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SAN DIEGO STATE UNIVERSITY

Presence of Symptomatology and VA Service Seeking Among OEF/OIF/OND Veterans with Complicated Grief

A dissertation submitted in partial satisfaction of the requirements for the degree of Doctor of Philosophy

in

Clinical Psychology

by

Kathryn Baker Seay

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The Dissertation of Kathryn Baker Seay is approved, and it is acceptable in quality and form for publication on microfilm and electronically:

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Chair

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2016

DEDICATION

To my parents and husband…for your unwavering love and support

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ABSTRACT OF DISSERTATION

Presence of Symptomatology and VA Service Seeking Among OEF/OIF/OND Veterans with Complicated Grief

by

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Doctor of Philosophy in Clinical Psychology

University of California, San Diego, 2016
San Diego State University, 2016

Professor Sidney Zisook, Chair

Posttraumatic stress disorder (PTSD) and complicated grief (CG) are debilitating disorders associated with numerous negative health concerns. PTSD has been widely studied among Veteran populations, however, few studies have evaluated CG. The current study examined 1122 returning Veterans following enrollment into the VA San Diego Healthcare System (VASDHS). Veterans were classified into four groups based

on self-reported symptoms: (1) CG alone (n = 26); (2) PTSD alone (n = 112); (3) both CG and PTSD (n = 99), and (4) neither CG or PTSD (Veteran controls; n = 554). This study aimed to (1) evaluate group differences in baseline demographic, physical, and mental health variables (baseline variables); (2) evaluate group differences in use of physical healthcare, mental healthcare, and emergency services (healthcare services) within the first six months following VASDHS enrollment; and (3) evaluate the predictive utility of baseline variables on use of healthcare services within the first six months following VASDHS enrollment. Regression analyses (multiple, binary logistic, multinomial logistic, and negative binomial) were used. Screening positive for both CG and PTSD was associated with the greatest severity of physical and mental health symptoms, followed by PTSD alone, CG alone, and Veteran controls. Screening positive for both CG and PTSD and PTSD alone was associated with greater use of healthcare services compared to other groups. Baseline variables, including branch of military service, positive TBI screen, greater generalized anxiety symptoms, greater insomnia symptoms, greater physical health symptoms, greater pain interference, worse mental health functioning, less resilience, and better physical health functioning predicted greater use of healthcare services. These findings supplement the growing body of literature documenting the negative health impact of PTSD and add to it the importance of considering CG in the overall health and health-utilization of returning Veterans. Results suggest that Veterans with PTSD are more likely to use healthcare services compared to Veterans without PTSD. Results may also suggest that Veterans with CG may underutilize healthcare services compared to other groups. This highlights the

importance of routinely screening for CG in Veteran populations, and is relevant to understanding and improving access to healthcare services for Veterans with CG.

INTRODUCTION

For many service members and Veterans, losing close friends in combat is an all-too common experience. Over 75% of Operation Iraqi Freedom (OIF) soldiers reported having lost someone in their immediate unit in combat (Currier & Holland, 2012; Hoge et al., 2004). Combat-related emotional difficulties have been widely studied in Veterans Administration Hospitals across the country, particularly in relation to posttraumatic stress disorder (PTSD). However, there is a growing body of literature suggesting that loss-specific emotional difficulties, including complicated grief (CG) are distinct from symptoms of PTSD and relevant for many Operation Enduring Freedom, Operation Iraqi Freedom, and Operation New Dawn (OEF/OIF/OND) Veterans.

This literature review will begin with a review of the CG and PTSD literatures followed by a review of the service utilization literatures for CG and PTSD. First, the CG literature will be reviewed, including information about the development of CG following loss, prevalence rates of CG in civilian and Veteran populations, a discussion of the medical and psychiatric comorbidities often seen with CG, and a discussion of how CG can be reliably differentiated from other mental health concerns, including adaptive (i.e., non-complicated) grief, PTSD, depression, and other anxiety disorders. Second, the PTSD literature will be reviewed, including the development of PTSD following exposure to a traumatic event, prevalence of PTSD among civilian and Veteran populations, and a discussion of the medical and psychiatric comorbidities often seen with PTSD. Third, a model of allostatic load (McEwen & Stellar, 1993) will be presented to provide a conceptual framework for understanding the cumulative burden of CG and

PTSD on a given individual. Later, the service utilization literatures for CG and PTSD will be reviewed in civilian and Veteran populations.

Complicated Grief

Development of complicated grief. Loss of a loved one or close friend is a unique and highly stressful event (Shear & Shair, 2005). Following the death of a meaningful attachment figure, most people experience an initial period of acute grief characterized by waves of intense pain, disruption in ordinary activities, a sense of disbelief, difficulty accepting the loss, and preoccupying thoughts and images of the person who died (Shear, 2009). These symptoms begin to abate with time and most bereaved individuals transition to a period of integrated grief where they are better able to assimilate the sorrow, longing, and memories of the deceased into their daily life (Shear, 2009) and no longer experience the intense bouts of emotional pain and life interference. A significant minority, however, are not able to effectively make this transition, resulting in a disorder called complicated grief (CG).

CG is a disruption in the normal grieving process characterized by prolonged and intense grief over the death of a loved one (Shear, 2009). Although there is ongoing debate about the symptoms, time course, and name of this disorder, it is evident that it can be reliably identified (Robinaugh, Marques, Bui, & Simon, 2012; Shear et al., 2011; Zisook et al., 2014). CG is characterized by a constellation of symptoms including ongoing yearning and longing for the deceased, preoccupation with the deceased, anger and bitterness, shock and disbelief, sense of futility and loss of meaning in life, estrangement from others, and behavior change (i.e., avoidance and/or seeking contact with reminders of the deceased; Simon et al., 2011). In CG, symptoms must be

experienced for at least six months following the death and cause clinically significant distress or impairment in social, occupational or other important areas of functioning (Shear et al., 2011). CG is often assessed using the *Inventory of Complicated Grief* (ICG), a 19-item self-report measure evaluating CG severity (Range 0-76). Clinical cut-off scores on the ICG range from 25 (Prigerson et al., 1995) to 30 (Shear, Frank, Houck, & Reynolds, 2005).

Prevalence of CG. CG is prevalent for a minority of individuals in the general population and may be a unique stressor facing many Veterans. Early studies have suggested that CG may affect as many as 10% to 20% of bereaved individuals in the general population (Jacobs, 1993; Middleton, Burnett, Raphael, & Martinek, 1996), however more recent estimates are closer to 5% to 10% (Kersting, Brahler, Glaesmer, & Wagner, 2011; Newson, Boelen, Hek, Hofman, & Tiemeier, 2011). While only few studies have evaluated CG in Veteran populations, reports of CG are high. Toblin et al. (2012) found that 21.3% of soldiers returning from Iraq and Afghanistan reported "difficulty coping with grief over the death of someone close" on a one-item screening measure (Toblin et al., 2012). Additionally, this investigator found that 19.9% of OEF/OIF/OND Veterans enrolling into the VA San Diego Healthcare System (VASDHS) who had experienced loss reported that grief was interfering with their ability to "work, socialize, or function in other ways" six or more months following their loss (Seay, 2014). While these studies are limited by brief measures of CG, results may indicate that Veteran populations are at increased risk of developing symptoms of CG compared to their civilian counterparts.

Past research has shown that direct exposure to trauma worsens grief (Neria et al., 2007; Sung et al., 2011) and leads to greater functional impairment (Bonanno et al., 2007; Mancini & Bonanno, 2011; Neria et al., 2007; Stroebe, Schut, & Stroebe, 2007). Specifically, violent loss has been associated with higher rates of PTSD and depression among all individuals with CG. Rates of comorbid PTSD range from 43% to 65% (Morina, Rudari, Bleichhardt, & Prigerson, 2010; Nakajima, Ito, Shirai, & Konishi, 2012; Neria et al., 2007; Simon et al., 2007) in certain populations, while rates of comorbid depression range from 21% to 54% (Horowitz et al., 1997; Prigerson et al., 1995). Nakajima et al. (2012) reported that unique factors such as lack of readiness for the death, difficulty in making sense of the death, high level of negative appraisal about self or others (including guilt and blame), and various social and environmental stressors make violent losses particularly difficult.

Among Veteran populations, Pivar and Field (2004) have suggested that Veterans may be at increased risk of developing CG given the violent and unexpected nature of combat-loss and close attachment to people in their unit (Pivar, 2004; Pivar & Field, 2004). Currier and Holland (2012) examined data from the National Vietnam Veterans Readjustment Study (NVVRS) to evaluate the contribution of combat-loss in psychological functioning and PTSD. They found that after controlling for demographics, exposure to non-bereavement combat stressors, and other bereavement experiences, combat-loss was uniquely associated with past and current functional impairment among Veterans, decades after returning from war. Of note, this impairment was not related to severity of PTSD symptoms. In a similar study of Vietnam Veterans, Papa, Neria, and Litz (2008) found that the risk of developing CG increased as the number of close friends

killed in combat increased. Among OEF/OIF/OND Veterans, combat-loss has been associated with higher rates of CG compared to Veterans who experienced non-combat-losses. Combat-loss has also been associated with greater PTSD severity, depression severity, suicidal ideation, and worse mental and physical health functioning (Seay, 2014). These findings underline that combat-loss (in particular multiple combat-losses) is an important risk factor for the development of CG among combat Veterans (Papa et al., 2008) and may explain the higher prevalence rates of CG seen in Veterans compared to civilian samples.

CG is highly comorbid with other disorders and associated with poor mental and physical health functioning. In civilian samples, CG has been associated with a range of negative mental and physical health concerns (Prigerson et al., 1997) including PTSD, depression, functional impairment (Neria et al., 2007), suicidal ideation and attempts (Latham & Prigerson, 2004), problematic alcohol use (Prigerson et al., 1997; Simon et al., 2005; Sung et al., 2011), other anxiety disorders (Prigerson et al., 1997; Simon et al., 2005; Simon et al., 2007), sleep problems (Germain, Caroff, Buysse, & Shear, 2005; Prigerson et al., 1997), hospitalization for mental illness (Li, Laursen, Precht, Olsen, & Mortensen, 2005), and medical comorbidity, including cancer (Levav et al., 2000), increased risk for cardiovascular and cerebrovascular events (Zisook et al., 2014), high blood pressure and hypertension (Chen et al., 1999; Prigerson et al., 1997), and mortality (Li, Precht, Mortensen, & Olsen, 2003). Among individuals with CG, the presence of additional psychiatric symptoms has been associated with greater severity of CG symptoms (Simon et al., 2007).

Among OEF/OIF/OND Veterans, CG has been associated with numerous physical health problems including high somatic symptoms, poor overall health, missed work days, high medical utilization, difficulty carrying a heavy load, and difficulty performing physical training (Toblin et al., 2012). OEF/OIF/OND Veterans who screened positive for CG also reported greater PTSD severity, depression severity, suicidal ideation, and worse mental and physical health functioning upon enrollment to the VASDHS compared to Veterans who did not screen positive for CG (Seay, 2014).

Differential diagnosis. While CG bears substantial symptomatic overlap with adaptive (i.e., non-complicated) grief, PTSD, depression, and other anxiety disorders, it can be reliably differentiated from these disorders among civilian and Veteran populations (Pivar & Field, 2004).

CG can be reliably differentiated from adaptive (i.e., non-complicated) grief due to the presence of excessive avoidance of reminders of the loss, significant rumination about circumstances or consequences of the death, and persistent, intense, and impairing grief symptoms beyond what is expected according to social and cultural norms. This time period may vary substantially across cultures; nonetheless, CG has been identified in countries across the world, including the United States, Western Europe, Iran, Bosnia, Kosovo, Pakistan, Turkey, Rwanda, China, and Japan (Shear et al., 2011).

CG can also be reliably differentiated from PTSD and depression. In a study of CG among Vietnam combat Veterans admitted to an inpatient PTSD rehabilitation unit, Pivar and Field (2004) found symptoms of CG to be distinct from PTSD and depression, and that significant CG symptoms remained 30-years post-combat-loss (Pivar & Field, 2004). CG can be differentiated from PTSD in that the trauma is a loss of a loved one

rather than a life-threatening event. Thus, grief and sadness, rather than fear, are the predominant emotions experienced among individuals with CG. Individuals with CG may experience intrusive thoughts and images; however, these intrusive symptoms are predominantly focused on the deceased person and circumstances of the loss rather than a traumatic event. In CG, these thoughts and memories are not frightening and may even be pleasurable at times (e.g., remembering positive experiences shared with the deceased). Avoidance in CG is related to reminders of the deceased person rather than a traumatic event and fueled by painful yearning and sadness rather than fear. In a given individual, both CG and PTSD may be present simultaneously.

While symptoms of CG and PTSD often co-occur in the event of a traumatic loss (Neria & Litz, 2004), avoidance of fear-inducing stimuli associated with PTSD does not occur with CG following a death, rather there is a hyperfocus on the loss and reminders of the deceased, a desire for reconnection with the deceased, and avoidance of reminders that the person is gone rather than high arousal and negative affect. Additionally, the unique separation distress symptoms of CG (e.g., longing and pining for the deceased, interpersonal attachment problems, mistrust of others, difficulty forming new relationships due to concerns about interpersonal abandonment) are not included among criteria for PTSD (Lichtenthal, Cruess, & Prigerson, 2004; Prigerson et al., 1996).

Numerous studies have also found that symptoms of CG (e.g., yearning and longing for the deceased, non-acceptance of the loss, ruminating on memories of the deceased, loneliness, lack of purpose or meaning without the deceased) are distinct from symptoms of depression (e.g., fatigue, loss of energy, self-blame, depressed mood, anhedonia, worthlessness) with unique outcomes in civilian (Boelen & van den Bout,

2005; Boelen, van den Bout, & de Keijser, 2003; Bonanno et al., 2007; Ogrodniczuk et al., 2003; Prigerson et al., 1996) and Veteran populations (Papa et al., 2008; Pivar & Field, 2004). Furthermore, these factors are independently predictive of treatment response to psychosocial (Ogrodniczuk et al., 2003) and pharmacological interventions (Ott, 2003) in broad-based community samples (Papa et al., 2008).

Similar differences in constructs have been found between symptoms of anxiety (e.g., worry, restlessness, nervousness) and CG (Boelen & Prigerson, 2007; Boelen & van den Bout, 2005; Boelen et al., 2003; Prigerson et al., 1996). In CG, anxiety and worry symptoms are limited to loss-related factors rather than fear of other stimuli (e.g., physical sensations in panic disorder, catastrophic thoughts in generalized anxiety disorder, fear of being negatively judged by others in social anxiety disorder, a specific object or situation in specific phobia, and obsessive thoughts in obsessive compulsive disorder).

Past studies in civilian samples have found that treatments for bereavement-related depression are minimally effective for treating CG symptoms (Reynolds et al., 1999; Shear et al., 2005; Zisook, Shuchter, Pedrelli, Sable, & Deaciuc, 2001) and that CG predicted functional impairment above what would be expected by PTSD, depression, and other anxiety disorders (Boelen & Prigerson, 2007; Bonanno et al., 2007; Neria & Litz, 2004; Shear et al., 2007; Silverman et al., 2000; Simon et al., 2007). Among Veterans who lost close friends in combat, the presence of CG has been found to predict poorer functioning beyond PTSD alone (Papa et al., 2008).

In sum, while mental and physical health concerns associated with CG have been widely studied in civilian populations, only a few studies have evaluated these concerns

in Veteran populations. Research has shown that CG can be reliably differentiated from PTSD, depression, and other anxiety disorders, however, more information is needed to clarify these differences. This study will evaluate differences in self-reported physical and mental health symptoms for Veterans who screened positive for CG alone, PTSD alone, both CG and PTSD, or neither CG or PTSD upon enrollment into the VASDHS.

Posttraumatic Stress Disorder

Development of PTSD. Within *DSM-5* a traumatic event is defined as exposure to actual or threatened death, serious injury, or sexual violence that was directly experienced, witnessed, or indirectly experienced by learning that a close relative or friend was exposed to a traumatic event (American Psychiatric Association, 2013). In the United States, the lifetime prevalence rate of traumatic exposure ranges from 50% to 90% of individuals in the general population (Breslau et al., 1998; Kessler, Sonnega, Bromer, Highes, & Nelson, 1995; Kilpatrick et al., 2013; Norris, 1992; Resnick, Kilpatrick, Dansky, Saunders, & Best, 1993), with many having exposure to multiple traumatic events (Kilpatrick et al., 2013). Bonanno (2005) suggested that although the vast majority of individuals experience immediate distress following a trauma, most will recover. However, a significant minority of individuals with trauma exposure, 10% to 30%, will go on to experience chronic physical or emotional problems, including PTSD (Bonanno, 2005).

PTSD is characterized by a constellation of symptoms including intrusion symptoms (e.g., intrusive thoughts, nightmares, dissociative reactions), avoidance (of thoughts, feelings, and external trauma reminders), negative alterations of cognitions and mood (e.g., distorted blame of self or others for causing the traumatic event or its

consequences, negative trauma-related emotions including fear, horror, anger, guilt, and shame), and alterations in arousal and reactivity (e.g., hypervigilance, sleep disturbance, irritability and aggressive behavior). In PTSD, symptoms must be experienced for at least one month and cause significant distress or functional impairment (American Psychiatric Association, 2013). The "gold standard" assessment for PTSD is the *Clinician-Administered PTSD Scale for DSM-5* (Weathers et al., 2013), a 30-item structured interview used to assess for current or lifetime PTSD symptoms.

Prevalence of PTSD. The lifetime prevalence rate of PTSD in the general population ranges from 6% to 12% (Breslau et al., 1998; Kessler, Berglund, et al., 2005; Kessler et al., 2008; Kessler et al., 1995; Kilpatrick et al., 2013; Norris & Slone, 2013; Resnick et al., 1993), while estimates of current PTSD (within the last 12 months) range from 3.5% to 6.3% depending on trauma type (Kessler et al., 2008; Kessler, Chiu, Demler, & Walters, 2005; Kilpatrick et al., 2013; Norris & Slone, 2013; Resnick et al., 1993).

Among Veteran populations, rates of PTSD are much higher. Prevalence rates of PTSD in national studies of OEF/OIF/OND and Vietnam Veterans ranges from 14% to 33.8% (Cohen et al., 2010; Frayne et al., 2011; Schell & Marshall, 2008; Schnurr et al., 2010; Seal et al., 2009; Weiss et al., 1992). Among returning Afghanistan (OEF) and Iraq (OIF/OND) Veterans specifically, PTSD has been the most commonly diagnosed mental health disorder, with over 19% of the 1.8 million OEF/OIF/OND Veterans seen at the Veterans Health Administration or Vet Centers across the country having been diagnosed with PTSD (Department of Veterans Affairs, 2014).

While prevalence rates of PTSD are high among Veterans who served in the

OEF/OIF/OND conflicts, some studies have suggested lower rates of PTSD among active duty personnel (soldiers and marines), three to four months following deployments to Afghanistan and Iraq (Hoge, Auchterlonie, & Milliken, 2006; Hoge et al., 2004). In these studies, rates of PTSD ranged from 4.5% to 12% of those returning from Afghanistan (Hoge et al., 2006; Hoge et al., 2004) and 9.8% to 19.3% of those returning from Iraq (Hoge et al., 2006; Hoge et al., 2004), based on symptom self-report. These studies may be limited, however, by measurement concerns (relying on screening measures such as the 17-item *PCL-C* and 4-item PTSD Scale) and short duration of time post-deployment (3 – 4 months), which may not be representative of the larger treatment-seeking OEF/OIF/OND Veteran population. McLay et al. (2008) also caution that estimates of PTSD among active duty personnel may be underestimated as a result of underreporting and numerous cases of sub-threshold PTSD.

PTSD is highly comorbid with other disorders and associated with poor mental and physical health functioning. Among civilian and Veteran populations, PTSD has been associated a range of negative mental and physical health problems, including depression, substance use disorders, other anxiety disorders (Brady, Killeen, Brewerton, & Lucerini, 2000; Keane & Kaloupek, 1997), suicidality (Jakupcak et al., 2009; Krysinska & Lester, 2010; Panagioti, Gooding, & Tarrier, 2009; Wunderlich, Bronisch, & Wittchen, 1998), sleep difficulties (Breslau, Lucia, & Davis, 2004), traumatic brain injury (TBI; Polusny et al., 2011; Vasterling et al., 2012), self-reported physical health problems (Barrett et al., 2002; Dobie et al., 2004; Wagner, Wolfe, Rotnitsky, Proctor, & Erickson, 2000), and other chronic medical problems including chronic pain, musculoskeletal problems, cardiovascular problems, gastrointestinal

problems, respiratory problems, and higher rates of autoimmune disease (Boscarino, 2004). In addition, individuals with PTSD are often diagnosed with a greater number medical (Frayne et al., 2011) and psychiatric disorders than individuals without mental health concerns (Brady et al., 2000; Grinage, 2003; Kessler et al., 1995).

Model of Allostatic Load

While both the CG and PTSD literatures provide information about the negative mental and physical health concerns associated with each disorder, little information is available to understand the cumulative health burden of CG and PTSD symptoms for an individual presenting with both concerns. To better understand this cumulative burden, the model of allostatic load (McEwen & Stellar, 1993) was adapted from the PTSD and alcohol use disorders (AUD) literature base. The model of allostatic load is defined by McEwen and Stellar (1993) as "the cumulative cost to an organism of going through repeated cycles of adaptation to stress" (Tate, Norman, McQuaid, & Brown, 2007). In this model, greater allostatic load is thought to exhaust an organism and thus lead to increased susceptibility to illness (Heltemes, Clouser, MacGregor, Norman, & Galarneau, 2014). This can be used to understand how increased stress (or load) on an individual can lead to a greater health concerns. Within the PTSD/AUD literature base, individuals with both PTSD and AUD have been found to have greater physical and mental health concerns compared to individuals with PTSD alone or those with no mental health concerns (Mills, Teesson, Ross, & Peters, 2006). Tate et al. (2007) found that Veterans with PTSD and AUD had a greater number of physical and mental health concerns compared to Veterans with substance use and no PTSD. Similarly, Heltemes et al. (2014) found that Veterans with PTSD and AUD reported a significantly higher

number of health complaints, on average, than Veterans endorsing only mental health symptoms and no AUD. Overall, these results suggest that the cumulative burden of PTSD and AUD is greater on an individual than PTSD alone, substance use alone, other mental health symptoms alone, and no mental health symptoms.

Using this model in the current study, both CG and PTSD can be considered a unique load for Veterans to bear. Using this framework, Veterans who screened positive for both CG and PTSD would be expected to experience greater physical and mental health strain (i.e., symptoms) compared to Veterans who screened positive for CG alone, PTSD alone, or Veteran controls. Veterans who screened positive for CG alone and PTSD alone would also be expected to experience greater physical and mental health symptoms compared to Veteran controls, who do not have the additional burden of CG or PTSD.

Summary and Limitations of Prior Research

In sum, CG is an abnormal bereavement reaction characterized by prolonged and intense grief over the death of a loved one. CG affects a minority of bereaved individuals in the general population and has been associated with a wide-range of negative physical and mental health concerns. To date, CG has been relatively unstudied in Veteran populations, with the majority of studies conducted with inpatient and outpatient Vietnam Veterans 30-years post-loss. In those studies, CG and PTSD have been reliably differentiated, however, symptom overlap exists. Few studies have addressed CG among returning Veteran populations. In those studies, rates of CG and associated physical and mental health concerns are high. Returning Veterans may be at an increased risk of

developing CG given the violent nature of combat-loss and close attachment to people in their unit.

PTSD is a common stress-reaction following exposure to a traumatic event, that impacts a significant minority of individuals in general population. PTSD has been widely studied in both civilian and Veteran populations and is associated with a wide-range of physical and mental health concerns. Among OEF/OIF/OND Veterans receiving healthcare at the Veterans Health Administration and Vet Centers across the United States, PTSD is the most widely diagnosed mental health problem, and is associated with significant social and occupational impairment.

To date, a considerable amount of research has been conducted evaluating the impact of PTSD in returning Veteran populations; however, research regarding Veterans with CG is limited. Considering data from both the civilian and Veterans literature base, the following conclusions about CG and PTSD can be drawn. First, both CG and PTSD affect a significant minority of individuals the Veteran population. Second, both CG and PTSD are associated with significant functional impairment and range of physical and mental health concerns, including: depression, other anxiety disorders, alcohol and substance use, suicidal ideation, sleep problems, and chronic medical problems. Third, while CG and PTSD share some common symptoms (e.g., intrusive memories, avoidance, maladaptive cognitions, negative affect), these symptoms have notable differences in their etiologies, and these disorders can be reliably differentiated. Fourth, if left untreated, both CG and PTSD are chronic, debilitating disorders. Fifth, while there have been few empirical studies evaluating individuals with both CG and PTSD, the

model of allostatic load may be helpful in understanding the cumulative health burden of both concerns on an individual.

The current study will attempt to close some gaps in the literature regarding CG and PTSD in returning Veteran populations by evaluating the impact of CG and PTSD on mental and physical health symptoms in a large sample of returning Veterans.

Service Utilization

Next, the service utilization literatures for CG and PTSD will be reviewed. Due to an extremely limited literature base evaluating service utilization in CG populations, data will be presented for bereaved individuals who both meet and do not meet clinical criteria for CG (based on duration of time since the loss). Additionally, for both CG and PTSD, data will be presented for both civilian and Veteran populations, where possible.

Grief and Complicated Grief. There is a dearth of information evaluating the impact of CG on use of physical and mental healthcare services within the literature. Findings from the few reported studies are mixed. In a study of early grief by Prigerson et al. (2001), authors found that women who reported high intensity of grief symptoms had a reduced use of physical healthcare services, despite an increased risk of high blood pressure and functional impairment compared to women with lower intensity of grief symptoms. Of note, the population in this study was widows who lost their spouse in the previous four months, and thus, would not meet duration criteria for CG (Prigerson et al., 2001; Stroebe et al., 2007). Conversely, a study by Lannen, Wolfe, Prigerson, Onelov, and Kreicbergs (2008) evaluated a sample of Swedish bereaved parents and found grief to be associated with increased use of healthcare services and an increased use of sick leave four to nine years following the death of their child. This study was conducted

using an anonymous mailed questionnaire, however, and authors were not able to verify a diagnosis of CG. A study by Lichtenthal et al. (2011) examined CG and mental health service use among bereaved caregivers of advanced cancer patients. They reported that bereaved caregivers with CG tended to underutilize mental healthcare services (only 43% engaging in services within 6.5 months following the death). However, this study is limited by small sample of individuals with CG (n = 14) and median time since the loss of only 6.5 months. No study has evaluated use of healthcare services among Veterans with CG.

To date, the state of the literature has not evaluated specific demographic, psychiatric, or loss-specific variables that contribute to use of mental and physical healthcare services in individuals with CG. The above studies are limited by small sample size, short duration of time post-loss, and limitations in measurement. One study evaluating a small population of caregivers with CG suggested that individuals with CG may underutilize healthcare services. Unfortunately, this is a very narrow sample of individuals with CG and may not generalize to broader civilian or Veteran populations. The present study will attempt to address significant gaps in the current literature regarding use of physical and mental healthcare services among returning Veterans who screened positive for CG.

Posttraumatic Stress Disorder

Within the broad service utilization literature, factors that lead to increased service utilization in individuals with PTSD has been more thoroughly evaluated. Specific demographic and psychiatric variables will be discussed for civilian and Veteran populations.

Demographic factors. In civilian studies of trauma survivors, demographic factors including age and gender have been related to use of mental healthcare services such that younger individuals (Lewis et al., 2005) and women (Elhai, North, & Frueh, 2005; New & Berliner, 2000) are more likely to engage in services. Other demographic factors including race and ethnicity have had mixed results in the literature. In many studies, no association between ethnicity and use of mental healthcare services was found (Boscarino, Galea, Ahern, Resnick, & Vlahov, 2002; Elhai, Reeves, & Frueh, 2004; Fontana & Rosenheck, 1994; Frueh, Elhai, Monnier, Hamner, & Knapp, 2004; Price, Davidson, Ruggiero, Acierno, & Resnick, 2014; Rosenheck & Fontana, 1996). However, a subset of studies found that Caucasians were more likely to engage in mental healthcare services compared to ethnic minorities (Fontana & Rosenheck, 1994; New & Berliner, 2000; Rosenheck & Fontana, 2001; Ullman & Brecklin, 2002).

Among Veteran populations, many of these relationships are reversed. Older Veterans (e.g., Vietnam Veterans) utilize mental healthcare services at higher rates than younger Veterans (Koenen, Goodwin, Struening, Hellman, & Guardino, 2003) with the greatest amount of mental healthcare service use occurring between ages 50-65 years old (Burnett-Zeigler et al., 2012; Chermack et al., 2008; Fasoli, Glickman, & Eisen, 2010). This age effect is also true among older OEF/OIF/OND Veterans with PTSD (Seal et al., 2010). Among OEF/OIF/OND Veterans, male gender was associated with greater likelihood of engaging in physical and mental healthcare services compared to female gender (Davis, Deen, Fortney, Sullivan, & Hudson, 2014; Seal, Bertenthal, Miner, Sen, & Marmar, 2007). Among national studies of OEF/OIF/OND Veterans, race and ethnicity have not been associated with use of healthcare services; however smaller

studies have found greater service utilization among Caucasian Veterans compared to those of other races (Blais, Hoerster, Malte, Hunt, & Jakupcak, 2014; Davis et al., 2014; Seal et al., 2008).

Psychiatric factors. Among civilian populations, PTSD severity and number of comorbid diagnoses have been associated with use of mental healthcare services such that individuals with greater PTSD severity use mental healthcare services more than those with less severe PTSD (Amstadter & Vernon, 2008; Lewis et al., 2005); however one study reported opposite findings (Schwarz & Kowalski, 1992). Number of comorbid diagnoses has also been associated with increased use of mental healthcare services among civilian populations (Rosenthal, Nunes, & Le Fauve, 2012; Talbot et al., 2005).

These relationships are also true for Veteran populations. Greater PTSD severity (Elhai, Richardson, & Pedlar, 2007; Kehle et al., 2010; Meis, Barry, Kehle, Erbes, & Polusny, 2010; Rosenheck & Fontana, 1995), number of comorbid diagnoses (Amstadter & Vernon, 2008; Boscarino et al., 2002; Chermack et al., 2008; DeViva, 2014; Fasoli et al., 2010; Lewis et al., 2005; Ullman & Brecklin, 2002), and worse self-reported mental health functioning (Fasoli et al., 2010) have also been associated with greater use of mental healthcare services among Veterans of all service eras.

While several demographic and psychiatric factors have been associated with increased use of mental healthcare services, among OEF/OIF/OND Veterans, utilization is low. Hoge et al. (2004) found that only 23% to 40% of OEF/OIF/OND Veterans with mental health concerns sought out mental healthcare services within the previous year. Another study by Kehle et al. (2010) found that less than half of National Guard soldiers with PTSD or depression initiated mental health care within two to three months after

returning from deployment to Iraq. Despite the availability of mental health treatment, Veterans with PTSD may avoid receiving care as a function of trauma-related avoidance symptoms that are characteristic of the disorder (Schwarz & Kowalski, 1992).

To date, two studies have evaluated PTSD as a predictor of use of physical healthcare services in large, national studies of OEF/OIF/OND Veterans. Frayne et al. (2011) examined use of physical healthcare services by OEF/OIF/OND Veterans and found that Veterans with a diagnosis of PTSD had a greater use of primary care services than Veterans without a mental health diagnosis. Similarly, Cohen et al. (2010) found, that after controlling for demographic factors (age, sex, race, marital status, active duty vs. guard/reserve status, rank, branch of service, number of deployments, distance to VA facility, and duration of time receiving healthcare services), Veterans with PTSD were 91% more likely to use physical healthcare services during their first year of VA care compared to Veterans without a mental health diagnosis. They additionally found that female sex and lower rank were independently associated with greater utilization of physical healthcare services (Cohen et al., 2010). Among Vietnam Veterans, PTSD has been shown in to be related to a greater lifetime use of VA medical services (Schnurr, Friedman, Sengupta, Jankowski, & Holmes, 2000).

In sum, the majority of reviewed studies have evaluated use of mental healthcare services among civilians and Veterans with PTSD. However, fewer studies have evaluated use of physical healthcare services in these populations. The present study will attempt to address gaps in the current literature regarding use of physical and mental healthcare services among returning Veterans who screened positive for PTSD.

Summary and Limitations of Prior Research

To date, there is a paucity of literature regarding the use of physical and mental healthcare services among individuals with CG. What little information is available suggests that individuals with CG may underutilize physical and mental healthcare services, however results are mixed. These studies are also limited by small sample size, narrow time windows post-loss (less than six months), and limitations in measurement, so results should be interpreted with caution.

Within the broad PTSD service utilization literature, demographic and psychiatric factors have been related to use of mental healthcare services. In treatment-seeking Veteran populations, older age, male gender, greater severity of PTSD symptoms, greater number of comorbid disorders, and worse self-reported mental health functioning have been associated with increased use of mental healthcare services. Less information is available regarding the use of physical healthcare services among OEF/OIF/OND Veterans with PTSD; however, presence of PTSD diagnoses, female gender, and lower military rank have been associated with increased use of physical healthcare services compared to Veterans without a mental health diagnosis. It is unknown whether these same demographic and psychiatric factors that contribute to use of mental and physical healthcare services among Veterans with PTSD are also related to a greater use of mental and physical healthcare services among Veterans with CG; however, this study will investigate those questions.

The present study will attempt to address some of these gaps in the literature by evaluating use of VA physical healthcare, mental healthcare, and emergency services among returning Veterans who screened positive for CG and/or PTSD.

Present Study

The goal of present study was to better understand CG in returning Veteran populations by evaluating physical and mental health symptom endorsement among OEF/OIF/OND Veterans who screened positive for CG and/or PTSD, as no empirical study had directly compared these two populations. Additionally, Veterans' use of physical healthcare, mental healthcare, and emergency services within the first six months following VASDHS enrollment was evaluated to close current gaps in the current literature regarding use of healthcare services. This will be accomplished in several ways.

Design

OEF/OIF/OND Veterans (N = 1122) who enrolled into the VASDHS were classified into four groups based on self-reported symptoms at enrollment. The four classification groups were the following:

(1) CG alone (n = 26): Veterans who screened positive for complicated grief (CG) on the 4-item *Grief and Loss Questionnaire* (described below) and did not screen positive for PTSD on the 17-item *PTSD Checklist* (*PCL-C* score $\leq$ 30).

(2) PTSD alone (n = 112): Veterans who screened positive for PTSD on the 17-item *PTSD Checklist* (*PCL-C* score $\geq$ 50) and did not screen positive for CG on the 4-item *Grief and Loss Questionnaire*.

(3) Both CG and PTSD (n = 99): Veterans who screened positive for both CG and PTSD on the 4-item *Grief and Loss Questionnaire* and 17-item *PTSD Checklist* (*PCL-C* score $\geq$ 50).

(4) Veteran controls (n = 554): Veterans who did not screen positive for CG or PTSD on the 4-item *Grief and Loss Questionnaire* and 17-item *PTSD Checklist* (*PCL-C* score $\leq$ 30).

All Veterans who endorsed sub-threshold symptoms of PTSD (defined as *PCL-C* scores between 31 and 49) or sub-threshold symptoms of CG (defined as experiencing a loss that was interfering with their ability to "work, socialize, or function in other ways" less than six months following their loss) were excluded from the analysis to further differentiate groups. Differences between groups were evaluated through three exploratory aims.

Aim 1: To evaluate differences in baseline demographic, physical health, and mental health variables across classification groups.

Hypothesis 1.1: Veterans who screened positive for both CG and PTSD will report greater baseline physical and mental health concerns compared to Veterans who screened positive for CG alone, PTSD alone, and Veteran controls. No significant differences were predicted for baseline demographic variables.

Hypothesis 1.2: Veterans who screened positive for CG alone and PTSD alone will report greater baseline physical and mental health concerns compared to Veteran controls. No significant differences were predicted for baseline demographic variables.

Aim 2: To evaluate group differences in use of physical healthcare, mental healthcare, and emergency services within the first six months following VASDHS enrollment.

Hypothesis 2.1: Veterans who screened positive for both CG and PTSD will have a greater use of physical healthcare, mental healthcare, and emergency services compared to Veterans who screened positive for CG alone, PTSD alone, and Veteran controls.

Hypothesis 2.2: Veterans who screened positive for CG alone and PTSD alone will have greater use of physical healthcare, mental healthcare, and emergency services compared to Veteran controls.

Aim 3: To evaluate the predictive utility of baseline demographic, physical health, and mental health variables as they relate to use of physical healthcare, mental healthcare, and emergency services in the first six months following VASDHS enrollment.

Hypothesis 3.1: Baseline physical health and mental health variables that differed significantly across classification groups will predict Veterans' use of physical healthcare, mental healthcare, and emergency services in the first six months following VASDHS enrollment.

METHOD

Study Population and Data Collection

This study used previously collected data from the protocol "Technology solution to improve OEF/OIF intake and assessment program" (PI: Niloofar Afari). Participants were 1122 male and female Veterans presenting for enrollment at the VA San Diego Healthcare System (VASDHS). OEF/OIF/OND Veterans were classified into four groups based on self-reported symptoms at enrollment: (1) Veterans who screened positive for CG alone (n = 26); (2) Veterans who screened positive for PTSD alone (n = 112); (3) Veterans who screened positive for both CG and PTSD (n = 99); and (4) Veteran controls (Veterans who did not screen positive for CG or PTSD; n = 554).

Veterans were included in the CG alone group (n = 26) if they screened positive for CG on the 4-item *Grief and Loss Questionnaire* (described below) and did not screen positive for PTSD on the 17-item *PTSD Checklist – Civilian* (*PCL-C*; Weathers, Litz, Herman, Huska, & Keane, 1993). Veterans screened positive for CG if they reported having experienced the loss of a "loved one, military buddy, or close friend" that was interfering with their ability to "work, socialize, or function in other ways" six months or longer. Veterans who scored 30 or lower on the *PCL-C* (Range 17-85) were were considered to not screen positive for PTSD.

Veterans were included in the PTSD alone group (n = 112) if they screened positive for PTSD on the on the 17-item *PCL-C* and did not screen positive for CG on the 4-item *Grief and Loss Questionnaire*. Veterans who scored 50 or higher on the *PCL-C* (Range 17-85) were considered to screen positive for PTSD. Veterans who denied experiencing the loss of a "loved one, military buddy, or close friend," denied having

experienced a loss six months ago or longer, or denied that grief was interfering with their ability to "work, socialize, or function in other ways" were considered to not screen positive for CG.

Veterans were included in the both CG and PTSD group (n = 99) if they screened positive for CG on the 4-item *Grief and Loss Questionnaire* and also screened positive for PTSD on the *PTSD Checklist* (i.e., *PCL-C* score of 50 or higher).

Veterans were included in the Veteran control group (n = 554) if they did not screen positive for CG or PTSD on the 4-item *Grief and Loss Questionnaire* and 17-item *PTSD Checklist* (i.e., *PCL-C* score of 30 or less).

Forty-nine Veterans were removed from the total sample due to missing data; 11 Veterans had missing data on the *Grief and Loss Questionnaire*, and 38 Veterans had missing data from the *PTSD Checklist – Civilian*. Additionally, 282 Veterans were removed from the total sample due to sub-threshold symptoms; 262 Veterans endorsed sub-threshold symptoms of PTSD (defined as *PCL-C* scores between 31 and 49) and 20 Veterans endorsed sub-threshold symptoms of CG (defined as experiencing a loss that was interfering with their ability to "work, socialize, or function in other ways" less than six months following their loss). A total of 791 Veterans were included in the following analyses.

Enrollment Questionnaire. Upon enrollment into the VASDHS, Veterans completed a packet of self-report measures as part of the OEF/OIF/OND standard clinical screening and assessment process. Veterans interested in participating in research completed an additional informed consent to have their assessment data used in research. Participants enrolling between March 2012 and December 2012 completed a paper

version of the clinical screening packet, while participants enrolling between December 2012 and September 2013 completed an electronic version of the same clinical screening packet on a tablet. The total study population included 567 Veterans who completed the paper screening packet and 556 Veterans who completed the electronic screening packet.

Medical records review. Following enrollment, a medical records review was conducted for consented Veterans covering the first six months following VASDHS enrollment. Information was collected regarding the number and type of consults to mental and physical healthcare services, visits to the Psychiatric Emergency Clinic (PEC), and visits to the Emergency Department (ED). In addition, attendance at consult appointments and diagnoses generated at consult, PEC, and ED visits were also collected. The present investigation utilized data collected from both the self-report questionnaires at enrollment and later medical records review.

Baseline inclusion criteria*:* All Veterans enrolling into the VASDHS were eligible to participate. Only Veterans completing the 4-item *Grief and Loss Questionnaire* and *PCL-C* were included in the analyses.

Baseline exclusion criteria*:* No Veterans were excluded from participating in this study. However, Veterans who endorsed sub-threshold symptoms of PTSD (defined as *PCL-C* scores between 31 and 49) or sub-threshold symptoms of CG (defined as experiencing a loss that was interfering with their ability to "work, socialize, or function in other ways" less than six months following their loss) were not included in the analyses to further differentiate the four classification groups.

Measures

Self-Report Questionnaires: The following self-report questionnaires were used to determine if baseline differences in self-reported demographic, physical health, and mental health variables varied across classification groups (Aim 1). These measures were also used to evaluate the the predictive utility of self-reported demographic, physical health, and mental health variables as they related to use of physical healthcare, mental healthcare, and emergency services in the first six months following VASDHS enrollment (Aim 3).

Demographics. Demographic information was assessed, including: age, sex, race, ethnicity, and education level.

Service history. Service history was assessed using a series of investigator-created questions. Veterans were asked to identify their branch of military service (Army, Air Force, Coast Guard, Marines, Navy), type of service (Active Duty, Reserve, National Guard), year they entered the military, year they discharged from the military, type of discharge they received (honorable, dishonorable, general under honorable conditions, medical, retired), grade at discharge (e.g., E-4, O-3), and job in the military (MOS). Veterans were also asked whether they received any disciplinary actions in the military, the number of deployments they had to a combat zone, whether they served in Operation Enduring Freedom, Operation Iraqi Freedom, or Operation New Dawn (OEF/OIF/OND), and whether they served in other military operations (e.g., Latin America, Gulf War (1991), Somalia, Bosnia, Kosovo, Djibouti, or others). Veterans were asked if they have any persistent concerns resulting from something they may have been exposed to when deployed, whether their military experience included combat, whether they were injured, and type of injury they received. Specific questions evaluating combat

exposure included: “being attacked or ambushed,” “firing weapons at the enemy,” “hand to hand combat,” “caring for wounded,” “interrogation,” “receiving rocket or mortar fire,” “seeing dead bodies,” “clearing or searching buildings,” “firing from a navy ship,” “processing/handling detainees,” “receiving small-arms fire,” “handling human remains,” “someone killed near you,” and “caring for enemy wounded.” Endorsement of any of the above items was considered combat exposure.

Complicated grief. CG was assessed using an investigator created 4-item screening measure (*Grief and Loss Questionnaire*), as no brief screening measure existed that assessed both combat-loss and CG. Questions included: (1) “Have you ever experienced the death of a loved one, military buddy, or close friend?” Response options are “Yes” or “No.” If yes, Veterans were prompted to “Please answer the following 3 questions based on the ***one*** death that was most difficult for you.” (2) “How long ago did that loss occur?” Response options are “Less than 6 months ago,” “6 months to 1 year ago,” “1 year to 5 years ago,” or “5 or more years ago.” (3) “Was the death combat related?” Response options are “Yes” or “No.” And (4) “Is your grief interfering with your ability to work, socialize, or function in other ways?” Response options are “Yes” or “No.” Veterans were considered to screen positive for CG if they reported that grief was interfering with their ability to “work, socialize, or function in other ways” six months or longer. These questions served as a proxy for CG and addressed the six-month duration criteria for CG as well as continued impairment in social, occupational or other important areas of functioning as outlined in the diagnostic criteria for CG. Preliminary psychometric analysis of the *Grief and Loss Questionnaire* was fair. Internal consistency scores were $\alpha = .63$ (Seay, 2014).

Posttraumatic stress disorder. PTSD was measured using the 17-item *PTSD Checklist-Civilian* (*PCL-C*; Weathers et al., 1993), a well-validated measure used in primary care and mental health settings (Bliese et al., 2008; Terhakopian, Sinaii, Engel, Schnurr, & Hoge, 2008; Thomas et al., 2010). In a review of the psychometric properties of the *PCL-C*, Wilkins, Lang, and Norman (2011) found high internal consistency ratings (α = .92 – .96) across 13 studies using the *PCL-C*. The *PCL-C* was scored by summing the answers to 17 questions (Range 17-85). A cutoff score of 50 or higher was used, based on review of common clinical cutoffs in military populations (Thomas et al., 2010).

Depression. Depression was measured using the 9-item *Patient Health Questionnaire-9* (*PHQ-9*; Kroenke, Spitzer, & Williams, 2001), a well-validated clinical scale measuring depression in primary care and specialty mental health settings (American Psychiatric Association, 1994; Spitzer, Kroenke, & Williams, 1999; Thomas et al., 2010). Kroenke et al. (2001) found internal consistency ratings to be high (α = .86 – .89) across two studies evaluating the psychometric properties of the *PHQ-9*. The *PHQ-9* was scored by summing the answers to nine questions (Range 0-27) with an additional item assessing functional impairment. Higher scores indicated greater depression severity. A *PHQ-9* total score ranging from 10 – 27 is consistent with moderate to severe depression severity.

Bipolar disorder. Bipolar Disorder was assessed using the 13-item *Mood Disorder Questionnaire* (*MDQ*), a well-validated screening instrument for bipolar spectrum disorders normed in psychiatric outpatient populations (Hirschfeld et al., 2000). The *MDQ* screens for lifetime history of mania or hypomania symptoms with good

sensitivity and specificity. Hirschfeld et al. (2000) found internal consistency ratings to be high (α = .90) in a study evaluating the psychometric properties of the *MDQ*. The *MDQ* screens for 13 symptoms of mania/hypomania, assesses whether symptoms occurred during the same period of time, and assesses for symptom impairment. Patients were considered to screen positive for bipolar disorder if they endorsed seven or more of the 13 symptoms, reported that the symptoms occurred during the same period of time, and endorsed moderate or serious symptom impairment.

Suicidal ideation. Suicidal ideation was measured using item 9 of the 9-item *Patient Health Questionnaire-9* (*PHQ-9*; Kroenke et al., 2001). Item 9 asks "Over the past 2 weeks, how often have you been bothered by any of the following problems?" "Thinking that you would be better off dead or that you want to hurt yourself in some way?" Responses are "Not at all," "Several days," "More than half the days," and "Nearly every day." Any positive response was categorized as suicidal ideation.

Insomnia. Insomnia was measured using the 7-item *Insomnia Severity Index* (*ISI*; Morin, 1993), a well validated measure evaluating insomnia severity. Internal consistency ratings for the *ISI* are high (α = .74 – .91), across three studies evaluating the psychometric properties of the ISI (Bastien, Vallières, & Morin, 2001; Morin, Belleville, Bélanger, & Ivers, 2011). The *ISI* was scored by summing the responses to the seven items, with higher scores indicating greater insomnia symptoms (Range 0-28). An *ISI* score of 15 – 28 is consistent with moderate to severe insomnia.

Generalized anxiety. Generalized anxiety was measured using the 7-item *Patient Health Questionnaire, Anxiety subscale* (*PHQ-Anxiety*; Spitzer et al., 1999) of the larger *Patient Health Questionnaire*, a well validated measure evaluating anxiety symptoms in

outpatient settings. The *PHQ-Anxiety* had good internal consistency (α = .75) across a large population-based study of US military personnel (Smith, Smith, Jacobson, Corbeil, & Ryan, 2007). This 7-item subscale assessed for symptoms of anxiety over the last four weeks. Response options were "not at all," "several days," and "more than half the days." The *PHQ-Anxiety* was scored by summing the responses to the 7-items and a higher score indicated greater generalized anxiety symptoms.

Aggression. Aggression was measured using the 16-item *Retrospective Overt Aggression Scale* (*ROAS*; Sorgi, Ratey, Knoedler, Markert, & Reichman, 1991). The *ROAS* assessed for frequency of verbal and physical aggression in the last month, with good internal consistency, α = .75 (Angkaw et al., 2013; Moffitt et al., 1997). The *ROAS* evaluates verbal aggression (e.g., yells, making clear threats), physical aggression towards objects (e.g., slams doors, sets fires), physical aggression towards others (e.g., swings at others, causes severe injury), and physical aggression towards self (e.g., scratches skin, makes deep cuts; Angkaw et al., 2013). The *ROAS* was scored on a weighted scale, with the least aggressive acts (e.g., swings at others) scoring less on the scale than more aggressive acts (e.g., causes severe injury) for each category. The four aggression categories are also differentially weighted, such that verbal aggression is considered to be the least severe (×1), with aggression against objects (×2), self (×3), and others (×4) increasing in severity (Serper et al., 2005) Higher scores were indicative of more aggressive behavior.

Problematic alcohol use. Problematic alcohol use was measured using the 3-*item Alcohol Use Disorders Identification Test* (*AUDIT-C*; Bush, Kivlahan, McDonell, Fihn, Bradley, 1998), a short-form of the longer 10-item *AUDIT* (Babor, Higgins-Biddle,

Saunders, & Monteiro, 2001) designed for use with general medical populations. Across several studies, the *AUDIT-C* has been shown to be a reliable and valid short form version of the the longer *AUDIT*. Internal consistency scores ranged from α = .69 – .91, across three recent psychometric studies (Reinert & Allen, 2007). The *AUDIT-C* was scored by summing the answers to the three items (Range 0-12). In men, a score of four or more is considered the optimal level for identifying hazardous drinking or active alcohol use disorders. For women, this score is three or more.

Substance use. Substance use was measured using the 10-item *Drug Abuse Screening Test* (*DAST-10*; Skinner, 1982), a well validated measure evaluating problematic substance use. In a comprehensive review of the psychometric properties of the *DAST-10*, Yudko, Lozhkina, and Fouts (2007) found the internal consistency ratings to be high (α = .86 – .94). The *DAST-10* queries about the use of multiple substances with a Yes/No answer format. The *DAST-10* is scored by summing the positive responses (with item 3 reverse coded; Range 0-10). Scores were dichotomized into no substance use (*DAST-10* = 0), and presence of substance use (*DAST-10* $\geq$ 1) due to the infrequency of reported substance use in this study. Typically, the *DAST-10* is interpreted as follows: 0 (no problems reported), 1-2 (low level of problems), 3-5 (moderate level of problems), 6-8 (substantial level of problems), and 9-10 (severe level of problems).

Traumatic brain injury. Traumatic brain injury (TBI) was measured using the 4-item Veterans Health Administration (VHA) *Traumatic Brain Injury Screening Tool* (*TBI Screening Tool;* Department of Veterans Affairs, 2007), a well validated screening tool assessing for deployment-related head injuries and TBI. Internal consistency scores for the *TBI Screening Tool* are good (α = .77; Donnelly et al., 2011). The *TBI Screening*

Tool asks Veterans if they have experienced any of the following events while serving on an OEF/OIF/OND deployment: blast or explosion (e.g., IED, RPG, land mine, grenade), vehicular accident/crash, fragment wound or bullet wound above the shoulders, fall, blow to the head (e.g., hit by falling/flying object, hit on head by another person, hit head against something), or other injury to the head. If yes, Veterans were asked to answer follow-up questions. Veterans were asked (1) whether or not they experienced the onset of symptoms immediately afterwards (e.g., loss of consciousness, being dazed or confused, not remembering the event, concussion, head injury); (2) whether or not they had problems that began or worsened after the event (e.g., memory problems or lapses, balance problems or dizziness, sensitivity to bright light, irritability, headaches, sleep problems); and (3) whether or not they have had continued problems within the last week (e.g., memory problems or lapses, balance problems or dizziness, sensitivity to bright light, irritability, headaches, sleep problems). Veterans screened positive for TBI if they endorsed a positive response to each of the four questions.

Resilience. Resilience was measured using the 10-item *Conner-Davidson Resilience Scale* (*CD-RISC-10*; Connor & Davidson, 2003), a well validated measure that screened for essential elements of resilience. Internal consistency ratings of the *CD-RISC*-10 are high (α = .85-.91; Campbell-Sills & Stein, 2007; Wang, Shi, Zhang, & Zhang, 2010). The instrument was scored by summing the answers to ten questions (Range 0-40) with higher scores indicating better resilience (Notario-Pacheco et al., 2011).

Physical health symptoms. Physical health symptoms were measured using the 15-item *Patient Health Questionnaire* (*PHQ-15*; Kroenke, Spitzer, & Williams, 2002), a

well validated measure for evaluating somatic symptoms. Internal consistency ratings of the *PHQ-15* were high (α = .80 – .82) across two studies evaluating the psychometric properties of the *PHQ-15* (Han et al., 2009; Kocalevent, Hinz, & Brähler, 2013). Questions asked Veterans to rate the degree to which they have been bothered by physical health symptoms within the last four weeks. The *PHQ-15* is scored by summing the answers to fifteen questions with higher scores indicating greater somatic symptoms (Range 0-28 for males, 0-30 for females).

Mental and physical health functioning. Mental and physical health functioning was additionally measured using the *Short Form Veterans RAND 12-Item Health Survey* (*VR-12*), a brief, generic, multi-use health survey (Iqbal et al., ND; Selim et al., 2009) widely used throughout the VHA to measure health-related quality of life, to estimate disease burden and to evaluate disease-specific benchmarks with other populations. Internal consistency of the *VR-12* is high (α = .96; Department of Veterans Affairs, ND). The 12 items in the questionnaire correspond to eight principal physical and mental health domains including: general health perceptions, physical functioning, role limitations due to physical problems, role limitations due to emotional problems, bodily pain, energy and fatigue, social functioning, and mental health. Results were expressed in terms of two meta-scores: The Physical Component Score (PCS) and the Mental Component Score (MCS). These provided an important contrast between physical and psychological health status (Iqbal et al., ND). The *VR-12* was scored and normalized in a complex algorithm using SAS statistical software (Range 0-100, $M = 50$, $SD = 10$) and higher scores indicated better health functioning (The ALS C.A.R.E Program, 2013).

Chronic Pain. Chronic pain was measured using the *PROMIS Pain Intensity and Interference Scales* (NIH PROMIS, 2000), well validated scales evaluating the intensity and interference from pain within the last week. Internal consistency scores were high for both scales and ranged from $\alpha = .91 – .99$ (Bartlett et al., 2015). Both the *PROMIS Pain Intensity Scale* (short form 3a) and *PROMIS Pain Interference Scale* (short form 6a) use standardized scores to evaluate dimensions of pain ($M = 50$, $SD = 10$) with higher scores indicating greater pain intensity and interference. Pain intensity was scored with three items (Raw Score Range 3-15) and pain interference was scored with six items (Raw Score Range 6-30). Two additional questions ask patients to identify the location of the pain and intensity of pain (Range 0-10) but were not used to calculate standardized scores. Standardized scores were calculated for each patient using standardized scoring conversion tables provided by scale developers (NIH PROMIS, 2000).

Medical Records Review Data: Existing chart review data was used to examine use of physical healthcare, mental healthcare, and emergency services in the first six months following VASDHS enrollment (Aims 2 and 3), using investigator-coded variables. Chart review data documented information about consults to healthcare services, attendance at consults appointments, use of emergency services (Emergency Department, Psychiatric Emergency Clinic), and clinician diagnoses at these appointments (recorded as primary or secondary concerns).

Mental healthcare services. Information regarding use of mental healthcare services was obtained from an existing review of Veterans' medical records. Investigator-coded variables were created using this data to examine use of mental healthcare services in two ways. First, Veterans' referrals to mental healthcare services were calculated. This

included summing the number of consults to mental healthcare clinics (e.g., PTSD clinic, Psychiatry), consults to physical healthcare clinics for a primary or secondary mental health concern (e.g., TBI/Polytrauma clinic for PTSD), Psychiatric Emergency Clinic (PEC) visits for mental health concerns (e.g., suicidal ideation), and Emergency Department (ED) visits for a primary or secondary mental health concern (e.g., depression) within the first six months following VASDHS enrollment. Second, Veterans' attendance at mental healthcare appointments was calculated by summing the number of attended consult appointments, PEC visits, and ED visits during the first six months following VASDHS enrollment.

Physical healthcare services. Information regarding use of physical healthcare services was obtained from an existing review of Veterans' medical records. Investigator-coded variables were created using this data to examine use of physical healthcare services in two ways. First, Veterans' referrals to physical healthcare services were calculated. This included summing the number of consults to physical healthcare clinics (e.g., cardiology, audiology), consults to mental health clinics for a primary or secondary physical health concern (e.g., behavioral medicine for chronic pain), and ED visits for a physical health concern (e.g., acute pain) within the first six months following VASDHS enrollment. Second, Veterans' attendance at physical healthcare appointments was calculated by summing the number of attended consult appointments and ED visits within the first six months following VASDHS enrollment.

Emergency services. Information regarding use of emergency services was obtained from an existing review of the Veterans' medical records. Investigator-coded variables were created to evaluate Veterans' use of emergency services by summing the

number of attended PEC and ED visits for any mental or physical health concern within the first six months following VASDHS enrollment.

Preliminary analyses.

Preliminary analyses consisted of examining the descriptive statistics of the study population with respect to CG and PTSD. Veterans were considered to screen positive for CG if they experienced the loss of a "loved one, military buddy, or close friend" that was interfering with their ability to "work, socialize, or function in other ways" six months or longer. Veterans were considered to screen positive for PTSD if they scored 50 or higher on the *PCL-C.*

Data Screening. Prior to the analyses, initial data screening was conducted. Veterans with missing data on the *Grief and Loss Questionnaire* and *PCL-C* data were excluded from the analyses, as they could not be accurately categorized into a classification group. For Veterans with missing data on the outcome variables of interest, list-wise deletion was used.

Statistical assumptions were evaluated for the multiple regression, logistic regression, and negative binomial regression analyses. In the multiple regression analyses, the assumption of normality of residuals was violated for the following variables of interest (*ROAS*, *PHQ-Anxiety*), based on visual inspection of the Normal P-P Plots. In many cases, normality of residuals was seen across some (1-3 levels) but not all (4 levels) of the predictor variable. Exponential (log10, ln), quadratic (square root, cube root, squared), and reciprocal data transformations were performed for these outcome variables, and normality of residuals was reevaluated (based on visual inspection of Normal P-P Plot and comparison of transformed R^2 to raw-score R^2 to determine model

fit). No transformation addressed the normality of residuals concern across all levels of the predictor variable. Because of this, raw data was used in the analyses. Additionally, the independence of residuals assumption was violated for the following variables of interest, based on evaluation of the Durbin-Watson statistic (*ISI* Durban-Watson = 1.838; *PHQ-15* Durbin-Watson = 1.865; *PHQ-Anxiety* Durbin Watson = 1.844). Ideally, values between 1.876 and 2.109 are wanted for a sample size of this magnitude and number of explanatory variables ($N = 800$, $k = 4$); however, no statistical corrections were made. Outliers more than three standard deviations away from the mean for each level of the predictor variable were removed from the analyses.

Based on assumptions testing, negative binomial regression was selected instead of poisson regression for hypothesis 2 and 3 due to a violation of the epi-dispersion assumption for poisson regression. Over-dispersion of data was seen (i.e., the conditional variance exceeded the conditional mean for each level of the predictor variable). No additional violations warranting corrective action were seen for the negative binomial regression or logistic regression analyses.

Analyses

Hypotheses 1.1 and 1.2: To evaluate differences baseline demographic, physical health, and mental health variables across classification groups, classification groups were dummy coded. A combination of multiple regression (for continuous variables), binary logistic regression (for dichotomous variables), and multinomial logistic regression (for categorical variables) was used to evaluate differences in baseline demographic, physical health, and mental health variables. Analyses were conducted with Veteran controls, Veterans who screened positive for both CG and PTSD, and Veterans

who screened positive for PTSD alone as a reference groups. Effect sizes were examined [standardized regression coefficients (Beta) and odds ratios (OR)].

Hypotheses 2.1 and 2.2: To evaluate group differences in use of physical healthcare, mental healthcare, and emergency services in the first six months following VASDHS enrollment, classification groups were dummy coded. Negative binomial regression analyses were performed to evaluate classification group as a predictor of Veterans' use of healthcare services. Five analyses were conducted using Veteran controls, Veterans who screened positive for both CG and PTSD, and Veterans who screened positive for PTSD alone as reference groups. First, referrals to mental healthcare services were evaluated. This included consults to mental healthcare clinics (e.g., PTSD clinic, Psychiatry), consults to physical health clinics for a primary or secondary mental health concern (e.g., TBI/Polytrauma clinic for PTSD), Psychiatric Emergency Clinic (PEC) visits for mental health concerns (e.g., suicidal ideation), and Emergency Department (ED) visits for a primary or secondary mental health concern (e.g., depression). Second, referrals to physical healthcare services were evaluated. This included consults to physical health clinics (e.g., cardiology, audiology), consults to mental health clinics for a primary or secondary physical health concern (e.g., behavioral medicine for chronic pain), and ED visits for a physical health concern (e.g., acute pain). Third, Veterans' attendance at mental healthcare appointments was evaluated, including attendance at consult appointments, PEC visits, and ED visits. Fourth, Veterans' attendance at physical healthcare appointments was evaluated, including attendance at consult appointments and ED visits. Lastly, Veterans' use of emergency services was

evaluated, including visits to PEC and ED for any mental or physical health concern. Effect sizes were examined [incidence rate ratios (IRR)].

Hypotheses 3.1: To evaluate the predictive utility of baseline demographic, physical health, and mental health variables as they related to use of physical healthcare, mental healthcare, and emergency services in the first six months following VASDHS enrollment, negative binomial regression analyses were performed. Baseline demographic, physical health, and mental health variables that were found to be significant at the .01 level in Aim 1 were included in the analyses. Four analyses were conducted. First, referrals to mental healthcare services were evaluated. This included consults to mental health clinics, consults to physical health clinics for a primary or secondary mental health concern, PEC visits for a mental health concern, and ED visits for a primary or secondary mental health concern. Second, referrals to physical healthcare services were evaluated. This included consults to physical health clinics, consults to mental health clinics for a primary or secondary physical health concern, and ED visits for a physical health concern. Third, Veterans' attendance at mental healthcare appointments was evaluated, including attendance at consult appointments, PEC visits, and ED visits. Lastly, Veterans' attendance at physical healthcare appointments was evaluated, including attendance at consult appointments and ED visits. Effect sizes were examined [incidence rate ratios (IRR)].

A logistic regression was also performed to evaluate baseline demographic, physical health, and mental health variables as predictors of Veterans' use of emergency services within six months following VASDHS enrollment. Baseline demographic, physical health, and mental health variables that were found to be significant at the .01

level in Aim 1 were included in the analysis. Emergency services were defined as any visit to the PEC or ED for a primary or secondary mental or physical health concern. Emergency service visits were dichotomized into “emergency service use” and “no emergency service use” for this analysis. Effect sizes were examined [odds ratios (OR)].

RESULTS

Descriptive Statistics: A total sample of 1122 OEF/OIF/OND Veterans completed the baseline self-report assessment upon enrollment to the VA San Diego Health System (VASDHS). Veterans were classified into four groups based on self-reported symptoms at enrollment. Veterans were included in the CG alone group (n = 26) if they screened positive for CG on the *Grief and Loss Questionnaire* and did not screen positive for PTSD on the *PTSD Checklist* (*PCL-C* score $\leq$ 30). Veterans screened positive for CG if they experienced a loss of a "loved one, military buddy, or close friend" that interfered with their ability to "work, socialize, or function in other ways" six months ago or longer. Veterans were included in the PTSD alone group (n = 112) if they screened positive for PTSD on the *PTSD Checklist* (*PCL-C* score $\geq$ 50) and did not screen positive for CG on the *Grief and Loss Questionnaire*. Veterans were included in the both CG and PTSD group (n = 99) if they screened positive for both CG and PTSD on the *Grief and Loss Questionnaire* and *PTSD Checklist* (*PCL-C* score $\geq$ 50). Veterans were included in the Veteran control group (n = 554) if they did not screen positive for CG or PTSD on the *Grief and Loss Questionnaire* and *PTSD Checklist* (*PCL-C* score $\leq$ 30). An overall sample of 791 OEF/OIF/OND Veterans were included in the following analyses. See Tables 1.1 and 1.2 for demographic and descriptive statistics for each group.

Of the overall sample (N = 791), 586 (74.1%) reported experiencing the loss of a loved one, military buddy, or close friend, 149 (25.5%) reported that their most difficult loss was combat-related, and 125 (15.8%) screened positive for CG. Of the overall

sample who experienced loss (N = 586), 125 (21.3%) screened positive for CG. See Table 1.2.

The mean *PCL-C* score for the overall sample (N = 791) was 32.01 (SD = 19.01). Veterans who screened positive for CG alone, had a mean *PCL-C* score of 22.54 (SD = 4.63), Veterans who screened positive for PTSD alone had a mean *PCL-C* score of 60.45 (SD = 8.11), Veterans who screened positive for both CG and PTSD had a mean *PCL-C* score of 64.86 (SD = 9.36), and Veteran controls had a mean *PCL-C* score of 21.02 (SD = 4.00). See Table 1.2.

Hypothesis 1.1: Veterans who screened positive for both CG and PTSD will report greater baseline physical and mental health concerns compared to Veterans who screened positive for CG alone, PTSD alone, and Veteran controls. No significant differences were predicted for baseline demographic variables.

***Demographic variables*:** Multiple regression, binary logistic regression, and multinomial logistic regression analyses were conducted to evaluate group differences in demographic variables based on classification group. Significant group differences were found for combat exposure ($\chi^2(3) = 75.32$, $p < .001$), and branch of military service ($\chi^2(12) = 64.67$, $p < .001$). No significant group differences were found for age, gender, race, ethnicity, education, or time in service. See Tables 1.1 and 1.2.

Compared to Veteran controls, Veterans who screened positive for both CG and PTSD were significantly more likely to have experienced combat (OR = 6.68; *95% CI* = 3.49, 12.78; $p < .001$). No significant difference in combat exposure was found for Veterans who screened positive for both CG and PTSD compared to Veterans who screened positive for CG alone or PTSD alone. See Tables 2.1 and 2.2.

Compared to Veteran controls, Veterans who screened positive for both CG and PTSD were significantly more likely to have served in the Marine Corps, Army, or in multiple service branches. Veterans who screened positive for both CG and PTSD were significantly more likely to have served in the Marine Corps compared to Veterans who screened positive for PTSD alone. They were also significantly less likely to have served in the Navy/Coast Guard than Veteran controls and Veterans who screened positive for PTSD alone. No significant group differences were seen for Veterans who screened positive for both CG and PTSD compared to Veterans who screened positive for CG alone. See Tables 2.1 and 2.2.

Physical health and mental health variables: Multiple regression and binary logistic regression analyses were conducted to evaluate group differences in baseline physical and mental health variables based on classification group. Significant group differences were found for depressive symptoms (*PHQ-9*; $F(3, 761) = 682.92$, adj. $R^2 = 0.73$, $p < .001$), generalized anxiety symptoms (*PHQ-Anxiety*; $F(3, 762) = 644.62$, adj. $R^2 = 0.72$, $p < .001$), mental health functioning (*VR-12 MCS*; $F(3, 772) = 459.72$, adj. $R^2 = 0.64$, $p < .001$), insomnia symptoms (*ISI*; $F(3, 723) = 262.49$, adj. $R^2 = 0.52$, $p < .001$), physical health symptoms (*PHQ-15*; $F(3, 726) = 245.42$, adj. $R^2 = 0.49$, $p < .001$), aggressive behavior (*ROAS*; $F(3, 735) = 235.45$, adj. $R^2 = 0.47$, $p < .001$), resilience (*CD-RISC-10*; $F(3, 755) = 155.0$, adj. $R^2 = 0.38$, $p < .001$), pain interference (*PROMIS Pain Interference*; $F(3, 772) = 101.54$, adj. $R^2 = 0.28$, $p < .001$), pain intensity (*PROMIS Pain Intensity*; $F(3, 765) = 55.85$, adj. $R^2 = 0.18$, $p < .001$), physical health functioning (*VR-12 PCS*; $F(3, 774) = 41.81$, adj. $R^2 = 0.14$, $p < .001$), problematic alcohol use (*AUDIT-C*; $F(3, 770) = 6.28$, adj. $R^2 = 0.02$, $p < .001$), suicidal ideation ($\chi^2(3) = 199.15$, $p < .001$),

positive TBI screen ($\chi^2(3) = 168.90$, $p < .001$), positive bipolar disorder screen (*MDQ*; $\chi^2(3) = 86.52$, $p < .001$), and drug use (*DAST-10*; $\chi^2(3) = 8.79$, $p = .032$). Table 3.1.

Compared to Veteran controls, Veterans who screened positive for both CG and PTSD endorsed significantly greater depressive symptoms (*PHQ-9*; Beta = 0.70, $p < .001$), greater generalized anxiety symptoms (*PHQ-Anxiety*; Beta = 0.66, $p < .001$), worse mental health functioning (*VR-12 MCS*; Beta = -0.65, $p < .001$), greater insomnia symptoms (*ISI*; Beta = 0.56, $p < .001$), greater physical health symptoms (*PHQ-15*; Beta = 0.54, $p < .001$), more aggressive behavior (*ROAS*; Beta = 0.58, $p < .001$), lower resilience (*CD-RISC-10*; Beta = -0.53, $p < .001$), greater pain interference (*PROMIS Pain Interference*; Beta = 0.43, $p < .001$), greater pain intensity (*PROMIS Pain Intensity*; Beta = 0.36, $p < .001$), worse physical health functioning (*VR-12 PCS*; Beta = -0.28, $p < .001$), and greater problematic alcohol use (*AUDIT-C*; Beta = 0.11, $p = .002$). See Table 4.1. They were also significantly more likely to screen positive for TBI (*OR* = 17.80; *95% CI* = 10.70, 29.62; $p < .001$), more likely to screen positive for bipolar disorder (*MDQ*; *OR* = 30.09; *95% CI* = 10.95, 82.66; $p < .001$), more likely to endorse suicidal ideation (*OR* = 75.83; *95% CI* = 30.94, 185.88; $p < .001$), and were more likely to endorse drug use (*OR* = 3.34; *95% CI* = 1.55, 7.22; $p = .002$) compared to Veteran controls. See Table 2.1.

Compared to Veterans who screened positive for both CG and PTSD, Veterans who screened positive for CG alone endorsed significantly fewer depressive symptoms (*PHQ-9*; Beta = -0.34, $p < .001$), fewer generalized anxiety symptoms (*PHQ-Anxiety*; Beta = -0.32, $p < .001$), better mental health functioning (*VR-12 MCS*; Beta = 0.34, $p < .001$), fewer insomnia symptoms (*ISI*; Beta = -0.26, $p < .001$), fewer physical health

symptoms (*PHQ-15*; Beta = -0.29, $p < .001$), less aggressive behavior (*ROAS*; Beta = -0.37, $p < .001$), better resilience (*CD-RISC-10*; Beta = 0.32, $p < .001$), less pain interference (*PROMIS Pain Interference*; Beta = -0.23, $p < .001$), less pain intensity (*PROMIS Pain Intensity*; Beta = -0.19, $p < .001$), better physical health functioning (*VR-12 PCS*; Beta = 0.11, $p < .001$), and less problematic alcohol use (*AUDIT-C*; Beta = -0.10, $p = .015$). See Table 4.2. They were also significantly less likely to screen positive for TBI (*OR* = 0.12; *95% CI* = 0.04, 0.37; $p < .001$) compared to Veterans who screened positive for both CG and PTSD. See Table 2.2.

Compared to Veterans who screened positive for both CG and PTSD, Veterans who screened positive for PTSD alone endorsed significantly fewer depressive symptoms (*PHQ-9*; Beta = -0.12, $p < .001$), less pain intensity (*PROMIS Pain Intensity*; Beta = -0.09, $p = .037$), less aggressive behavior (*ROAS*; Beta = -0.17, $p < .001$), better mental health functioning (*VR-12 MCS*; Beta = 0.12, $p < .001$), and better resilience (*CD-RISC-10*; Beta = 0.16, $p < .001$). See Table 4.2. They were also significantly less likely to screen positive for TBI (*OR* = 0.28; *95% CI* = 0.28, 0.84; $p = .010$), and less likely to endorse suicidal ideation (*OR* = 0.52; *95% CI* = 0.30, 0.92; $p = .024$) compared to Veterans who screened positive for both CG and PTSD. See Table 2.2.

Demographic physical health, and mental health variables that were found to be significant at the .01 level were included as covariates for the analyses in Aim 3.

Hypothesis 1.2: Veterans who screened positive for CG alone and PTSD alone will report greater baseline physical and mental health concerns compared to Veteran controls. No significant differences were predicted for baseline demographic variables.

Demographic variables: Compared to Veteran controls, Veterans who screened positive for CG alone and PTSD alone were significantly more likely to have experienced combat (*OR* = 4.38; *95% CI* = 1.48, 12.93; $p = .007$ and *OR* = 3.84; *95% CI* = 2.30, 6.41; $p < .001$, respectively). See Table 2.1.

Compared to Veteran controls, Veterans who screened positive for CG alone were significantly more likely to have served in the Marine Corps, Army, or Air Force. They were also significantly less likely to have served in the Navy/Coast Guard than Veteran controls. Compared to Veteran controls, Veterans who screened positive for PTSD alone were significantly more likely to have served in the Marine Corps or Army. They were also significantly less likely to have served in the Navy/Coast Guard than Veteran controls. Veterans who screened positive for CG alone were significantly more likely to have served in the Army than Veterans who screened positive for PTSD alone. No other significant group differences in service branch were seen. See Tables 2.1 and 2.2.

Physical health and mental health variables: Compared to Veteran controls, Veterans who screened positive for CG alone endorsed significantly greater depressive symptoms (*PHQ-9*; Beta = 0.04, $p = .041$). No other group differences were statistically significant. See Table 4.1.

Compared to Veteran controls, Veterans who screened positive for PTSD alone endorsed significantly greater depressive symptoms (*PHQ-9*; Beta = 0.61, $p < .001$), greater generalized anxiety symptoms (*PHQ-Anxiety*; Beta = 0.65, $p < .001$), worse mental health functioning (*VR-12 MCS*; Beta = -0.58, $p < .001$), greater insomnia symptoms (*ISI*; Beta = 0.56, $p < .001$), greater physical health symptoms (*PHQ-15*; Beta = 0.55, $p < .001$), more aggressive behavior (*ROAS*; Beta = 0.45, $p < .001$), lower

resilience (*CD-RISC-10*; Beta = -0.40, $p < .001$), greater pain interference (*PROMIS Pain Interference;* Beta = 0.39, $p < .001$), greater pain intensity (*PROMIS Pain Intensity*; Beta = 0.29, $p < .001$), worse physical health functioning (*VR-12 PCS*; Beta = -0.30, $p < .001$), and more problematic alcohol use (*AUDIT-C*; Beta = 0.11, $p = .002$). See Table 4.1. They were also significantly more likely to screen positive for TBI (*OR* = 8.59; *95% CI* = 5.28, 13.97; $p < .001$), more likely to screen positive for bipolar disorder (*MDQ*; *OR* = 26.70; *95% CI* = 9.80, 72.73; $p < .001$), and more likely to endorse suicidal ideation (*OR* = 39.67; *95% CI* = 16.13, 97.54; $p < .001$) compared to Veteran controls. See Table 2.1.

Compared to Veterans who screened positive for PTSD alone, Veterans who screened positive for CG alone endorsed significantly fewer depressive symptoms (*PHQ-9*; Beta = -0.28, $p < .001$), fewer generalized anxiety symptoms (*PHQ-Anxiety*; Beta = -0.31, $p < .001$), better mental health functioning (*VR-12 MCS*; Beta = 0.28, $p < .001$), fewer insomnia symptoms (*ISI*; Beta = -0.24, $p < .001$), fewer physical health symptoms (*PHQ-15*; Beta = -0.29, $p < .001$), less aggressive behavior (*ROAS*; Beta = -0.27, $p < .001$), better resilience (*CD-RISC-10*; Beta = 0.24, $p < .001$), less pain interference (*PROMIS Pain Interference*; Beta = -0.20, $p < .001$), less pain intensity (*PROMIS Pain Intensity*; Beta = -0.15, $p < .001$), better physical health functioning (*VR-12 PCS*; Beta = 0.10, $p < .001$), and less problematic alcohol use (*AUDIT-C*; Beta = -0.09, $p = .017$). See Table 4.2. They were also significantly less likely to screen positive for TBI (*OR* = 0.25; *95% CI* = 0.08, 0.76; $p = .015$) compared to Veteran who screened positive for PTSD. See Table 2.2.

Demographic, physical health, and mental health variables that were found to be significant at the .01 level were included as covariates for the analyses in Aim 3.

Hypothesis 2.1: Veterans who screened positive for both CG and PTSD will have greater use of physical healthcare, mental healthcare, and emergency services compared to Veterans who screen positive for CG alone, PTSD alone, and Veteran controls.

Negative binomial regression analyses were conducted to evaluate classification group as a predictor of referrals to mental healthcare services, physical healthcare services, Veterans' attendance at mental healthcare appointments, Veterans' attendance at physical healthcare appointments, and use of emergency services within the first six months following VASDHS enrollment.

Significant group differences were found for referrals to mental healthcare services, $\chi^2(3) = 236.29$, $p < .001$. See Table 5.1. Compared to Veteran controls, Veterans who screened positive for both CG and PTSD had significantly more referrals to mental healthcare services (*IRR* = 7.23; *95% CI* = 5.51, 9.49; $p < .001$). Compared to Veterans who screened positive for both CG and PTSD, Veterans who screened positive for CG alone had significantly fewer referrals to mental healthcare services (*IRR* = 0.22; *95% CI* = 0.11, 0.42; $p < .001$). No significant difference was found for Veterans who screened positive for both CG and PTSD compared to Veterans who screened positive for PTSD alone. See Tables 6.1 and 6.2.

Significant group differences were found for referrals to physical healthcare services, $\chi^2(3) = 32.53$, $p < .001$. See Table 5.1. Compared to Veteran controls, Veterans who screened positive for both CG and PTSD had significantly more referrals to physical healthcare services (*IRR* = 1.87; *95% CI* = 1.45, 2.41; $p < .001$). No significant

difference was found for Veterans who screened positive for both CG and PTSD compared to Veterans who screened positive for CG alone or PTSD alone. See Tables 6.1 and 6.2.

Significant group differences were found for Veterans' attendance at mental healthcare appointments, $\chi^2(3) = 165.34$, $p < .001$. See Table 5.1. Similar to the mental healthcare results presented above, Veterans who screened positive for both CG and PTSD attended significantly more mental healthcare appointments compared to Veteran controls (*IRR* = 7.04; *95% CI* = 5.03, 9.85; $p < .001$). Compared to Veterans who screened positive for both CG and PTSD, Veterans who screened positive for CG alone attended significantly fewer mental healthcare appointments (*IRR* = 0.28; *95% CI* = 0.13, 0.62; $p = .002$). No significant difference was found for Veterans who screened positive for both CG and PTSD compared to Veterans who screened positive for PTSD alone. See Tables 6.1 and 6.2.

Significant group differences were found for Veterans' attendance at physical healthcare appointments, $\chi^2(3) = 10.45$, $p = .015$. See Table 5.1. Similar to the physical healthcare results presented above, Veterans who screened positive for both CG and PTSD attended significantly more physical healthcare appointments compared to Veteran controls (*IRR* = 1.52; *95% CI* = 1.13, 2.03; $p = .006$). No significant differences were found for Veterans who screened positive for both CG and PTSD compared to Veterans who screened positive for CG alone or PTSD alone. See Table 6.1 and 6.2.

Significant group differences were found for use of emergency services, $\chi^2(3) = 13.91$, $p = .003$. See Table 5.1. Compared to Veteran controls, Veterans who screened positive for both CG and PTSD had significantly greater use of emergency services (*IRR*

= 1.83; *95% CI* = 1.24, 2.70; $p = .002$). No significant differences were found for Veterans who screened positive for both CG and PTSD compared to Veterans who screened positive for CG alone or PTSD alone. See Table 6.1 and 6.2.

Hypothesis 2.2: Veterans who screened positive for CG alone and PTSD alone will have greater use of physical healthcare, mental healthcare, and emergency services compared to Veteran controls.

Compared to Veteran controls, Veterans who screened positive for PTSD alone had significantly more referrals to mental healthcare services (*IRR* = 6.36; *95% CI* = 4.88, 8.30; $p < .001$). Compared to Veterans who screened positive for PTSD alone, Veterans who screened positive for CG alone had significantly fewer referrals to mental healthcare services (*IRR* = 0.25; *95% CI* = 0.13, 0.48; $p < .001$). No significant difference was found in referrals for mental healthcare services for Veterans who screened positive for CG alone compared to Veteran controls. See Tables 6.1 and 6.2.

Compared to Veteran controls, Veterans who screened positive for PTSD alone had significantly more referrals to physical healthcare services (*IRR* = 1.58; *95% CI* = 1.24, 2.02; $p < .001$). No significant difference was found in referrals to physical healthcare services for Veterans who screened positive for CG alone compared to Veteran controls or Veterans who screened positive for PTSD alone. See Tables 6.1 and 6.2.

Similar to the mental healthcare results presented above, Veterans who screened positive for PTSD alone attended significantly more mental healthcare appointments compared to Veteran controls (*IRR* = 6.68; *95% CI* = 4.82, 9.26; $p < .001$). Compared to Veterans who screened positive for PTSD alone, Veterans who screened positive for CG

alone attended significantly fewer mental healthcare appointments (*IRR* = 0.30; *95% CI* = 0.13, 0.65; *p* = .002). No significant difference was found for attendance at mental healthcare appointments for Veterans who screened positive for CG alone compared Veteran controls. See Tables 6.1 and 6.2.

No significant differences were found in attendance at physical healthcare appointments for Veterans controls compared to Veterans who screened positive for CG alone or PTSD alone. There were also no significant differences in attendance at physical healthcare appointments for Veterans who screened positive for CG alone compared to Veterans who screened positive for PTSD alone. See Tables 6.1 and 6.2.

Compared to Veteran controls, Veterans who screened positive for PTSD alone had significantly greater use of emergency services (*IRR* = 1.71; *95% CI* = 1.18, 2.48; *p* = .005). No significant difference was found in use of emergency services for Veterans who screened positive for CG alone compared to Veteran controls or Veterans who screened positive for PTSD alone. See Tables 6.1 and 6.2.

Hypothesis 3.1: Baseline physical health and mental health variables that differed significantly across classification groups will predict Veterans' use of physical healthcare, mental healthcare, and emergency services in the first six months following VASDHS enrollment.

Negative binomial regression. Negative binomial regression analyses were conducted to evaluate baseline demographic, physical health, and mental health variables as predictors of referrals to mental healthcare services, physical healthcare services, attendance at mental healthcare appointments, and attendance at physical healthcare appointments within the first six months following VASDHS enrollment.

Significant results were found for referrals to mental healthcare services, $\chi^2(19) = 306.43$, $p < .001$. See Table 7.1. Of the sixteen predictor variables, six were statistically significant, such that greater generalized anxiety symptoms (*PHQ-Anxiety*; *IRR* = 1.06; *95% CI* = 1.02, 1.11; $p = .002$), greater insomnia symptoms (*ISI*; *IRR* = 1.03; *95% CI* = 1.01, 1.05; $p = .003$), worse mental health functioning (*VR-12 MCS*; *IRR* = 0.98; *95% CI* = 0.97, 0.99; $p = .004$), less resilience (*CD-RISC-10*; *IRR* = 0.98; *95% CI* = 0.97, 1.00; $p = .026$), positive TBI screen (*IRR* = 1.66; *95% CI* = 1.33, 2.08; $p < .001$), and branch of military service (Marine Corps; *IRR* = 1.48; *95% CI* = 1.17, 1.87; $p = .001$) predicted greater number of referrals to mental healthcare services. See Table 8.1.

Significant results were found for referrals to physical healthcare services, $\chi^2(19) = 125.28$, $p < .001$. See Table 7.1. Of the sixteen predictor variables, two were statistically significant, such that greater physical health symptoms (*PHQ-15*; *IRR* = 1.67; *95% CI* = 1.36, 2.04; $p < .001$) and positive TBI screen (*IRR* = 1.04; *95% CI* = 1.01, 1.06; $p = .003$) predicted greater number of referrals to physical healthcare services. See Table 8.1.

Significant results were found for Veterans' attendance at mental healthcare appointments, $\chi^2(19) = 155.06$, $p < .001$. See Table 7.1. Of the sixteen predictor variables, four were statistically significant, such that greater anxiety symptoms (*PHQ-Anxiety*; *IRR* = 1.09; *95% CI* = 1.04, 1.13; $p < .001$), greater insomnia symptoms (*ISI*; *IRR* = 1.02; *95% CI* = 1.00, 1.04; $p = .032$), worse mental health functioning (*VR-12 MCS*; *IRR* = 0.98; *95% CI* = 0.97, 1.00; $p = .007$), and positive TBI screen (*IRR* = 1.43; *95% CI* = 1.14, 1.80; $p = .002$) predicted greater attendance at mental healthcare appointments. See Table 8.2.

Significant group differences were found for Veterans' attendance at physical healthcare appointments, $\chi^2(19) = 77.58$, $p < .001$. See Table 7.1. Of the sixteen predictor variables, two were statistically significant, such that positive TBI screen (*IRR* = 1.79; *95% CI* = 1.40, 2.30; $p < .001$) and branch of military service (Multiple Branches; *IRR* = 1.71; *95% CI* = 1.02, 2.85; $p = .04$) predicted greater attendance at mental healthcare appointments. See Table 8.2.

Logistic regression. A logistic regression analysis was also performed to evaluate baseline demographic, physical health, and mental health variables as predictors of Veterans' use of emergency services within six months following VASDHS enrollment. Emergency service use was dichotomized into "emergency service use" and "no emergency service use" for this analysis.

Significant results were found for use of emergency services, $\chi^2(19) = 37.55$, $p = .007$. See Table 7.1. Of the sixteen predictor variables, two were statistically significant, such that greater pain interference (*PROMIS Pain Interference*; *OR* = 1.09; *95% CI* = 1.04, 1.15; $p < .001$) and, surprisingly better physical health functioning (*VR-12 PCS*; *OR* = 1.03; *95% CI* = 1.01, 1.06; $p = .019$) predicted Veterans' use of emergency services. See Table 9.1.

DISCUSSION

In this large study of returning Veterans enrolling into the VA San Diego Healthcare System (VASDHS), physical and mental health concerns were common. Veterans were classified into four groups based on self-reported symptoms at enrollment, including Veterans who screened positive for CG alone (n = 26), PTSD alone (n = 112), both CG and PTSD (n = 99), and Veteran controls (those who did not screen positive for CG or PTSD; n = 554). Both CG and PTSD independently predicted greater physical and mental health symptoms, and were predictive of later use of physical healthcare, mental healthcare, and emergency services in the first six months following VASDHS enrollment.

Veterans who screened positive for both CG and PTSD endorsed greater mental and physical health symptoms compared to all other groups. Compared to Veterans who screened positive for PTSD alone, Veterans who screened positive for both CG and PTSD endorsed greater depressive symptoms, worse mental health functioning, greater pain intensity, more aggressive behavior, less resilience, were more likely to screen positive for TBI, and were more likely to endorse suicidal ideation. This result is notable and suggests that even among Veterans who screened positive for PTSD, Veterans who also screened positive for CG may have greater medical and psychiatric morbidity. This result is supported by numerous studies in the literature documenting the negative health impact of CG among civilian (Latham & Prigerson, 2004; Neria et al., 2007; Prigerson et al., 1997) and Veteran populations (Seay, 2014; Toblin et al., 2012).

Additionally, Veterans who screened positive for both CG and PTSD endorsed greater depressive symptoms, greater generalized anxiety symptoms, greater insomnia

symptoms, more aggressive behavior, more problematic alcohol use, worse mental and physical health functioning, greater physical health symptoms, greater pain intensity and interference, lower resilience, and were more likely to screen positive for TBI compared to Veterans who screened positive for CG alone and Veteran controls. They were also more likely to endorse suicidal ideation, drug use, and screen positive for bipolar disorder compared to Veteran controls. These results add to numerous studies in the literature documenting the negative health impact of PTSD among civilian and Veteran populations (Brady et al., 2000; Breslau et al., 2004; Keane & Kaloupek, 1997; Polusny et al., 2011; Vasterling et al., 2012).

These results support the the model of allostatic load (McEwen & Stellar, 1993) presented in this paper. In this model, Veterans with greater allostatic load (i.e., Veterans who screened positive for both CG and PTSD) were predicted to have greater physical and mental health concerns compared to all other groups. This hypothesis was fully supported in this study, as Veterans who screened positive for both CG and PTSD reported a greater number and severity of physical and mental health symptoms compared to all other groups.

Veterans who screened positive for PTSD alone endorsed greater mental and physical health symptoms compared to Veteran controls and Veterans who screened positive for CG alone. Veterans who screened positive for PTSD alone endorsed greater depressive symptoms, greater generalized anxiety symptoms, greater insomnia symptoms, more aggressive behavior, more problematic alcohol use, worse mental and physical health functioning, greater physical health symptoms, greater pain intensity and interference, lower resilience, and were more likely to screen positive for TBI compared

to Veteran controls and Veterans who screened positive for CG alone. They were also more likely to endorse suicidal ideation and screen positive for bipolar disorder compared to Veteran controls. These results provide further support for the results presented above, documenting the negative health impact of PTSD.

Veterans who screened positive for CG alone endorsed greater depressive symptoms than Veteran controls, but did not show significant differences on other mental and physical health symptoms of interest. This result also supports the results presented above, documenting the negative health impact of CG.

These later results provider further support for the model of allostatic load presented in this paper, in which Veterans with greater allostatic load (i.e., Veterans who screened positive for CG alone and PTSD alone) were predicted to have greater physical and mental health concerns compared to Veterans controls. This hypothesis was fully supported for Veterans who screened positive for PTSD alone, as greater physical and mental health symptoms were endorsed compared to Veteran controls. This hypothesis was partially supported for Veterans who screened positive for CG alone, as only greater depressive symptoms were endorsed compared to Veteran controls. Although no hypotheses were made regarding the relationship between Veterans who screened positive for PTSD alone compared to Veterans who screened positive for CG alone, results from this study found that screening positive for PTSD alone was associated with greater physical and mental health symptoms compared to screening positive for CG alone. Thus, screening positive for PTSD was a far greater “load” than screening positive for CG in this population of returning Veterans.

Overall, the cumulative burden of screening positive for both CG and PTSD was associated with the greatest physical and mental health symptom severity, followed by Veterans who screened positive for PTSD alone, CG alone, and Veteran controls. To date, this is the first study to evaluate differences in mental and physical health symptoms among these populations. It supplements the growing body of literature about the negative health impact of PTSD among civilian and Veteran populations (Brady et al., 2000; Breslau et al., 2004; Keane & Kaloupek, 1997; Polusny et al., 2011; Vasterling et al., 2012) and adds to it the importance of also considering CG as a contributor to negative health symptoms among returning Veterans. Further studies should evaluate the unique contributions of both CG and PTSD, using proportional sample sizes, if possible, and a comprehensive screening measure of CG severity.

To evaluate the second goal of this study, group differences in the use of mental healthcare, physical healthcare, and emergency services were evaluated for each classification group. Significant results were found such that Veterans who screened positive for both CG and PTSD and PTSD alone had greater use of healthcare services compared to Veterans who screened positive for CG alone and Veteran controls.

Specifically, Veterans who screened positive for both CG and PTSD and PTSD alone had significantly more referrals to physical healthcare services, more referrals to mental healthcare services, were more likely to attend mental healthcare appointments, and were more likely to use emergency services than Veteran controls. Additionally, Veterans who screened positive for both CG and PTSD were more likely to attend physical healthcare appointments than Veteran controls. Compared to Veterans who screened positive for CG alone, Veterans who screened positive for both CG and PTSD

and PTSD alone also had significantly more referrals to mental healthcare services and were more likely to attend mental healthcare appointments.

These results are largely consistent with findings within the PTSD service utilization literature, which has found that civilians and Veterans who endorse greater PTSD symptoms (i.e., both CG and PTSD group, PTSD alone group) use physical and mental healthcare services more than those with less severe PTSD symptoms (i.e., CG alone group, Veteran control group; Amstadter & Vernon, 2008; Cohen et al., 2010; Elhai et al., 2007; Frayne et al., 2011; Kehle et al., 2010; Lewis et al., 2005; Meis et al., 2010; Rosenheck & Fontana, 1995). Additionally, these results add to the current literature which suggests that individuals who endorse greater psychiatric symptoms (i.e., both CG and PTSD group, PTSD alone group) are associated with increased use of mental healthcare services among civilian and Veteran populations (Amstadter & Vernon, 2008; Boscarino et al., 2002; Chermack et al., 2008; DeViva, 2014; Lewis et al., 2005; Rosenthal et al., 2012; Talbot et al., 2005; Ullman & Brecklin, 2002).

These results add to the limited CG service utilization literature and may suggest that despite considerable medical and psychiatric morbidity, Veterans who screened positive for CG may underutilize mental healthcare (Lichtenthal et al., 2011) and physical healthcare (Prigerson et al., 2001) services compared to other groups. These findings may have been confounded, however, by a couple of factors. First, by the measurement characteristics for CG in this study. CG was dichotomized into those who screened positive for CG compared to those who did not, rather than a measurement of CG severity as is seen with the PTSD data. Second, the exclusion of Veterans with *PCL-C* score between 31 and 49 in the CG alone group may have artificially selected Veterans

with less severe CG symptoms than one would expect in the total Veteran population who screen positive for CG. Third, the low use of healthcare services may be better explained by lower endorsement of physical and mental health symptoms overall (compared to the both CG and PTSD group and PTSD alone group), rather than the direct effect of CG symptoms on use of healthcare services.

To summarize these findings within the model of allostatic load presented in this paper, Veterans with greater symptom severity and endorsement (i.e., Veterans who screened positive for both CG and PTSD and PTSD alone) had a greater "load" than Veterans screening positive for CG alone or Veteran controls. Groups with greater allostatic load had significantly greater use of healthcare services compared to other groups.

To evaluate the third goal of this study, demographic, physical health, and mental health variables that varied significantly by classification group were used to predict Veterans' use of mental healthcare, physical healthcare, and emergency services within the first six months following VASDHS enrollment. Branch of military service and positive TBI screen were the two factors that predicted greater use of both mental and physical healthcare services. Additionally, mental health factors such as greater generalized anxiety symptoms, greater insomnia symptoms, worse mental health functioning, and less resilience predicted greater use of mental healthcare services. Physical health factors such as greater physical health symptoms, greater pain interference, and, surprisingly better self-reported physical health functioning predicted greater use of physical healthcare services and emergency services.

These results add to the current literature, which to date, has predominantly evaluated how demographic factors (such as age, gender, race and ethnicity) and psychiatric factors (such as PTSD severity and number of comorbid symptoms) have impacted the use of healthcare services among civilian (Amstadter & Vernon, 2008; Lewis et al., 2005; Rosenthal et al., 2012; Talbot et al., 2005) and Veteran populations (Amstadter & Vernon, 2008; Boscarino et al., 2002; Chermack et al., 2008; Cohen et al., 2010; DeViva, 2014; Elhai et al., 2007; Kehle et al., 2010; Lewis et al., 2005; Meis et al., 2010; Rosenheck & Fontana, 1995; Ullman & Brecklin, 2002).

Results from this study highlight some of the gaps in the literature regarding CG in returning Veteran populations. Results indicate that CG is an important contributor to worse mental and physical health functioning and may be associated with a heightened risk for negative health concerns among Veterans who also screen positive for PTSD. Specific interventions to address both CG and PTSD symptoms among returning Veterans may be needed to address these concerns.

This study also highlights some of the gaps in the literature looking at use of healthcare services among returning Veterans. Results suggest that Veterans who screened positive for PTSD (i.e., both CG and PTSD group, PTSD alone group) use physical healthcare, mental healthcare, and emergency services more Veterans who did not screen positive for PTSD. In addition to PTSD symptoms, positive TBI screen, mental health factors (including: greater generalized anxiety symptoms, greater insomnia symptoms, worse mental health functioning, lower resilience), and physical health factors (including: greater physical health symptoms, pain interference, and better physical health functioning) were also associated with greater healthcare service use.

These results may highlight areas of strength for the hospital system, such that returning Veterans presenting with these concerns are referred for further evaluation and needed services. However, these results may also suggest that in the absence of PTSD symptoms, returning Veterans who screen positive for CG may underutilize services despite endorsing some prominent symptoms. This may highlight an unmet healthcare need for these Veterans, which can be addressed through regular screening of CG symptoms in primary care, mental health, and emergency department settings.

Limitations

There are several limitations in this study. First, CG was measured using an unvalidated, 4-item screening measure as a proxy for CG, as no brief screening measure existed that assessed both combat-loss and CG. This measure assessed for the experience of loss, time since the loss, functional impairment as a result of loss, and whether the loss was combat-related. Veterans screened positive for CG if they reported experiencing a loss of a "loved one, military buddy, or close friend" that was interfering their ability to "work, socialize, or function in other ways" six months ago or longer. Similar screening measures used by Toblin et al. (2012) found the single item "difficulty coping with grief" to independently predict important post-deployment health outcomes (Toblin et al., 2012). Even though past studies have found acceptable correlations between brief (sometimes one-item) and longer grief scales (Maciejewski, Zhang, Block, & Prigerson, 2007; Zisook & Shuchter, 1993), conclusions drawn from this study would have been greatly improved with the use of a longer, validated screening measure for CG, such as the *Inventory of Complicated Grief* (ICG; Prigerson et al., 1995)

Second, this study relied solely on the use of self-report screening measures to evaluate baseline physical and mental health concerns rather than clinician administered diagnostic assessments. While the use of of screening measures greatly facilitates the gathering of clinical data, screening measures are generally considered to be less reliable than clinician administered interviews. Because of this, Veterans were considered to "screen positive for PTSD" instead of meeting diagnostic criteria for PTSD, among other conditions.

Third, for Veterans who screened positive for both CG and PTSD, it is unknown if the Criterion A trauma that was assessed on the *PCL-C* was related to the loss or another traumatic event. In the event of combat-loss, it is not known if the death was witnessed or learned about or if the loss occurred while the Veteran was deployed to a combat location, serving outside of theater, or outside the military.

Fourth, across the four classification groups, uneven sample sizes were seen. This may have limited the power to detect differences among very distressed populations. This may have been particularly true for the CG alone group, which had the smallest sample size (n = 26).

Fifth, due to how the classification groups were defined, a significant number (n = 43) Veterans who screened positive for CG were excluded from the analyses, 10 due to missing *PCL-C* data, 33 due to *PCL-C* scores between 31 and 49. While this allowed for greater separation in scores between the both CG and PTSD group and CG alone group, and further defined the unique contribution of CG and PTSD symptoms, it may have reduced the power to distinguish group differences between the CG alone group and the Veteran control group.

Sixth, this study relied on existing chart review data and investigator-coded variables to evaluate use of physical healthcare, mental healthcare, and emergency services within the first six months following VASDHS enrollment. While this allowed for important follow-up data for these Veterans, the chart review was not able to fully capture all variables of interest for this study. Proxy variables for use of healthcare services were created by the principle investigator based on consults, PEC, and ED visits as well as attendance at consult appointments; however, the present study cannot comment on ongoing use of healthcare services, treatment completion, or treatment dropout that would have been of interest to fully understand service utilization in these populations.

Seventh, consult data in the existing chart review was limited to ten consults per Veteran. For the minority of Veterans with greater than ten consults in the first six months following VASDHS enrollment, data was collapsed across consults. Because of this, total number of physical and mental health consults as well as attendance at consult appointments may have been underestimated for those Veterans.

Lastly, violations to the normality and independence of residuals assumptions were seen for some variables in the multiple regression analyses. Several transformations were performed to address these problems; however, no transformation addressed this violation across all levels of the predictor variable. Because of this, raw data was used in the analyses and no additional corrections were made. This may have negatively impacted power.

Future Directions

Results from this study highlight the importance of routinely screening for loss and CG in Veteran populations, and are relevant to better understanding and improving access to healthcare services for Veterans who screen positive for CG. The importance of recognizing CG is underscored not only by the morbidity and suffering associated with these symptoms but also by the fact that once recognized, it is a treatable condition (Shear et al., 2005). An important future direction includes greater loss and CG symptom assessment in primary care, mental health, and emergency department settings. Common validated measures for evaluating CG severity include *Inventory of Complicated Grief* (ICG; Prigerson et al., 1995), *Texas Revised Inventory of Grief* (TRIG; Faschingbauer, 1981; Faschingbauer, Zisook, & DeVaul, 1987; Zisook, DeVaul, & Click, 1982), and *Brief Grief Questionnaire* (BGQ; Ito et al., 2012).

Targeted interventions to manage CG symptoms in VA settings are also needed. To date, few empirically supported treatments have been used to target CG-specific symptoms. One such treatment, called Complicated Grief Therapy (CGT; Shear et al., 2001), has been studied in three randomized controlled trials in civilian populations with significant treatment effects over Interpersonal Therapy (IPT; Shear et al., 2005; Shear et al., 2014) and pharmacotherapy alone (Shear et al., 2016). This treatment, includes elements of Prolonged Exposure Therapy (by imaginally revisiting the story of the death to facilitate emotional processing, in vivo exposures to reduce situational avoidance), Interpersonal Therapy (to facilitate and strengthen social relationships), and Motivational Interviewing techniques (to facilitate work towards personal goals; Shear, 2010; Wetherell, 2012). Additional treatment approaches for PTSD can also be used to target CG symptoms for Veterans presenting with both concerns. Prolonged Exposure Therapy

and the “traumatic bereavement” add-on to Cognitive Processing Therapy can be used to address both CG and PTSD symptoms, particularly when a traumatic loss (e.g., combat, suicide, murder) is also the index trauma.

Results from this study also suggested that Veterans who screened positive for CG may underutilize healthcare services, despite reporting significant concerns. Further outreach may also be needed to improve access to healthcare services among Veterans who screen positive for CG.

In summary, CG is an important clinical condition that has been relatively unstudied, but may be clinically relevant to many Veterans, especially those returning from combat. Effective treatment of PTSD, depression, and other mental and physical health concerns are uniformly viewed as priorities in Veterans Health Administrations across the country. Each of these challenges may be aided by identifying CG, which has been associated with numerous physical and mental health concerns, yet has been critically under-recognized and unaddressed issue facing many Veterans (Papa et al., 2008).

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TABLES

Table 1.1. Summary of Demographic Data and Descriptive Data by Group

	CG only (N = 26)	PTSD only (N = 112)	CG & PTSD (N = 99)	Veteran Control (N = 554)	Overall Sample (N = 791)	χ^2 or F	adj. R^2	Sig.
Demographics								
Age, years [a]	30.73 (6.23)	31.09 (7.19)	32.37 (8.63)	31.79 (8.29)	31.73 (8.12)	0.70	-0.002	0.635
Gender [b]						5.08		0.166
Male	22 (84.6%)	96 (85.7%)	91 (91.9%)	463 (83.7%)	672 (85.1%)			
Female	4 (15.4%)	16 (14.3%)	8 (8.1%)	90 (16.3%)	118 (14.9%)			
Race [b]						18.15		0.255
Caucasian	17 (70.8%)	53 (52.5%)	52 (56.5%)	307 (61.8%)	429 (60.1%)			
American Indian	0 (0.0%)	2 (2.0%)	3 (3.3%)	10 (2.0%)	15 (2.1%)			
Pacific Islander	0 (0.0%)	0 (0.0%)	2 (2.2%)	5 (1.0%)	7 (1.0%)			
African American	3 (12.5%)	20 (19.8%)	12 (13.0%)	81 (16.2%)	116 (16.2%)			
Asian	3 (12.5%)	11 (10.9%)	13 (14.1%)	65 (13.1%)	92 (12.9%)			
Other	1 (4.2%)	15 (14.9%)	10 (10.9%)	29 (5.8%)	55 (7.7%)			
Ethnicity [b]						5.26		0.154
Non-Hispanic	6 (42.9%)	64 (72.7%)	48 (65.8%)	311 (70.2%)	429 (69.4%)			
Hispanic	8 (57.1%)	24 (27.3%)	25 (34.2%)	132 (29.8%)	189 (30.6%)			

Table 1.2. Summary of Demographic Data and Descriptive Data by Group, Continued

	CG only (N = 26)	PTSD only (N = 112)	CG & PTSD (N = 99)	Veteran Control (N = 554)	Overall Sample (N = 791)	χ^2 or F	adj. R^2	Sig.
Education [b]						4.84		0.564
≤ High School	9 (34.6%)	27 (24.3%)	24 (24.5%)	123 (23.2%)	183 (23.2%)			
Some College	13 (50.0%)	71 (64.0%)	62 (63.3%)	337 (60.9%)	483 (61.3%)			
≥ Bachelors	4 (15.4%)	13 (11.7%)	12 (12.2%)	93 (16.8%)	122 (15.5%)			
Service Branch [b]						64.67		<.001
Air Force	2 (7.7%)	0 (0%)	2 (2.0%)	19 (3.5%)	23 (2.9%)			
Army	7 (26.9%)	19 (17.0%)	20 (20.4%)	52 (9.5%)	98 (12.5%)			
Marine Corps	10 (38.5%)	32 (28.6%)	42 (42.9%)	118 (21.6%)	202 (25.8%)			
Navy / Coast Guard	6 (23.1%)	56 (50.0%)	29 (29.6%)	342 (62.6%)	433 (55.4%)			
Multiple Branches	1 (3.8%)	5 (4.5%)	5 (5.1%)	15 (2.7%)	26 (3.3%)			
Time in Service, years [a]	8.00 (5.31)	9.29 (6.04)	10.10 (7.58)	9.99 (7.44)	9.84 (7.24)	.896	0.000	0.443
Combat Exposure [b]	21 (84.0%)	92 (82.1%)	88 (88.9%)	296 (54.5%)	497 (63.8%)	75.32		<.001
Grief and PTSD Descriptive Data								
Experienced a Loss [b]	26 (100%)	91 (81.3%)	99 (100%)	370 (66.8%)	586 (74.1%)	92.77		<.001
Combat-Related Loss [b]	3 (11.5%)	30 (33.3%)	59 (59.6%)	57 (15.4%)	149 (25.5%)	78.95		<.001
Screens for CG after 6 mo [b]	26 (100%)	0 (0.0%)	99 (100%)	0 (0.0%)	125 (15.8%)	690.36		<.001
PCL-C Score [a]	22.54 (4.63)	60.45 (8.11)	64.86 (9.36)	21.02 (4.00)	32.01 (19.01)	2705.45	0.911	<.001

[a] Results of Multiple Regression analyses, presented as Mean (*SD*), *F* Test, adj. R^2

[b] Results of Logistic Regression analyses, presented as *N* (%), Chi Square (χ^2)

Table 2.1. Summary of Significant Logistic Regression Results by Group

	Veteran Control vs.											
	CG				PTSD				CG & PTSD			
		95% CI				*95% CI*				*95% CI*		
	OR	Lower	Upper	Sig.	*OR*	Lower	Upper	Sig.	*OR*	Lower	Upper	Sig.
Demographic Variables												
Combat Exposure	4.38	1.48	12.93	0.007	3.84	2.30	6.41	<.001	6.68	3.49	12.78	<.001
Service Branch [a]												
Air Force	6.00	1.13	31.74	0.035	--	--	--	--	1.24	0.28	5.59	0.778
Army	7.67	2.48	23.72	<.001	2.23	1.23	4.05	0.008	4.54	2.39	8.60	<.001
Marine Corps	4.83	1.72	13.58	0.003	1.66	1.02	2.68	0.040	4.20	2.50	7.04	<.001
Navy / Coast Guard	--	--	--	--	--	--	--	--	--	--	--	--
Multiple	3.80	0.43	33.59	0.230	2.04	.71	5.82	0.185	3.93	1.33	11.59	0.013
Psychiatric Variables												
Drug Use	1.06	0.14	8.20	0.957	1.78	0.73	4.32	0.202	3.34	1.55	7.22	0.002
Positive Bipolar Screen	4.64	0.52	41.38	0.169	26.70	9.80	72.73	<.001	30.09	10.95	82.66	<.001
Positive TBI Screen	2.11	0.69	6.43	0.188	8.59	5.28	13.97	<.001	17.80	10.70	29.62	<.001
Suicidal Ideation	--	--	--	--	39.67	16.13	97.54	<.001	75.83	30.94	185.88	<.001

Note: *OR* = odds ratio; *95% CI* = 95% Confidence Interval for *OR*
[a] Navy / Coast Guard as reference group

Table 2.2. Summary of Significant Logistic Regression Results by Group, Continued

	CG & PTSD vs.								PTSD vs.			
	CG				PTSD				CG			
		95% CI				*95% CI*				*95% CI*		
	OR	Lower	Upper	Sig.	*OR*	Lower	Upper	Sig.	*OR*	Lower	Upper	Sig.
Demographic Variables												
Combat Exposure	0.66	0.19	2.27	0.505	0.58	0.26	1.27	0.171	1.14	0.35	3.69	0.825
Service Branch [a]												
Air Force	4.83	0.56	41.41	0.151	--	--	--	--	--	--	--	--
Army	1.69	0.49	5.79	0.402	0.49	0.23	1.06	0.072	3.44	1.03	11.51	0.045
Marine Corps	1.15	0.38	3.52	0.805	0.40	0.21	0.75	0.005	2.92	0.97	8.77	0.057
Navy / Coast Guard	--	--	--	--	--	--	--	--	--	--	--	--
Multiple	0.97	0.01	9.84	0.977	0.52	0.14	1.94	0.328	1.87	0.19	18.73	0.596
Psychiatric Variables												
Drug Use	0.32	.04	2.57	0.282	0.53	0.20	1.43	0.212	0.59	0.07	5.05	0.634
Positive Bipolar Screen	0.15	0.02	1.21	0.076	0.89	0.45	1.77	0.734	0.17	0.02	1.36	0.096
Positive TBI Screen	0.12	0.04	0.37	<.001	0.48	0.28	0.84	0.010	0.25	0.08	0.76	0.015
Suicidal Ideation	--	--	--	--	0.52	0.30	0.92	0.024	--	--	--	--

Note: *OR* = odds ratio; *95% CI* = 95% Confidence Interval for *OR;* only variables with significant groups differences are displayed
[a] Navy / Coast Guard as reference group

Table 3.1. Summary of Physical Health and Mental Health Variables by Group

	CG only (N = 26)	PTSD only (N = 112)	CG & PTSD (N = 99)	Veteran Control (N = 554)	Overall Sample (N = 791)	χ^2 or F	adj. R^2	Sig.
Logistic Regression [a]								
Drug Use	1 (3.8%)	7 (6.4%)	11 (11.2%)	20 (3.7%)	39 (5.0%)	8.79		0.032
Positive Bipolar Screen	1 (4.2%)	21 (20.2%)	20 (22.0%)	5 (0.9%)	47 (6.3%)	86.52		<.001
Positive TBI Screen	4 (16.0%)	48 (44.0%)	61 (61.6%)	42 (8.0%)	155 (20.5%)	168.90		<.001
Suicidal Ideation	0 (0.0%)	33 (29.7%)	45 (45.5%)	6 (1.1%)	84 (10.8%)	199.15		<.001
Multiple Regression [b]								
AUDIT-C	2.39 (2.23)	3.75 (3.06)	3.80 (3.13)	2.95 (2.22)	3.15 (2.51)	6.28	0.02	<.001
ISI	7.55 (7.11)	18.57 (5.12)	19.18 (4.98)	6.22 (5.42)	9.69 (7.76)	262.49	0.52	<.001
PHQ-9	4.54 (4.82)	15.39 (4.88)	17.86 (4.91)	3.02 (3.00)	6.72 (7.04)	682.92	0.73	<.001
PHQ-15	6.08 (3.59)	14.81 (4.81)	14.83 (4.51)	5.54 (3.78)	7.92 (5.69)	245.42	0.50	<.001
PHQ-Anxiety	2.37 (3.33)	10.62 (2.41)	11.08 (2.33)	1.90 (2.51)	4.34 (4.69)	644.62	0.72	<.001
PROMIS Pain Intensity	6.96 (3.13)	9.41 (2.55)	10.19 (2.24)	6.96 (2.76)	7.71 (2.96)	55.85	0.18	<.001
PROMIS Pain Interference	13.08 (5.62)	21.84 (6.09)	22.19 (5.46)	12.83 (6.23)	15.12 (7.19)	101.54	0.28	<.001
Resilience [c]	33.56 (5.92)	22.76 (7.87)	19.14 (7.14)	32.03 (5.78)	29.23 (7.98)	155.00	0.38	<.001
ROAS	0.96 (3.39)	16.31 (12.01)	21.70 (15.57)	1.96 (4.14)	5.82 (10.35)	235.45	0.49	<.001
VR-12 MCS [c]	51.75 (10.37)	29.30 (9.90)	24.37 (9.67)	53.28 (8.17)	46.33 (14.49)	459.72	0.64	<.001
VR-12 PCS [c]	43.21 (10.63)	37.39 (11.06)	37.20 (9.96)	45.99 (8.99)	43.59 (10.20)	41.81	0.14	<.001

[a] Results of Multiple Regression analyses, presented as Mean (*SD*), *F* Test, adj. R^2
[b] Results of Logistic Regression analyses, presented as *N* (%), Chi Square (χ^2)
[c] Higher scores indicate better functioning

Table 4.1. Summary of Multiple Regression Results by Group

	Veteran Control vs.											
	CG				PTSD				CG & PTSD			
	B	SE_B	Beta	Sig.	B	SE_B	Beta	Sig.	B	SE_B	Beta	Sig.
AUDIT-C	-0.55	0.53	-0.04	0.294	0.80	0.26	0.11	0.002	0.85	0.28	0.11	0.002
ISI	1.32	1.17	0.03	0.260	12.35	0.58	0.56	<.001	12.96	0.61	0.56	<.001
PHQ-9	1.51	0.74	0.04	0.041	12.36	0.39	0.61	<.001	14.83	0.41	0.70	<.001
PHQ-15	0.54	0.81	0.02	0.507	9.27	0.45	0.55	<.001	9.30	0.46	0.54	<.001
PHQ-Anxiety	0.48	0.52	0.02	0.358	8.73	0.26	0.65	<.001	9.19	0.27	0.66	<.001
PROMIS Pain Intensity	0.00	0.55	0.00	0.996	2.44	0.28	0.29	<.001	3.23	0.30	0.36	<.001
PROMIS Pain Interference	0.25	1.22	0.01	0.841	8.01	0.64	0.39	<.001	9.36	0.68	0.43	<.001
Resilience [a]	1.53	1.29	0.03	0.234	-9.27	0.67	-0.40	<.001	-12.88	0.71	-0.53	<.001
ROAS	-1.00	1.49	-0.02	0.501	13.55	0.81	0.45	<.001	19.65	0.91	0.58	<.001
VR-12 MCS [a]	-1.54	1.75	-0.02	0.380	-23.98	0.91	-0.58	<.001	-28.91	0.97	-0.65	<.001
VR-12 PCS [a]	-2.77	1.90	-0.05	0.145	-8.59	0.99	-0.30	<.001	-8.78	1.05	-0.28	<.001

Note: B = unstandardized coefficient, SE_B = standard error of coefficient, Beta = standardized coefficient

[a] Higher scores indicate better functioning

Table 4.2. Summary of Multiple Regression Results by Group, Continued

	CG & PTSD vs.								PTSD vs.			
	CG				PTSD				CG			
	B	SE_B	Beta	Sig.	B	SE_B	Beta	Sig.	B	SE_B	Beta	Sig.
AUDIT-C	-1.41	0.58	-0.10	0.015	-0.05	0.35	-0.08	0.875	-1.36	0.57	-0.09	0.017
ISI	-11.64	1.28	-0.26	<.001	-0.61	0.77	-0.03	0.425	-11.03	1.26	-0.24	<.001
PHQ-9	-13.32	0.81	-0.34	<.001	-2.46	0.51	-0.12	<.001	-10.86	0.80	-0.28	<.001
PHQ-15	-8.76	0.89	-0.29	<.001	-0.03	0.59	0.00	0.967	-8.73	0.89	-0.29	<.001
PHQ-Anxiety	-8.71	0.57	-0.32	<.001	-0.46	0.35	-0.03	0.188	-8.25	0.56	-0.31	<.001
PROMIS Pain Intensity	-3.23	0.61	-0.19	<.001	-0.79	0.38	-0.09	0.037	-2.45	0.59	-0.15	<.001
PROMIS Pain Interference	-9.11	1.35	-0.23	<.001	-1.34	0.85	-0.07	0.116	-7.77	1.33	-0.20	<.001
Resilience [a]	14.42	1.42	0.32	<.001	3.61	0.90	0.16	<.001	10.80	1.40	0.24	<.001
ROAS	-20.74	1.64	-0.37	<.001	-5.38	1.14	-0.17	<.001	-15.35	1.65	-0.27	<.001
VR-12 MCS [a]	27.38	1.93	0.34	<.001	4.94	1.22	0.12	<.001	22.19	1.88	0.28	<.001
VR-12 PCS [a]	6.01	2.10	0.11	0.004	0.19	1.33	0.01	0.884	5.82	2.07	0.10	0.005

Note: B = unstandardized coefficient, SE_B = standard error of coefficient, Beta = standardized coefficient

[a] Higher scores indicate better functioning

Table 5.1. Summary of Healthcare Services by Group

	CG only (N = 26)	PTSD only (N = 112)	CG & PTSD (N = 99)	Veteran Control (N = 554)	Overall Sample (N = 791)	χ^2	Sig.
Healthcare Referrals [a]							
MH Services [b]	0.50 (1.03)	2.04 (1.96)	2.32 (2.11)	0.32 (0.85)	0.82 (1.52)	236.29	<.001
PH Services [c]	2.77 (3.61)	3.20 (3.75)	3.80 (3.51)	2.03 (2.48)	2.43 (2.94)	32.53	<.001
Appointments Attended [a]							
MH Appointments [d]	0.35 (0.80)	1.17 (1.41)	1.23 (1.40)	0.18 (0.56)	0.45 (0.98)	165.34	<.001
PH Appointments [e]	1.50 (1.98)	1.40 (1.84)	1.62 (2.04)	1.07 (1.55)	1.20 (1.69)	10.45	0.015
Emergency Services [f]	0.42 (0.64)	0.58 (1.10)	0.62 (1.22)	0.34 (0.69)	0.41 (0.84)	13.91	0.003

Note: Results of Negative Binomial Regression analyses, presented as N (%), Chi Square (χ^2)

[a] Number of Appointments

[b] MH Services: includes consults to mental healthcare clinics (e.g., PTSD clinic, Psychiatry), consults to physical healthcare clinics for a primary/secondary mental health concern (e.g., TBI/Polytrauma for PTSD), PEC visits for mental health concerns (e.g., Suicidal Ideation), ED visits for a primary/secondary mental health concern (e.g., Depression)

[c] PH Services: includes consults to physical healthcare clinics (e.g., cardiology, audiology), consults to physical healthcare clinics for a primary/secondary physical health concern (e.g., behavioral medicine for chronic pain), ED visits for physical health concerns (e.g., pain)

[d] MH Appointments: number of mental healthcare appointments attended by Veteran in first 6 months following VASDHS enrollment

[e] PH Appointments: number of physical healthcare appointments attended by Veteran in first 6 months following VASDHS enrollment

[f] Emergency Services: includes visits to PEC or ED for any reason (e.g., depression, acute pain)

Table 6.1. Summary of Negative Binomial Regression Results by Group

	Veteran Control vs.											
	CG				PTSD				CG & PTSD			
	IRR	*95% CI*		Sig.	*IRR*	*95% CI*		Sig.	*IRR*	*95% CI*		Sig.
		Lower	Upper			Lower	Upper			Lower	Upper	
Healthcare Referrals												
MH Services [a]	1.56	0.80	3.01	0.190	6.36	4.88	8.30	<.001	7.23	5.51	9.49	<.001
PH Services [b]	1.37	0.85	2.20	0.200	1.58	1.24	2.02	<.001	1.87	1.45	2.41	<.001
Appointments Attended												
MH Appointments [c]	1.98	0.91	4.31	0.087	6.68	4.82	9.26	<.001	7.04	5.03	9.85	<.001
PH Appointments [d]	1.41	0.82	2.42	0.218	1.31	0.99	1.75	0.060	1.52	1.13	2.03	0.006
Emergency Services [e]	1.24	0.58	2.69	0.579	1.71	1.18	2.48	0.005	1.83	1.24	2.70	0.002

Note: *IRR* = incidence rate ratio; *95% CI* = 95% Confidence Interval for *IRR*

[a] MH Services: includes consults to mental healthcare clinics (e.g., PTSD clinic, Psychiatry), consults to physical healthcare clinics for a primary/secondary mental health concern (e.g., TBI/Polytrauma for PTSD), PEC visits for mental health concerns (e.g., Suicidal Ideation), ED visits for a primary/secondary mental health concern (e.g., Depression)

[b] PH Services: includes consults to physical healthcare clinics (e.g., cardiology, audiology), consults to physical healthcare clinics for a primary/secondary physical health concern (e.g., behavioral medicine for chronic pain), ED visits for physical health concerns (e.g., pain)

[c] MH Appointments: number of mental healthcare appointments attended by Veteran in first 6 months following VASDHS enrollment

[d] PH Appointments: number of physical healthcare appointments attended by Veteran in first 6 months following VASDHS enrollment

[e] Emergency Services: includes visits to PEC or ED for any reason (e.g., depression, acute pain)

Table 6.2. Summary of Negative Binomial Regression Results by Group, Continued

	CG & PTSD vs. CG				CG & PTSD vs. PTSD				PTSD vs. CG			
	IRR	*95% CI*		Sig.	*IRR*	*95% CI*		Sig.	*IRR*	*95% CI*		Sig.
		Lower	Upper			Lower	Upper			Lower	Upper	
Healthcare Referrals												
MH Services [a]	0.22	0.11	0.42	<.001	0.88	0.65	1.19	0.405	0.25	0.13	0.48	<.001
PH Services [b]	0.73	0.43	1.23	0.234	0.84	0.61	1.16	0.297	0.86	0.52	1.45	0.578
Appointments Attended												
MH Appointments [c]	0.28	0.13	0.62	0.002	0.95	0.66	1.36	0.774	0.30	0.13	0.65	0.002
PH Appointments [d]	0.93	0.51	1.68	0.805	0.87	0.60	1.26	0.452	1.07	0.60	1.93	0.821
Emergency Services [e]	0.68	0.30	1.56	0.361	0.93	0.58	1.51	0.775	0.73	0.32	1.66	0.451

Note: *IRR* = incidence rate ratio; *95% CI* = 95% Confidence Interval for *IRR*

[a] MH Services: includes consults to mental healthcare clinics (e.g., PTSD clinic, Psychiatry), consults to physical healthcare clinics for a primary/secondary mental health concern (e.g., TBI/Polytrauma for PTSD), PEC visits for mental health concerns (e.g., Suicidal Ideation), ED visits for a primary/secondary mental health concern (e.g., Depression)

[b] PH Services: includes consults to physical healthcare clinics (e.g., cardiology, audiology), consults to physical healthcare clinics for a primary/secondary physical health concern (e.g., behavioral medicine for chronic pain), ED visits for physical health concerns (e.g., pain)

[c] MH Appointments: number of mental healthcare appointments attended by Veteran in first 6 months following VASDHS enrollment

[d] PH Appointments: number of physical healthcare appointments attended by Veteran in first 6 months following VASDHS enrollment

[e] Emergency Services: includes visits to PEC or ED for any reason (e.g., depression, acute pain)

Table 7.1. Summary of Healthcare Service Use, Controlling for Group Differences in Baseline Demographic, Physical Health, and Mental Health Variables

	χ^2	Sig.
Negative Binomial Regression		
MH Services [a]	306.43	<.001
PH Services [b]	125.28	<.001
MH Appointments [c]	155.06	<.001
PH Appointments [d]	77.58	<.001
Logistic Regression		
Emergency Services [e]	37.55	0.007

Note: Results of Regression analyses, presented as Chi Square (χ^2). The following factors (combat exposure, service branch, positive bipolar disorder screen, positive TBI screen, suicidal ideation) and covariates (AUDIT-C, ISI, PHQ-9, PHQ-15, PHQ-Anxiety, PROMIS Pain Intensity, PROMIS Pain Interference, Resilience, ROAS, VR-12 MCS, VR-12 PCS) were included in the model; *N* = 796 (Negative Binomial Regression); *N* = 795 (Logistic Regression)

[a] MH Services: includes consults to mental healthcare clinics (e.g., PTSD clinic, Psychiatry), consults to physical healthcare clinics for a primary/secondary mental health concern (e.g., TBI/Polytrauma for PTSD), PEC visits for mental health concerns (e.g., Suicidal Ideation), ED visits for a primary/secondary mental health concern (e.g., Depression)

[b] PH Services: includes consults to physical healthcare clinics (e.g., cardiology, audiology), consults to physical healthcare clinics for a primary/secondary physical health concern (e.g., behavioral medicine for chronic pain), ED visits for physical health concerns (e.g., pain)

[c] MH Appointments: number of mental healthcare appointments attended by Veteran in first 6 months following VASDHS enrollment

[d] PH Appointments: number of physical healthcare appointments attended by Veteran in first 6 months following VASDHS enrollment

[e] Emergency Services: includes visits to PEC or ED for any reason (e.g., depression, acute pain)

Table 8.1. Summary of Negative Binomial Regression Results, Controlling for Group Differences in Baseline Demographic, Physical Health, and Mental Health Variables

	Healthcare Referrals (incl. Consults, ED, PEC)							
	MH Services [b]				PH Services [c]			
	IRR	*95% CI*		Sig.	*IRR*	*95% CI*		Sig.
		Lower	Upper			Lower	Upper	
Factors								
Combat Exposure	1.23	0.95	1.58	0.118	1.08	0.89	1.30	0.435
Service Branch [a]				0.012				0.186
Air Force	0.61	0.23	1.66	0.335	0.67	0.40	1.15	0.145
Army	1.20	0.89	1.62	0.226	0.85	0.66	1.09	0.199
Marine Corps	1.48	1.17	1.87	0.001	0.94	0.78	1.14	0.536
Navy / Coast Guard	---	---	---	---	---	---	---	---
Multiple	1.44	0.85	2.45	0.180	1.37	0.88	2.15	0.162
Positive Bipolar Screen	1.18	0.87	1.60	0.298	1.22	0.90	1.66	0.201
Positive TBI Screen	1.66	1.33	2.08	<.001	1.67	1.36	2.04	<.001
Suicidal Ideation	1.32	0.98	1.78	0.064	1.16	0.87	1.55	0.326
Covariates								
AUDIT-C	1.03	0.99	1.06	0.185	0.98	0.95	1.01	0.253
ISI	1.03	1.01	1.05	0.003	1.01	0.99	1.02	0.439
PHQ-9	0.99	0.96	1.02	0.464	1.02	0.99	1.04	0.300
PHQ-15	1.00	0.97	1.03	0.819	1.04	1.01	1.06	0.003
PHQ-Anxiety	1.06	1.02	1.11	0.002	0.99	0.96	1.02	0.562
PROMIS Pain Intensity	0.98	0.93	1.05	0.594	1.02	0.98	1.07	0.342
PROMIS Pain Interference	1.02	0.99	1.05	0.262	1.01	0.98	1.03	0.672
Resilience [d]	0.98	0.97	1.00	0.026	1.00	0.99	1.02	0.533
ROAS	1.00	0.99	1.00	0.515	1.00	0.99	1.00	0.400
VR-12 MCS [d]	0.98	0.97	0.99	0.004	1.01	1.00	1.02	0.056
VR-12 PCS [d]	1.01	0.99	1.02	0.365	0.99	0.98	1.01	0.265

Note: *IRR* = incidence rate ratio; *95% CI* = 95% Confidence Interval for *IRR; N* = 796

[a] Navy / Coast Guard is the reference group

[b] MH Services: includes consults to mental healthcare clinics (e.g., PTSD clinic, Psychiatry), consults to physical healthcare clinics for a primary/secondary mental health concern (e.g., TBI/Polytrauma for PTSD), PEC visits for mental health concerns (e.g., Suicidal Ideation), ED visits for a primary/secondary mental health concern (e.g., Depression)

[c] PH Services: includes consults to physical healthcare clinics (e.g., cardiology, audiology), consults to physical healthcare clinics for a primary/secondary physical health concern (e.g., behavioral medicine for chronic pain), ED visits for physical health concerns (e.g., pain)

[d] Higher scores indicate better functioning

Table 8.2. Summary of Negative Binomial Regression Results, Controlling for Group Differences in Baseline Demographic, Physical Health, and Mental Health Variables, Continued

	Appointments Attended (incl. Consults, PEC, ED)							
	MH Appointments [b]				PH Appointments [c]			
	IRR	*95% CI*		Sig.	*IRR*	*95% CI*		Sig.
		Lower	Upper			Lower	Upper	
Factors								
Combat Exposure	1.25	0.94	1.64	0.122	0.99	0.78	1.24	0.912
Service Branch [a]				0.065				0.024
Air Force	0.78	0.28	2.14	0.630	0.60	0.30	1.20	0.148
Army	1.21	0.90	1.63	0.205	0.75	0.55	1.03	0.073
Marine Corps	1.31	1.03	1.67	0.030	0.86	0.68	1.09	0.203
Navy / Coast Guard	---	---	---	---	---	---	---	---
Multiple	1.81	1.10	2.97	0.019	1.71	1.02	2.85	0.040
Positive Bipolar Screen	1.12	0.84	1.49	0.452	0.94	0.63	1.38	0.739
Positive TBI Screen	1.43	1.14	1.80	0.002	1.79	1.40	2.30	<.001
Suicidal Ideation	1.09	0.82	1.46	0.540	1.02	0.71	1.48	0.899
Covariates								
AUDIT-C	1.01	0.97	1.05	0.614	0.99	0.95	1.03	0.597
ISI	1.02	1.00	1.04	0.032	1.00	0.98	1.02	0.804
PHQ-9	0.99	0.96	1.03	0.727	1.02	0.98	1.05	0.390
PHQ-15	1.01	0.98	1.04	0.585	1.03	1.00	1.06	0.051
PHQ-Anxiety	1.09	1.04	1.13	<.001	0.99	0.96	1.04	0.761
PROMIS Pain Intensity	0.98	0.92	1.05	0.596	1.01	0.95	1.07	0.880
PROMIS Pain Interference	1.01	0.98	1.04	0.536	1.02	0.99	1.05	0.327
Resilience [d]	0.99	0.98	1.01	0.325	1.01	0.99	1.02	0.339
ROAS	1.00	0.99	1.00	0.326	1.00	0.99	1.00	0.311
VR-12 MCS [d]	0.98	0.97	1.00	0.007	1.01	0.99	1.02	0.313
VR-12 PCS [d]	1.01	0.99	1.03	0.313	0.99	0.98	1.01	0.448

Note: *IRR* = incidence rate ratio; *95% CI* = 95% Confidence Interval for *IRR; N* = 796

[a] Navy / Coast Guard is the reference group

[b] MH Appointments: number of mental healthcare appointments attended by Veteran in first 6 months following VASDHS enrollment

[c] PH Appointments: number of physical healthcare appointments attended by Veteran in first 6 months following VASDHS enrollment

[d] Higher scores indicate better functioning

Table 9.1. Summary of Logistic Regression Results, Controlling for Group Differences in Baseline Demographic, Physical Health, and Mental Health Variables

	Emergency Services [b]			
	OR	*95% CI*		Sig.
		Lower	Upper	
Factors				
Combat Exposure	1.14	0.77	1.67	0.519
Service Branch [a]				0.880
Air Force	0.72	0.23	2.25	0.568
Army	1.25	0.75	2.08	0.391
Marine Corps	1.04	0.70	1.55	0.840
Navy / Coast Guard	---	---	---	---
Multiple	1.09	0.43	2.78	0.849
Positive Bipolar Screen	1.16	0.62	2.16	0.638
Positive TBI Screen	0.74	0.48	1.15	0.181
Suicidal Ideation	0.95	0.51	1.77	0.871
Covariates				
AUDIT-C	1.01	0.94	1.07	0.854
ISI	1.00	0.97	1.04	0.804
PHQ-9	1.05	0.99	1.11	0.135
PHQ-15	0.99	0.94	1.04	0.626
PHQ-Anxiety	0.95	0.89	1.01	0.099
PROMIS Pain Intensity	1.03	0.93	1.14	0.525
PROMIS Pain Interference	1.09	1.04	1.15	<.001
Resilience [c]	1.00	0.98	1.03	0.862
ROAS	1.00	0.99	1.01	0.548
VR-12 MCS [c]	1.01	0.99	1.03	0.450
VR-12 PCS [c]	1.03	1.01	1.06	0.019

Note: *OR* = odds ratio; *95% CI* = 95% Confidence Interval for *OR; N* = 795

[a] Navy / Coast Guard is the reference group

[b] Emergency Services: includes visits to PEC or ED for any reason (e.g., depression, acute pain)

[c] Higher scores indicate better functioning