSS, SPSS and ACFS was entered into the model in Step 4, model fit did not improve (Table 9). The four-way interaction term was not associated with total suicide risk, suggesting that the combination of PTSD severity, BNSS, SPSS and ACFS was unrelated to total suicide risk.

CHAPTER IV

DISCUSSION

The goal of the present study was to examine the Interpersonal Psychological Theory of Suicide (IPTS) in a military sample using proxy variables for perceived burden and thwarted belonging. In our study, PTSD severity was used as a proxy for perceived burden and bothersomeness of negative social support (BNSS)/satisfaction of positive social support (SPSS) were used as proxy variables for thwarted belonging. This is the first study to our knowledge to utilize this approach to empirically test the IPTS. Findings from the current study demonstrated that higher PTSD severity and BNSS and lower SPSS were individually associated with higher acute suicidal ideation (SI) and suicide risk. Contrary to hypotheses, the combination of PTSD severity, BNSS, SPSS and ACFS did not result in higher SI or suicide risk. Interestingly, SPSS and BNSS demonstrated a roughly equivalent association with both SI and total suicide risk. This association has several important implications both for clinicians assessing suicide risk and future research investigating suicidal behavior and social support.

Facets of negative social support are understudied in extant military research, but our results suggest that negative social support may be an important factor to consider when examining risk for suicidal behavior. Indeed, the few studies that have examined negative social support have utilized civilian samples and observed associations with various negative outcomes, such as poor physical health (Newsom et al., 2008), and marital distress (Gottman, 1999). Further, one study using a military sample observed that negative social support was associated with SI (Mavandadi et al., 2013). Such

findings bolster the hypothesis that social support is a multi-faceted construct with positive and negative dimensions (Newsom et al., 2005, 2008; Rook et al., 1997, and that our understanding of social support may be limited due to extant research measuring social support unitarily. Future research should develop and incorporate more multifaceted measures of social support, so that we may increase our understanding of social support's association with mental health outcomes. Clinicians treating individuals at risk for suicide may consider including assessments of both positive and negative aspects social support in order to better understand the impact of social support on their client's suicidal behaviors. Such assessments may improve the identification of underlying concerns regarding perceptions of negative relationships that were previously unassessed and are contributing to a client's target problem.

The current study also observed that higher PTSD severity and lower SPSS were related to endorsement of SI and higher total suicide risk. These findings are consistent with previous research, showing that those who report higher PTSD symptoms and lower perceptions of positive social support report higher SI (Debeer et al., 2014; Elbogen et al., 2018; Gradus et al., 2015; Jakupcak et al., 2009) and demonstrate higher suicide risk (Jakupcak el al., 2010; Leardmann et al., 2013; Raines et al., 2017; Ramsawh et al., 2014; Wisco et al., 2014). Taken together, findings suggest that clinicians should routinely be assessing for suicidal behavior when PTSD symptoms and low perceptions or satisfaction with positive social support are present. Researchers who wish to study suicidal behavior in veterans should also account for the effects of PTSD symptoms and low perception of positive social support.

Our results also demonstrated that ACFS was unrelated to SI and total suicide risk after accounting for the effects of other variables in our models. One explanation for the lack of a relationship between our outcome variables and ACFS is that ACFS may be elevated across the entire sample, rather than only in the portion of our sample that is at risk for suicidality. It is possible that military experiences, such as exposure to combat and basic training, may contribute to higher ACFS in suicidal and non-suicidal military populations. Indeed, when compared to civilians, military veterans tend to report higher levels of ACFS, regardless of their risk for suicide, suggesting that military populations may have increased their ACFS as a function of their experiences in the military (Bryan et al., 2010). Further, previous research found that greater exposure to combat experiences was associated with higher ACFS (Bryan, Cukrowicz, West & Morrow, 2010). Although not all service members are exposed to combat, all military service members/veterans must undergo basic training, where they learn to tolerate frequent intense physical discomfort and perform their duties under life threatening circumstances (e.g. in a hostile combat theatre). This training not only increases military service members' tolerance of pain and but also sets an expectation that a regularity of their occupation is to tolerate high levels of physical discomfort and life-threatening situations (Anestis, Bryan, Cornette, & Joiner, 2009; Knapik et al., 1998). Taken together, it is possible that experiences such as combat exposure and basic training may serve to increase service member's ACFS regardless of their suicide risk, and may thus be contributing to the mixed support for the IPTS in military populations.

Our findings demonstrated that the combined effects of PTSD severity, BNSS,

and SPSS, which were used as proxy variables for perceived burden and thwarted belonging, were unrelated to SI. This is consistent with previous studies of the IPTS in military samples that observed no significant effect on SI as a function of the combined effect of high perceived burden and thwarted belonging using traditional measures of these constructs (Bryan et al., 2010; Monteith et al., 2017). These findings, in combination with our results, suggest that thwarted belonging and perceived burden may function differently in military samples relative to civilian samples, given the wider spread support of the IPTS in civilian samples (Christensen et al., 2013; Joiner et al., 2009; Van Orden et al., 2008). Alternatively, it is possible that differences in statistical methods across studies of the IPTS in military samples may be contributing to the lack of consistent findings. As we did not include traditional measures of thwarted belonging and perceived burden in the current study, additional research may be needed to better understand the lack of uniform support in military samples.

The lack of uniform support of the IPTS in military samples may also be due to unique experiences associated with military service that influence perceived burden and thwarted belonging. One such experience includes moral injury. Moral injury occurs following an experience in the line of duty in which a soldier perpetrates, witnesses, or fails to prevent an action that transgresses a deeply held belief about themselves, or their values (Litz et al., 2009). Moral injury may occur in response to specific experiences that a service member/veteran can face during deployment, such as combat-related killing, war-atrocities (e.g. unnecessary cruelty, inhumane treatment of others, lethal violence), post-battle aftermath (e.g. seeing/handling bodies following orchestrated explosions)

(Litz et al., 2009). An individual who experiences moral injury may come to view themselves as inherently evil, damaged beyond repair, or that they exist in a nefarious world (Litz et al., 2009). Thus, moral injury may relate perceived burden in that perpetrating or failing to prevent a morally injurious experience may increase service members'/veterans' perception of themselves as being a fundamentally flawed or evil person, who is thus a burden to the well-being of those around them. Additionally, moral injury is often accompanied by a deep sense of shame and guilt, which may have behavioral implications that influence thwarted belonging. More specifically, shame, which involves extensive fear/worry of negative evaluation from others, may decrease a person's willingness to engage in effective social behavior, thus decreasing a person's sense of belonging (Dyer et al., 2017; Fergus, Valentiner, McGrath, & Jencius, 2010; Kim, Thibodeau & Jorgenson, 2011; Øktedalen, Hoffart, & Langkaas, 2015). Taken together, perceived burden and thwarted belonging may be separately influenced by moral injury, which may explain the lack of a combined effect of high perceived burden and thwarted belonging on SI.

Although informative, the present study is not without limitations. We did not seek to recruit a clinically distressed sample and as a result we had a low overall number of participants with SI and clinically at-risk suicidality. Our study was also limited by our use of cross-sectional data, which limited our ability to infer any causal relationships, or assess changes over time. Our study was limited in our use of self-report measures. Each of these limitations should be addressed in future research as we seek to develop a more adequate and inclusive model of suicidal behavior that fits the unique experiences of the

military population. Future studies may consider alterations to both study design and inclusion of variables when testing the IPTS among military populations. For example, future researchers may wish to recruit a clinically distressed sample of military service members/veterans, which would be more appropriate for accurately testing the IPTS. Such samples may more clearly elucidate the differences in the components of the IPTS, and the impact of unique military experiences on those components between each group. Future studies may also consider the relative contributions of moral injury, combat exposure, and military training as correlates of suicide risk.

In conclusion, our study did not find support for the combined effect of perceived burden, thwarted belonging, and ACFS on suicide risk in a sample of male service members/veterans. However, our results showed that lower SPSS and higher BNSS and PTSD were associated with higher suicide risk. Further, our results offer preliminary evidence that negative social support is at least as important as positive support in the context of suicide. Our lack of significant associations, in combination with previous studies showing only partial support of the IPTS in military samples (Bryan et al., 2010; Monteith et al., 2017), suggest that it is possible that the IPTS may need to be modified to consider the influence of unique military experiences as risk factors for suicide.

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