The Purple Heart and Suicidal Behaviors in Post-9/11 U.S. Army Combat Veterans with a Traumatic Brain Injury: A Mixed Methods Study

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THE PURPLE HEART AND SUICIDAL BEHAVIORS IN POST-9/11 U.S. ARMY COMBAT VETERANS WITH A TRAUMATIC BRAIN INJURY: A MIXED METHODS STUDY

A Dissertation
Submitted to Duquesne University

Duquesne University

In partial fulfillment of the requirements for
the degree of Doctor of Philosophy

By
Jayna Moceri-Brooks

August 2022
THE PURPLE HEART AND SUICIDAL BEHAVIORS IN POST-9/11 U.S. ARMY
COMBAT VETERANS WITH A TRAUMATIC BRAIN INJURY: A MIXED
METHODS STUDY

By

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Approved June 27, 2022

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ABSTRACT

THE PURPLE HEART AND SUICIDAL BEHAVIORS IN POST-9/11 U.S. ARMY COMBAT VETERANS WITH A TRAUMATIC BRAIN INJURY: A MIXED METHODS STUDY

By
Jayna Moceri-Brooks
August 2022

Dissertation supervised by Linda Garand, PhD, RN, CGNS-BC

Military suicide rates remain high, despite years of targeted efforts to prevent suicide. Specifically, Army Combat Veterans who sustained a traumatic brain injury (TBI) while deployed in support of the Global War on Terrorism are at the highest risk for suicide. This dissertation highlights possible causes for suicidal behaviors within this unique group and provides specific military suicide prevention recommendations. The dissertation is organized into three publishable manuscripts: The first manuscript (Chapter 1) is a mixed-methods dissertation research proposal written according to the National Institute of Health proposal guidelines. The second manuscript (Chapter 2) is an integrative review of the literature (under review by an academic journal) identifying what is known about suicidal behaviors among Post-9/11 Combat Veterans through the lens of the Interpersonal Theory of Suicide. The third manuscript (Chapter 3) reports the results of the mixed methods study (under review by an academic journal). To our knowledge, this study is the first to identify the values, beliefs, and
meaning of the Purple Heart among Post-9/11 Army Combat Veterans with a TBI and examine the relationship between not receiving the Purple Heart and suicidal behaviors. This manuscript also identifies specific, actionable policy changes that may prevent suicidal behaviors among Post-9/11 U.S Army Combat Veterans with a TBI.
DEDICATION

This dissertation is dedicated to Post-9/11 Combat Veterans and their families. Your sacrifices will never be forgotten.
I am grateful to everyone who contributed to this dissertation. First and foremost, I thank my committee Chair, Dr. Linda Garand (Duquesne University) and committee members Dr. Kathy Sekula (Duquesne University) and Dr. Thomas Joiner (Florida State University) for their mentorship and support.

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Suicidal Behaviors Among Post-9/11 U.S Army Combat Veterans with a Traumatic Brain Injury:

Does the Purple Heart Medal Make a Difference?

Dissertation Research Proposal

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Specific Aims

Traumatic brain injuries (TBI) are the “signature injuries” of the U.S. post-9/11 conflicts, are uniquely “invisible” relative to other combat injuries, and are a prominent suicide risk factor (Fonda et al., 2017). The Department of Defense (DoD) and the Defense and Veteran's Brain Injury Center estimate that 22% of all combat casualties from these conflicts are brain injuries, compared to 12% of Vietnam related combat injuries (Military Health System, 2020). The symptoms of TBI have wide-ranging physical and psychological effects (physical, sensory, mood, cognitive, and/ or behavioral symptoms) (Brenner et al., 2009). In addition to these symptoms, active duty service members and Veterans with a deployment-related TBI are four times more likely to attempt suicide than those without a TBI (Fonda et al., 2017). In this proposal, current and former service members with combat experience are referred to as Combat Veterans.

Combat Veterans with a TBI generated by enemy fire are eligible for the Purple Heart Award (Army Human Resources Command, 2019). Despite the importance of commendation in the military culture (Army Human Resources Command, 2019), being awarded or denied the Purple Heart Award for combat injuries, has not been studied in the context of suicide behaviors. A large proportion of post-9/11 Combat Veterans sustained a TBI in combat and returned to fight without a medical evaluation of their injury (Zwerdling & Miller, 2010). Consequently, thousands of Combat Veterans received a TBI diagnosis after they returned home and were denied the Purple Heart Award because the TBI was not documented at the time of the injury (Zwerdling & Miller, 2010). Anecdotally, these Combat Veterans describe their continued battle with “invisible” symptoms such as short-term memory loss, irritability, and visual changes; their
stories have a reoccurring theme of abandonment, anger, and isolation (personal communication, 2015).

The Interpersonal Theory of Suicide was developed to help explain why people desire to end their life, as well as how they develop the capability to do so (Van Orden et al., 2010). The components of the theory are thwarted belongingness, perceived burdensomeness, and the acquired capability for suicide (Van Orden et al., 2010). Thwarted belongingness refers to feeling socially disconnected from other people, and perceived burdensomeness is the feeling of being a burden on others to the point they believe their loved ones would be better off without them (Van Orden et al., 2010). The interpersonal constructs of thwarted belongingness and perceived burdensomeness contribute to suicidal ideation and require the capability to make a lethal attempt at suicide. The acquired capability for suicide develops when an individual no longer fears death or has a lower threshold for pain. This can occur as a result of near-death experiences, violence, and/or multiple painful events (Van Orden et al., 2010), which are all common occurrences in combat environments.

Military studies using the Interpersonal Theory of Suicide (Van Orden et al., 2010) as a guiding framework show that post-9/11 Veterans have risk factors for suicide that are unique to their combat experiences (Martin et al., 2020). Researchers also found that thwarted belongingness and perceived burdensomeness predict suicidal ideation in Army service members (Anestis et al., 2015). It is important to determine if receipt of the Purple Heart Award provides a sense of belonging to those who receive it. If so, not receiving the Purple Heart Award may be an important factor to consider in military suicide risk among Veterans and service members with a combat-related TBI.
This proposed convergent mixed method study will use the Interpersonal Theory of Suicide framework to examine thwarted belongingness and perceived burdensomeness levels, as well as suicidal ideations and attempts (i.e., suicide behaviors) among \( \approx 85 \) post-9/11 Army Combat Veterans with a combat-related TBI. The qualitative strand will explore aspects of military culture, including recognition and awards, and the quantitative strand will examine relationships between receipt of the Purple Heart Award, domains of the Interpersonal Theory of Suicide model (thwarted belongingness and perceived burdensomeness), interpersonal hopelessness, institutional betrayal, quality of life, and suicide behaviors among Combat Veterans with a combat-related TBI.

The specific aims of the study are to: 1) determine the values, beliefs, and meaning of the Purple Heart award among post-9/11 Army Veterans with a combat-related TBI, 2) determine if there are differences in self-reported suicide behaviors among Combat Veterans with a TBI who did, versus did not, receive a Purple Heart Award for their combat-related injury. Secondary aims of the study are to explore associations between the Purple Heart Award, thwarted belongingness, perceived burdensomeness, interpersonal hopelessness, institutional betrayal, quality of life, and suicide behaviors among Army Combat Veterans with a TBI.

The proposed study may be the first study to document what the Purple Heart award means to Army Combat Veterans and may elucidate underlying causes of suicidal behaviors in this population. Results of the proposed study have the potential to influence military policies regarding awards and recognitions. It is possible that military commendations are protective against suicide in this population.
Significance

**Suicide Among U.S. Military Combat Veterans**

Veteran and service members’ suicide rates remain higher than the civilian population at 24.8 per 100,000 and 18.2 per 100,000, respectively (Department of Defense, 2019). Even higher rates of suicide (29.0 per 100,000) are seen among Combat Veterans who deployed in support of the post-9/11 conflicts (Bullman et al., 2018). Among the various military branches, Army and Marine Combat Veterans have the highest rates of suicide at 30.3 per 100,000 (Bullman et al., 2018). This higher rate of suicide corresponds with these two branches deploying the greatest number of ground troops to the Middle East (post-9/11) conflicts (Military Health System, 2020).

Estimates suggest that more than 400,000 post-9/11 Combat Veterans sustained a TBI while deployed to the Middle East (Military Health System, 2020). As noted earlier, Combat Veterans with a deployment-related TBI have a four-times higher rate of suicide attempts than Combat Veterans without a deployment-related TBI (Fonda et al., 2017). These high suicide rates persist, despite targeted suicide prevention efforts by the Veterans Administration (VA) and DoD over the last ten years (*Veterans Suicide Prevention*, 2019).

Suicide has a far-reaching impact, both emotionally and financially, on families, friends, fellow service members, and society (Cerel et al., 2015). It is devastating for families to welcome their Soldier home from combat, only to lose them to suicide (Giacomo, 2019). Consequently, suicide risk transfers to the family and friends since people who experience the loss of a loved one by suicide are more likely to contemplate suicide themselves (Cerel et al., 2015).
Risk Factors for Suicide Among Combat Veterans

Many studies have examined risk factors within the military population (Pompili et al., 2013). Post-traumatic stress disorder (PTSD), firing a weapon or killing someone in combat (Tripp et al., 2016) chronic pain (Blakey et al., 2018), depression (Shura et al., 2019), and traumatic brain injuries (TBI) (DeBeer et al., 2017; Fonda et al., 2017; Gradus et al., 2015; Schneider et al., 2016; Shura et al., 2019) have been identified as contributors or predictors of suicide behaviors. However, the relationship between suicide behaviors and TBI in the military population is not fully understood. A better understanding of interpersonal risk factors for military suicide may assist in developing targeted strategies for prevention and early intervention.

The Interpersonal Theory of Suicide and the Military

The Interpersonal theory of suicide (ITS) (Van Orden et al., 2010) is well-suited for military populations as the components are particularly relevant to members of the military. The concept of thwarted belongingness mirrors the sense of “brotherhood/sisterhood” within this population (Substance Abuse and Mental Health Services Administration, 2010). The notion of being a burden (i.e., perceived burdensomeness) is counter to military training that teaches self-reliance and the importance of helping others (Substance Abuse and Mental Health Services Administration, 2010). Further, Combat Veterans with a TBI have the capability to complete suicide (acquired capacity for suicide) due to the traumatic, near-death experience of sustaining a TBI, as well as experiences on the battlefield such as witnessing injuries and deaths of fellow soldiers and/or civilians (Bryan et al., 2012; Bryan & Cukrowicz, 2011).
Research Utilizing the Interpersonal Theory of Suicide among Combat Veterans

Military studies grounded in the Interpersonal Theory of Suicide reveal that elevated levels of thwarted belongingness and perceived burdensomeness predict suicidal ideation in Army service members (Anestis et al., 2015). Interpersonal Theory of Suicide research focused on post-9/11 Combat Veterans identified unique risk factors among this group. There is a correlation between the acquired capacity for suicide and combat exposures (Bryan, Hernandez, et al., 2013), specific combat experiences (Butterworth et al., 2017), and number of deployments (Bryan & Cukrowicz, 2011; Kramer et al., 2020). Thwarted belongingness also directly correlates with combat experiences and is impacted by interpersonal experiences during and after combat deployments (Bryan et al., 2013a, Bryan et al., 2013b, Martin, 2020). For example, thwarted belongingness levels increased when a service member experienced a moral injury or betrayal by a fellow Soldier during the deployment (Houtsma et al. (2017). Interestingly, the effect was specific to witnessing or hearing about actions by another Soldier (Houtsma et al., 2017). Self-initiated transgressions (causing a moral violation) did not impact thwarted belongingness (Houtsma et al., 2017). Further, post-deployment support moderates the association between moral injuries and thwarted belongingness (Houtsma et al., 2017).

Important risk factors for high levels of thwarted belongingness and perceived burdensomeness are high depression symptom levels (Bryan et al., 2010), high levels of betrayal (Martin et al., 2017), and PTSD (Bryan et al., 2010). PTSD is directly associated with thwarted belongingness and perceived burdensomeness, as well as suicide rates and combat experience (Bryan et al., 2010). These studies reveal that PTSD has indirect pathways to suicide and demonstrates how this theoretical framework provides a deeper understanding of risk factors for suicide.
The articles cited above provide important insights regarding relationships between combat experience and suicide. However, an integrated review of the literature (under development) identified only ten published studies (to date) that used the Interpersonal Theory of Suicide to understand suicide risk exclusively among Combat Veterans within different branches of service (Allan et al., 2019; Bryan & Anestis, 2011; Bryan et al., 2012; Bryan & Cukrowicz, 2011; Bryan et al., 2010; Bryan, Hernandez, et al., 2013; Butterworth et al., 2017; Houtsma et al., 2017; R.L. Martin et al., 2020; Martin et al., 2017). The limited number of studies using the Interpersonal Theory of Suicide to understand suicide within this high-risk group demonstrates that researchers have only just begun to explain why Combat Veterans attempt or think about suicide (suicidal ideation).

**Extending the Interpersonal Theory of Suicide to Combat Veterans with a TBI**

Some of the more prominent risk factors of suicide within the military, such as having a TBI (Fonda et al., 2017), have not been directly studied using the Interpersonal Theory of Suicide framework. Although some of the studies using the Interpersonal Theory of Suicide framework included participants with a self-reported combat-related TBI, there was no discussion of the Interpersonal Theory of Suicide constructs in relation to the injury (Bryan & Anestis, 2011; Bryan et al., 2012). Thus, it is unclear what role, if any, TBIs played in the study findings (Bryan & Anestis, 2011; Bryan et al., 2012). Regarding interpersonal experiences in combat, it is unclear how Combat Veterans experience betrayals while deployed (Houtsma et al., 2017; Martin et al., 2017). Researchers have yet to determine if a Combat Veteran’s feelings of betrayal are connected to their injuries, or if the thwarted belongingness or perceived burden (ITS constructs) are associated with “invisible” injuries such as a TBI (such as how the injury
occurred, recognition of the injury, and receiving care for the injury). These questions need to be explored to have a better understanding of suicidal behaviors in Combat Veterans with a TBI.

**Toward a Better Understanding of Military Commendation and Suicidal Behaviors**

Very little is known about how military awards, recognitions, and promotions impact Combat Veterans. One study described the impact of the Purple Heart Award on Veterans, though not regarding suicide specifically. This large-scale study (n=10,255) examined mortality rates (from all causes) among Veterans who served in World War II and the Korean War (Kimbrell et al., 2011). Researchers compared the mortality rates between Veterans with and without PTSD who did, and did not, receive the Purple Heart Award. Veterans who received the Purple Heart Award (with and without PTSD) had a 50% lower mortality rate than Veterans who did not receive the Award (Kimbrell et al., 2011). This landmark study reveals that the Purple Heart Award may be a relevant variable to explore with post-9/11 Combat Veterans.

The Purple Heart is the only military award for being injured in combat and is awarded during or after deployments. Service members with a TBI caused by enemy fire are eligible for the Purple Heart Award (Army Human Resources Command, 2019). However, tens of thousands of post-9/11 Veterans sustained a TBI and returned to the fight without a medical evaluation of their injury (Tanielian & Jaycox, 2008; Zwerdling & Miller, 2010). This was due in part to a lack of understanding of concussion injuries caused by blast waves (Tanielian & Jaycox, 2008; Zwerdling & Miller, 2010). Thus, many service members received TBI diagnoses long after they returned home and were denied the Purple Heart Award by the military because the injury was either not documented overseas, or medical documents were lost or destroyed.

Anecdotally, Veterans describe their continued post-concussive battle with “invisible” symptoms such as short-term memory loss, irritability, tinnitus, headaches, and visual changes
In addition to physical symptoms, Veterans also express feelings of loneliness, frustration, abandonment, and isolation related to their injury, which may link to the interpersonal components of the Interpersonal Theory of Suicide. Combat Veterans who were denied the Purple Heart Award also mention feeling “betrayed” by the military (personal communication, 2020). This description is interesting, considering the connection between betrayal, thwarted belongingness, and perceived burdensomeness (Martin et al., 2017).

In contrast, Combat Veterans who received the Purple Heart Award for their TBI describe how the award validated their invisible injury and was an important conduit for receiving care (personal communication, 2020). Therefore, it is important to explore what this commendation means to Combat Veterans, and to determine if receipt of the Purple Heart provides a sense of belonging to those who receive it. It is possible that this recognition prevents feelings of betrayal or is a conduit for post-deployment support. If so, denial of the Purple Heart among Combat Veterans with a TBI may be an important factor to consider in military suicide risk. The proposed study will address these important considerations.

**Proposed Study and its Contribution to Science**

The proposed study is in line with the priorities of the National Institute of Mental Health to identify underlying causes of suicide and lower suicide rates (2020). The study is grounded in the Interpersonal Theory of Suicide and acknowledges that the Army is a unique military subculture. The Interpersonal Theory of Suicide literature will be extended by exploring relationships among military commendation, thwarted belongingness, perceived burden, institutional betrayal, quality of life, and suicidal behaviors with an exclusive/specific population (Army Combat Veterans at high risk for suicide). Additionally, the study is designed to test a newly identified construct; interpersonal hopelessness (Tucker et al., 2018). This construct
supports the Interpersonal Theory of Suicide model, but it has not been evaluated in a military sample (Tucker et al., 2018). Lastly, the proposed study is designed to gather descriptive data specific to combat experiences, promotions, and military culture that may provide additional insight surrounding suicidal behaviors in this high-risk group.

Findings from the proposed study may help to explain why there is a strong relationship between TBI and suicidal behavior (Fonda et al., 2017) and provide insight into how aspects of military culture impacts Combat Veterans. Regardless of the study outcomes, insights gained may inform suicide prevention interventions and direct future studies. In the short term, this study will help to identify if receiving the Purple Heart Award is protective against suicidal behaviors. If it is protective, this type of recognition may be protective against suicidal behaviors and may serve as a conduit for Combat Veterans to receive care for their injury. In the long-term the proposed study will extend the literature by exploring associations between the Purple Heart Award, thwarted belongingness, perceived burdensomeness, interpersonal hopeless, institutional betrayal, quality of life, and suicidal behaviors among Army Combat Veterans with a TBI. This study may provide direction for future studies and prompt a more urgent effort by the VA and DoD to identify service members who may not yet know they sustained a TBI in combat.

**Military Policy Implications**

The proposed study findings may influence military policies regarding how the Purple Heart is awarded to Veterans with a combat-related TBI. It may also inform policies that would expand TBI screening, education, and medical or rehabilitative care. Additionally, policy recommendations may arise from learning about other aspects of military culture, such as awards, promotions, and retirement, as they are explored in the qualitative arm of the proposed
study. Policies that promote consistent recognition within the military may serve as suicide preventive measures.

**Innovation**

Military suicide research has historically focused on risk factors, tailoring suicide prevention programs accordingly (Department of Defense, 2019). Unfortunately, these programs have not lowered the suicide rate in over a decade (Department of Defense, 2019). Thus, the proposed study will take a different approach to understanding the path to suicide using a mixed methods design. This study will be framed within a cultural perspective, identifying how military values, beliefs, and practices within the military system impact this population. This approach has the potential to reveal a more complete picture of why Combat Veterans with a TBI contemplate or attempt suicide.

Military culture and values are engrained in service members and Veterans and vary across service branches, yet suicide has not been explored looking for direct connections to military culture. Investigators often group military branches together without identifying the unique cultural differences between branches and then attempt to generalize findings across the military (Allan et al., 2019; Bryan & Anestis, 2011; Bryan et al., 2010). The proposed study will challenge the current practice by studying only one military branch. The Army was selected because they deployed the most Combat Veterans to the post-9/11 conflicts and consequently have the highest prevalence of TBIs and suicide rates across the military (Military Health System, 2020).

The effect of receiving or being denied military commendations has not been studied in the context of TBI and suicidal behaviors. This may be the first study to explain what the Purple Heart means to Combat Veterans and may offer other meaningful insights regarding how aspects
of the military culture impact Combat Veterans. This holistic approach offers a new paradigm from which to study military suicide.

**Approach**

**Research Design**

The proposed convergent parallel mixed methods study will examine suicidal behaviors among post-9/11 Army Combat Veterans with a TBI, in context of military culture. The proposed qualitative strand (n ≈ 15) is a focused ethnographic study to gain insight into the values, beliefs, and meaning of the Purple Heart Award. This method is context-specific and can explain phenomena within cultures and subcultures (Holloway & Galvin, 2017). The proposed quantitative strand (n ≈ 70) will be a cross-sectional descriptive study using a survey to explore the relationship between Purple Heart status and suicidal behaviors. The associations between the Purple Heart Award, thwarted belongingness, perceived burdensomeness, interpersonal hopelessness, institutional betrayal, quality of life, and suicidal behaviors will also be explored. The qualitative and quantitative data will be collected simultaneously, analyzed separately (qualitative first), and then merged. The two types of data are important to potentially explain findings from each strand and provide a deeper insight into suicidal within this high-risk group.

**Setting**

The study will be conducted primarily in Fort Knox, Kentucky (KY) and virtually worldwide. Fort Knox is an active-duty Army post that is south of Louisville set on 109,000 acres of land. Service members from all over the country travel to Fort Knox for military training, especially during the summer months. The headquarters for the Army Human Resources Command (AHRC), Recruitment Command, Reserve Officers Training Corps (ROTC), and V Corps of the Army are all at Fort Knox. In addition, military promotion boards,
leader training events, and conferences are frequently held at this installation. Retired Combat Veterans frequent Fort Knox to visit the Veteran’s Affairs clinic, work in civilian jobs, and/or for tax-free shopping.

**Sample**

Post-9/11 Army Combat Veterans will be invited to participate in both strands of the study based on the following inclusion criteria: Served, or are currently serving in the U.S. Army, have been deployed to Iraq or Afghanistan in support of a combat mission (such as Operation Iraqi Freedom or Operation Enduring Freedom), and have a self-reported TBI or concussion injury caused by enemy fire (either directly or indirectly) while deployed. All participants will be over the age of 18, congruent with military service age requirements. No participants will be excluded based on gender, or race/ethnicity. Participants will be excluded from study participation if they are actively receiving inpatient mental health care. Efforts will be made to balance the sample (i.e., target mix of 1:1 with and without the Purple Heart) so that comparisons can be drawn between the two groups of Veterans.

**Recruitment**

Recruitment will take place primarily at Fort Knox, KY, and extend globally since Combat Veterans work in positions (both military and civilian) around the world. Potential study participants will learn about both strands of the proposed study (separately) through IRB-approved flyers distributed not only at key locations at Fort Knox, but also worldwide in workplaces or common areas on other active duty or National Guard military posts, on Veterans’ websites, and via e-mail from the gatekeepers.

The gatekeepers may include chaplains, healthcare personnel, and high-ranking officers at AHRC and in V Corps on Fort Knox and in Europe; a Command Sergeant Major at Fort
Carson, CO; a Staff Sergeant in Texas; a General in the Oregon National Guard; a military
Neurologist in Florida; the Military and Veterans liaison at Duquesne University; military
researchers; and military spouses. In addition, service members and Veterans will assist with
recruitment via the snowball method by word of mouth, e-mail, or social media. For the
quantitative strand, the primary investigator (PI) will also recruit in person by attending the first
five minutes of meetings or training classes on Fort Knox to briefly describe the study, answer
any questions, and pass out flyers with a QR code linked to the IRB-approved study consent
form. Finally, the PI will recruit within each strand, informing participants of the opportunity to
participate in both strands of the study.

Study Instruments and Measures

Qualitative Strand

The qualitative strand of the study will be conducted either in person (following CDC
Covid-19 prevention guidelines) or via videoconference using Zoom. Qualtrics survey software
will be used to gather demographic data on gender, age, education level, ethnicity, marital status,
military status, military rank, and whether participants have received the Purple Heart Award.
The interviews will last approximately 60-90 minutes, using a semi-structured interview guide
based upon Leininger’s sunrise model (Leininger & McFarland, 2006). This model provides a
comprehensive view of the dimensions of culture, such as values and beliefs, political factors,
social factors, and biological factors (Leininger & McFarland, 2006). Observable data will be
collected through field notes. The semi-structured interview guide is included in Appendix A
(see p. 36).

Quantitative Strand
Qualtrics survey software will be used to collect all self-reported data for the quantitative strand of the study. The survey will include demographic and descriptive questions asking about Combat Veterans’ military experience and brain injury, such as military status, military rank, number of deployments, deployment location, number of suspected TBIs, years the TBIs occurred, and health care received for the injury. In addition, the survey will include five instruments (described below). The complete survey is included in Appendix B (see p.38).

**Thwarted Belongingness and Perceived Burdensomeness.** The Interpersonal Needs Questionnaire-15 (INQ-15) will measure the interpersonal components of the Interpersonal Theory of Suicide; nine-items measure thwarted belongingness and six-items measure perceived burdensomeness on a seven-point scale Likert scale (Gutierrez et al., 2016; Van Orden et al., 2012). Answers range from “not at all true for me” to “very true for me” with scores ranging from 15-105. No cut-score has been established, but higher thwarted belongingness and perceived burdensomeness scores are predictive of suicide attempts in military samples (Anestis et al., 2015; VanOrden et al., 2012), demonstrating sound construct validity. This instrument consistently demonstrates strong internal validity in military samples with Cronbach alphas over 0.89 for both thwarted belongingness and perceived burdensomeness (Butterworth et al., 2017; Gutierrez et al., 2016) and has been shown to be reliable in military samples (Chu et al., 2017).

**Interpersonal Hopelessness.** The Interpersonal Hopelessness Scale (IHS) is a 10-item instrument that measures current feelings of hopelessness about experiencing thwarted belongingness and perceived burdensomeness, on a four-point Likert scale (Tucker et al., 2018). Responses can range from “definitely false” (0) to “completely true” (4). Scores range from 0-40. A cut-score has not been established, but higher thwarted belongingness and perceived burdensomeness scores are associated with higher levels of IH. The sentinel study testing IH
demonstrated a three-way interaction between IH, thwarted belongingness and perceived burdensomeness to predict suicidal ideation and suicide attempts (Tucker et al., 2018). The IHS had a strong internal consistency of $\alpha = 0.95$ in a sample of college students (Tucker et al., 2018). This proposed study may be the first to use the IHS to extend the Interpersonal Theory of Suicide literature within a military sample.

**Suicidal Behaviors.** The Suicidal Behavior Questionnaire-Revised (SBQ-R) is a 4-item tool that will be used to measure suicidal behaviors; previous suicide attempts, how often suicidal ideation occurs, and the likelihood of attempting suicide in the future (Gutierrez et al., 2016). Each item is rated on a five or six-point Likert scale with answers ranging from “never” to “very often/likely.” Scores range from 3-18. No cut-score has been determined in the literature, but higher scores reveal more pronounced previous or current suicidal behavior. The internal consistency of the instrument in a mirroring sample of Combat Veterans was $\alpha = 0.78$ (Bryan, Hernandez, et al., 2013) and has shown to be effective in separating suicidal and non-suicidal groups within a civilian sample (Osman et al., 2001).

**Institutional Betrayal.** The Institutional Betrayal Questionnaire-2 (IBQ2) consists of 14 items used to identify if individuals feel, or have felt, betrayed by large systems (i.e. the military) (Smith, 2017). There are three subscales in the IBQ2: the environment that leads to the trauma, institutional response to the trauma, and institutional belongingness after the trauma (Monteith et al., 2021). The tool provides examples next to each item referring to a “healthcare institution.” For the proposed study, the words “healthcare institution” will be replaced with the words “military institution.” For the first twelve questions, respondents indicate the number of statements they agree with related to betrayal by the institution. The thirteenth item is on a three-point Likert scale ranging from “not at all” (0) to “very much” (3). The final question is
dichotomous (yes/no). Scores range from 0-16. No cut-score has been determined, but higher scores reveal higher levels of feeling betrayed. This measure demonstrated strong convergent and discriminant validity in a sample of female Veterans who experienced a sexual assault (Monteith et al., 2021) and an internal consistency of $\alpha = 0.95$ in a sample of female military Veterans (Monteith et al., 2016). However, the IBQ2 has not been psychometrically tested in male Combat Veterans.

**Quality of Life.** The Quality of Life After Brain Injury Scale (QOLBIS) (von Steinbüchel et al., 2010) has 6 items and measures the satisfaction level of an individual’s life since the brain injury occurred. Each answer ranges from “not at all” to “very much” on a five-point Likert scale. Total scores range from 6-30, with higher scores revealing a higher (more positive) quality of life. Initial psychometric testing of this instrument demonstrated an internal consistency of $\alpha = 0.75$ to 0.89 and test-retest reliability of 0.78 to 0.85 in a cross-cultural civilian study (von Steinbüchel et al., 2010). No psychometric testing of this instrument with a military population has been published.

**Data Collection Procedures**

**Qualitative Strand**

Qualitative data will be collected primarily from interviewing Combat Veterans. Additional data will be collected through first-hand observation around Fort Knox and through observations made during the interviews. These observations may include notes on the participant’s environment, appearance, and non-verbal cues. Video files, audio files, and interview transcripts will be stored in the password protected Zoom cloud and saved on a password protected file on the PI’s computer. The field notes and digital recorder will be kept in a locked drawer in the PI’s home office and the consent forms and demographic information will
be stored on Qualtrics with the protection of a password and username only known by the PI. When the Qualtrics data is transferred to an Excel spreadsheet, all participant names will be replaced with unique numbers so the names and contact information of participants will remain separate from the study data.

Once a potential participant contacts the PI (by e-mail or telephone) indicating interest in the study, the PI will determine their eligibility to participate either with an e-mail message, or telephone call (depending on how they contacted the PI originally). If eligible for study participation, the PI will request their e-mail address to send a copy of the study consent form and study links. Next, the PI and participant will schedule a mutually agreeable time and place (if in person) to review the study consent form and conduct the interview.

Before the interview and after introductions, the PI will review the study consent form and obtain a signature on the form before starting the interview. A copy of the signed consent form will be sent or given to the participant (either electronically or a paper copy) for his or her files. Then, the participant will be asked to provide demographic information using a study link. Once the consent is signed and the demographic information is provided, the PI will request verbal permission to record the interview. If the participant does not give permission to be recorded, the interview will proceed in person or via Zoom without recording the conversation. If, at any point, the participant appears to be in, or expresses emotional distress, the PI will ask if they would like to stop the interview. The PI will respect the wishes of the participant to either stop the interview or continue.

Quantitative Strand

Potential participants will access the screening (inclusion/exclusion criteria) survey by either scanning a QR-code on the IRB-approved flyer with their mobile phones or by entering
the URL link on their mobile device or computer. For those Combat Veterans that qualify for the study, a link will take them directly to the study consent form. Similar to the qualitative strand, the consent form will indicate the purpose of the study, requirements for participation, measures taken to ensure confidentiality, and the risks and benefits of participation. The Veterans’ crisis line telephone number and the PI’s name and contact information will be provided at the end of the consent form. If they wish to proceed after reading the consent form, participants will be prompted to digitally sign the consent form. At that time, they will have the option to download and save the consent form to their mobile device. Once consent is provided, participants will be able to click “next” to access the survey. The survey will have approximately 84 questions and is expected to take 15-20 minutes to complete.

**Compensation and Process for Collecting E-mails for Future Studies**

If funding allows, participants will be compensated for their time with a twenty-dollar electronic gift card. Participants within the qualitative strand will receive the gift card in the follow-up e-mail from the PI. They will also have the opportunity to give verbal consent to be contacted for future studies at the end of each study interview. Their response will be recorded via Zoom or digital recorder. If participants agree to be contacted for future studies, their e-mail address will be entered into a database to start an Army Combat Veteran research registry.

Participants of the quantitative strand will be directed to a separate Qualtrics link once they complete the survey. This link will ask for the participant’s email address to receive a gift card. If the participant provides their e-mail address, the PI will e-mail an electronic gift card either directly or through a third party, such as Amazon. This process ensures that study data cannot be linked to the participants.
Once participants submit their e-mail address to receive an electronic gift card, they will see a message asking them to provide their e-mail address, once again, if they would like to be contacted to learn about future studies. When study participants provide an e-mail address, their digital signatures will be collected, and their names and e-mail addresses will be entered into the Army Combat Veteran research registry. Participant e-mail addresses within both study strands will be destroyed no later than five years after the study is complete, unless participants agree to be contacted for future studies.

**Sample and Sampling Procedures with Power Analysis**

In the qualitative strand, \( \approx 15 \) participants will be interviewed, or as many are required for data saturation. For the quantitative strand, according to a G-Power analysis, a sample of 57 participants will be necessary to obtain a 95% confidence interval (CI) of +/- 5% (Bland et al., 2012). Approximately 70 participants will be recruited to power the quantitative strand of the study.

**Plans for Data Analysis**

**Qualitative Analysis**

Leininger’s four phases of data analysis will be employed in the qualitative strand of the study to address aim one: To determine the values, beliefs, and meaning of the Purple Heart medal among Post-9/11 Army Veterans with a combat related TBI. During phase one of data analysis, the primary investigator (PI) will collect and review the raw data and field notes, double checking the transcripts for errors. In phase two, the PI will code and categorize the data using NVivo12 (computer assisted qualitative data analysis software). Phase three will focus on finding and identifying patterns from data retrieved from observations, interviews, and demographic questions. The Qualtrics data analysis tool will be used to look for patterns in the
demographic data. Finally, the PI will identify themes and highlight new findings (Leininger & McFarland, 2006). Although there are four phases to analyzing qualitative data, the collection and analysis of data will occur concurrently. Data collection will cease when data saturation occurs. Saturation will be determined when new participants are no longer providing new information during the interviews. The PI will maintain an audit trail to show how decisions are made throughout the study. This practice will promote and maintain transparency. Once the qualitative data analysis is complete, the quantitative data will be analyzed. This order of analysis is important to reduce the chance for bias during the quantitative analysis (Creswell & Plano Clark, 2018).

**Quantitative Analysis**

When the quantitative analysis commences, data from the surveys will be exported from Qualtrics to an Excel spreadsheet, checked for errors, and then imported into SPSS and/or JAMOVI statistical software for analysis. The first step of data analysis will be to run a descriptive test to examine the distributions of the data to identify any outliers. Then correlations will be tested to identify if the Purple Heart Award and suicidal behaviors are significantly correlated. Once that is complete, the analysis will be a traditional linear regression where the variables will be input simultaneously because the estimated coefficients are the unique relationship between the individual independent variable (Purple Heart Award) and the outcome variable (suicidal behaviors). Given the exploratory nature of this study, alpha is set at 0.10 (Sletto & Meehl, 1955). The specific model to be tested is: Purple Heart Award as the dichotomous independent variable, coded as no or yes, and suicidal behaviors (total SBQ-R scores) as the continuous outcome variable.
Once the primary aim has been addressed, the PI will conduct a traditional multiple regression analysis to address the secondary aim, which is to determine if there are associations between the Purple Heart Award, thwarted belongingness, perceived burdensomeness, interpersonal hopelessness, quality of life, betrayal (independent variables), and suicidal behaviors (outcome/dependent variable). The first step of data analysis will be to run a descriptive test to examine the distributions of each continuous variable (thwarted belongingness, perceived burdensomeness, interpersonal hopelessness, quality of life, and betrayal) and identify any univariate outliers. Then correlations will be tested to identify if any of the variables are highly correlated with one another. Once that is complete, the variables will be input into the regression model simultaneously because the estimated coefficients are the unique relationship between the individual independent variables (Purple Heart Award, thwarted belongingness, perceived burdensomeness, interpersonal hopelessness, quality of life, and betrayal) and the outcome variable (suicidal behaviors). Secondly, stepwise or block type of entering of variables can capitalize on chance and overfit data (Schreiber, in press; Tabachnick & Fidel, 2001). Given the exploratory nature of this study, alpha is set at 0.10 (Sletto & Meehl, 1955). The specific model to be tested is: The Purple Heart Award as the dichotomous independent variable, coded as no or yes, and thwarted belongingness, perceived burdensomeness, interpersonal hopelessness, quality of life and betrayal as the continuous independent variables. Suicidal behavior is the continuous outcome variable.

After each analysis is run (to address the primary and secondary aims) multicollinearity will be checked through the VIF, autocorrelation will be checked by Durbin-Watson, and residuals will be examined with Mahalanobis distance and Center Leverage values, along with standardized residual plots, e.g., heteroscedasticity (Schreiber, in press; Tabachnick & Fidel,
2001). Any problematic variables or residuals will be examined individually and decision to remove will be based on if the results are being affected. Independent variable(s) where the p-value does not pass the alpha value threshold of 0.10 will still be retained in the model unless the variable(s) are affecting the results, such as the standardized coefficients are larger than the raw correlations. Additionally, those variables will be retained because the assumption that they are not important cannot be ascertained with a one sample one time point data set. Only replications can provide evidence that an independent variable is not associated with an outcome variable across multiple data sets (Schreiber, in press).

If the model within each analysis is a good fit, explaining at least 30% of the variance (r-squared of .30 or higher) (Schreiber, in press), then a coefficient table will be developed and reviewed. The beta coefficients will be used to determine the magnitude of prediction for the independent variables at or below the alpha value (.10). For every one unit increase in the predictor, the outcome variable will increase or decrease by the magnitude of the unstandardized beta coefficient. A follow-up residual analysis will accompany this test to look for any potential multi-variate outliers skewing the results and the effect size will be calculated. The PI will rely on the effect size (.30 or greater) to determine whether there are true associations between the variables in each analysis (Schreiber, in press).

**Merging the Strands**

After the quantitative strand is analyzed, the PI will examine the qualitative findings to see if they explain associations found in the quantitative strand. The PI will also identify if results from either strand contrast the other. Findings will then be merged together in a comprehensive discussion noting convergence or divergence of the data (Creswell & Plano
Clark, 2018). Findings that cannot be merged will also be reported and may inform the recommendations for future studies.

**Study Limitations and Potential Problems with Proposed Procedures**

The proposed study has several limitations. The cross-sectional design of the quantitative strand does not allow for cause and effect inferences or to determine if participant responses change over time (Creswell & Plano Clark, 2018). In addition, TBIs and suicidal behaviors will be self-reported and not accompanied by medical documentation. Further, using non-psychometrically tested tools (IHS and IBQ2) may limit the validity of the findings. Moreover, this study may not be generalizable across military branches due to the unique culture of each military branch.

The main potential problem with the proposed procedures is recruiting enough participants for the study. Also, it may be difficult to recruit an equal (or near equal) number of Combat Veterans with and without the Purple Heart Award to be able to discern potential differences between each group. The COVID-19 pandemic has intermittently closed businesses and workplaces, thereby limiting the ability to have in-person contact with others. This could make recruitment with the use of flyers challenging. In addition, the PI may not be allowed to hand out flyers or attend meetings in-person to describe the study due to COVID-19 restrictions. If this occurs, the PI will focus on virtual recruitment via e-mail or web announcements with the assistance of gatekeepers and use of snowball methods.

Another potential issue is enrolling Army Combat Veterans with time required for completing an interview and/or survey. Although the interview is estimated to take 60 to 90 minutes and the survey will take approximately 15 to 20 minutes, active duty and Reserve/National Guardsmen/women have rigorous training cycles and deploy overseas which
cause them to be away from the internet and/or unable to devote their limited time to anything outside of their household. Thus, the PI will map out training schedules (with the assistance of the gatekeepers) to recruit within military units at appropriate times.
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Chapter 2

Exploring the Interpersonal Theory of Suicide Among Post-9/11 U.S. Combat Veterans: An Integrative Review

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Abstract

This integrative review expands on the work of Kramer et al. (2020), by reviewing studies that examined the interpersonal constructs of the Interpersonal Theory of Suicide to understand suicide behaviors (i.e., suicidal ideation and/or suicide attempts) among service members and Veterans with combat experience. Very few studies (n=9) in the literature were identified, however important relationships were revealed between combat exposure/experiences, thwarted belongingness, perceived burdensomeness, and suicidal behaviors among military samples. Studies also reported risk factors for high levels of thwarted belongingness or perceived burdensomeness in military samples, such as betrayal and aggression. This review highlights the value of the Interpersonal Theory of Suicide in understanding suicide among this high-risk population and demonstrates the need for more studies to examine suicide behaviors among Combat Veterans using the ITS framework.

Keywords: combat veterans, Interpersonal Theory of Suicide, suicide behaviors, military, post-9/11

Public Significance Statement: This article describes what we know about root causes of suicidal behaviors (ideation and/or attempts) among Post-9/11 U.S. Combat Veterans. The authors also describe gaps in knowledge and make recommendations for future research.
Introduction

Problem Identification and Significance

Suicide rates among U.S. military Veterans and service members remain higher than the civilian population, despite Department of Defense (DoD) and Veteran’s Administration (VA) efforts to lower them (Department of Defense, 2019). Estimates suggest that active duty military suicide rates are 24.8 per 100,000, compared to the civilian suicide rates of 18.2 per 100,000 (Department of Defense, 2019). Even higher rates of suicide are seen among service members who deployed in support of the post-9/11 conflicts (i.e., the Global War on Terrorism, from 2001 to 2012), with 25.7 suicides per 100,000 National Guard/ Reserve service members and 29 suicides per 100,000 active-duty service members (Bullman et al., 2018). When compared to suicide rates in the general U.S. population, National Guard/ Reserve Post-9/11 Veterans are 29% more likely to die by suicide and active-duty Post-9/11 Veterans are 56% more likely to die by suicide (Bullman et al., 2018).

The literature identifies risk factors for suicide behaviors (i.e., ideation and/or attempts) among Post-9/11 Combat Veterans, such as having a traumatic brain injury (Fonda et al., 2017), post-traumatic stress disorder (Blakey et al., 2018), depression, and insomnia (Bryan et al., 2015). Studies identified that Combat Veterans have higher suicide rates but have not explained why Combat Veterans have higher rates of suicide than other service members (without combat experience) and civilians. A theoretical framework is necessary to guide researchers in understanding suicide behaviors within the military and developing targeted strategies for early identification and preventive intervention.

The Interpersonal Theory of Suicide (ITS), also known as the Interpersonal-Psychological Theory of Suicide (IPTS), was developed to explain why people desire to end
their life, as well as how they develop the capability to do so (Joiner, 2005). The three components of the theory are thwarted belongingness, perceived burdensomeness, and the acquired capability for suicide (Joiner, 2005). Thwarted belongingness refers to feeling socially disconnected from other people and perceived burdensomeness is the feeling of being a burden on others, to the point they believe their loved ones would be better off without them. An acquired capability of suicide develops when an individual no longer fears death or has a lower threshold for pain. The capability for suicide can result from near-death experiences or experiencing violence or multiple painful events (Joiner, 2005). The 25-item Interpersonal Needs Questionnaire (INQ) (Van Orden et al., 2012) was developed to measure the interpersonal constructs of the ITS theory, however, researchers use several different abbreviated versions of the INQ.

Specific Aims

A systematic review of the literature was recently published that focused exclusively on the acquired capability for suicide and how it is used in studies involving U.S. military service members and Veterans (Kramer et al., 2020). The authors specifically included Combat Veteran studies and reported correlations between the acquired capability for suicide and combat exposures (Bryan, Hernandez, et al., 2013), specific combat experiences (Butterworth et al., 2017), and the number of deployments a service member has experienced (Bryan & Cukrowicz, 2011) (Kramer et al., 2020). The purpose of this integrative review is to expand on the work of Kramer et al. (2020) by focusing on studies examining the interpersonal constructs of the ITS (i.e., thwarted belongingness and perceived burdensomeness) to understand suicide behaviors (i.e., suicidal ideation and/or suicide attempts) among service members and Veterans. Aims of this review are as follows: a) to determine relationships between combat exposure/experiences,
thwarted belongingness, perceived burdensomeness, and suicidal behaviors among military
samples; (b) to identify risk factors for high levels of TB or PB in military samples, (c) to
organize studies in this review using different versions of the INQ to compare study findings;
and (d) to make recommendations for future research.

Methods

This IR was conducted using the Whittemore and Knafl Integrative Review method
(2005). This method is a rigorous approach to promote a thorough reporting of the state of the
science on a given topic. The steps in this process are problem identification, literature search,
data evaluation, data analysis, and presentation (Whittemore & Knafl, 2005).

Literature Search

A comprehensive search of literature was conducted with the guidance of an experienced
medical librarian. Articles were identified through advanced data searches in PubMed, APA
PsychInfo, Academic Search Elite, and EMBASE. The precise literature search terms are:
*Interpersonal Theory of Suicide or Interpersonal psychological theory of suicide or acquired
capability for suicide or perceived burdensomeness or thwarted belongingness and suicide* or
ptsd, or traumatic brain injury* or concussion and armed forces personnel or combat or
military* or soldier or veteran or operation Iraqi freedom or operation enduring freedom.
Ancestry searching was also conducted to ensure that scholarly articles were not overlooked.

Inclusion and Exclusion Criteria

Articles were included if the authors used the Interpersonal Theory of Suicide (ITS) as a
framework for understanding suicide among a sample of U.S. Combat Veterans and if they used
psychometrically sound and/or reliable version of the INQ instrument to measure the
interpersonal ITS constructs. Articles were excluded from this review if the study was meant to
evaluate an INQ instrument, included civilians, or included military participants without combat experience. No articles were excluded by year of publication since the ITS was published in 2010 (during the post-9/11 conflicts).

**Literature Search Results**

The initial search yielded 359 articles and the ancestry technique yielded no additional data. The articles were first exported to EndNote, sorted by bibliographic database, and then moved to Covidence (a literature review management program) for review. Covidence software identified and removed 226 duplicate articles (63%) and 46 articles (13%) did not meet inclusion criteria. The remaining 87 articles (24%) were examined for inclusion criteria by two reviewers (JMB and LG).

This process resulted in another 78 (22%) articles being excluded from the sample. Most of the articles were excluded for samples consisting of civilians or service members without combat experience. Others were excluded for not measuring ITS constructs. As a final step, the reviewers graded the articles using the 36-point Hawker Quality Scale (Hawker, 2002) which evaluates the title and abstract, introduction and aims, method of data collection, sampling techniques, data analysis, ethics, and bias. No articles were excluded after quality scoring, as they all were given a quality score of 31/36 points or higher. The PRISMA diagram (see Figure 1) illustrates the literature reduction process (Moher et al., 2009).

**Data Analysis**

Table 1 contains information extracted from primary sources using NVIVO-12 software. Categories for extraction included the study purpose, sample size, quality score (Hawker, 2002) and major findings related to the Interpersonal Theory of Suicide framework. The articles were then grouped by the version of the INQ used in the study to ensure fair comparisons between
measurements and samples. Next, a content analysis was conducted within each grouping to compare key findings. In support of the aims of this review, the information in Table 1 is organized by the version of the ITS tool used.

**Results**

**Description of Studies**

The articles report results from quantitative studies exploring thwarted belongingness and perceived burdensomeness among combined samples of nearly 4,000 Combat Veterans. The articles span ten years (2010 to 2020) of investigative work and were all published in Psychology journals. Study samples were almost exclusively comprised of United States (U.S.) Army and/or Air Force Combat Veterans. Three of the articles included a sample that was predominantly active U.S Army personnel and three study samples consisted mainly of U.S Army National Guard service members. One article included an entirely Army National Guard sample and three had exclusively Air Force samples. A small percentage of Navy personnel were included in one article (Allan et al., 2019) and Marines were included in three of the nine articles (Allan et al., 2019; Bryan & Anestis, 2011; Bryan et al., 2010). The Air Force was represented in all but the one study (the study with an Army National Guard sample) and is therefore overrepresented in this review.

Detailed demographics of each sample, such as relationship status, children, education level, and length of military service were not consistently reported, but all authors reported gender, which was predominately male. Articles that described the military rank and race/ethnicity of the sample reported that a majority of the sample were non-Hispanic White enlisted service members (Bryan & Anestis, 2011; Bryan et al., 2012; Bryan, Hernandez, et al., 2013). The majority of the studies relied on self-reported data and used a cross-sectional study
design. Only one study used a longitudinal design to model suicide behavioral trajectories and make predictions related to suicide (Allan et al., 2019).

**The Interpersonal Needs Questionnaire**

The Interpersonal Needs Questionnaire (INQ) was developed to assess thwarted belongingness (TB) and perceived burdensomeness (PB) (Van Orden, 2009). Items on the INQ are rated by self-report on a 7-point Likert scale ranging from 1 (not at all true for me) to 7 (very true for me), and composite scores are computed as mean scores across each subscale. Examples of items assessing TB include, “These days, I feel disconnected from other people” and “These days, I am close to other people (reverse scored).” Examples of PB items include, “These days, the people in my life would be happier without me” and “These days, I think I make things worse for the people in my life.”

After development of the original 25-item version (Van Orden, 2009), abbreviated versions of the INQ have been used in published research to lower participant burden. Four versions of the INQ were used by studies in this review: the INQ-8, INQ-10, INQ-12, and INQ-15. The INQ-10 was the predominate instrument used in earlier studies (2010-2013) and the INQ-15 was favored by researchers after it was validated with military samples in 2012 (Van Orden et al., 2012).

The use of several different versions of the INQ instrument presents a challenge from a measurements standpoint because each version of the INQ essentially becomes a new instrument and inferences from the scores are not perfectly comparable (J. Schreiber, personal communication, 2022). For example, the thwarted belongingness score of an individual on one version of the INQ may be very different than the score on another version of the INQ. Thus, the most accurate comparisons can only be made between studies using the same INQ version.
(J.Schreiber, personal communication, 2022). Hence, this review is organized by version of the INQ to promote the most accurate comparisons between studies and report findings in context of the version of the INQ used.

**INQ - 8**

The INQ-8 was developed specifically for a longitudinal study of suicidal ideation trajectories in a sample of past/current military service members endorsing suicidal ideation in the past two weeks and/or a lifetime suicide attempt (Allan et al., 2019). The INQ-8 reliability was 0.73 for measuring TB and 0.88 for measuring PB (Allan et al., 2019).

**Thwarted Belongingness**

Only one study used the INQ-8. Allan and colleague’s (2019) longitudinal study identified four distinct trajectories of suicidal ideation (SI): Low-Stable, Moderate-Stable, High-Stable, and High-Rapidly Declining (i.e., increasing SI) among a mixed military branch sample (n=359). Analysis of the data suggests that thwarted belongingness (TB) predicts SI trajectories. In general, the subsample endorsing a High-Stable SI trajectory had the highest levels of TB and those endorsing Low-Stable SI trajectories also endorsed low levels of TB.

**Perceived Burdensomeness**

Allan et al. (2019) also measured perceived burdensomeness (PB), along with PTSD symptoms and substance use over one year. The study showed that PB also predicted SI trajectories. PB levels were highest in the High-Stable SI trajectory, compared to both Moderate-Stable and Low-Stable SI trajectories. In this sample of high-risk Combat Veterans (i.e., service members endorsing suicidal ideation), PB distinguished between High-Stable and Moderate-Stable trajectories.
The 10-item INQ demonstrated strong factor structure of the two interpersonal variables and clinical utility to identify current suicidal ideation among deployed service members (Bryan, 2011). Four studies used the INQ-10 which demonstrated internal consistencies of greater than 0.80 for measuring TB and greater than 0.70 for measuring PB.

**Thwarted Belongingness**

Bryan and associates (2010) used the INQ-10 to examine the relationship between thwarted belongingness (TB), past suicidality, post-traumatic stress disorder (PTSD) symptoms, depression symptoms, and combat experiences in a retrospective study using data from a mixed clinical (referred to TBI or mental health clinic) and non-clinical sample (service members who participated in baseline testing only) of mostly male (90.4%) Air Force personnel (74%) while deployed to Iraq (n=522). In the non-clinical sample only, past suicide behaviors, PTSD symptoms, and depression levels were associated with higher levels of TB, regardless of demographic variables such as age, gender, rank, and number of past deployments. Combat experiences were not associated with TB, when clinical variables, like depression, were considered.

Thwarted belongingness (TB) was positively correlated with PTSD re-experiencing symptoms (Bryan & Anestis, 2011) and PTSD symptom severity (Bryan, Hernandez, et al., 2013) in service members (n=157 and n=348, respectively) with a suspected or diagnosed TBI in Iraq (Bryan & Anestis, 2011; Bryan, Hernandez, et al., 2013). Also, suicide behaviors (i.e. suicide ideation and/or attempts) were associated with TB and PTSD (Bryan & Anestis, 2011). In contrast, the Bryan et al., 2012 study found that TB was not associated with suicide risk or suicide attempts in two different samples (combined n=188) of deployed service members.
recruited from a TBI and mental health clinic (Bryan et al., 2012). The ambiguous findings may have been due to different combat experiences, number of deployments, and length of time in theatre when data was collected. Bryan, Hernandez, et al. (2013) also reported ambiguous findings regarding TB among clinical and non-clinical samples of mainly Air Force Security Forces deployed to Iraq (Bryan, Hernandez, et al., 2013). In the Bryan, Hernandez, et al. (2013) study, half of the clinical sample had no previous combat deployments and the other half had previously deployed up to 8 times. The non-clinical sample averaged three previous deployments (Bryan, Hernandez, et al., 2013). At the time of data collection, soldiers on their first deployment may not have yet fought in battle, causing their data to mirror soldiers who had never deployed. This may explain the ambiguity of the study findings. Analysis of data from the non-clinical sample showed that the number of combat experiences were correlated with PTSD symptom severity, but not TB or suicide risk (Bryan, Hernandez, et al., 2013). Analysis also revealed significant relationships between depression symptoms and TB, as well as depression symptoms and suicide risk, although there was no direct relationship between TB and suicide risk, nor combat exposure and suicide risk (Bryan, Hernandez, et al., 2013).

**Perceived Burdensomeness**

The Bryan et al. (2010) study also measured perceived burdensomeness (PB) and found that high levels of PB were associated with PTSD re-experiencing symptoms, past suicidality (thoughts and/or attempts), and depression. However, they were not able to find a direct link between PB and combat experiences (Bryan et al., 2010). This may have been due to evaluating the service members in the combat environment rather than in their home environment where they are more likely to experience PB. PTSD re-experiencing symptoms were also correlated with PB in a sample of mostly Army service members presenting to a TBI clinic in Iraq (Bryan
Bryan et al. (2012) studied an almost identical sample and found that PB was associated with suicidality. PB and suicide risk were also correlated in a mixed clinical sample of Airforce (61.6%) and Army (32%) personnel receiving psychological and/or neuropsychological evaluations in Iraq, but the same association was not found in the non-clinical (baseline testing only) sample from the same study (Bryan, Hernandez, et al., 2013). As mentioned previously, it is unclear if the ambiguous findings are due to differences in service members who had been previously deployed and service members who were on their first deployment. Service members on their first deployment may have not yet had the opportunity to experience feeling like they were a burden because they had not yet returned home to know how it would feel to be around family and friends having experienced combat and/or a combat injury.

**INQ-12**

The 12-item version of the INQ has been validated with military samples at high risk for suicide with or without combat exposure, and with or without a TBI (Gutierrez et al. (2016). One study in this review used the INQ-12 and reported reliability statistics of greater than .80 (Martin et al., 2020) for measuring TB and PB.

**Thwarted Belongingness**

Martin et al., (2020) examined the relationships between post-battle experiences and thwarted belongingness in three military samples. Post-battle experiences are identified as “consequences of war,” such as seeing dead bodies and destroyed villages (p. 3). The authors used the INQ-12 in two of their three samples (Air Force and Army) (n=445). The researchers identified correlations between post-battle experiences and thwarted belongingness (TB) among the Air Force Security Forces sample (n=273). The correlation between post-battle experiences and TB remained significant after controlling for the participants’ annual income, age, sex,
marital status, and perceived burdensomeness levels. However, TB was not associated with post-battle experiences in the group of active-duty Army service members seeking outpatient mental health treatment (n=172). The authors hypothesize that post-battle experiences may have been less important to this group than the mental health struggles they were experiencing at the time of data collection.

This study did not find an association between perceived burdensomeness (PB) and post-battle experiences (witnessing the consequences of war) in either of their samples using the INQ-12.

**INQ-15**

The INQ-15 is the only abbreviated version of the 25-item INQ that has been psychometrically tested in several different samples (civilian and military) (Van Orden et al., 2012). Psychometric testing found the properties of the INQ-15 to be stronger than the original 25-item questionnaire (Van Orden et al., 2012). Four studies used the INQ-15 and the reliability of the INQ-15 ranged between .85 to .94 for measuring thwarted belongingness (TB) and .89 to .94 for measuring perceived burdensomeness (PB) in military samples.

**Thwarted Belongingness**

One study examined how combat experiences impacted TB in Army National Guard service members (n=400) (Butterworth et al., 2017). This study showed that National Guardsmen who witnessed both a fellow soldier and an enemy soldier being killed or seriously wounded, endorsed higher TB levels than their fellow service members who did not witness such events during the same deployment. Likewise, killing someone, or believing they killed someone, was associated with higher TB scores. Martin and colleagues (2020) also found correlations between negative post-battle experiences and higher TB levels in their sample of Army National
Guardsmen (half of whom were returning from a combat tour) (n=564). As noted above, post-battle experience refers to the immediate aftermath of battle, such as destroyed towns and caring for the remains of fellow soldiers and allies who died. The correlation between negative post-battle experiences and high TB levels remained significant in National Guardsmen, after controlling for annual income, age, sex, marital status, and PB levels.

Interpersonal experiences during and after deployment also impact thwarted belongingness (TB) levels in Combat Veterans. Houstma and colleagues (2017) found that experiencing a transgression (moral violation) or betrayal from a fellow soldier during the deployment, combined with a low levels of post-deployment (interpersonal) support, was associated with higher TB levels. Interestingly, the effect of transgressions on TB is specific to the type of transgression. Transgressions committed by the service member did not impact TB levels, but witnessing, failing to prevent, or learning about transgressions committed by others resulted in higher levels of TB. Further analysis showed that post-deployment support moderated the relationship between transgressions (moral injuries) and TB. When post-deployment support was at or above the mean level of support, TB levels were lower.

Martin et al. (2017), using the same Army National Guard sample as Houtsma et al. (2017) (n=562), tested the impact of aggression on the correlation between betrayal and thwarted belongingness (TB). Betrayal was operationalized or defined as “the perception that an individual has been betrayed by others” (p. 274). The researchers found that the interaction of betrayal and verbal and physical aggression predicted TB levels. The interaction of betrayal and hostility also predicted TB levels. Associations between betrayal and TB levels were significant only when aggression levels (verbal or physical) were categorized as high.
**Perceived Burdensomeness**

Investigators using the INQ-15 did not find an association between combat or post-battle experiences and perceived burdensomeness (PB) (Butterworth et al., 2017; Martin et al., 2020), but they did find that PB was associated with suicidal ideation and betrayal among a large sample (N=937) of Army National Guardsmen (Martin et al., 2017). In this sample, aggression did not influence or impact the association between betrayal and PB, although betrayal had a small main effect on PB. PB was a significant covariate when the relationship between betrayal and TB was mediated by hostility and anger. For example, PB was associated with betrayal when hostility levels were high.

**Summary of Findings**

The literature exploring military suicide suggests relationships between specific experiences in combat, thwarted belongingness (TB), perceived burdensomeness (PB), and suicide behaviors (ideas of self-harm, past suicide attempts, future suicide plans). The literature also introduces important moderators or mediators between the interpersonal constructs of the ITS and suicide behaviors, such as post-traumatic stress disorder (PTSD), betrayal, aggression, and post-deployment support. The following section summarizes the study findings.

**Combat Exposure/Experience and the Interpersonal Constructs**

Only one of the three studies in this review exploring the impact of combat exposure/experience on suicide found a direct relationship between specific combat experiences (i.e., killing an enemy and/or witnessing the injury or death of a fellow Soldier) and suicide behavior (Butterworth et al., 2017). The impact of combat on suicide behavior was more consistently highlighted when investigators used the Interpersonal Theory of Suicide framework.
Researchers found relationships between PTSD symptoms (flashbacks and/or nightmares related to combat), thwarted belongingness, and perceived burdensomeness in a sample of predominately Army service members (Bryan & Anestis, 2011). Studies looking at more specific experiences in combat found that killing an enemy, witnessing the injury or death of an enemy and/or fellow Soldier, and being wounded in combat are strongly correlated with thwarted belongingness (not perceived burdensomeness) in Army service members (Butterworth et al., 2017). These results were confirmed by the Martin et al. (2020) study that revealed an association between thwarted belongingness and combat experiences, such as witnessing death and destruction of villages, in mixed samples of Air Force and Army service members (Martin et al., 2020).

Experiencing a betrayal by a fellow Army service member while deployed is also associated with thwarted belongingness, and this relationship is moderated by an individuals’ propensity toward physical and/or verbal aggression (Martin et al., 2017). Finally, post-deployment support was identified as a possible confounding variable when exploring associations between betrayal, experiencing a transgression while deployed, and thwarted belongingness (Houtsma et al., 2017). Only one study in this review reported that combat experiences are not related to thwarted belongingness nor perceived burdensomeness in a mixed sample (n=273) of deployed Air Force and Army service members (Bryan, Cukrowicz, et al., 2010).

The Interpersonal Constructs and Suicide Behaviors

The few studies that looked for relationships between the interpersonal ITS constructs and suicide behaviors showed equivocal results. Both thwarted belongingness and perceived burdensomeness are directly related to past suicide behaviors (Bryan et al., 2010) and suicide
risk (Bryan, Hernandez, et al., 2013) in military samples. In fact, thwarted belongingness and perceived burdensomeness levels predicted suicidal ideation trajectories among a sample of predominately Army service members (Allen et al., 2011). Yet, several cross-sectional studies examining the relationship between thwarted belongingness and suicide behaviors did not show an association between the same variables (Bryan, Hernandez, et al., 2013)(Bryan et al., 2012; Bryan, Hernandez, et al., 2013). However, one study in this review found that perceived burdensomeness levels are associated with suicidality (Bryan et al., 2012).

Risk Factors for High Thwarted Belongingness and Perceived Burdensomeness Levels

Important risk factors for high levels of both thwarted belongingness (TB) and perceived burdensomeness (PB) emerged from the literature, such as depression (Bryan et al., 2010) and the concept of betrayal (Martin et al., 2017). Further, a Soldier’s propensity towards all forms of aggression (verbal and physical) (Martin et al., 2017) and low post-deployment moral support (Houtsma et al., 2017) are correlated with high TB levels. PTSD also emerged as a notable risk factor for suicide behaviors among Combat Veterans. PTSD is directly associated with both TB and PB, as well as suicide behaviors and combat experiences. This review shows that PTSD has indirect pathways to suicide behaviors when examining the ITS constructs. Some Combat Veterans with PSTD appear to have unique risk factors for suicide because of their combat experience.

Gaps in the Literature

Several gaps in the Interpersonal Theory of Suicide (ITS) literature are noted. First, only three studies examined suicide behaviors among service members with a suspected TBI, and the investigators did not look specifically at TBI symptoms, mechanism of injury, and/or number of TBIs (Bryan & Anestis, 2011; Bryan et al., 2012; Bryan, Hernandez, et al., 2013). Data from
service members with a suspected TBI were only collected in the operational theatre; no studies in this review explored how sequelae of a TBI impacts thwarted belongingness, perceived burdensomeness, or suicidal behaviors once the service members returned from deployment. Consequently, the ITS literature cannot yet explain why Combat Veterans with a deployment related TBI are four times more likely to attempt suicide than Combat Veterans without a TBI (Fonda et al., 2017).

Second, there is no consensus from the literature whether number of combat deployments, length of combat deployments, or time between deployments influences the effect of thwarted belongingness (TB) or perceived burdensomeness (PB) on suicide behaviors. Third, it is difficult to know if study results would be different if all authors used the same version of the INQ and/or if follow-up data was collected after the deployed Combat Veterans returned home. For example, one study using the INQ-10 found a significant interaction between age, combat exposure levels, and thwarted belongingness levels among Airmen who were not deployed (Bryan, McNaughton-Cassill, et al., 2013). As age and combat exposure increased, TB levels increased, especially in Combat Veterans above the age of 34 years (Bryan, McNaughton-Cassill, et al., 2013). The Bryan et al. (2013) study did not meet our inclusion criteria (only a portion of the sample had combat experience), but the results support the need to continue examining the impact of combat exposure after Combat Veterans are home. Finally, the limited number of studies (n=9) exclusively looking at Combat Veterans reveals that little is known about suicide risk factors in this specific population. Even less is known about female service members who deployed to combat zones.
Limitations

Despite our rigorous approach, the inclusion/exclusion criteria and search strategy may have caused articles to be overlooked. In general, this review showed that the military suicide literature related to the impact of combat is in its infancy (i.e., relatively new), with most investigators using a cross-sectional study design and several studies utilizing the same military sample. Further, the magnitude of the relationship between variables were either small (Butterworth et al., 2017) or not reported.

The military suicide literature is also limited by investigators not fully describing the sample’s combat exposure and experiences, which make comparisons of the findings difficult. Studies that examined the impact of combat on suicidal behaviors during a deployment did not report how long the sample had been in theatre (at the time of the assessment), information related to the combat mission or location, nor did they separate service members with a history of multiple combat experience in the analyses to compare them to service members on their first combat deployment. Without this information, it is difficult to compare combat experiences across samples, as deployment experiences vary widely based upon the mission and location of service members overseas (J.C. Brooks, personal communication, 2020). For example, some service members were assigned to military posts (e.g., forward operating bases for the duration of the deployment while others were assigned to combat outposts embedded in Iraqi or Afghani villages enduring daily violent encounters (J.C. Brooks, personal communication, 2021). These design limitations inhibit generalizability of the findings and the ability to fully appreciate the importance of the study findings.

Lastly, authors in this review used the term “predictor” when interpreting results from cross-sectional studies which can be misleading and must be interpreted with caution (Hanis &
Mansori, 2017). Prediction models can be derived from two separate sets of cohort data, where the prediction model derived from one sample would be validated in a second sample or longitudinal studies where the prediction model would be validated over time (Hanis & Mansori, 2017). Without longitudinal data, it is difficult to identify potential/true “predictors” of suicide in military samples.

**Implications for Future Research**

It is clear from this review that the links between military experiences and suicidal behaviors are complex. Exposure to combat, witnessing the aftermath of war, thwarted belongingness, betrayal, and post-deployment support play an important role in military suicide behavior. The Interpersonal Theory of Suicide framework shifts the paradigm from mitigating suicide risk among Combat Veterans to getting to the heart of how or why suicidal ideation and behaviors develop in this population.

The findings in this review have important clinical and research implications regarding the interpersonal aspects of suicide among military samples. Previous preventive suicide interventions target specific diagnoses (i.e., TBI, PTSD, depression, anxiety), rather than focusing on root issues of not belonging, feeling a sense of betrayal, or feeling as though one is a burden to others. Results of this review show that early and routine screening for TB and PB, using the INQ, may provide useful information for developing and evaluating the effects of suicide prevention efforts with Combat Veterans.

Findings from this review also suggest that study findings are different in clinical and non-clinical military samples. With the knowledge that some conditions (e.g., PTSD, TBI, and depression) are associated with suicidal behaviors (Fonda et al., 2017), Combat Veterans with such conditions should receive targeted interventions to address feelings of belonging and of
being a burden, as a way to prevent suicide (Bryan & Anestis, 2011; Bryan, McNaughton-Cassill, et al., 2013).

Regarding future research, since we know that sustaining a TBI in combat is a prominent risk factor for suicide attempts (Fonda et al., 2017), and being wounded in combat is associated with thwarted belongingness (Butterworth et al., 2017), future studies should examine how invisible combat injuries (i.e., TBI) impact a Combat Veteran through the lens of the ITS. This is especially important since many of the Combat Veterans included in the reviewed studies have been out of combat environments for some time and/or are no longer serving in the military. Psychological and physical injuries sustained in combat may place strain on interpersonal relationships (i.e., burden) in their homes and workplaces (civilian and/or military).

Since thwarted belongingness is consistently associated with suicide behaviors among Combat Veterans, studies are necessary to examine specific aspects of the military culture that may impact, or have impacted, Combat Veterans’ sense of “belonging,” such as promotions, job positions, military commendations, or other more subtle institutional norms. Since there are significant differences between military branches (i.e., culture, training, and job responsibilities), study samples examining military culture must study each military branch separately. To go a step further, it would also be important to identify and examine the sub-cultures within each military branch (i.e., combat arms vs. support personnel). Since many of the samples in this review consisted of mixed military branches, further research should be conducted to confirm study findings in homogeneous samples.

The concept of betrayal emerged as an important concept for the study of military suicide behaviors. It would be interesting to use the ITS to examine the association between thwarted belongingness, perceived burdensomeness, and betrayal in the post-deployment period. Such
investigative efforts may lead to more discoveries since a feeling of betrayal may be a risk for suicide in the post-deployment period (Martin et al., 2017).

Finally, researchers must recruit study samples that accurately reflect the racial and ethnic distribution seen in the US military. For example, as of September, 2020, almost 50% of active duty Army and Reserve Soldiers are non-White (Department of the Army, 2020), yet studies in this review enrolled mostly non-Hispanic White service members. Without adequate racial/ethnic representation in studies, the study results are generalizable to only non-Hispanic White service members.

**Conclusion**

This literature review provides insight into why suicide rates among U.S. military Veterans and service members remain higher than the civilian population (Department of Defense, 2019). The literature suggests that a sense of belonging and feeling like a burden on others plays a key role in suicide behaviors in Combat Veterans. Since National Guard/ Reserve Post-9/11 Combat Veterans are 29% more likely to die by suicide and active-duty Post-9/11 Combat Veterans are 56% more likely to die by suicide (Bullman et al., 2018), longitudinal studies need to identify predictors of suicide among these specific military populations. Given the small number of studies of Combat Veterans (military personnel experiencing combat) and high rates of suicide in this population (Bullman et al., 2018), researchers need to focus on Combat Veterans as a unique and specific population.

The Interpersonal Theory of Suicide (ITS) provides a useful framework for suicide research and should continue to be used to understand and prevent suicide in the military population. The ITS theory promotes a common language and shared data to build the body of knowledge on military suicide. Since most of the studies in this review used the INQ-15, it
would be useful for future studies with military samples to use the INQ-15 to measure ITS constructs since it has strong psychometric properties and is reliable in combat veteran samples. This would allow readers to draw accurate comparisons between studies. In conclusion, we must continue to advocate for the Post-9/11 Combat Veterans through innovative and thoughtful research. New questions must be asked to discover connections that will ultimately lower the suicide rate within this population.
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## Table 1

*Studies Exploring Associations Between Thwarted Belongingness, Perceived Burdensomeness, and Suicidal Ideation and/or Behaviors Among Combat Veterans*

<table>
<thead>
<tr>
<th>INQ Version &amp; Authors</th>
<th>Study Purpose</th>
<th>Study Sample</th>
<th>Study Design</th>
<th>Article Quality Score</th>
<th>Major Findings Related to the ITS Constructs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Interpersonal Needs Questionnaire: 8-Item Version (INQ-8)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>INQ-8 Allan et al. (2019)</td>
<td>To understand suicidal ideation (SI) and suicide behavior (SB, attempts) trajectories over one year of follow-up.</td>
<td>N = 359 past &amp; current service members (SMs)</td>
<td>Longitudinal descriptive study with 3-month follow-up assessments over 12 months</td>
<td>34/36</td>
<td>TB levels predict SI trajectories. PB levels predict SI trajectories. SI predicted SB</td>
</tr>
<tr>
<td><strong>Interpersonal Needs Questionnaire: 10-Item Version (INQ-10)</strong></td>
<td></td>
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</tr>
<tr>
<td>INQ-10 Bryan, Cukrowicz, West, Morrow (2010)</td>
<td>Explore the relationships between combat experience and PTSD symptoms, depression symptoms, TB, PB, ACS, SI, and SB.</td>
<td>N = 522 SMs</td>
<td>Cross-sectional descriptive study</td>
<td>33/36</td>
<td>Combat experiences are not related to TB or PB levels. Combat experiences are directly related to ACS. Both TB and PB are directly related to past SB, PTSD symptoms, and depression symptoms.</td>
</tr>
<tr>
<td>INQ-10 Bryan &amp; Anestis (2011)</td>
<td>Examine the relationships between flashbacks and/or repeated nightmares about traumatic experiences (PTSD symptoms), general mental health, TB, PB, ACS, and/or SB.</td>
<td>N = 157 SMs being evaluated for a TBI in theatre.</td>
<td>Cross-sectional descriptive study</td>
<td>33/36</td>
<td>PTSD symptoms (flashbacks and/or nightmares) are directly related to TB, PB,</td>
</tr>
<tr>
<td>INQ-10 Evaluate the IPTS constructs of TB, PB,</td>
<td><strong>Sample 1:</strong> N = 133 SMs with a mild TBI (mTBI)</td>
<td>Cross-sectional</td>
<td></td>
<td>34/36</td>
<td>TB is not significantly associated with suicidality, neither independently or in conjunction with either PB or ACS.</td>
</tr>
</tbody>
</table>
| Bryan, Clemans, & Hernández (2012) | ACS, and suicidality in two samples of deployed service members seeking mental health evaluations and/or treatment. | Army: 80.3%  
**Sample 2:** N=55 SMs who self-referred to MH clinic  
Air Force: 82.7 | descriptive study | PB and ACS are associated with suicidality.  
The interaction of PB and ACS is significantly related to suicidality. As ACS levels increased, the effect of PB on suicidality becomes much more pronounced. |
| INQ-10 | Identify the direct and indirect effects of combat exposure on suicide risk, depression symptom levels, PTSD symptom severity, TB, PB, and ACS. | N=348 USAF Security Forces personnel deployed to Iraq (OIF)  
Rank: Enlisted: 98% | Cross-sectional descriptive study | 34/36 | There is no direct connection between combat exposure and suicide risk.  
TB is positively correlated with combat exposure.  
TB and PB are positively correlated with Suicide risk.  
Combat exposure is associated with PTSD symptom severity.  
PTSD symptom severity is strongly associated with depression symptom severity, which in turn is directly related to suicide risk (in the non-clinical sample) and indirectly related to suicide risk through high TB and PB (in the clinical sample). |
| **Interpersonal Needs Questionnaire: 12-Item Version (INQ-12)** | To examine the relationship between post-battle experiences and TB and PB and SI in a 3 military samples  
*INQ-12 used for samples 2 & 3  
See below for sample 1 (INQ-15) | N2=273 active-duty Air Force Security Forces with history of deployment  
N3=172 active-duty Army with deployment history, receiving outpatient mental health treatment | Cross-sectional survey study | 31/36 | **Sample 2:**  
TB is associated post-battle experiences  
PB is not associated with post-battle experiences  
**Sample 3:**  
TB is not associated with post-battle experiences  
PB is not associated with post-battle experiences |
| **Interpersonal Needs Questionnaire: 15-Item Version (INQ-15)** | Examine the relationship between post-battle experiences and TB and PB and SI in 3 military samples | N1=564 non-clinical ARNG demobilizing from combat deployment | Cross-sectional survey study | 31/36 | **Sample 1:**  
TB is correlated with post-battle experiences  
PB is not associated with post-battle experiences |
<table>
<thead>
<tr>
<th>INQ-15</th>
<th>Butterwo rth et al. (2017)</th>
<th>To examine the relationship between specific combat experiences, SI, TB, PB, and/or ACS.</th>
<th>N = 400 ARNG deployed to a combat zone and endorsing combat experience.</th>
<th>Cross- sectional descriptive study</th>
<th>34/36</th>
<th>Killing, or thinking one killed an enemy in combat is associated with TB, SI, and ACS.</th>
<th>Witnessing the serious injury or death of a soldier (from one’s unit or an enemy) is associated with both TB and ACS.</th>
<th>Being wounded or injured in combat is associated with TB.</th>
</tr>
</thead>
<tbody>
<tr>
<td>INQ-15</td>
<td>Martin et al. (2017)</td>
<td>To examine the relationship between deployment-related betrayal and TB, and if that relationship is moderated by a specific type of aggression (physical aggression, verbal aggression, hostility, and/or anger) among SMs with at least one previous deployment.</td>
<td>N=562 ARNG (89.4%)</td>
<td>Cross- sectional descriptive study</td>
<td>35/36</td>
<td>Betrayal is associated with TB, only when aggression (physical aggression, verbal aggression, hostility, and anger) levels are high.</td>
<td>Neither betrayal, nor aggression are associated with PB levels.</td>
<td></td>
</tr>
<tr>
<td>INQ-15</td>
<td>Houtsma et al. (2017)</td>
<td>Examine the moderating role of post-deployment social support on the association between moral injury (self-transgressions, other-transgressions, and betrayal) and TB among SMs with at least one previous deployment.</td>
<td>N=562 SMs ARNG: &gt;85% of sample</td>
<td>Cross- sectional descriptive study</td>
<td>32/36</td>
<td>When post-deployment support is low, transgressions towards others and betrayal are significantly associated with TB.</td>
<td>Self-transgressions are not associated with post-deployment support or TB.</td>
<td></td>
</tr>
</tbody>
</table>

SM= Service member; INQ= Interpersonal Questionnaire; AD= active duty; ARNG= Army National Guard; SI= suicidal ideation; SB= suicidal behaviors; SA= suicide attempts; ITS/IPTS= Interpersonal Theory of Suicide/Interpersonal-Psychological Theory of Suicide; PB= perceived burdensomeness; TB= thwarted belongingness; ACS= acquired capability of suicide
Figure 1

PRISMA Flow Diagram

Records identified through database searching (n = 359)  Additional records identified through other sources (n = 0)

Records after duplicates removed (n = 133)

Records screened for inclusion (n = 133)  Records excluded (n = 46)

Full-text articles assessed for exclusion (n = 87)  Full-text articles excluded (n = 78)

Studies included in integrative review (n = 9)
The Purple Heart and Suicidal Behaviors in Post-9/11 U.S. Army Combat Veterans with a Traumatic Brain Injury: A Mixed Methods Study

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Key Words: Interpersonal Theory of Suicide, Suicide, Military, Purple Heart, Traumatic Brain Injury
Abstract

Active service members and Veterans with a deployment-related traumatic brain injury (TBI) (Combat Veterans) are four times more likely to attempt suicide than those without a TBI (Fonda et al., 2017). TBIs are the signature injuries of recent conflicts in the Middle East and Combat Veterans with these injuries are entitled to receive the Purple Heart medal. However, tens of thousands of Combat Veterans did not receive, or were denied, the Purple Heart because a TBI was not documented during combat. To our knowledge, this is the first study to explore the meaning of the Purple Heart and examine the impact of the Purple Heart on Post-9/11 Army Combat Veterans with a combat-related TBI. Findings from this mixed methods study revealed that not receiving the Purple Heart was associated with higher suicidal behaviors scores and lower quality of life after a brain injury scores. Additionally, thwarted belongingness, perceived burdensomeness, and military institutional betrayal were associated with suicidal behaviors in Army Combat Veterans with a TBI. This mixed methods study provides important insights into Army culture and the power of the Purple Heart among this high-risk group of current and former service members.
Introduction

Veteran and service members’ suicide rates remain higher than the civilian population at 24.8 per 100,000 and 18.2 per 100,000, respectively (Department of Defense, 2019). Even higher rates of suicide (29.0 per 100,000) are seen among Combat Veterans (i.e., current and former service members with combat experience) who deployed in response to the Global War on Terrorism (post-9/11 conflicts) (Bullman et al., 2018). Among the various military branches, Army and Marine Combat Veterans have the highest rates of suicide at 30.3 per 100,000 (Bullman et al., 2018). This higher rate of suicide corresponds with the two branches that deployed the greatest number of ground troops deployed in Post-9/11 conflicts in the Middle East (post-9/11) conflicts (Military Health System, 2020).

Traumatic brain injuries (TBI) are the “signature injuries” of the U.S. Post-9/11 Global War on Terrorism and are uniquely “invisible” relative to other combat injuries. Estimates suggest that more than 400,000 post-9/11 Combat Veterans sustained a TBI while deployed to the Middle East (Military Health System, 2020). The symptoms of TBI have wide-ranging physical and psychological effects including physical, sensory, mood, cognitive, and/or behavioral symptoms (Brenner et al., 2009). In addition to these symptoms, Combat Veterans with a deployment-related TBI are four-times more likely to attempt suicide than those without a TBI (Fonda et al., 2017). These high suicide rates persist, despite targeted suicide prevention efforts by the Veterans Administration (VA) and DoD over the last ten years (Veterans Suicide Prevention, 2019).

Suicide has a far-reaching impact, both emotionally and financially; on families, friends, fellow service members, and society (Cerel et al., 2015). It is devastating for families to welcome their Soldier home from combat, only to lose them to suicide (Giacomo, 2019). Consequently,
suicide risk transfers to the family and friends because people who experience the loss of a loved one by suicide are more likely to contemplate suicide themselves (Cerel et al., 2015).

The Interpersonal Theory of Suicide was developed to help explain why people contemplate suicide, as well as how they develop the capability to do so. The components of the theory are thwarted belongingness, perceived burdensomeness, and the acquired capability for suicide (Joiner, 2005). Thwarted belongingness refers to feeling socially disconnected from other people and perceived burdensomeness is the feeling of being a burden or liability on others, to the point an individual believes their loved ones would be better off without them. According to the Interpersonal Theory of Suicide (Joiner, 2005), thwarted belongingness and perceived burdensomeness contribute to suicidal ideation and require the capability to make a lethal attempt at suicide. The acquired capability for suicide develops when an individual has a lower threshold for pain or no longer fears death. This can occur as a result of experiencing violence, multiple painful events, or being involved in experiences that could have been fatal (Joiner, 2005), which are all common occurrences in combat environments.

**Research Utilizing the Interpersonal Theory of Suicide among Combat Veterans**

Military studies using the Interpersonal Theory of Suicide as a guiding framework show that Post-9/11 Combat Veterans have risk factors for suicide that are unique to their combat experiences (Martin et al., 2020). Thwarted belongingness directly correlates with combat experiences and is impacted by interpersonal experiences during and after combat deployments (Bryan et al., 2013a, Bryan et al., 2013b, Martin, 2020). For example, thwarted belongingness levels increased when a service member experienced a moral injury or betrayal by a fellow Soldier during the deployment (Houtsma et al., 2017). The relationship between betrayal and thwarted belongingness is moderated by a Combat Veteran’s propensity toward physical and/or
verbal aggression (Martin et al., 2017). Specific experiences in combat, such as killing an enemy, witnessing the injury or death of an enemy and/or fellow Soldier, or being wounded in combat, have been explored. The research shows that such experiences are strongly correlated with thwarted belongingness (not perceived burdensomeness) in Army service members (Butterworth et al., 2017) and post-deployment support moderates the association between moral injuries and thwarted belongingness (Houtsma et al., 2017).

Investigative efforts thus far provide important insights regarding relationships between combat experience and suicide. However, a recent integrative review of the literature (under review) identified only nine published studies that used the Interpersonal Theory of Suicide to understand suicide risk exclusively among Combat Veterans (Allan et al., 2019; Bryan & Anestis, 2011; Bryan et al., 2012; Bryan & Cukrowicz, 2011; Bryan et al., 2010; Butterworth et al., 2017; Houtsma et al., 2017; Martin et al., 2020; Martin et al., 2017). The limited number of studies using the Interpersonal Theory of Suicide to understand suicide behaviors within this high-risk group demonstrates that researchers have only just begun to explain why Army Combat Veterans attempt or think about suicide (suicidal ideation).

**Extending the Interpersonal Theory of Suicide to Combat Veterans with a TBI**

Some of the more prominent risk factors of suicide within the military, such as having a TBI (Fonda et al., 2017), have not been directly studied using the Interpersonal Theory of Suicide. Although some of the studies using the Interpersonal Theory of Suicide framework included participants with a self-reported combat-related TBI, there was no discussion of the Interpersonal Theory of Suicide in relation to the injury (Bryan & Anestis, 2011; Bryan et al., 2012). Thus, it is unclear what role, if any, TBIs played in the study findings (Bryan & Anestis, 2011; Bryan et al., 2012).
Regarding interpersonal experiences in combat, it is unclear how Combat Veterans with a TBI experience betrayals while deployed (Houtsma et al., 2017; Martin et al., 2017). Researchers have yet to determine if a Combat Veteran’s feelings of betrayal and a propensity towards aggression are connected to their brain injury, or if the thwarted belongingness or perceived burden (ITS constructs) are associated with the experience of having a TBI (such as how the injury occurred, recognition of the injury, and receiving care for the injury). These questions need to be explored to have a better understanding of suicide in Combat Veterans with a TBI.

**Toward a Better Understanding of Military Commendation and Suicide**

The Purple Heart is the only military medal for being injured in combat and is awarded during or after deployments. Service members with a TBI caused by enemy fire are eligible for the Purple Heart medal (Army Human Resources Command, 2019). However, tens of thousands of Post-9/11 Combat Veterans sustained a TBI and returned to the fight without a medical evaluation of their injury (Tanielian & Jaycox, 2008; Zwerdling & Miller, 2010). This occurred mostly from 2001-2012 when blast-related concussive injuries were not well understood, causing them to be overlooked, under-appreciated, and/or not documented (Tanielian & Jaycox, 2008; Zwerdling & Miller, 2010). Thus, many service members received TBI diagnoses long after they returned home and were then denied the Purple Heart by the military because their injuries were either not documented in the operational theatre, or medical documents were lost or destroyed.

Despite the importance given to commendation in the military culture (Army Human Resources Command, 2019), very little is known about how military awards, recognitions, and promotions impact Army Combat Veterans, especially in the context of suicide. One study described the impact of the Purple Heart Medal on Veterans, though it did not describe the relationship to suicide. This large-scale study (n=10,255) examined mortality rates (from all
causes) among Veterans who served in World War II and the Korean War (Kimbrell et al., 2011). Researchers compared the mortality rates between Veterans with and without PTSD who did, and did not, receive the Purple Heart medal. Veterans who received the Purple Heart medal (with and without PTSD) had a 50% lower mortality rate than Veterans who did not receive the medal (Kimbrell et al., 2011). This landmark study reveals that the Purple Heart medal may be a relevant variable to explore with Post-9/11 Combat Veterans.

Our study aims were as follows: 1) to determine the values, beliefs, and meaning of the Purple Heart medal among Post-9/11 U.S Army Combat Veterans with a combat-related TBI, and 2) determine if there are differences in self-reported suicidal behaviors among Combat Veterans with a TBI who did, versus did not, receive a Purple Heart for their combat-related brain injury. Secondary aims of the study were to explore associations between the Purple Heart and the ITS interpersonal constructs (thwarted belongingness and perceived burdensomeness), military institutional betrayal, and quality of life after brain injury. We hypothesized that not receiving a Purple Heart for a combat-related TBI leads to higher suicidal behaviors scores and may provide insight as to why Army Combat Veterans with a TBI have higher suicide rates.

**Method**

**Study Design**

This study used a convergent parallel mixed methods design to examine suicidal behaviors among Post-9/11 Army Combat Veterans with a TBI, in context of military culture. The quantitative strand used a survey design, and the qualitative strand was employed as a focused ethnographic study. This qualitative approach was chosen because it is context-specific and can explain previously unknown phenomena within cultures and subcultures (Holloway & Galvin, 2017). Quantitative (survey) and qualitative (interview) data were collected concurrently.
and independently, and then merged to determine convergence or divergence of data. Interview data was necessary to enhance our understanding of the survey findings, especially because we believed we were introducing a new variable (Purple Heart status) to the suicide literature.

**Recruitment of Study Participants**

Post-9/11 U.S. Army Combat Veterans with a suspected (were involved directly in a blast or were near a blast) or confirmed combat-related TBI were eligible to participate in the study. After receiving institutional review board approval, study participants were recruited from several Army installations and Veteran organizations (with the help of gatekeepers), and through the snowball method via text messages, e-mails, and word of mouth across the United States and the globe. Participants in the qualitative strand contacted the primary investigator directly to set up an interview and then provided digital consent, completed a brief demographic survey online, and were interviewed via a secure web conference software. Combat Veterans interested in the study survey were directed to the study consent form (through a QR code or URL on the recruitment flyer) to read and sign before accessing the survey. At the end of the survey, participants were automatically directed to a separate URL where they were presented with the option to enter their e-mail address to receive a $20 gift card via e-mail. The separate URL ensured the e-mail addresses were not connected to the survey responses to protect participants anonymity.

**Measures**

*Qualitative Strand*

Participants were interviewed using a semi-structured interview that was based upon Leininger’s Sunrise Model (Leininger & McFarland, 2006). This model provides a comprehensive view of the dimensions of culture, such as values and beliefs, social factors, and
biological factors (Leininger & McFarland, 2006). All participants were asked to describe Army values, Army culture, the meaning of the Purple Heart, and beliefs about the medal. They also gave a detailed description of the combat event that caused their TBI, along with their experiences after the injury occurred. Saturation of the data was reached after fifteen interviews and two additional confirmatory interviews were conducted.

**Quantitative Strand**

**Thwarted Belongingness (TB) and Perceived Burdensomeness (PB).** The Interpersonal Needs Questionnaire (INQ-15) (Van Orden et al., 2012) includes nine items to measure thwarted belongingness (TB) and six items to assess perceived burdensomeness (PB) (Gutierrez et al., 2016; Van Orden et al., 2012). Participants rate statements from 1 (not at all true for me) to 7 (very true for me). Scale scores are item sums; higher values indicate increased levels of TB (range 9–63) and PB (range 6–42). Higher TB and PB scores predict suicide attempts in military samples (Anestis et al., 2015; Van Orden et al., 2012). Internal consistency reliabilities were \( \alpha = 0.90 \) for TB and \( \alpha = 0.96 \) for PB.

**Institutional Betrayal.** The Institutional Betrayal Questionnaire-2 (IBQ2) consists of 12 items used to identify if individuals feel, or have felt, betrayed by large systems such as the military (Smith, 2017). The tool provides examples next to each item referring to a “healthcare institution.” For this study, the words “healthcare institution” were replaced with the words “military institution.” Respondents indicated the number of statements they agree with related to betrayal by the institution. Scores range from 0-12 and higher scores reflect higher levels of feeling betrayed. This measure demonstrated strong convergent and discriminant validity in two different samples of female Veterans, however, the IBQ2 has not been psychometrically tested in male Combat Veterans. The internal consistency for IB in this study was \( \alpha = 0.88 \).
Suicidal Behaviors. The Suicide Behavior Questionnaire-Revised (SBQ-R) is a 4-item tool that is used to measure suicidal behaviors; previous suicide attempts, how often suicidal ideation occurs, and the likelihood of attempting suicide in the future (Gutierrez et al., 2016). This instrument has been used to distinguish suicidal and non-suicidal individuals in civilian samples (Osman et al., 2001). Each item on the SBQ-R is rated on a five or six-point Likert scale with answers ranging from “never” to “very often/likely.” Scores range from 3-18. Higher scores reveal more pronounced previous or current suicide behavior. The internal consistency of the instrument was stronger with the current sample of Army Combat Veterans ($\alpha = 0.84$), when compared to a similar sample of Combat Veterans ($\alpha = 0.78$) (Bryan et al., 2013).

Quality of Life After Brain Injury. The six-item Quality of Life After Brain Injury Scale (QOLIBRI S) measures the satisfaction level of an individual’s life since the brain injury occurred, with specific questions related to how satisfied they are with their memory (von Steinbüchel et al., 2010). Responses range from “not at all” to “very much” on a five-point Likert scale. Total scores range from 6-30, with higher scores revealing a higher (more positive) quality of life. Initial psychometric testing of this instrument demonstrated an internal consistency of $\alpha = 0.75$ to 0.89 and test-retest reliability of $\alpha =0.78$ to 0.85 in a cross-cultural civilian study (von Steinbüchel et al., 2010). To our knowledge, no psychometric testing of this instrument with a military population has been published. The internal consistency of the QOLIBRI scale in this sample was $\alpha =0.91$.

Data Analysis

Qualitative Data Analysis

Leininger’s four phases of data analysis were used (Leininger & McFarland, 2006) to determine the values, beliefs, and meaning of the Purple Heart medal among Post-9/11 Army
Veterans with a combat-related TBI. During phase one, the primary investigator (PI) reviewed transcribed interviews and field notes. In phase two, the PI coded and categorized the data using NVivo12 (computer assisted qualitative data analysis software). Phase three focused on identifying patterns from observations, interviews, and demographic questions. Finally, the PI and co-PI identified themes and highlighted findings (Leininger & McFarland, 2006). Although there are four phases to analyzing qualitative data, the collection and analysis occurred concurrently. Data collection ceased when no new themes were identified (data saturation occurred). The PI maintained an audit trail to indicate what and why decisions were made throughout the study. Once the qualitative data analysis was complete, the quantitative data was analyzed. This order of analysis is important to reduce the chance for bias during the qualitative analysis (Creswell & Plano Clark, 2018).

**Quantitative Data Analysis**

The quantitative data was analyzed using SPSS 28 and Jamovi 2.3.3. Data distributions were examined, and the data was transformed when appropriate. Means and standard deviations were used to describe continuous variables and proportions were used to describe categorical variables. Spearman’s Rho correlations were used to establish associations between the variables of interest (see Table 2). Generalized linear models were constructed with suicide behavior scores as the outcome variable and a maximum of five predictor variables (in keeping with our G-power analysis) (Faul et al., 2009). For the exploratory analysis, traditional bivariate and multiple regression models were constructed with quality of life after a brain injury (QOLIBRI) as the outcome variable. Variables were entered into the regression model stepwise (or block type) to capitalize on chance and overfit the data (Schreiber, in press; Tabachnick & Fidel, 2001). Multicollinearity of variables was evaluated with variance inflation factor (VIF),
autocorrelation was evaluated using Durbin-Watson, and residuals were examined with Mahalanobis distance and Center Leverage values, along with standardized residual plots, e.g., heteroscedasticity (Schreiber, in press; Tabachnick & Fidel, 2001). The distribution of residuals was examined for normality and post-hoc analyses with a Bonferroni correction was used to confirm the significance of the findings.

Results

Study Participants

Interviews were conducted with 17 U.S. Army Combat Veterans and the survey was completed by 62 U.S. Army Combat Veterans. Due to the anonymity of the survey, it is not known how many qualitative participants also completed a survey. Combat Veteran characteristics for each strand are described in Table 1. Both strands of the study had similar demographics. The typical study participant was an active-duty, college educated, 40-year-old, married male. Although the military rank of the study participants varied, the majority were Non-Commissioned Officers (E5-E9) with 14 years of service. Of interest, Officers were more represented in both strands of this study than other Post-9/11 Combat Veteran studies (Bryan et al., 2012; Bryan et al., 2013). Participants endorsed an average of two combat-related deployments and two-thirds of them (in each study strand) did not receive the Purple Heart medal for their combat-related injury or injuries. One-quarter of the survey sample applied for and were denied the Purple Heart for their combat-related TBI.

Qualitative Results

The interview data resulted in 28 categories and seven patterns being identified. At the final step of the analyses, three themes emerged: 1) The Army demands loyalty but does not always reciprocate loyalty, 2) the culture of the Army creates and promotes a sense of
ambivalence around the Purple Heart, TBIs, and TBI care, and 3) the lasting power of the Purple Heart in healing.

**The Army Demands Loyalty but does not Always Reciprocate Loyalty**

All the participants easily recited the Army value acronym LDRSHIP, with loyalty being the first value represented in the acronym. Combat Veterans described the sacrifices made to give their best effort in various jobs throughout their careers, describing the most important principle, “to never let my fellow Soldiers or the Army down,” saying the Army mantra - “mission first.” When asked if the Army reciprocated the loyalty it required, the responses were mostly negative and/or ambiguous, “no, I do not feel the Army is loyal, they have screwed us over,” “50/50, it depends,” the Army “just takes, takes, takes from us,” “Army values are not reciprocated,” “some of the Army values are reciprocated.” Participants also described feeling expendable, “The Army does a great job training, but they don’t untrain you and once they’re done with you, they’re done with you period.” “If you’re not 100%, you’re zero,” “If you don’t do your job, you’re expendable, but even if you do your job, you’re still sort of expendable,” “you’re a cog in the machine” “as the song goes…the Army just keeps rolling along.” “You start seeing yourself more as a number and less as a kind of valued member for your skillset, so it went up and down across my career.”

**The Army Culture Creates and Promotes a Sense of Ambivalence around the Purple Heart, TBIs, and TBI care**

Participants described conflicting feelings about the Purple Heart medal. Several of the participants explained that, early in their military careers, the Purple Heart “was negatively portrayed.” When they entered the Army, they were taught by their immediate chain of command that it was an unfavorable medal, calling it the “forgot to duck award,” “they got you”
medal, or the “enemy marksmanship badge.” “It’s the award you don’t ever want to receive—because it means you are hurt.” “I guess I don't want to be judged. You know, it really is an award for those that are very unlucky.”

Participants also described stigma attached to being injured, “If you say I’m hurt, and I got these issues…you’re marked as a quitter.” “You definitely don’t want to be that guy; you don’t want to be the complainer.” “Yeah, there's always a stigma for anything mental health, PTSD, TBI you never wanted to be that guy.” “I know there have been some people that flat out deserved it [the Purple Heart] didn't want it…they don't want there to be some sort of stigma attached.” “TBI is least desirable injury-there is a stigma. “The stigma is that you are weak if you have symptoms.” “The last thing you want to do is to be the guy who is not pulling his weight.” Often in the same interview, participants would express conflicting feelings about the Purple Heart, “A Purple Heart isn't a bad thing, you know you earned it-- you deserve it, you know.” “It’s a prestigious award.” “They are [family] certainly proud of that award.”

Participants expressed ambiguity surrounding whether they deserved the medal for their TBI. The “S” in the Army values acronym (LDRSHIP) mentioned previously stands for “selfless service”. This means that Soldiers are trained to think of others over themselves and not seek the spotlight. “Soldiers are either told they don’t deserve it by their chain of command or Soldiers refuse the Purple Heart because they think they are taking it from someone who deserves it.” Participants frequently compared their brain injury to others with visible injuries, “…if you walked away, regardless of your internal condition. If you were able to walk out of there and fight another day, you kind of just, you don't feel like you've earned a Purple Heart.” “You would always hear this person has it worse than you, so you probably shouldn't be trying to get you know, a Purple Heart when this person lost a leg, you didn't lose anything you know.” “My
TBI isn't nearly as severe as many people like I'm still functional.” “Other guys have it a lot worse.” “But you contrast those [visible] injuries…I didn’t really put those [TBIs] on the same plane in terms of sacrifice, but I think it’s naïve because you don’t really understand the effects of a traumatic brain injury until years down the road.”

All participants shared details about their continued suffering from their brain injury that occurred up to 20 years prior to the study interview. Participants described symptoms such as, short-term memory loss, balance issues, dizziness, and light and noise sensitivity. “My head pounds…” “I’ve had so many TBI’s a lot of my memories are just not there anymore.” “There are a lot of things that don’t exist for me anymore.” “I have headaches, tinnitus, short term memory loss, behavioral changes.” Participants described their hesitation seeking care for their brain injury, “I did not see a doctor for my TBI symptoms because it was still the era of ‘…if you want to get promoted, then you have to be fully qualified and competitive. So, anyone with any mark against them was penalized…at least from 2006-2012.” “And it seems like when people are out of that culture…like the farther you get away from the institution, it seems like you start from the outside looking in again and you're like ‘oh actually I would have gotten help’.

The Lasting Power of the Purple Heart in Healing

Once participants talked through their ambiguity surrounding the Purple Heart medal, in keeping with always thinking of others, they were asked to set aside concerns about the stigma and/or their concern for other wounded Soldiers “who have it worse,” to reflect on either what the Purple Heart means to them personally or what it would mean to them. Most of the participants (n=15, 88%) stated that the Purple Heart “validates” “acknowledges” or “legitimizes” their invisible injury. “The Purple Heart is the Army’s validation …acknowledging the fact that I was hurt in combat.” “It would be validation for everything that I’ve gone
through...everything my family’s gone through. “I just want the Army to acknowledge what happened to me.” “Knowing my wife…it probably would mean a lot to her. You know, it would probably for her validate all the stuff that we’ve been through as a family.” One participant referenced how it would help his children, “Having a Purple Heart would be validation that my daddy did something...they all know something happened to me, but a Purple Heart would validate.” “The Purple Heart would show that I did something, and I suffered through something, and somebody said it was okay to feel the way that I felt.” “It [the Purple Heart] means that I sacrificed.” “I think, for a lot of people, it would mean so much to finally have that acknowledgement.” “The Purple Heart would provide closure for me.”

All participants stated that they believe that they either received care for their TBI because of receiving the Purple Heart or would have received care for their TBI sooner, or at all if they were given a Purple Heart. “We realize we are hurt when we have a Purple Heart.” “If you don’t think you are hurt, you won’t ask for help—the Purple Heart helped me ask for help.”

The Purple Heart is a symbol of the injury and the only evidence you have that you were hurt.” “It is nearly impossible to get care for your TBI, you get treated like you are making it up...the Purple Heart was like an advocate for me, it gave me strength to speak up and fight for care—it made me know I could ask for help.” “…for other soldiers that [the Purple Heart] would have made the difference between them having the treatment that they needed.” Receiving a Purple Heart “would have instantaneously acknowledged that an injury happened.” “Having a Purple Heart would change the way that I see my injury and I would have gotten care.” “100% I would have received care if I was given a Purple Heart in theatre.” “I believe that if I had a Purple Heart, I would have gotten faster care.” The Purple Heart “would get you care at all, period...it would have been easier to get treatment if I were to receive a Purple Heart.”
Quantitative Results

Descriptive analyses of the variables revealed non-normal distributions, except for quality of life after brain injury (QOLIBRI). Log transformations slightly improved the distributions of thwarted belongingness and perceived burdensomeness. Spearman’s Rho was used to calculate the following correlations: Thwarted belongingness (TB), perceived burdensomeness (PB), and betrayal were positively correlated with suicide behaviors. Quality of life after brain injury (QOLIBRI) scores were negatively correlated with suicide behaviors, TB, and betrayal. TB was positively correlated with PB and betrayal. As expected, TB and PB were highly intercorrelated (see Table 2).

The distribution of suicide behavior scores was positively skewed, with a negative binomial distribution. Therefore, a generalized linear model for negative binomial distributions was constructed, with suicide behavior scores as the outcome variable. The quality of life after a brain injury variable (QOLIBRI) was the only normally distributed variable. Multicollinearity of variables were evaluated using VIF, Durbin-Watson, Mahalanobis distance and Center Leverage values, along with standardized residual plots, e.g., heteroscedasticity (Schreiber, in press; Tabachnick & Fidel, 2001). Listwise deletion removed a total of five cases (n=57) from each of the regression analyses.

Suicide Behaviors: Negative Binomial Regression

Independent variables were added using a forward step approach to model selection where we first identified the variable with the highest loglikelihood ratio (thwarted belongingness) and then added only the variables that improved model fit up to our pre-determined maximum (according to the loglikelihood ratio, Akaike Information Criterion (AIC),
and r-squared values). As each additional variable was added to the model, the AIC decreased from 272.21 to 260.60 and the r-square increased from 0.37 to 0.56.

Initially, significant independent variables in the regression model were thwarted belongingness (TB), perceived burdensomeness (PB), institutional betrayal, and number of blast wave exposures (i.e., TBIs). The model confirmed that TB, PB, and institutional betrayal associated with higher suicide behaviors. Interestingly, number of blast wave exposures was associated with slightly slower suicide behavior scores. Purple Heart status was then added to the equation, which further improved model fit ($r^2=0.56$) and revealed that not having a Purple Heart is associated with higher suicide behavior scores in the presence of thwarted belongingness, perceived burdensomeness, betrayal, and number of blast waves exposures (i.e., TBIs) (see Table 3 for details).

Quality of Life after Brain Injury: Exploratory Bivariate and Multiple Regression

A significant relationship between receiving the Purple Heart and higher quality of life after brain injury (QOLIBRI) scores was revealed, although this model accounted for only 11% of the variance. Next, block wise entering of variables demonstrated that PB negatively impacted the model (due to multicollinearity), thus it was removed. The final model with Purple Heart status, thwarted belongingness, and betrayal and quality of life was strong, accounting for over 50% of the variance. The traditional multiple regression results indicate that receiving a Purple Heart is associated with higher quality of life scores. Feeling betrayed by the military institution and higher levels of thwarted belongingness are negatively associated with quality of life (see Table 4 for coefficients). In both the traditional linear and multiple regression analyses, all residuals were under the Cook’s, centered leverage, and Mahalanobis cut-off values and the assumption of homoscedasticity were met.
Mixed Methods Data Analysis

As a final analytic step, the results from each study strand were compared. The qualitative results provided rich cultural context for the quantitative results deepening our understanding of the associations identified in the quantitative analyses (see Figure 1).

The Relationship Between Purple Heart Status and Suicide Behaviors

The relationship between Purple Heart status and suicidal behaviors can be explained by the theme, lasting power of the Purple Heart in healing. Recognition is a significant part of Army culture and is mainly accomplished through awards and medals. Awards are given to Soldiers when they complete training, graduate from an Army school, complete a job, move to another location, make a significant contribution to their job, engage in combat action with the enemy overseas, and for a heroic act. Often, these awards are given during a ceremony with friends and family invited to attend. Frequently the family is involved, with spouses, parents, and/or children pinning the award on their Soldier’s uniform. This ceremony helps families see the importance of their Soldiers contribution and/or provides “closure”, according to several interview participants (n=3). These awards are added to the Soldier’s permanent Army record and are proudly displayed on their Army dress uniforms, with larger racks of awards signifying more years of service and/or greater contributions in service to the nation. According to the study participants, some awards/medals have greater meaning than others. The Purple Heart was frequently described as holding more importance to the Combat Veteran than other medals or awards.

Although Soldiers are trained to think of others over themselves, they are conditioned by Army culture to expect an award/medal based upon merit or entitlement. The Purple Heart has a prominent role among Army Combat Veterans because it is the only way the Army officially
acknowledges a combat injury. When combat injuries are invisible and not officially recognized, it creates a personal ambiguity for the Combat Veteran regarding the severity or significance of their injury. This ambiguity has prevented some Combat Veterans from seeking and/or receiving care. The Purple Heart helps to resolve feelings of ambiguity either because it provides certainty that the TBI symptoms they are experiencing (memory loss, ringing in the ears, light sensitivity, headaches, anger) are real, and/or is a reminder that their sacrifice is important and worthy of care. As a result, the Purple Heart has been identified as being a conduit for Combat Veterans to receive medical care and rehabilitation, and “validates” or adds visibility to this uniquely invisible combat injury (TBI). The Purple Heart is often a catalyst for support from family and friends, improves the quality of life of Combat Veterans, and ultimately reduces suicidal behaviors.

**Institutional Betrayal and Suicide Behaviors**

The association between institutional betrayal and suicidal behaviors in Army Combat Veterans connects to the theme of unreciprocated loyalty (identified in the interviews). All members of the Army agree to follow the Army values of loyalty, duty, respect, selfless-service, honor, integrity, and personal courage. However, when Army leadership and/or Army medical professionals do not demonstrate or reciprocate these values to Combat Veterans, it is perceived as the institution not fulfilling its obligation, a betrayal. “I feel like yes, they have an obligation to care for me and I also feel like they're going to do their best to do the bare minimum.” “The Army did not fulfill their obligation to care for us,” “they sweep things under the rug.” “We get hurt in combat, and some got the Purple Heart and others didn’t, it’s because of the leadership, they subjectively gave out awards.” Participants who did not receive the Purple Heart shared that their leaders had their own criteria for the medal stating, “it is given to those who bleed.”
One-quarter of the sample (28%, n=4) described being called a “quitter” by Army leaders when they decided to transition out of the Army. Combat Veterans described how it felt to be called “quitters” and how it hurt to have their leaders “turn their backs” on them when they were injured. One Combat Veteran said, “I got to the point where, you know, I locked and loaded my weapon” with intent to end their life.

Other participants described betrayal by Army medical professionals when they did not receive care for their injury, being told “you’re fine,” despite blacking-out when their military vehicle was catastrophically destroyed after rolling over an improvised explosive device (IED), or “flying 10 feet in the air” when a mortar struck nearby. “You know, each time I got hit, they're like ‘oh no you're fine’ and they never actually put me through like a cat scan…they just go off of that questionnaire and they say no you're fine.”

Combat Veterans also described their exhausting battle advocating for their own care after returning home from their combat deployment. They described the frustration in trying to convince physicians (on military installations or in the VA system) to appreciate how their TBI symptoms are negatively impacting their life. “They didn’t believe me…” “The VA withholds help and information.”

When Combat Veterans finally receive a TBI diagnosis, often months to years after combat, and apply for the Purple Heart, the Army denies the request because the Combat Veteran did not have their TBI documented in the operational theatre, stating “we cannot utilize post-deployment diagnoses” to fulfill the medical documentation requirement. Yet, the medical documentation requirement does not consider the unique circumstances of the Post- 9/11 combat environments, where Soldiers served in combat outposts embedded in Iraqi or Afghani villages and their invisible injuries were either overlooked, not documented, or the documentation of the
injuries was destroyed (ProPublica, 2012). Study participants shared stories of watching trucks full of medical records being set on fire by the enemy.

Purple Heart denials based solely upon timing or location of the TBI diagnosis is perplexing because Combat Veterans are required to include other corroborating documents in their applications, such as two sworn statements from eyewitnesses of the blast/injury, a combat action narrative describing the event in which they were injured (signed by senior Army leaders), and proof of VA disabilities for their combat-related TBI. Study participants believe that the Army makes applying for the Purple Heart difficult “to discourage us [them] from applying.”

**Thwarted Belongingness and Suicidal Behaviors**

Most the participants agree that “there’s comradery among Purple Heart recipients.” Purple Heart recipients feel safe “to talk about their injury with other Purple Heart recipients.” Civilians also recognize the Purple Heart as a medal of importance. Private businesses and Veterans Administration (VA) clinics and hospitals have dedicated parking spaces for Purple Heart recipients. “Purple Heart recipient” is often included in introductions of Combat Veterans and on employment biographies. Many states have Purple Heart license plates and highways named to honor Purple Heart recipients. The Purple Heart has a place of honor in society. Combat Veterans without the Purple Heart describe a “sting” when they see the license plates, drive past a parking space, hear the introductions, or watch emotional vignettes on TV about Purple Heart recipients. The Purple Heart is synonymous with combat wounded, so where do Combat Veterans without a Purple Heart fit in? “It feels shitty,” “I just hang my head.” These Army Combat Veterans do not feel like they belong.
Perceived Burdensomeness and Suicidal Behaviors

Interview participants described how being a burden is counter to military culture which explains the relationship between perceived burdensomeness and suicide behaviors. “The last thing you want to do is to be the guy who is not pulling his weight.” Many participants described not wanting to leave their teammates to see a medic after a concussion injury because it would leave the team with one less Soldier on a mission or convoy, possibly placing the team at a greater risk of harm. Yet, participants described how having a brain injury inhibits their ability to “pull their own weight.” “It’s upsetting that my wife has to take care of me.” “I don’t want to be someone else’s problem.” “It sucks to just like let people down because you can’t remember.” “There are holes in my memory,” “…you know what you want to say, but you stumble to get the words out,” “Being a burden on my family made me want to kill myself, I was going to kill myself if I didn’t get better, the symptoms are exhausting, and the guilt and shame are unbearable after angry outbursts.”

A lack of education or understanding about the injury can add to the burden because many Combat Veterans do not fully understand the injury and do not have hope that they will heal. “There is no cure for so much of this and the Veteran has to deal with it--- and the Vets do the research themselves and they have to talk to each other for information.” Further, families who are not educated on the injury may hold their Soldier to the same expectations prior to the brain injury, which adds to the Combat Veteran feeling like they are a burden or letting their family down.
The Relationship between the Purple Heart Status, Thwarted Belongingness, Betrayal and Quality of Life after Brain Injury

The explanation for the variables impacting a Combat Veteran’s quality of life after brain injury is woven throughout the data convergence findings explained above. The qualitative narratives provide clear understanding of how a Combat Veterans’ assessment of their quality of life after a TBI (overall satisfaction with their physical condition, how their brain is working, their emotions, ability to carry out daily activities, personal and social life, and current situation and future prospects) is negatively impacted by not receiving the Purple Heart, institutional betrayal, and thwarted belongingness.

Discussion

The convergence of two strands of scholarly inquiry provides insights as to why Army Combat Veterans with a TBI have unique suicide risks. To our knowledge, this study is the first to describe the values, beliefs, and meaning of the Purple Heart among Post-9/11 Army Combat Veterans and adds military commendation as an important new variable in suicide research. Findings from the study confirmed our hypothesis that not receiving the Purple Heart is a risk factor for suicide because receipt of the Purple Heart is inversely associated with suicidal behaviors among Army Combat Veterans with a TBI. Receipt of the Purple Heart is also negatively associated with quality of life after a brain injury. Further, among Army Combat Veterans with a TBI, thwarted belongingness, perceived burdensomeness, and institutional betrayal are associated with suicidal behaviors. When combined, Purple Heart status, thwarted belongingness, perceived burdensomeness, and betrayal accounted for over 50% of the variance in suicidal behavior scores in our sample.
This study also demonstrated that Post-9/11 Army Combat Veterans with a TBI endorsed higher mean suicidal behavior scores than other military samples (Anestis & Bryan, 2013). This highlights the importance of focusing inquiry on homogeneous military samples (i.e., Army Combat Veterans with a TBI), to identify potential suicide prevention interventions that meet the cultural needs unique to each military branch. Future studies grounded in the Interpersonal Theory of Suicide (Joiner, 2005) should build upon the current study by asking questions specific to Army Combat Veterans in the context of a TBI. Such exploration will enhance our understanding of why this population continues to be at highest risk for suicide. It would also be interesting to explore the association between number of blast exposures and suicidal behavior scores in a larger sample of Army Combat Veterans to confirm the negative association we found between the two variables. It is possible that surviving multiple life-threatening experiences enhances a Combat Veteran’s sense of purpose in life or impacts their acquired capacity for suicide (an Interpersonal Theory of Suicide variable).

This study confirms that TBIs have long-lasting physical and psychological impacts. The Committee on Accelerating Progress in Traumatic Brain Injury Research and Care indicates that TBIs do “not have a place to reside” in the U.S. health care system and TBIs should not be viewed as a one-time event, but rather managed as a condition (National Academies of Sciences, 2022). Healthcare Providers “need a comprehensive set of ‘bio-psycho-socio-ecological’ lenses to truly see a TBI in all its dimensions, and care and concern over time—not just in terms of a bounded episode” (National Academies of Sciences, 2022, p. xii). It is clear from our study that a holistic approach must be taken to identify or diagnose the TBI, educate Combat Veterans and their families about TBIs and their effects, and offer rehabilitation for these injured Veterans. Consider the relief a person feels when they identify the source of their symptoms, it is
validating. Once someone is diagnosed, a plan of care is created, and the Combat Veteran can take steps to heal or adjust to a new normal. When TBIs are not diagnosed, patients and families struggle, attaching their own names and meaning to the symptoms, “I thought I was just a crazy person.” Another Combat Veteran explained, “The Veteran has to figure out how to cope with a brain injury and if they cannot cope, they commit suicide.” These feelings may be preventable if TBIs are diagnosed and appropriately treated. Recognition of this invisible injury may be life-saving.

**Study Limitations**

There are several study limitations to note. First, Covid-19 restrictions and the Ukraine crisis (causing the U.S. to deploy on deterrence missions) negatively impacted participant recruitment efforts. The sample size was small, although it was sufficient for the analyses (Faul et al., 2009). Further, the psychological co-morbidities of participants were not identified, so we were not able to control for those potential confounders. In line with other military suicide studies, women and non-White men are under-represented in this study, despite efforts to recruit a diverse sample. There was specific hesitation among women and service members of color to participate, thus future studies must find ways to recruit them. Finally, the study used self-reported data and was cross-sectional which captures the feelings of participants at one point in time, prohibiting our ability to make predictions.

**Conclusion**

This study highlights the importance of examining suicide risk in Army Combat Veterans with a TBI and adds Purple Heart status as an important variable to consider in suicidal behavior studies among Army service members and Veterans. The study findings revealed three concrete ways to assist Army Combat Veterans at high risk for suicide. First, all Soldiers with a history of
being in or near a blast need to be systematically identified (modeling the burn pit registry) and offered a comprehensive TBI evaluation (biological, physical, social, and ecological). The Army must reject the notion that a Soldier can walk away from an explosive blast unharmed. Science makes it clear that blast waves cause concussion injuries through multiple mechanisms (Cernak, 2017; National Academies of Sciences, 2022) and loss of consciousness is not required (as previously thought). A comprehensive evaluation of the Combat Veteran’s symptoms would convince the Soldier, his family, and health care providers that the TBI symptoms are real and deserving of treatment.

Second, a TBI diagnosis may relieve some of the burden associated with living with a TBI because a diagnosis would indicate need for information and continuous follow-up care to address the Combat Veteran’s long-term care needs. The Combat Veterans would no longer need to fight to receive care. “…Just to help me and others like me understand what we're going through, because there may be things that that I'm not aware of. And I think the greatest benefit would be to actually talk with a provider that is well versed in TBI treatment and therapies.”

Third, all Army Combat Veterans who are diagnosed with a combat-related TBI (in the operational theatre or later) must be given a Purple Heart medal to officially recognize their combat injury and sacrifice. According to Army Human Resources command, “the Purple Heart differs from all other decorations in that an individual is not ‘recommended’ for the decoration; rather he or she is “entitled” to it upon meeting specific criteria.” (Army Human Resources Command, 2019). Because the Purple Heart is an entitlement, not an award based upon merit, it must be given to all Combat Veterans who were injured (invisible or visible), just like other military entitlements. To do otherwise, is unjust.
We considered several explanations for why Combat Veterans with a combat-related TBI do not receive Purple Heart medals, including having sufficient self-efficacy. Subjective decision-making by Army leaders and unobtainable Purple Heart application requirements (such as requiring the Combat Veteran to produce documentation of the injury from the deployment) make it difficult for Combat Veterans to receive the Purple Heart. Combat Veterans who are currently serving require their unit to submit the application on their behalf; they are not permitted to apply for the Purple Heart on their own. Unfortunately, several of the study participants said that their leaders blocked submission of the paperwork either denying their injury or citing their own criteria for the medal. Veterans who are no longer serving can submit their applications on their own but are being denied the Purple Heart for having a post-deployment TBI diagnosis. So, self-efficacy, for example, cannot get around military policy.

Two major changes are required for the Purple Heart medal to be given to all combat-injured Army Veterans. First, a paradigm shift is needed to change the common misconception among Army leaders that giving a Purple Heart to all Soldiers with a combat-related TBI would “water it down.” Second, the existing Purple Heart documentation requirement must change to allow Combat Veterans to submit a post-deployment TBI diagnosis as evidence of their combat-injury. This is especially important for Combat Veterans who served in the first 10 years of the Global War on Terrorism, when TBIs were not regularly acknowledged, treated, and/or documented (Miller & Zwerdling, 2010). This change would resolve the paradox that exists between the VA and the Army, where the VA awards 30-100% lifetime disability to a Veteran for their combat-related TBI while the Army denies the Purple Heart for the same injury. As mentioned, the Army rejects post-deployment TBI diagnoses from VA neurologists as legitimate documentation for a Purple Heart.
Future studies should also evaluate suicidal behaviors in Army Combat Veterans over time to look for predictive variables unique to having a TBI, and to understand when and how to effectively intervene to prevent suicide. It is important to determine if suicide rates drop after Army Combat Veterans with a possible TBI are evaluated, diagnosed, treated, and given a Purple Heart medal. This could be a systematic preventive intervention for all Soldiers with a combat-related TBI.

Lastly, public education efforts are necessary to enhance everyone’s understanding of TBIs. In the words of a Combat Veteran, “maybe, the more this gets talked about and the more people will be reading these articles going ‘hey that happened to me, too’, and they get diagnosed with a TBI, and they get a Purple Heart…maybe they'll go get checked up on and get help if they need it.” Sentiments like this support a national imperative to provide all combat-wounded Post-9/11 Army service members and Veterans with an evaluation, diagnosis, Purple Heart medal, and follow-up care.
Table 1
Sociodemographic Characteristics of Participants

<table>
<thead>
<tr>
<th>Military component</th>
<th>Quantitative</th>
<th>Qualitative</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. Army active duty</td>
<td>84.7%</td>
<td>88.2%</td>
</tr>
<tr>
<td>U.S. Army Reserve</td>
<td>5.1%</td>
<td>5.9%</td>
</tr>
<tr>
<td>U.S. Army National Guard</td>
<td>10.2%</td>
<td>5.9%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Military rank at time of the survey/interview</th>
<th>Quantitative</th>
<th>Qualitative</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1-E4</td>
<td>14.5%</td>
<td>11.8%</td>
</tr>
<tr>
<td>E5-E9</td>
<td>55%</td>
<td>47.1%</td>
</tr>
<tr>
<td>CW1-CW5</td>
<td>6.4%</td>
<td>-</td>
</tr>
<tr>
<td>O1-O4</td>
<td>16.1%</td>
<td>29.4%</td>
</tr>
<tr>
<td>O5-O9</td>
<td>8%</td>
<td>11.8%</td>
</tr>
</tbody>
</table>

| Age                                           | Quantitative | Qualitative |
| Mean (SD)                                     | 40.71(7.68)  | 40.76(5.69) |

| Sex                                           | Quantitative | Qualitative |
| Female                                        | 1.7%         | 5.9%        |
| Male                                          | 98.3%        | 94.1%       |

| Race/Ethnicity                                | Quantitative | Qualitative |
| American Indian or Alaska Native             | 3.3%         | 5.9%        |
| Asian                                         | 1.7%         | -           |
| Black or African American                     | 16.7%        | 5.9%        |
| Hispanic or Latino                           | 6.7%         | 5.9%        |
| White/Caucasian                               | 70%          | 76.5%       |
| Other                                         | 1.7%         | 5.9%        |

| Relationship status                           | Quantitative | Qualitative |
| Married                                       | 76.3%        | 82.4%       |
| Divorced                                      | 8.5%         | 11.8%       |
| Separated                                     | 6.8%         | -           |
| Single/never married                          | 6.8%         | -           |
| Partnered and/or engaged                      | 1.7%         | 5.9%        |

| Children (that depended on them)              | Quantitative | Qualitative |
| Yes                                           | 22.4%        | -           |
| No                                            | 77.6%        | -           |

| Education                                     | Quantitative | Qualitative |
| High school degree or equivalent (e.g., GED)  | 3.3%         | -           |
| Some college, but no degree                   | 26.7%        | 5.9%        |
| Diploma or Technical Certification            | 5.0%         | -           |
| Associate degree                              | 16.7%        | 11.8%       |
| Bachelor’s degree                             | 20.0%        | 47.1%       |
| Master’s degree                               | 23.3%        | 35.3%       |
| Doctorate                                     | 5.0%         | -           |

| Number of deployments                         | Quantitative | Qualitative |
| Mean (SD)                                     | 2.89(1.63)   | 2.35(1.28)  |

| Number of blast exposures (i.e., TBI)         | Quantitative | Qualitative |
| Mean (SD)                                     | 5.58(3.84)   | -           |

Purple Heart status
### Table 1
**Sociodemographic Characteristics of Participants**

<table>
<thead>
<tr>
<th></th>
<th>Quantitative (%)</th>
<th>Qualitative (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>75.8%</td>
<td>64.7%</td>
</tr>
<tr>
<td>Yes</td>
<td>24.2%</td>
<td>35.3%</td>
</tr>
</tbody>
</table>

Note. Quantitative n=62, Qualitative n=17

### Table 2
**Correlations Among Study Variables and Descriptive Statistics**

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. TB</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. PB</td>
<td>0.55 ***</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Institutional Betrayal</td>
<td>0.33 *</td>
<td>0.05</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. QOLIBRI</td>
<td>0.56 ***</td>
<td>0.14</td>
<td>-0.38 **</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. SB</td>
<td>0.57 ***</td>
<td>0.54 ***</td>
<td>0.33 **</td>
<td>-0.27 *</td>
<td></td>
</tr>
</tbody>
</table>

Mean: 29.5 14.0 17.6 7.55
SD: 12.9 8.66 3.60 5.79 4.05
Minimum: 9.0 6.0 6.00 4.00
Maximum: 56.0 38.0 0 29.0 21.00
n: 57 57 60 60 60

Note. * p < .05, ** p < .01, *** p < .001, TB=thwarted belongingness, PB=perceived burdensomeness, QOLIBRI=quality of life after brain injury, SB=suicidal behaviors
### Table 3

*Suicide Behaviors: Negative Binomial Regression Coefficients and Loglikelihood Ratio*

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Estimate</th>
<th>SE</th>
<th>exp(B)</th>
<th>Lower</th>
<th>Upper</th>
<th>z</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Intercept)</td>
<td>1.20</td>
<td>0.11</td>
<td>3.32</td>
<td>2.68</td>
<td>4.07</td>
<td>11.26</td>
</tr>
<tr>
<td>Thwarted Belongingness</td>
<td>1.30</td>
<td>0.49</td>
<td>3.67</td>
<td>1.43</td>
<td>9.73</td>
<td>2.68</td>
</tr>
<tr>
<td>Purple Heart Status (Yes)</td>
<td>-0.48</td>
<td>0.20</td>
<td>0.62</td>
<td>0.42</td>
<td>0.91</td>
<td>-2.40</td>
</tr>
<tr>
<td>Perceived Burdensomeness</td>
<td>1.17</td>
<td>0.37</td>
<td>3.22</td>
<td>1.55</td>
<td>6.75</td>
<td>3.13</td>
</tr>
<tr>
<td>Institutional Betrayal</td>
<td>0.07</td>
<td>0.02</td>
<td>1.08</td>
<td>1.03</td>
<td>1.13</td>
<td>3.08</td>
</tr>
<tr>
<td>Number of Blasts (TBIs)</td>
<td>-0.06</td>
<td>0.02</td>
<td>0.94</td>
<td>0.90</td>
<td>0.99</td>
<td>-2.47</td>
</tr>
</tbody>
</table>

**Model r²** 0.56

*Note. N=57*

### Table 4

*Quality of Life After a TBI: Hierarchical Regression*

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE</th>
<th>t</th>
<th>Stand β</th>
<th>r²</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.11</td>
</tr>
<tr>
<td>Intercept *</td>
<td>16.93</td>
<td>0.81</td>
<td>20.83</td>
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<tr>
<td>Purple Heart Status (Yes)</td>
<td>4.00</td>
<td>1.58</td>
<td>2.53</td>
<td>0.73</td>
<td></td>
</tr>
</tbody>
</table>

**Step 2**

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE</th>
<th>t</th>
<th>Stand β</th>
<th>r²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept *</td>
<td>34.71</td>
<td>3.15</td>
<td>11.02</td>
<td></td>
<td>0.52</td>
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<tr>
<td>Purple Heart Status (Yes)</td>
<td>2.804</td>
<td>1.22</td>
<td>2.31</td>
<td>0.51</td>
<td></td>
</tr>
<tr>
<td>Thwarted Belongingness</td>
<td>-10.79</td>
<td>2.24</td>
<td>-4.82</td>
<td>-0.47</td>
<td></td>
</tr>
<tr>
<td>Institutional Betrayal</td>
<td>-0.54</td>
<td>0.16</td>
<td>-3.48</td>
<td>-0.35</td>
<td></td>
</tr>
</tbody>
</table>

*Note. N=57*
Figure 1

*Pictorial Model of the Mixed Methods Findings*
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