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The Connection between Post-traumatic Stress Disorder and Suicide Behavior: What Links Post-traumatic Stress Disorder to Suicide?

by

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Submitted to the Graduate Faculty as partial fulfillment of the requirements for the Doctor of Philosophy Degree in Clinical Psychology

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An Abstract of

The Connection between Post-traumatic Stress Disorder and Suicide Behavior: What Links Post-traumatic Stress Disorder to Suicide?

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Suicide behavior and posttraumatic stress disorder (PTSD) are highly prevalent among college students. PTSD has been shown to be a significant predictor of suicide behavior among clinical and non-clinical adult populations. This research examined PTSD as a predictor of suicide behavior in a sample of college students. Different symptom clusters of PTSD (intrusive, avoidance, and hyperarousal symptoms) were investigated as predictors of suicide behavior. Amount of exposure to trauma and anxiety sensitivity were examined as moderators of the predictive relationship between PTSD and suicide, controlling for depression and substance abuse. The issue of comorbidity was considered, and depression was examined as a moderator of the predictive relationship between PTSD and suicide behavior. Correlation and regression analyses established PTSD significantly predicts suicide behavior. Multiple regression analyses did not show any of the symptom clusters predicted suicide behavior, and they indicated neither the amount of exposure to trauma nor anxiety sensitivity moderated the predictive relationship between PTSD and suicide behavior. They did, however, demonstrate depression moderated the predictive relationship between PTSD and suicide behavior. These results have important implications for the prevention of suicide.
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Chapter One

Introduction

The Prevalence of Suicide

Suicide was the tenth leading cause of death for all ages in 2010 (Center for Disease Control and Prevention [CDC], 2012). It is the third leading cause of death among young adults 15 to 24 years old in the United States (Anderson & Smith, 2005; CDC, 2012). According to Kumar Dogra, Basu, and Das (2008) as well as Schwartz (2006), suicide is the second leading cause of death among college students.

However, suicide behavior, including suicidal ideation and suicide attempts, is far more prevalent. The prevalence of suicidal thoughts, suicide planning, and suicide attempts is significantly higher among young adults 18 to 29 years old than among adults 30 years and older (CDC, 2012). According to the CDC (2012), there are approximately 100 to 200 suicide attempts for every completed suicide among young adults age 15 to 24 years, and suicide accounts for 20% of all deaths annually for the same age group.

Therefore, suicide behavior has been examined among college students, given the college student population is mostly comprised of young adults. Wilcox et al. (2010) reported 12% of individuals in a college student sample experienced suicidal ideation at some point during college. Westefeld et al. (2005) found 24% of a sample of 1,865 college students thought about attempting suicide. Arria et al. (2009) surveyed over 1,000 college students. They found 12% of the students sampled thought about killing themselves at least once, and 1% made specific plans or suicide attempt. These researchers also reported 6% of first year university students in the sample experienced current suicidal ideation. Additionally, in a national survey of college students from 70
United States colleges and universities, 6% of undergraduates and 4% of graduate students reported experiencing suicidal ideation in the prior 12 months (Brownson, Drum, Smith, & Burton Demark, 2011). Finally, the American College Health Association (ACHA) (2012) found 7.1% of a national sample of 90,666 surveyed college students seriously considered suicide within the 12 months prior to their completion of the survey, and 1.2% of the surveyed college students attempted suicide within the 12 months prior to their completion of the survey. Thus, suicide behavior among the young adult, college population is an issue of great importance, and in the interest of preventing suicide, there is a need to investigate the risk factors associated with suicide behavior in young adult, college students.

**The Process of Suicide**

O’Carroll et al. (1996) defined suicide as self-inflicted death, where the deceased committed the act with the direct and conscious effort and intention to kill himself or herself. Suicide involves any behavior that is self-initiated and carried out with the intention or expectation to die and includes self-inflicted, active or passive acts (de Leo, Burgis, Bertolote, Kerkof, & Bille-Brahe, 2004). A suicide attempt is a self-inflicted, self-injurious act committed with some intent to die (O’Carroll et al., 1996). Suicidal ideation involves thoughts related to a desire, intent, and method for committing suicide; furthermore, suicidal ideation can include fleeting thoughts of death to persistent ruminative thoughts about committing suicide (Wilcox et al., 2010). Suicidal ideation is considered to be the first step on the pathway to suicide and an important precursor to later attempted and completed suicide (Arria et al., 2009; Kachur, Potter, Powell, & Rosenberg, 1995). Suicidal ideation most strongly predicts an individual’s likelihood of
engaging in a suicide attempt, and a suicide attempt has been shown to most strongly predict completed suicide (Kessler, Borges, & Walters, 1999; Weissman, Klerman, Markowitz, & Ouellette, 1989). Suicide behavior can include suicidal ideation, making a suicide plan, having suicide intent, or making a suicide attempt (Wilcox et al., 2010).

Furthermore, there is a process involved in suicide completion. The suicide process involves suicidal ideation, a suicide plan, a suicide attempt, and completed suicide (See Figure 1) (Vilhjalmsson, Kristjansdottir, & Sveinbjarnardottir, 1998). Those with persistent suicidal ideation are often deemed to be at high risk for engaging in other suicide behaviors (Wilcox et al., 2010).

![Figure 1. Diagram of the suicide process. This figure illustrates the steps in the suicide process.](image)

Given the steps in the suicide process, it appears as though there is ample opportunity for clinicians to intervene and attempt to prevent the completion of suicide. Although the previously discussed prevalence rates for suicidal ideation, suicide attempts, and suicide completions among the college student population are cause for concern, the rates at which people engage in each step of the suicide process are staggered across a spectrum. Considering the previously described prevalence rates, it is evident that a fair amount of individuals think about suicide. However, fewer individuals make a suicide plan or attempt, and even fewer individuals complete the act of suicide. Specifically, among the college student population, suicide behaviors manifest along a continuum of
increasing severity, where suicide behavior ranges from pre-suicidal thoughts of death to serious contemplation of committing suicide to planning and preparing for suicide to making a suicide attempt (Drum, Brownson, Burton Denmark, & Smith, 2009). Thus, suicide behavior (suicidal ideation and suicide attempts) is much larger in scope than completed suicide, providing numerous points for intervention. If clinicians can identify the risk factors predictive of suicide behavior, then they can intervene at different points in the suicide process in an attempt to prevent the completion of suicide. Given the prevalence rates of suicide and suicide behavior among college students, preventing suicides is becoming a priority among colleges and counseling centers nationwide (Brownson et al., 2011).

Predicting Suicide Behavior among College Students

Nock and Banaji (2007) maintained that suicide behavior is difficult to predict because of the transitory nature of suicide ideation. Suicide behavior is complex and often the result of psychosocial, psychological, environmental, and genetic risk factors interacting with each other (Wilcox et al., 2010). According to Wilcox et al. (2010), numerous studies have examined risk factors for adolescent suicide behavior, but the research providing evidence for risk factors of suicide behavior among the young adult, college student population is more limited. These researchers further explained that suicide behavior among the college student population has unique causes as a result of the social and academic pressures specific to this population. They posited that several characteristics of the period associated with transitioning and developing into an adult might make entering college difficult, placing young adults who are predisposed to experiencing mental health problems more vulnerable to thinking about, attempting, and
completing suicide. Such characteristics include leaving home, spending time away from
family and peers, changes in family and peer relationships, increased exposure to
opportunities for alcohol and drug use, social challenges, sexual identity and orientation
conflicts, developing and losing intimate relationships, pressure to achieve academic
success, and the challenge of navigating a new environment (Wilcox et al., 2010; Zisook,
Downs, Moutier, & Clayton, 2012). Furthermore, many psychiatric disorders, such as
anxiety and depressive disorders, first manifest during young adulthood and can be
exacerbated by the stress associated with entry into college, making college students
vulnerable to engaging in suicide behavior (Wilcox et al., 2010). Zisook et al. (2012)
discussed how the availability of drugs and alcohol complicates the college years and can
lead to alcohol and drug abuse, which can impact one’s suicide risk by exacerbating
depressive symptoms, increasing impulsivity, diminishing normal inhibitions against
destructive impulses, and sometimes contributing to social isolation.

As previously noted, the research devoted to identifying risk factors for suicide
behavior among college students is limited (Jagdeo, Sareen, & Bolton, 2009; Wilcox et
al., 2010). Much of the research that exists focuses on risk factors of suicidal ideation,
not taking into account other suicide behaviors, such as making a suicide attempt. The
studies examining predictors of suicidal ideation in college students found that tobacco,
alcohol, and drug use; negative life events; hopelessness; desperation; depression; risky
behaviors; lack of social belongingness; low social support; child or adolescent exposure
to domestic violence; and maternal depression are associated with suicide ideation (Arria
et al., 2009; Barrios, Everett, Simon, & Brener, 2000; Brener, Hassan, & Barrios, 1999;
Garlow et al., 2008; Konick & Gutierrez, 2005; Van Orden et al., 2008; Wilcox et al.,
Current research should examine risk factors for overall suicide behavior, including both suicidal ideation and suicide attempts.

**PTSD as a Risk Factor for Suicide Behavior**

Mental health disorders, especially mood disorders, are robust risk factors for suicide and suicide behavior, including suicidal ideation and suicide attempts (Cavanagh, Carson, Sharpe, & Lawrie, 2003; Joiner, 2010; Zisook et al., 2012). Specifically, research suggests major depression, with an early onset in young adulthood, is a significant risk factor for suicidal ideation and behavior (Bae, Ye, Chen, Rivers, & Singh, 2005; Garlow et al., 2008; Gibb, Andover, & Beach, 2006; Hirsch, Conner, & Duberstein, 2007; Kisch, Leino, & Silverman, 2005; Konick & Gutierrez, 2005; Singh & Joshi, 2008; Stephenson, Pena-Shaff, & Quirk, 2006; Westefeld et al., 2006). However, one risk factor of suicide behavior among college students that has received little attention is anxiety.

Like depression, anxiety disorders often manifest themselves during college age years and have been shown to be associated with greater suicide risk (Jagdeo et al., 2009; Zisook et al., 2012). Individuals with anxiety may seek an escape from their suffering and consider suicide to be an acceptable option (Jagdeo et al., 2009). In addition, anxiety disorders are highly prevalent, have an early onset, and significantly elevate an individual’s suicide risk, especially when comorbid with mood disorders (Anxiety Disorders Association of America [ADAA], 2011; Jagdeo et al., 2009; Kessler et al., 2005a; Kessler, Chiu, Demler, & Walters, 2005b; Kessler et al., 2007a; Kessler et al., 2007b). According to ADAA (2011), anxiety disorders are the most common mental illness in the United States, affecting approximately 18% of the adult population. Previous findings documented lifetime prevalence rates for anxiety disorders in the
United States to be about 28.8% (Kessler et al., 2005a; Kessler et al., 2005b; Starcevic, 2006). Moreover, the median age for the onset of anxiety disorders is early in the second decade of life, before the time that a young adult would enter college (Kessler et al., 2005a; Kessler et al., 2005b). Approximately, half of all anxiety disorders have an onset before the age of 14, and almost three-fourths have an onset by age 24 (Kessler et al., 2005a; Kessler et al., 2005b).

Anxiety is common among the young adult, college student population (Abbassi & Stacks, 2007; Abdel-Khalek & Maltby, 2009; Asmundson & Norton, 1993; Crocker, Canevello, Breines, & Flynn, 2010; Ham, Zamboanga, Olthuis, Casner, & Bui, 2010; Johnson, Johnson, & Petzel, 1992; Matsushita et al., 2010; Seligman & Wuyek, 2007). The results of the American College Health Association-National College Health Assessment II (ACHA-NCHA II), a survey of 90,666 college students, indicated 11.9% of the surveyed college students were diagnosed with or treated for anxiety by a mental health professional in the 12 months prior to their completion of the survey; moreover, the results also demonstrated 50.7% of the surveyed college students reported experiencing overwhelming anxiety within the 12 months prior to their completion of the survey (ACHA, 2012). College is an important period of transition, where students leave familiar surroundings, roles, and relationships and enter into new ones (Read, Ouimette, White, Colder, & Farrow, 2011). In addition, college students are at risk for experiencing trauma and stressful life events (Humphrey & White, 2000; Wood & Sher, 2002). Thus, they are also at risk for developing post-traumatic stress disorder (PTSD), a specific anxiety disorder.
Several studies have assessed the prevalence of lifetime trauma and PTSD symptomatology among college students. According to the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (DSM-IV-TR)*, in order for an individual to meet criteria for PTSD, he or she “experienced, witnessed, or was confronted with an event or events that involved actual or threatened death or serious injury, or a threat to the physical integrity of others” (American Psychiatric Association [APA], 2000, p. 467). In addition, for more than one month, an individual must also persistently re-experience the traumatic event, avoid stimuli associated with the trauma, experience numbing of general responsiveness not present before the trauma, and exhibit symptoms of increased arousal not present before the trauma. These disturbances must cause clinically significant impairment in social, occupational, or other important areas of functioning.

Oswalt and Silberg (1995) investigated perceived stress in a college sample and found that 42% of their sample of 179 college students reported experiencing traumatic events since the beginning of college. Vrana and Lauterbach (1994) as well as Watson and Haynes (2007) examined a range of traumatic events and found high prevalence rates for lifetime traumatic stress among college students, 84% ($N=440$) and 94% ($N=339$) respectively. Similarly, Frazier et al. (2009) found that 85% of their sample of 1,528 college students reported experiencing at least one traumatic event during their lifetime. Read et al. (2011) examined the prevalence of and risk for trauma and PTSD in a large sample ($N=3,014$) of college students and found 66% reported exposure to a trauma. Several other studies assessed lifetime trauma among college students and excluded commonly experienced traumatic events (e.g. unexpected or sudden deaths), finding
somewhat lower, but still alarming, prevalence rates ranging from 52% to 84% (Bernat, Ronfeldt, Calhoun, & Arias, 1998; Goodman, Corcoran, Turner, Yuan, & Green, 1998; Green et al., 2000; Humphrey & White, 2000; Kilpatrick, Acierno, Resnick, Saunders, & Best, 1997; Kirk & Dollar, 2002; Marx & Sloan, 2002; Owens & Chard, 2006; Scarpa et al. 2002).

Some of the most distressing traumatic events experienced by college students are those perceived to be personally life threatening and those that included assaultive violence, especially sexual assault and family violence (Bernat et al., 1998; Daugherty, 1998; Frazier et al., 2009; Green et al., 2000; Owens & Chard, 2006; Vrana & Lauterbach, 1994; Watson & Haynes, 2007). According to Frazier et al. (2009), the most common traumatic events experienced by college students are the unexpected death of a close friend or a loved one, an accident, a loved one surviving a life-threatening event, family violence, unwanted sexual attention, and sexual assault. Similarly, Elhai, Gray, Docherty, Kashdan, and Kose (2007) found that the most commonly reported traumatic events in college students included directly experiencing transportation accidents, physical assaults, and natural disasters; witnessing life-threatening illnesses and/or injuries, and being confronted with news that an individual with whom one is close was attacked with a weapon.

Furthermore, research has revealed that individuals who report more traumatic events, especially sexual assault, often report more depression and anxiety, specifically PTSD symptoms (Bernat, Ronfeldt, Calhoun, & Arrias, 1998; Frazier et al., 2009; Green et al., 2000; Smyth, Hockemeyer, Heron, Wonderlich, & Pennebaker, 2008; Vrana & Lauterbach, 1994). Therefore, numerous studies have examined the prevalence rates of
PTSD among college students. Oswalt and Silberg (1995) found 6% of their college student sample (N=179) met diagnostic criteria for PTSD. Read et al. (2011) found 9% of their college student sample (N=3,014) met criteria for PTSD. Also, Watson and Haynes (2007) reported a PTSD prevalence rate of 12% among a sample of college students (N=339) who experienced trauma. Additionally, Frazier et al. (2009) obtained a PTSD prevalence rate of 6% among college students who experienced a traumatic event at some point in their lifetime (n=1,299) and a PTSD prevalence rate of 8% among college students who recently experienced a traumatic event (n=321). Smyth et al. (2008) demonstrated 9% of a sample of college students who participated in their study (N=6,053) examining the prevalence of adverse life events reported symptoms of a clinical diagnosis of PTSD, whether or not the adverse life event was clinically considered to be traumatic. Other research reported prevalence rates of PTSD among college students in the range of 6% to 17% (Lauterbach & Vrana, 2001; Marx & Sloan, 2003; McDevitt-Murphy, Weathers, Flood, Eakin, & Benson, 2007; Twamley, Hami, & Stein, 2004). Overall, the prevalence of PTSD among college students appears to be similar and sometimes slightly higher than the lifetime PTSD prevalence rates for the general population ranging from 6.4% to 7.8% (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995; Kessler et al., 2005b; Pietrzak, Goldstein, Southwick, & Grant, 2011). Given the prevalence of anxiety, trauma, and PTSD among young adults and college students, it appears PTSD should be examined as a risk factor for suicide behavior among college students.
The Predictive Relationship between PTSD and Suicide Behavior

The role of anxiety, specifically PTSD, in the development of suicide behavior has been understudied among the college student population. However, several studies that utilized data from large general population mental health surveys established an association between certain anxiety disorders and increased risk for engaging in suicide behavior. These associations between anxiety disorders and increased risk for suicide behavior persisted even when controlling for sociodemographic variables and comorbid mental disorders (Jagdeo et al., 2009).

Khan, Leventhal, Khan, and Brown (2002) conducted a meta-analysis of 20,076 participants in the Food and Drug Administration database of anxiety treatment studies and found that the presence of anxiety disorders increased suicide risk, even among individuals deemed to be at low risk. Nock et al.’s (2008) 17 country World Mental Health survey analysis of 84,850 adults in the general population is the largest research study to report on the relationship between anxiety disorders and suicide behavior. Nock et al. (2008) found anxiety disorders were significantly associated with suicidal ideation and suicide attempts and increased the risk of suicide behavior by as much as three to five times. However, these researchers do not specify what anxiety disorder diagnoses account for this relationship and the increased risk of suicide behavior.

Several studies have specifically examined the predictive relationship between PTSD and suicide behavior. Khan et al. (2002) assessed suicide and suicide attempt risk among outpatients who were diagnosed with anxiety disorders and participating in recent clinical trials. Their results indicated that PTSD is an increased independent risk factor for suicidal behavior. Also, Sareen, Houlihan, Cox, and Asmundson (2005b) utilized the
National Comorbidity Survey to examine the relationship between anxiety disorders and suicide behavior. The National Comorbidity Survey contained a nationally representative sample of 5,877 adults in the United States from the general population. These authors used multiple regression analyses to determine what anxiety disorders were associated with suicidal ideation and suicide attempts, controlling for comorbid mental disorders, including major depressive disorder, dysthymia, bipolar disorder, alcohol abuse/dependence, drug abuse/dependence, antisocial personality disorder, non-affective psychosis. Their results revealed PTSD was significantly associated with lifetime suicidal ideation and lifetime suicide attempts. Moreover, other studies found similar results using clinical samples (Ferrada-Noli, Asberg, Ormstad, Lundin, & Sundbom, 1998; Kotler, Iancu, Efroni, & Amir, 2001) and community samples (Kessler et al. 78, 1995; Wunderlich, Bronisch, & Wittchen, 1998). These studies demonstrated PTSD is predictive of suicide behavior.

In addition, Cougle, Keough, Riccardi, and Sachs-Ericsson (2009) conducted research from which they utilized data from the National Comorbidity Survey-Replication to study and update the relationship between anxiety disorders and suicide behavior. They utilized a representative sample of 4,131 adult individuals in the United States who reported on lifetime suicidal ideation and suicide attempts. Similar to the work of Sareen et al. (2005b), they completed multiple regression analyses which yielded results revealing PTSD is predictive of suicidal ideation and suicide attempts, even after adjusting for comorbid mental disorders.

Nepon, Belik, Bolton, and Sareen (2010) conducted a research study, where they examined the relationship between anxiety disorders and suicide attempts, accounting for
the influence of comorbid mental disorders. These researchers obtained a nationally representative sample of civilian, non-institutionalized adults from the National Epidemiologic Survey on Alcohol and Related Conditions Wave 2 (N=34,653). They conducted multiple regression analyses. While controlling for mood disorders as well as alcohol and substance abuse and dependence, these researchers found PTSD uniquely predicted which individuals who were experiencing suicidal ideation went on to make a suicide plan or attempt, demonstrating PTSD predicts suicide behavior.

Finally, Wilcox, Storr, and Breslau (2009) examined the association between exposure to traumatic events with and without the resulting PTSD and the risk of a subsequent suicide attempt. They utilized a community sample of urban young adults (N=1,698). These researchers found that PTSD was associated with increased risk for a suicide attempt, even after controlling for depression, substance abuse/dependence, and alcohol abuse/dependence, whereas exposure to a traumatic event without PTSD was not associated with suicide attempts. From this review of the research, it is evident past research has established there is a significant predictive relationship between PTSD and suicide behavior, including suicidal ideation and suicide attempts.

The Role of Suicide Theory

As previously discussed, research has established a strong and consistent predictive relationship between PTSD and suicide behavior, including suicidal ideation and attempts. However, there is a lack of research seeking to determine what aspects of PTSD link the disorder to suicide behavior and examining the mechanisms that influence the relationship between PTSD and suicide behavior. In an attempt to identify what characteristics of PTSD link the disorder to suicide behavior and to determine what
mechanisms strengthen the relationship between PTSD symptomatology and suicide behavior, one must consider past research and theory related to suicide and examine how different dimensions of PTSD relate to suicide theory.

According to the interpersonal-psychological theory of suicide, suicide occurs when an individual possesses a desire to die and the acquired capability to die by committing suicide (Joiner, 2005; Van Orden et al., 2010). Two specific psychological states contribute to one’s desire to die: perceived burdensomeness and thwarted belongingness. Perceived burdensomeness refers to one’s view that his or her existence burdens family, friends, or society, and thwarted belongingness refers to the extent to which an individual perceives he or she is alienated from others (Joiner, 2005; Van Orden et al., 2010). An individual’s acquired capability to die by suicide develops from a fearlessness of death and a high tolerance for self-inflicted pain which is often learned by repeatedly experiencing painful, provocative events, such as past suicide attempts, non-suicidal self-injurious behavior, combat exposure, and physical violence (Joiner, 2005; Van Orden et al., 2010).

The interpersonal-psychological theory of suicide can be used to explain how certain dimensions of PTSD may link the disorder to suicide behavior. There are three main clusters of PTSD symptoms: intrusive symptoms, avoidance symptoms, and hyperarousal symptoms. These symptom clusters may link PTSD to suicide behavior, making it a strong predictor of suicidal ideation and suicide attempts. In addition, the interpersonal-psychological theory of suicide can be utilized to propose possible mechanisms that moderate the relationship between PTSD symptomatology and suicide.
behavior, including exposure to traumatic events and anxiety sensitivity related to the fear of the cognitive features of anxiety.

**Intrusive symptoms.** Intrusive symptoms of PTSD involve re-experiencing the traumatic event in some way: nightmares, unwelcome images of the trauma or its aftermath while in a conscious state, and intrusive thoughts related to the traumatic event (Weiss, 2007). Re-experiencing the trauma is often accompanied by some intense physiological distress. Previous research has linked intrusive symptoms to suicide behavior. Bell and Nye (2007) found intrusive symptoms of PTSD to significantly predict increased suicidal ideation and behavior among a sample of Vietnam veterans (N=50).

Applying the interpersonal-psychological theory of suicide, intrusive symptoms can contribute to the development of an individual’s acquired capability for suicide by increasing his or her tolerance for self-inflicted pain through the repeated re-experiencing of the traumatic event, a painful provocative event, in the form of nightmares or unwanted images and thoughts. Thus, in the context of the interpersonal-psychological theory of suicide, increased intrusive symptoms experienced by those with PTSD could predict increased suicide behavior, helping to explain the predictive relationship between PTSD and suicide behavior.

**Avoidance symptoms.** Avoidance symptoms of PTSD involve making deliberate efforts to not think about the traumatic event, to not talk about the traumatic event, and/or to avoid reminders of the traumatic event (e.g. people, places, objects) of the event (Weiss, 2007). Thus, individuals restrict their thoughts related to the traumatic event, distance themselves from reminders of the event, and often experience emotional and
social withdrawal. Previous research has demonstrated avoidance symptoms of PTSD are associated with suicide behavior. Lemaire and Graham (2011) demonstrated increased avoidance symptoms of PTSD are significantly associated with greater suicide behavior among a sample of male and female veterans (N=1,740).

Using the interpersonal-psychological theory of suicide, avoidance symptoms can contribute to an individual’s experience of thwarted belongingness, or feeling alienated from others. Reminders of the traumatic event could include people and places, and if an individual deliberately avoids specific people and places, he or she can be inadvertently isolating him or herself, potentially causing the development of feelings of being alienated from others. In the context of the interpersonal-psychological theory of suicide, avoidance symptoms experienced by those with PTSD could predict increased suicide behavior, helping to explain the connection between PTSD and suicide behavior.

**Hyperarousal symptoms.** Hyperarousal symptoms of PTSD are mostly physiological symptoms and include anger, insomnia, irritability, jumpiness, an exaggerated startled response, impaired concentrating, psycho-physiologic arousal upon exposure to reminders, and hypervigilance (Weiss, 2007). Previous research has connected hyperarousal symptoms to suicide behavior. Ben-Ya’acov & Amir (2004) provided evidence indicating hyperarousal symptoms significantly predict suicide behavior among a community sample of men (N=103), and Sharhabani-Arzy, Amir, & Ben-Ya’acov (2002) found a significant association between hyperarousal symptoms and suicide behavior among a sample of battered women, where high levels of arousal were significantly associated with suicide risk.
In accordance with the interpersonal-psychological theory of suicide, it is also possible for hyperarousal symptoms to contribute to the development of an individual’s acquired capability for suicide. Hyperarousal symptoms, especially psycho-physiologic arousal resulting from exposure to reminders of a trauma, can serve as reminders of the aroused state one experienced during a trauma. The consistent experience of hyperarousal symptoms can contribute to the development of an individual’s acquired capability to die by suicide by heightening one’s tolerance for self-inflicted pain through repeatedly experiencing an exaggerated startled response or psycho-physiologic arousal. Using the interpersonal-psychological theory of suicide, increased hyperarousal symptoms of PTSD could predict increased suicide behavior, helping to explain the predictive relationship between PTSD and suicide behavior.

**Exposure to traumatic events.** Exposure to traumatic events refers to the number of traumatic events experienced by an individual. Previous research has shown exposure to traumatic events is associated with suicide behavior. Stein et al. (2010) showed increased exposure to traumatic events is significantly associated with increased suicide behavior in an international community sample of 102,245 adult males and females; these researchers demonstrated a dose-response relationship between the number of traumatic events and suicide behavior, suggesting the odds of engaging in suicide ideation and attempts increase as the number of traumatic events experienced by an individual increases (Stein et al., 2010).

The association between exposure to traumatic events and suicide behavior is consistent with the interpersonal-psychological theory of suicide (Joiner, 2005). Traumatic events experienced by those with PTSD symptomatology may moderate the
predictive relationship between PTSD and suicide behavior; specifically, increased exposure to traumatic events may account for their increased risk for engaging in suicide behaviors, including making a suicide attempt (Capron, Cougle, Ribeiro, Joiner, & Schmidt, 2012a). Exposure to a traumatic event is the first criterion (Criterion A) for receiving a diagnosis of PTSD (4th ed., text rev.; *DSM-IV-TR*; APA, 2000). An individual’s amount of exposure to traumatic events may strengthen the predictive relationship between PTSD and suicide behavior. According to the interpersonal-psychological theory, an individual with PTSD has increased exposure to traumatic events that could increase his or her risk of engaging in suicide behavior, because repeated exposure to traumatic events can contribute to the development of a fearlessness of death and the tolerance for self-inflicted pain learned through repeatedly experiencing painful, provocative events such as traumas (Capron et al., 2012a).

**Anxiety sensitivity-cognitive dyscontrol.** Anxiety sensitivity may also moderate the relationship between PTSD and suicide behavior. Anxiety sensitivity refers to one’s fear of anxiety-related symptoms, including physical (somatic sensations), cognitive (cognitive dyscontrol), and social (publicly observable) features of anxiety (Reiss & McNally, 1985; Taylor, 1999; Zinbarg, Mohlman, and Hong, 1999). This fear results from a belief that the physical, cognitive, and/or social concerns may have potentially harmful somatic, psychological, or social consequences (Reiss, 1987; Reiss & McNally, 1985; Reiss, Peterson, Gurskey, & McNally, 1986). Thus, when someone with high anxiety sensitivity becomes anxious in response to a stressor, he or she tends to worry that his or her anxiety symptoms (e.g. heart palpitations) will have harmful consequences (e.g. heart attack). Several studies have shown anxiety sensitivity to be elevated in
individuals with anxiety disorders, including PTSD, compared to individuals in normal controls (Taylor, 1995; Taylor, 1996; Taylor, Koch, & McNally, 1992). Therefore, increased total PTSD symptomatology coupled with increased anxiety sensitivity related to the fear of the cognitive features of anxiety could predict increased suicidal ideation and suicide attempts.

Previous research has linked anxiety sensitivity related to the fear of the cognitive features of anxiety to suicide behavior. Increased anxiety sensitivity was significantly associated with suicidal ideation among a sample of patients with panic disorder, even when controlling for mood disorder diagnoses and depressive symptoms; much of this association resulted from increased cognitive concerns related to anxiety, where individuals had an increased fear of the loss of cognitive control (Schmidt, Woolaway-Bickel, & Bates, 2001). Additional research utilizing a community sample of individuals from the National Epidemiologic Survey on Alcohol and Related Conditions with major depressive episodes (N=2,679) suggested individuals with catastrophic cognitive panic attack symptoms (e.g. fear of dying, losing control over one’s mind, or going insane), symptoms similar to those reflected by high anxiety sensitivity related to the fear of the cognitive features of anxiety, are more likely to transition from experiencing suicidal ideation to making a suicide attempt (Katz, Yaseen, Mojtabai, Cohen, & Galynker, 2011). Capron et al. (2012b) conducted research that yielded results which indicated anxiety sensitivity related to the fear of the cognitive concerns of anxiety is associated with suicidal ideation and suicide attempts among a large diverse group of clinical outpatient individuals (N=1,378).
The association between anxiety sensitivity and suicide behavior is consistent with the interpersonal-psychological theory of suicide (Joiner, 2005). One particular dimension of anxiety sensitivity impacts the likelihood for an individual to engage in suicide behavior: anxiety sensitivity related to the fear of the cognitive concerns of anxiety. Anxiety sensitivity related to the fear of the cognitive concerns of anxiety involves fear of the loss of control over one’s mind and/or emotional intensity, and it closely resembles the catastrophic panic attack symptoms. Katz et al. (2011) proposed a positive feedback model of suicidality, where they posit that the emergence of catastrophic cognitions suggests a susceptibility to the experience of suicidal ideation. Furthermore, they maintained individuals move from experiencing suicidal ideation to making a suicide attempt when these catastrophic cognitions are combined with increased limbic autonomic arousal. This model of suicide behavior suggests individuals with high anxiety sensitivity become vulnerable to engaging in suicide behavior, because they experience increased physical distress (limbic autonomic arousal) as a result of their catastrophic cognitions.

According to the interpersonal-psychological theory of suicide, the increased physical distress resulting from anxiety sensitivity related to the fear of the cognitive concerns of anxiety may influence the development of one’s acquired capability for suicide by contributing to the development of individuals’ high tolerance of self-inflicted pain. The intense fear of losing control of one’s mind and/or emotional intensity can aid in the development of the acquired capability for suicide by increasing an individual’s level of physical distress and arousal and causing an increased tolerance for self-inflicted pain to develop. Therefore, anxiety sensitivity, specifically increased fear of the
cognitive features of anxiety, might strengthen the predictive relationship between PTSD and suicide behavior.

**The Issue of Comorbidity**

Although previous research has established a predictive relationship between PTSD and suicide behavior among the adult general population, there is a need to investigate the extent to which comorbid mental disorders account for the predictive relationship between PTSD and suicide behavior. Much of the previously discussed research considered the issue of comorbidity, yielding results demonstrating PTSD is predictive of suicide behavior, even after controlling for comorbidity (Cougle et al., 2009; Khan et al., 2002; Nepon et al., 2010; Sareen et al., 2005b). However, other research suggests mental disorders, including mood and substance use disorders, comorbid with anxiety disorders, such as PTSD, may increase the risk of suicide behavior and may be accounting for some of the relationship between PTSD and suicide behavior (Beautrais, Wells, McGee, & Browne, 2006; Cougle et al., 2009; Fairweather, Anstey, Rodgers, & Butterworth, 2006; Kramer, Lindy, Green, Grace, & Leonard, 1994; Oquendo et al., 2003; Sareen et al., 2005a; Sareen et al., 2005b; Simon et al., 2007a). Particular consideration has been given to the comorbidity of PTSD and depression, substance abuse, and alcohol abuse, because these disorders are known to be highly comorbid with one another (Blaney & Millon, 2009; Lepine, 2002; Sher, 2004).

Research has demonstrated that approximately 40% of individuals with PTSD acutely, and up to 95% during their lifetime, meet criteria for major depression (Kramer et al., 1994). Furthermore, like PTSD, depressive and substance abuse disorders are also major risk factors predictive of suicide behavior among college students (Barrios et al., 2005b).
Several research studies have indicated that the comorbidity of PTSD and depression increases the risk of suicide behavior. Oquendo et al. (2003) examined the differences in rates of suicide attempts among a sample of patients (*N* = 156) with a diagnosis of a major depressive episode only and patients with diagnoses of both a major depressive episode and PTSD. These researchers determined there is a greater rate of suicide attempts among those patients with comorbid depression and PTSD. They found the increased rate of suicide attempts was not the result of differences in substance abuse, child abuse, or cluster B personality disorders.

Oquendo et al. (2005) sampled 230 patients with a lifetime history of a major depressive episode and determined 59 of those patients had lifetime comorbid PTSD. These researchers compared the clinical characteristics of individuals with and without PTSD, finding patients with a lifetime history of a major depressive episode and PTSD were significantly more likely than the patients with a lifetime history of a major depressive episode only to have made a suicide attempt. Also, these researchers demonstrated individuals with current PTSD and a major depressive episode reported greater suicidal ideation. Moreover, Campbell et al. (2007) sampled 677 depressed military veteran primary care patients and found a greater prevalence of suicide ideation among patients with comorbid major depressive disorder and PTSD. Finally, Cougle, Resnick, and Kilpatrick (2009) examined the differential contributions of major depressive disorder, PTSD, and the comorbidity of the two disorders to increasing suicide risk among a national household probability sample of 3,085 women. These researchers
conducted cross-sectional analyses and found the group of women with lifetime comorbidity of major depressive disorder and PTSD exhibited an increased prevalence of suicide ideation compared to the group of women with only a PTSD diagnosis and the group of women with only a major depressive disorder diagnosis.

These research studies demonstrated there are differences in suicide behavior between individuals with comorbid PTSD and depression, individuals with only a depression diagnosis, and individuals with only a PTSD diagnosis, providing evidence of increased suicide behavior among individuals with comorbid PTSD and depression. They used clinical and non-clinical samples of adult individuals and utilized descriptive statistics, correlational analyses, and comparisons of means to determine there is increased suicide behavior among individuals with comorbid PTSD and depression compared to individuals without comorbid PTSD and depression.

Therefore, comorbidity is an issue to be considered when investigating the predictive relationship between PTSD and suicide behavior. Research should control for depressive symptomatology, substance abuse, and alcohol abuse when analyzing the predictive relationship between PTSD and suicide behavior in order to be sure the connection between PTSD and suicide behavior is not better explained by the link between PTSD and these other mental disorders. Additionally, as a result of the high comorbidity between depression and PTSD and the research establishing depression and PTSD as predictors of suicide behavior, research should examine the impact depression may have on the predictive relationship between PTSD and suicide behavior, exploring whether or not depression moderates the relationship.
The Current Research

As previously discussed, little research has examined the prevalence rates of suicide behavior among college students with PTSD symptomatology. First, this research investigated the prevalence of suicide behavior, including suicidal ideation and suicide attempts, among the total sample of college students and a subsample of college students who met diagnostic criteria for PTSD.

Second, despite the elevated rates of PTSD in college students, limited research has explored whether or not a predictive relationship exists between PTSD and suicide behavior among college students. Past research demonstrated PTSD is significantly predictive of suicide ideation and attempts among clinical and non-clinical adult samples, even when controlling for comorbid mental disorders. Thus, total PTSD symptomatology is likely to be a significant predictor of suicide behavior among college students. Therefore, this research also examined the predictive relationship between total PTSD symptomatology and suicide behavior among college students, hypothesizing that elevated total PTSD symptomatology would significantly predict high levels of suicide behavior.

Finally, a significant predictive relationship between total PTSD symptomatology and suicide behavior among college students would suggest a need for further investigation, exploring how PTSD is related to suicide behavior by examining what dimensions of PTSD might help explain the relationship between total PTSD symptomatology and suicide behavior among college students. To this researcher’s knowledge, little research has given consideration to the different dimensions of anxiety and PTSD that might help explain how this disorder is related to suicide behavior.
Therefore, the current research also examined which of the following symptom clusters of PTSD, if any, predict suicide behavior in attempt to determine if there is a certain cluster of symptoms that links the disorder to suicide behavior: intrusive symptoms, avoidance symptoms, and hyperarousal symptoms. While controlling for comorbid mental disorders (depression, substance abuse, and alcohol abuse), it was hypothesized that high levels of intrusive symptoms of PTSD, high levels of avoidance symptoms of PTSD, and high levels of hyperarousal symptoms would significantly predict suicide behavior among college students who met diagnostic criteria for PTSD.

Moreover, this study also aimed to determine if either of the following dimensions of anxiety moderated the predictive relationship between total PTSD symptomatology and suicide behavior: amount of exposure to traumatic events and anxiety sensitivity related to the fear of cognitive aspects of anxiety. The current research proposed a moderation model for these variables based on the longstanding nature of the variables (See Figure 2). It was expected that the amount of exposure to traumatic events and anxiety sensitivity related to the fear of the cognitive aspects of anxiety would enhance the relationship between total PTSD symptomatology and suicide behavior. College students with increased exposure to traumatic events and increased anxiety sensitivity related to the fear of the cognitive features of anxiety were predicted to be more susceptible to the relationship between total PTSD symptomatology and suicide behavior. Controlling for comorbid mental disorders (depression, substance abuse, and alcohol abuse), college students who have experienced a greater number of traumatic events and/or have higher levels of anxiety sensitivity related to the fear of the cognitive
Figure 2. Diagram of the moderation model for exposure to traumatic events and anxiety sensitivity. This figure illustrates the moderation model proposed by this research, where amount of exposure to traumatic events and anxiety sensitivity related to the fear of the cognitive features of anxiety moderate the relationship between PTSD symptomatology and suicide behavior.

Aspects of anxiety were hypothesized to be those who have the greatest risk for experiencing suicide behavior in the presence of increased PTSD symptomatology.

Finally, considering the issue of comorbidity and the need to determine the extent to which the predictive relationship between PTSD and suicide behavior is impacted by depression, the current research also examined depressive symptomatology as a moderator of the predictive relationship between total PTSD symptomatology and suicide behavior, using multivariate analyses (See Figure 3). The researchers attempted to determine if the comorbidity between PTSD and depression influences suicide behavior among college students, providing evidence suggesting depressive symptomatology uniquely influences the predictive relationship between total PTSD symptomatology and suicide behavior by strengthening the relationship. Controlling for other comorbid
mental disorders (substance and alcohol abuse), college students with increased depressive symptomatology were hypothesized to be those who have the greatest risk for experiencing suicide behavior in the presence of increased PTSD symptomatology.

**Figure 3.** Diagram of the moderation model for depression. This figure illustrates the mediation model proposed by this research, where depressive symptomatology moderates the relationship between PTSD symptomatology and suicide behavior.
Chapter Two

Method

Participants

Participants in this study included a total of 634 university students (472 women, 162 men) enrolled in undergraduate psychology courses who volunteered to participate in the study in return for research credit or extra credit in their psychology courses. Of these participants, 460 (71.8%) identified themselves as being White/Caucasian American, 99 (15.4%) identified themselves as being Black/African American, 28 (4.4%) identified themselves as being Hispanic/Latino American, 21 (3.3%) identified themselves as being Asian American, and 26 (4.1%) identified themselves as being from other ethnic groups. The mean age of the total number of participants was 20.64 years ($SD = 4.31$).

From the 634 participants in the total college student sample, a subsample of college students who met $DSM-IV-TR$ (2000) 4th ed., text rev. diagnostic criteria for PTSD was created. The subsample of participants who met diagnostic criteria for PTSD was developed based on their report of past traumatic experiences and current PTSD symptoms. The subsample included 97 university students (82 women, 15 men). Of the 97 participants who met criteria for a diagnosis of PTSD, 64 (66.0%) identified themselves as being White/Caucasian American, 25 (25.8%) identified themselves as being Black/African American, 3 (3.1%) identified themselves as being Hispanic/Latino American, 2 (2.1%) identified themselves as being Asian American, and 3 (3.1%) identified themselves as being from other ethnic groups. The mean age of the participants who met diagnostic criteria for PTSD was 20.62 years ($SD = 4.14$).
Materials

One survey was administered to all participants, using PsychData. PsychData is a company that provides an internet-based platform for data collection to researchers (see www.PsychData.com for details on the company, and security issues). Data were collected from an online survey, accessed by participants through an internet address. Data was stored on PsychData’s computer servers. PsychData allowed for a computerized administration of the survey, displaying the self-report items. The use of PsychData permitted a standardized administration of the measures as well as self-pacing through the survey.

The survey was comprised of the following self-report measures on which participants provided a response to a scale: Anxiety Sensitivity Index-Revised-36 (ASI-R-36), Life Events Checklist (LEC), PTSD Checklist-Civilian Version (PCL-C), Impact of Events Scale-Revised (IES-R), Beck Depression Inventory-II (BDI-II), Drug Abuse Screening Test (DAST), Michigan Alcohol Screening Test (MAST), Suicidal Behaviors Questionnaire-Revised (SBQ-R), and a demographics form. Please note the Cronbach’s alpha coefficients reported below for the measures used in the present study were derived using the subsample (n=97) college students who met diagnostic criteria for PTSD.

Anxiety Sensitivity Index-Revised-36. The ASI-R-36 is a 36-item self-report questionnaire designed by Taylor and Cox (1998) to assess the construct of anxiety sensitivity, a person’s fear of anxiety-related symptoms. The ASI-R-36 is proposed to measure an individual’s threatening beliefs about the social, cognitive, and physical consequences of anxiety symptoms (Taylor & Cox, 1998). For the ASI-R-36, participants rate the extent to which each item applies to themselves on a five point
Likert-type scale (0=Very little, 4=Very much) (Taylor & Cox, 1998). A total score, ranging from 0 to 144, is obtained by summing participants’ ratings for each item. (Reiss et al., 1986; Taylor & Cox, 1998). Higher scores indicate greater anxiety sensitivity.

Furthermore, the ASI-R-36 contains six subscales derived from previous factor analytic studies which suggested that these domains may be distinct lower-order factors of anxiety sensitivity: fear of cardiovascular symptoms, fear of respiratory symptoms, fear of publicly observable anxiety reactions, fear of dissociative and neurological symptoms, fear of gastrointestinal symptoms, and fear of cognitive dyscontrol (Taylor & Cox, 1998). These subscales assess fear of the physical, cognitive, and social aspects of anxiety. Subscale scores are obtained by summing participants’ responses to the items that comprise the scale (Taylor & Cox, 1998).

The ASI-R-36 has demonstrated good reliability. The ASI-R-36 has yielded Cronbach’s alpha coefficients for all six subscales ranging from .80 to .91 in a clinical sample and Cronbach’s alpha coefficients for the total scale ranging from .94 to .95 in nonclinical samples, indicating good internal consistency (Deacon, Abramowitz, Woods, & Tolin, 2003; Taylor & Cox, 1998). The ASI-R-36 yielded coefficient alphas for all six subscales ranging from .75 to .89 in this study, and the coefficient alpha obtained for the total scale in this study is .96, suggesting a high level of internal consistency. The ASI-R-36 has demonstrated good psychometric properties in both clinical and nonclinical samples, including content, criterion, and construct validity (Blais et al., 2001; Deacon et al., 2003; Peterson & Reiss, 1993; Reiss et al., 1986; Taylor & Cox, 1998).

**Life Events Checklist.** The LEC is a 17-item self-report survey developed by Blake, Weathers, Nagy, and Kaloupek (1995) to measure exposure to potentially
traumatic life events. It is designed to screen for potentially traumatic events in an individual’s lifetime. The LEC assesses an individual’s previous exposure to 16 potentially traumatic events. For each potentially traumatic event, participants rate their experience of that event on a five point nominal scale (1=Happened to me, 2=Witnessed it, 3=Learned about it, 4=Not sure, and 5=Does not apply). Items that participants endorse as having happened to them personally receive a score of one. All other responses to items receive a score of zero. Item scores are summed to yield a total score, where higher scores indicate greater exposure to potentially traumatic events. In this study, participants with scores of one or higher on the LEC are considered to have experienced a traumatic event, the first criterion for a diagnosis of PTSD.

The LEC has demonstrated good psychometric properties with a nonclinical sample of undergraduate students and a sample of combat veterans. It has showed reasonable test-retest reliability, yielding a mean kappa coefficient of .61 and a retest correlation of .82. for direct exposure items and a lower but acceptable mean kappa coefficient of .41 for indirect exposure items (Gray, Litz, Hsu, & Lombardo, 2004). In addition, the LEC has demonstrated good construct validity, specifically good convergent validity (Gray et al., 2004). The LEC exhibits stability as a screening measure designed to assess exposure to potentially traumatic events and converges with other measure of exposure to traumatic events as well as with measures of psychopathology known to be associated with trauma exposure.

**PTSD Checklist-Civilian Version.** The PTSD Checklist (PCL) is a 17-item self-report measure designed by Weathers, Litz, Herman, Huska, and Keane (1993) to assess symptoms of PTSD in relation to stressful experiences. Items on the PCL correspond to
the PTSD symptoms outlined in the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV)* (*4th* ed., *DSM-IV*; APA, 1994). Three versions of the PCL exist and differ slightly according to the event to which they are anchored and the wording describing the event: PCL-military version (PCL-M), PCL-civilian version (PCL-C), and PCL-specific version (PCL-S). The PCL-C was used in this study. The PCL-C can be used with any population and measures symptoms that may not be specific to just one event, allowing for the assessment of symptoms for individuals who have experienced multiple traumatic events. Participants are asked to rate how often they have been bothered by each symptom in the past month on a five point Likert-type scale (1=Not at all, 2=A little bit, 3=Moderately, 4=Quite a bit, and 5=Extremely).

Participants’ responses to the 17 items can be summed to yield a total symptom severity score, where higher scores indicate a higher presence of PTSD symptoms. A total severity score of 44 or higher is considered to be indicative of the presence of PTSD for the general population. Another way to score the PCL-C is to treat responses of three or higher to items as symptomatic and responses of two or lower as non-symptomatic, and then apply the diagnostic scoring rules to make a diagnosis of PTSD. Participants’ are considered to meet diagnostic criteria for a PTSD diagnosis if they rate at least one item designed to assess Criterion B for PTSD, at least three items designed to assess Criterion C for PTSD, and at least two items designed to assess Criterion D for PTSD as a three or higher. The authors recommend using both scoring procedures to determine if a diagnosis of PTSD can be made. In the current study, both scoring procedures were used to determine which participants meet diagnostic criteria for PTSD based on their report of current PTSD symptoms. It is important to note research has demonstrated the
PCL has good diagnostic utility (Blanchard, Jones-Alexander, Buckley, & Forneris, 1996; Conybeare, Behar, Solomon, Newman, & Borkovac, 2012; Weathers et al., 1993). The PCL has also demonstrated good psychometric properties in clinical, nonclinical, community, and college student samples (Wilkins, Lang, & Norman, 2011). It has good internal consistency, yielding a coefficient alphas ranging from .89 to .96 (Adkins, Weather, McDevitt-Murphy, & Daniels, 2008; Blanchard et al., 1996; Conybeare et al., 2012; Bollinger, Cuevas, Vielhauer, Morgan, & Keane, 2008; Cuevas et al., 2006; Keen Kutter, Niles, & Krinsley, 2008; Ruggerio, Del Ben, Scotti, & Rabalais, 2003; Weathers et al., 1993). The coefficient alpha obtained for the PCL-C in this study is .94, suggesting a high level of internal consistency. Internal consistency coefficients for the items measuring Criterion B, Criterion C, and Criterion D for PTSD have ranged from .85 to .94, .82 to .91, and .80 to .92 respectively (Blanchard et al., 1996; Cuevas et al., 2006; Keen et al., 2008). In this study, the coefficient alphas for the items measuring Criterion B, Criterion C, and Criterion D for PTSD were .89, .88, and .85 respectively. In addition, the PCL has a good test-retest reliability ranging from .66 to .96, depending on the amount of time between administrations (Adkins et al., 2008; Conybeare et al., 2012; Ruggerio et al., 2003). Finally, the PCL has been shown to have good construct validity, including convergent and discriminant validity (Adkins et al., 2008; Bollinger et al., 2008; Conybeare et al., 2012; Cuevas et al., 2006; Keen et al., 2008; Ruggerio et al., 2003). See Wilkins et al. (2011) for a thorough review of studies that examined the psychometric properties of the PCL.

**Impact of Event Scale-Revised.** The IES-R is a 22-item self-report questionnaire developed by Weiss and Marmar (1997) to measure an individual’s
subjective response to traumatic events. Specifically, it assesses PTSD symptoms of hyperarousal (anger, irritability, hypervigilance, difficulty concentrating, strained attention, increased watchfulness, wakefulness, and heightened startle), intrusion (intrusive thoughts, nightmares, intrusive imagery and feelings, and dissociative-like re-experiencing), and avoidance (numbing of responsiveness and avoidance of feelings, situations, or ideas). Participants rate each of the items on a five point Likert-type scale (0=Not at all, 1=A Little Bit, 2=Moderately, 3=Quite A Bit, and 4=Extremely), indicating their subjective distress over the past seven days. A total subjective distress score on the IES-R can be obtained by summing participants’ responses for each item; higher total scores indicate higher levels of subjective distress. In addition, subscale scores can be obtained for the intrusion subscale, avoidance subscale, and hyperarousal subscale by calculating the mean response for the items on each scale. Scores for the subscales can range from zero to four, where higher scores indicate higher levels of distress on that subscale.

The IES-R has demonstrated good psychometric properties. Weiss and Marmar (1997) reported good internal consistency for the three subscales. The three subscales have yielded coefficient alphas ranging from .79 to .92 across different samples, including clinical, nonclinical, college student, and community samples (Creamer, Bell, & Failla, 2003; Vassar, Knaup, Hale, & Hale, 2011; Weiss & Marmar, 1997). In this study, the intrusion, avoidance, and hyperarousal subscales yielded coefficient alphas of .92, .91, and .87, respectively. Additionally, research has shown the IES-R to have good internal consistency overall with the total scale yielding coefficient alphas ranging from .91 to .96 (Adkins et al., 2008; Creamer et al., 2003; Vassar et al., 2011). The coefficient
alpha obtained for the total scale in this study is .96, suggesting a high level of internal consistency. The subscales have yielded adequate reliable test scores as well with reliability coefficient values above .70 (Adkins et al., 2008; Vassar et al., 2011). Also, the IES-R has demonstrated good predictive and construct validity, including convergent and discriminant validity; the scale has been highly correlated with other measures of PTSD symptomatology while lacking significant correlations with measures of depression, generalized anxiety, and social phobia (Adkins et al., 2008; Creamer et al., 2003; Vassar et al., 2011).

**Beck Depression Inventory-II.** The BDI-II is a self-report instrument developed by Beck, Steer, and Brown (1996) to measure the severity of depressive symptoms in adults; it assesses symptoms of depression as defined by the *DSM-IV* (1994) 4th ed. (4th ed., *DSM-IV*; APA, 1994). This inventory contains 21 items, most of which assess depressive symptoms on a four point rating scale from zero to three (Beck et al., 1996). For this inventory, people are asked to report feelings consistent with their own over the past two weeks; the ratings for each item are summed to obtain a total score, where possible inventory scores range from 0 to 63 (Beck et al., 1996). Clinical interpretation of total scores is accomplished through criterion referenced procedures utilizing the following interpretive ranges: 0 to 13-minimal depression, 14 to 19-mild depression, 20 to 28-moderate depression, and 29 to 63-severe depression (Beck et al., 1996).

The BDI-II has demonstrated good reliability, yielding a coefficient alpha of .92 for an outpatient sample referred to in the manual and a coefficient alpha of .93 for a sample of college students (Beck et al., 1996). Other studies using clinical and nonclinical samples have reported internal consistency coefficient alphas of .91 or higher.
The coefficient alpha obtained for the BDI-II in this study is .94, suggesting a high level of internal consistency. The BDI-II has demonstrated other good psychometric properties, including construct and criterion validity, in both clinical and nonclinical samples (Arnau, Meagher, Norris, & Bramson, 2001; Beck et al., 1996; Beck, Steer, Ball, & Ranieri, 1996; Beck, Steer, & Garbin, 1988; Dozois et al., 1998; Hewitt & Norton, 1993; Sprinkle et al., 2002).

**Drug Abuse Screening Test.** The DAST is a 28-item self-report measure designed by Skinner (1982) to screen for problematic substance use and substance abuse problems. It assesses drug use over the past 12 months and yields a quantitative index of problems associated with drug use (Cocco & Carey, 1998). Participants respond to each item in a yes/no format; they endorse “yes” if the item applies to them and “no” if the item does not apply to them (Skinner, 1982). A majority of the items are scored by assigning one point for each “yes” response; however, there are three items keyed to receive a point for a “no” response (Skinner, 1982). Total scores are obtained by summing the points earned for each of the 28 responses and can range from 0 to 28; a score of six or higher is suggested as a cutoff score indicative of drug abuse or dependence (Skinner, 1982). Taylor, James, Bobadilla, and Reeves (2008) recently investigated the effectiveness of the DAST as a screening measure for drug use disorder in a college student sample. Their analyses revealed the DAST is a good measure for detecting drug abuse and dependence and indicated the recommended cutoff score of six produces a reasonable diagnostic efficiency for drug abuse and dependence (Taylor et al., 2008). However, their results suggested that raising the cutoff score to eight is a highly
effective means of detecting drug abuse and significantly increased the chances of identifying drug dependence among college students (Taylor et al., 2008).

The DAST has demonstrated good reliability, yielding Cronbach’s alpha coefficients ranging from .92 to .94 in a variety of clinical and nonclinical samples (El-Bassel et al., 1997; McCann, Simpson, Ries, & Rot-Byrne, 2000; Skinner, 1982; Staley & El-Guebaly, 1990; Yudko, Lozhkina, & Fouts, 2007). The coefficient alpha obtained for the DAST in this study is .81, suggesting a high level of internal consistency. El-Bassel et al. (1997) also reported a test-retest correlation of .85 for the DAST in a nonclinical sample. Furthermore, the DAST has exhibited other good psychometric properties in a variety of clinical and nonclinical samples, including face validity, criterion validity, convergent validity, and construct validity, (Achenbach, Krukowski, Dumenci, & Ivanova, 2005; Cocco & Carey, 1998; El-Bassel et al., 1997; Gavin, Ross, & Skinner, 1989; McCann et al., 2000; Skinner, 1982; Staley & El-Guebaly, 1990).

**Michigan Alcohol Screening Test.** The MAST is a 24-item self-report questionnaire designed by Selzer (1971) to assess drinking behaviors and the severity of alcohol related problems, such as alcohol abuse and dependence. The MAST is a widely used clinical assessment tool (Dawe, Loxton, Hides, Kavanaugh, & Mattick, 2002; Laux, Newman, & Brown, 2004; Magruder-Habib, Stevens, and Alling, 1993; Teitelbaum and Mullen, 2000). It has been administered to numerous different clinical and nonclinical subject groups (Hedlund & Vieweg, 1984). Moreover, research has shown that it is effective in identifying problem drinkers in the college student population (Silber, Capon, & Kuperschmit, 1985).
The questions on the MAST require a forced-choice response from participants, where participants indicate “yes” or “no” to each item (Selzer, 1971). Each item is assigned a score of zero, one, two, or five based on the direction in which a participant responds, and a total score is obtained by summing each of the items scores (Selzer, 1971). Total scores on the MAST can range from 0 to 53 and can fall within three scoring categories: zero to three-no alcohol problems or nonalcoholic, four-suggests presence of alcohol problems or suggestive of alcoholism, and 5 to 53-indicates alcoholism (Selzer, 1971). A cutoff score of five or above was established to identify problem drinking (Selzer, 1971).

The MAST has demonstrated high internal consistency with Cronbach’s alpha coefficients ranging from .83 to .95 in a variety of clinical and nonclinical samples, suggesting the scale has good reliability (Hedlund & Vieweg, 1984; Mischke & Venneri, 1987; Selzer, 1971; Skinner, 1979; Skinner & Sheu, 1982; Zung, 1979; Zung, 1982; Zung and Ross, 1980). The coefficient alpha obtained for the MAST in this study is .69, suggesting an adequate level of internal consistency. The MAST has shown other good psychometric properties, including face validity, criterion validity, and construct validity, in a variety of clinical and nonclinical samples (Friedrich & Loftsgard, 1978; Jacobson, 1976; Magruder-Habib, Harris, & Fraker, 1982; McAuley, Longabough, & Gross, 1978; Mischke & Venneri, 1987; Moore, 1971; Moore, 1972; Ross, Gavin, & Skinner, 1990; Selzer, 1971; Selzer, Vinokur, & vonRooijen, 1975; Skinner, 1979; Zung, 1982; Zung & Ross, 1980).

**Suicide Behavior Questionnaire-Revised.** The SBQ-R is a 4-item self-report measure designed by Osman et al. (2001) that taps four different dimensions of
suicidality. The items on the SBQ-R measure lifetime suicidal ideation and suicide attempts, the frequency of suicidal ideation over the past 12 months, the threat of suicidal behavior, and the self-reported likelihood of suicidal behavior. Participants respond to items one, two, and three on a five point scale, and they respond to item four on a seven point scale. A total score for the SBQ-R is obtained by summing participants’ ratings on each of the items; total scores can range from 3 to 18 with higher scores indicating greater suicide behavior (Osman et al., 2001).

The SBQ-R has demonstrated adequate to moderately high internal consistency, yielding a Cronbach’s alpha coefficient of .87 in an adult psychiatric inpatient sample and a Cronbach’s alpha of .76 in an undergraduate college student sample (Osman et al., 2001). The coefficient alpha obtained for the SBQ-R in this study is .83, suggesting good internal consistency. This indicates that the measure has good reliability. Furthermore, the SBQ-R has shown good psychometric properties, including construct validity and criterion validity, in both clinical and nonclinical samples (Osman et al., 2001).

**Demographics Measure.** The demographics measure requires participants to report their age, gender, and ethnicity.

**Procedure**

Participants completed the online survey on one occasion in an individual setting. The completion of the survey measure required approximately 60 to 90 minutes. Participants were not permitted to participate in the study until they read and signed the provided consent form. After a participant consented to complete the research study, he or she was presented with the survey. Participants were asked to complete the ASI-R-36,
LEC, PCL-C, IES-R, BDI-II, DAST, MAST, and SBQ-R. In addition, participants reported demographic information.

Upon completion of the study measures, a debriefing screen was shown to all participants before they signed out of the online study session. The debriefing included information about suicide, trauma, and the predictive relationship between PTSD and suicide behavior; an explanation of how the study was designed to assess different predictors of suicide behavior and different moderators and of the predictive relationship between PTSD and suicide behavior; the possible implications of identifying different facets of anxiety as moderators of the relationship between PTSD and suicide behavior; and contact information for support services in the event participants needed to seek mental health services.
Chapter Three

Results

Prevalence of PTSD and Trauma among the Total Sample

Of the 634 participants in the total college student sample, 97 participants (15.3%) met diagnostic criteria for PTSD according to the scoring procedures for the PCL-C. Of the 97 participants who met diagnostic criteria for PTSD, 14 (14.4%) participants reported experiencing only one traumatic event, 15 (15.5%) participants reported experiencing two traumatic events, 26 (26.8%) participants reported experiencing three traumatic events, 12 (12.4%) participants reported experiencing four traumatic events, 12 (12.4%) participants reported experiencing five traumatic events, and 18 (18.5%) participants reported experiencing six or more traumatic events. The most commonly reported traumatic events among the subsample of college student who met diagnostic criteria for PTSD included directly experiencing a transportation accident ($n=52$, 53.6%); sudden, unexpected death of someone close to you ($n=39$, 40.2%); and other unwanted or uncomfortable sexual experience ($n=38$, 39.2%); a physical assault ($n=32$, 33.0%); a serious accident at home, work, or during recreational activity ($n=22$, 22.7%); a sexual assault ($n=24$, 24.7%). It should be acknowledged the subsample was comprised of significantly more women ($n=82$) than men ($n=15$). In addition, compared to the percentage of women and men in the total sample, the percentage of women (84.5%) in the subsample is higher than the percentage of women (74.4%) in the total sample; additionally, the percentage of men (15.5%) in the subsample is lower than the percentage of men (25.6%) in the total sample. These findings suggest more women than men in the total sample ($N=634$) are reporting high levels of PTSD symptomatology.
This is to be expected, given previous research indicates women are at a greater risk for developing PTSD following exposure to a traumatic event. Specifically, women experience a lifetime prevalence rate of PTSD that is twice that of men, indicating women are twice as likely as men to develop PTSD following exposure to a traumatic event (Breslau et al., 1998; Kessler et al., 1995; Oquendo et al., 2003).

**Prevalence of PTSD and Depressive Symptomatology among the Total Sample**

As a result of there being such a high comorbidity between PTSD and depression, it was determined how many college students in the total sample fell into each of the following symptomatology classification categories: individuals without PTSD or depressive symptomatology, individuals with PTSD symptomatology only, individuals with depressive symptomatology only, and individuals with both PTSD and depressive symptomatology. Of the 634 college student participants, 435 (68.6%) denied experiencing significant PTSD and depressive symptomatology, 30 (4.7%) endorsed experiencing significant PTSD symptomatology only, 102 (16.1%) endorsed experiencing significant depressive symptomatology only, and 67 (10.6%) endorsed experiencing significant PTSD and depressive symptomatology. An individual was determined to be experiencing significant depressive symptomatology if he or she reported experiencing moderate to severe depression on BDI-II. An individual was determined to be experiencing significant PTSD symptomatology if he or she met diagnostic criteria for PTSD according to the previously outlined scoring procedures for the PCL-C.
Prevalence of Suicide Behavior among the Total Sample

Of the 634 participants in the total sample, 568 participants (89.6%) denied having ever made a suicide attempt, while 66 participants (10.4%) reported having made at least one suicide attempt in their lifetime. Of the 66 participants who reported having made a suicide attempt, 40 (60.6%) participants indicated they have only made one suicide attempt, 19 (28.8%) participants indicated they have made two suicide attempts, and seven (10.6%) participants indicated they have made three or more suicide attempts in their lifetime. Participants also reported whether or not they experienced suicidal ideation in the past year. Of the 634 participants in the total sample, 365 participants (57.6%) reported never having thought about committing suicide in the past year, while 269 participants (42.4%) indicated they have thought about committing suicide in the past year.

Prevalence of Suicide Behavior among the Subsample of College Students Who Met Diagnostic Criteria for PTSD

Of the 97 participants in the subsample who met diagnostic criteria for PTSD, 75 participants (77.3%) denied having ever made a suicide attempt, while 22 participants (22.6%) reported having made at least one suicide attempt in their lifetime. Of the 22 participants who reported having made a suicide attempt, 14 (63.6%) participants indicated they have only made one suicide attempt, four (18.2%) participants indicated they have made two suicide attempts, and four (18.2%) participants indicated they have made three or more suicide attempts in their lifetime.

Of the 97 participants in the subsample who met diagnostic criteria for PTSD, 45 participants (46.4%) reported never having thought about committing suicide in the past
year, while 52 participants (53.6%) indicated they have thought about committing suicide in the past year. Of the 52 participants who met diagnostic criteria for PTSD and reported experiencing suicidal ideation, 16 participants (30.8%) reported they rarely (approximately one time) thought about killing themselves in the past year, 17 participants (32.7%) reported they sometimes (approximately two times) thought about killing themselves in the past year, eight participants (15.4%) reported they thought about killing themselves in the past year often (approximately three to four times), and 11 participants (21.1%) reported they thought about killing themselves in the past year very often (approximately five or more times).

Descriptives and Correlations

Descriptive statistics for the total sample \((N=634)\) and subsample \((n=97)\) were computed. The means and standard deviations for the study variables for the total sample of college student participants \((N=634)\) and subsample \((n=97)\) of college student participants who met diagnostic criteria for PTSD are presented in Table 1. The means and standard deviations obtained using the total sample \((N=634)\) are consistent with those obtained in other non-clinical samples of college students (Adkins et al., 2008; Baker, Prevatt, and Proctor, 2011; Conybeare et al., 2012; Creamer et al., 2003; Deacon et al., 2003; Hirsch & Barton, 2011; Walker, Wingate, Obasi, & Joiner, 2008). For the subsample \((n=97)\), compared to means reported for non-clinical college student samples in previous research, where participants were not determined to meet diagnostic criteria for PTSD, the means for following variables in the subsample of this study are somewhat elevated: PTSD symptomatology, depressive symptomatology, and anxiety sensitivity (Adkins et al., 2008; Conybeare et al., 2012; Creamer et al., 2003; Walker et al., 2008).
However, it is to be expected that individuals who meet diagnostic criteria for PTSD will report higher levels of PTSD symptomatology, depressive symptomatology, and anxiety sensitivity, given the comorbidity between PTSD and depression and the significant association between anxiety sensitivity and PTSD (4th ed., text rev.; DSM-IV-TR; APA, 2000; Blaney & Millon, 2009; Lepine, 2002; Taylor, 1995; Taylor, 1996; Taylor, Koch, & McNally, 1992).

Pearson correlation analyses were conducted among study variables for the total sample (N=634) and the subsample (n=97) of college student participants who met diagnostic criteria for PTSD, and the results are presented in Tables 2 and 3. It should be noted depressive and PTSD symptomatology were most strongly correlated with suicide behavior, where increased depressive and PTSD symptomatology were significantly associated with increased suicide behavior for both the total sample (N=634) and subsample (n=97) of college student participants who met diagnostic criteria for PTSD.

The researchers examined whether or not there were mean differences in suicide behavior based on gender and race for the participants in the total sample (N=634) and subsample (n=97) of college student participants who met diagnostic criteria for PTSD. No gender or race differences in suicide behavior were found. Therefore, the researchers did not control for gender or race in the multivariate analyses.
Table 1

*Descriptive Statistics for the Subsample of College Students Who Met Diagnostic Criteria for PTSD (n=97) and the Total Sample of College Students (N=634)*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Subsample (n=97)</th>
<th>Total Sample (N=634)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>LEC Total</td>
<td>3.66</td>
<td>2.02</td>
</tr>
<tr>
<td>ASI-R-36 Total</td>
<td>51.84</td>
<td>26.98</td>
</tr>
<tr>
<td>ASI-R-36 Cog Dys</td>
<td>6.74</td>
<td>4.92</td>
</tr>
<tr>
<td>IES-R Total</td>
<td>45.03</td>
<td>15.10</td>
</tr>
<tr>
<td>IES-R Intrusion</td>
<td>2.09</td>
<td>0.80</td>
</tr>
<tr>
<td>IES-R Avoidance</td>
<td>2.10</td>
<td>0.74</td>
</tr>
<tr>
<td>IES-R Hyperarousal</td>
<td>1.93</td>
<td>0.78</td>
</tr>
<tr>
<td>PCL-C Total</td>
<td>56.36</td>
<td>9.99</td>
</tr>
<tr>
<td>BDI-II Total</td>
<td>19.11</td>
<td>11.33</td>
</tr>
<tr>
<td>MAST Total</td>
<td>2.38</td>
<td>2.08</td>
</tr>
<tr>
<td>DAST Total</td>
<td>2.06</td>
<td>1.89</td>
</tr>
<tr>
<td>SBQ-R Total</td>
<td>6.64</td>
<td>3.75</td>
</tr>
</tbody>
</table>

*Note.* LEC Total=Life Events Checklist Total Score; ASI-R-36 Total=Anxiety Sensitivity Index-Revised-36 Total Score; ASI-R-36 Cog Dys=Anxiety Sensitivity Index-Revised-36 Cognitive Dyscontrol Subscale Score; IES-R Total=Impact of Events Scale-Revised Total Score; IES-R Intrusion=Impact of Events Scale-Revised Intrusion Subscale Score; IES-R Avoidance=Impact of Events Scale-Revised Avoidance Subscale Score; IES-R Hyperarousal=Impact of Events Scale-Revised Hyperarousal Subscale Score; PCL-C Total=PTSD Checklist-Civilian Version Total Score; BDI-II=Beck Depression Inventory-II Total Score; MAST Total=Michigan Alcohol Screening Test Total Score; DAST Total=Drug Abuse Screening Test Total Score; SBQ-R Total=Suicide Behavior Questionnaire-Revised Total Score.
Table 2

Correlations for the Total Sample (N = 634)

<table>
<thead>
<tr>
<th>Variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. LEC Total</td>
<td>----</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>2. ASI-R-36 Total</td>
<td>0.22**</td>
<td>----</td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>3. ASI-R-36-CD</td>
<td>0.22**</td>
<td>0.82**</td>
<td>----</td>
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</tr>
<tr>
<td>4. IES-R Total</td>
<td>0.34**</td>
<td>0.54**</td>
<td>0.54**</td>
<td>----</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>5. IES-R-I</td>
<td>0.32**</td>
<td>0.49**</td>
<td>0.49**</td>
<td>0.96**</td>
<td>----</td>
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</tr>
<tr>
<td>6. IES-R-A</td>
<td>0.33**</td>
<td>0.50**</td>
<td>0.49**</td>
<td>0.94**</td>
<td>0.85**</td>
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</tr>
<tr>
<td>7. IES-R-H</td>
<td>0.32**</td>
<td>0.55**</td>
<td>0.54**</td>
<td>0.92**</td>
<td>0.86**</td>
<td>0.78**</td>
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</tr>
<tr>
<td>8. PCL-C Total</td>
<td>0.34**</td>
<td>0.57**</td>
<td>0.58**</td>
<td>0.83**</td>
<td>0.79**</td>
<td>0.76**</td>
<td>0.82**</td>
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<td></td>
</tr>
<tr>
<td>9. BDI-II Total</td>
<td>0.31**</td>
<td>0.39**</td>
<td>0.41**</td>
<td>0.49**</td>
<td>0.47**</td>
<td>0.43**</td>
<td>0.51**</td>
<td>0.58**</td>
<td>----</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. MAST Total</td>
<td>0.22**</td>
<td>0.19**</td>
<td>0.20**</td>
<td>0.22**</td>
<td>0.20**</td>
<td>0.18**</td>
<td>0.25**</td>
<td>0.28**</td>
<td>0.21**</td>
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</tr>
<tr>
<td>11. DAST Total</td>
<td>0.12**</td>
<td>0.20**</td>
<td>0.26**</td>
<td>0.20**</td>
<td>0.18**</td>
<td>0.17**</td>
<td>0.22**</td>
<td>0.22**</td>
<td>0.18**</td>
<td>0.54**</td>
<td>----</td>
<td></td>
</tr>
<tr>
<td>12. SBQ-R Total</td>
<td>0.29**</td>
<td>0.32**</td>
<td>0.34**</td>
<td>0.35**</td>
<td>0.33**</td>
<td>0.30**</td>
<td>0.36**</td>
<td>0.43**</td>
<td>0.60**</td>
<td>0.21**</td>
<td>0.20**</td>
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</tr>
</tbody>
</table>

** p<.01 (two-tailed)    *   p<.05 (two-tailed)

Note. LEC Total=Life Events Checklist Total Score; ASI-R-36 Total=Anxiety Sensitivity Index-Revised-36 Total Score; ASI-R-36 CD=Anxiety Sensitivity Index-Revised-36 Cognitive Dyscontrol Subscale Score; IES-R Total=Impact of Events Scale-Revised Total Score; IES-R-I=Impact of Events Scale-Revised Intrusion Subscale Score; IES-R-A=Impact of Events Scale-Revised Avoidance Subscale Score; IES-R-H=Impact of Events Scale-Revised Hyperarousal Subscale Score; PCL-C Total=PTSD Checklist-Civilian Version Total Score; BDI-II=Beck Depression Inventory-II Total Score; MAST Total=Michigan Alcohol Screening Test Total Score; DAST Total=Drug Abuse Screening Test Total Score; SBQ-R Total=Suicide Behavior Questionnaire-Revised Total Score.
### Table 3

**Correlations for the Subsample (n=97) of College Student Participants Who Met Diagnostic Criteria for PTSD**

<table>
<thead>
<tr>
<th>Variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
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<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. LEC Total</td>
<td>----</td>
<td></td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>6. ASI-R-36 Total</td>
<td>0.15</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>7. ASI-R-36-CDS</td>
<td>0.17</td>
<td>0.80**</td>
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<td></td>
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</tr>
<tr>
<td>8. IES-R Total</td>
<td>0.40**</td>
<td>0.36**</td>
<td>0.26*</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>5. IES-R-I</td>
<td>0.36**</td>
<td>0.26*</td>
<td>0.23*</td>
<td>0.91**</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>6. IES-R-A</td>
<td>0.35**</td>
<td>0.37**</td>
<td>0.19</td>
<td>0.88**</td>
<td>0.69**</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>7. IES-R-H</td>
<td>0.33**</td>
<td>0.33**</td>
<td>0.27**</td>
<td>0.85**</td>
<td>0.70**</td>
<td>0.62**</td>
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<td></td>
</tr>
<tr>
<td>8. PCL-C Total</td>
<td>0.23*</td>
<td>0.34**</td>
<td>0.37**</td>
<td>0.59**</td>
<td>0.52**</td>
<td>0.47**</td>
<td>0.59**</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>9. BDI-II Total</td>
<td>0.34**</td>
<td>0.27**</td>
<td>0.39**</td>
<td>0.32**</td>
<td>0.33**</td>
<td>0.20*</td>
<td>0.33**</td>
<td>0.46**</td>
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<tr>
<td>10. MAST Total</td>
<td>0.14</td>
<td>0.11</td>
<td>0.17</td>
<td>0.23*</td>
<td>0.20*</td>
<td>0.16</td>
<td>0.27**</td>
<td>0.24*</td>
<td>0.20</td>
<td></td>
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</tr>
<tr>
<td>11. DAST Total</td>
<td>0.14</td>
<td>0.27**</td>
<td>0.34**</td>
<td>0.22*</td>
<td>0.19</td>
<td>0.12</td>
<td>0.30**</td>
<td>0.19</td>
<td>0.23*</td>
<td>0.30**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. SBQ-R Total</td>
<td>0.20</td>
<td>0.24*</td>
<td>0.30**</td>
<td>0.24*</td>
<td>0.20</td>
<td>0.16</td>
<td>0.28**</td>
<td>0.43**</td>
<td>0.64**</td>
<td>0.08</td>
<td>0.20</td>
<td></td>
</tr>
</tbody>
</table>

*p<.01 (two-tailed)   * p<.05 (two-tailed)

**Note.** LEC Total=Life Events Checklist Total Score; ASI-R-36 Total=Anxiety Sensitivity Index-Revised-36 Total Score; ASI-R-36 CD=Anxiety Sensitivity Index-Revised-36 Cognitive Dyscontrol Subscale Score; IES-R Total=Impact of Events Scale-Revised Total Score; IES-R-I=Impact of Events Scale-Revised Intrusion Subscale Score; IES-R-A=Impact of Events Scale-Revised Avoidance Subscale Score; IES-R-H=Impact of Events Scale-Revised Hyperarousal Subscale Score; PCL-C Total=PTSD Checklist-Civilian Version Total Score; BDI-II=Beck Depression Inventory-II Total Score; MAST Total=Michigan Alcohol Screening Test Total Score; DAST Total=Drug Abuse Screening Test Total Score; SBQ-R Total=Suicide Behavior Questionnaire-Revised Total Score.
Differences between Participants in the Subsample Who Have Made a Suicide Attempt and Participants Who Have Not Made a Suicide Attempt

The researchers compared the means for each of the study variables to determine if there were important significant mean differences between those in the subsample \((n=97)\) of college students who met diagnostic criteria for PTSD and have made a suicide attempt and those who met diagnostic criteria for PTSD and have not made a suicide attempt. Independent samples t-tests revealed significant for the following variables: the amount of exposure to traumatic events, anxiety sensitivity related to the cognitive features of anxiety, avoidance symptoms of PTSD, hyperarousal symptoms of PTSD, PTSD symptomatology, depressive symptomatology, and suicide behavior. See Table 4 for the results of the analyses comparing the means between suicide attempters and non-suicide attempters. Participants in the subsample who have made a suicide attempt reported greater exposure to traumatic events, anxiety sensitivity related to the cognitive features of anxiety, avoidance symptoms of PTSD, hyperarousal symptoms of PTSD, PTSD symptomatology, depressive symptomatology, and suicide behavior than participants who have not made a suicide attempts.
Table 4

Results for Analyses Examining Mean Differences between College Students Who Had a History of Suicide Attempts and College Students Who Had No History of Suicide Attempts in the Subsample of Participants Who Met Diagnostic Criteria for PTSD

<table>
<thead>
<tr>
<th></th>
<th>Previous Attempt (n=22)</th>
<th>No Previous Attempt (n=75)</th>
<th>t</th>
<th>p (two-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEC</td>
<td>4.55 (1.92)</td>
<td>3.43 (1.98)</td>
<td>-2.33</td>
<td>0.02*</td>
</tr>
<tr>
<td>ASI-R-36</td>
<td>65.91 (30.65)</td>
<td>48.30 (24.15)</td>
<td>-2.82</td>
<td>0.006**</td>
</tr>
<tr>
<td>ASI-R-36-Cog-Dys</td>
<td>9.27 (6.42)</td>
<td>6.08 (4.13)</td>
<td>-2.78</td>
<td>0.007**</td>
</tr>
<tr>
<td>IES-R</td>
<td>51.86 (12.59)</td>
<td>43.61 (14.50)</td>
<td>-2.41</td>
<td>0.02*</td>
</tr>
<tr>
<td>IES-R Intrusion</td>
<td>2.30 (0.79)</td>
<td>2.05 (0.77)</td>
<td>-1.33</td>
<td>0.19</td>
</tr>
<tr>
<td>IES-R Avoidance</td>
<td>2.44 (0.64)</td>
<td>2.02 (0.72)</td>
<td>-2.44</td>
<td>0.02*</td>
</tr>
<tr>
<td>IES-R Hyperarousal</td>
<td>2.33 (0.74)</td>
<td>1.84 (0.73)</td>
<td>-2.74</td>
<td>0.01**</td>
</tr>
<tr>
<td>PCL-C</td>
<td>54.99 (10.66)</td>
<td>62.73 (8.02)</td>
<td>-3.67</td>
<td>&lt;0.001***</td>
</tr>
<tr>
<td>BDI-II</td>
<td>28.59 (11.44)</td>
<td>16.55 (9.62)</td>
<td>-4.93</td>
<td>&lt;0.001***</td>
</tr>
<tr>
<td>MAST</td>
<td>2.82 (2.65)</td>
<td>2.28 (1.88)</td>
<td>-1.06</td>
<td>0.29</td>
</tr>
<tr>
<td>DAST</td>
<td>2.36 (2.24)</td>
<td>1.96 (1.79)</td>
<td>-0.89</td>
<td>0.38</td>
</tr>
<tr>
<td>SBQ-R</td>
<td>10.86 (3.38)</td>
<td>5.43 (2.85)</td>
<td>-7.51</td>
<td>&lt;0.001***</td>
</tr>
</tbody>
</table>

* p ≤ 0.05      ** p ≤ 0.01      *** p ≤ 0.001

Note. Significance levels are based on two-tailed tests. LEC=Life Events Checklist Total Score; ASI-R-36=Anxiety Sensitivity Index-Revised-36 Total Score; ASI-R-36 Cog Dys=Anxiety Sensitivity Index-Revised-36 Cognitive Dyscontrol Subscale; IES-R=Impact of Event Scale-Revised Total Score; IES-R Intrusion=Impact of Events Scale-Revised Intrusion Subscale Score; IES-R Avoidance=Impact of Events Scale-Revised Avoidance Subscale Score; IES-R Hyperarousal=Impact of Events Scale-Revised Hyperarousal Subscale Score; PCL-C=PTSD Checklist-Civilian Version Total Score; BDI-II=Beck Depression Inventory-II Total Score; MAST=Michigan Alcohol Screening Test Total Score; DAST=Drug Abuse Screening Test; SBQ-R=Suicide Behavior Questionnaire-Revised Total Score.

Regression Analysis Examining Intrusive, Avoidance, and Hyperarousal Symptoms as Predictors of Suicide Behavior

A hierarchical regression analysis was conducted to determine which of the following subset(s) of PTSD symptoms best predict suicide behavior among the subsample (n=97) of college students who met diagnostic criteria for PTSD: intrusive symptoms of PTSD, avoidance symptoms of PTSD, or hyperarousal symptoms of PTSD.
Depressive symptomatology, alcohol abuse, and substance abuse were controlled for in this analysis. The results are presented in Table 5. For those participants who met diagnostic criteria for a PTSD, neither intrusive, avoidance, nor hyperarousal symptoms of PTSD had a significant influence on suicide behavior. However, although none of the subsets of PTSD symptoms appeared to be significant predictors of suicide behavior, the results indicated, of the three subsets of PTSD symptoms, hyperarousal symptoms of PTSD ($\beta=0.14$, $t=1.19$, $p=0.24$) account for most of the variance in suicide behavior compared to the intrusive ($\beta=-0.13$, $t=-1.05$, $p=0.30$) and avoidance ($\beta=0.04$, $t=0.35$, $p=0.73$) symptoms of PTSD. This suggests, of the three subsets of PTSD symptoms, hyperarousal symptoms of PTSD were the most strongly related to and predictive of, although not significantly predictive of, suicide behavior among the subsample ($n=97$) of college students who met diagnostic criteria for PTSD. It should be noted depressive symptomatology, a control variable, was significantly predictive of suicide behavior in the hierarchical regression analysis conducted.
Table 5

Results of a Multiple Regression Analysis Testing Intrusive, Avoidance, and Hyperarousal Symptoms of PTSD as Predictors of Suicide Behavior in the Subsample (n=97) of Participants Who Met Diagnostic Criteria for PTSD

<table>
<thead>
<tr>
<th>Variable</th>
<th>Standardized Beta</th>
<th>t</th>
<th>p (two-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BDI-II</td>
<td>0.64</td>
<td>7.80</td>
<td>&lt;0.001***</td>
</tr>
<tr>
<td>MAST</td>
<td>-0.07</td>
<td>-0.79</td>
<td>0.43</td>
</tr>
<tr>
<td>DAST</td>
<td>0.08</td>
<td>0.91</td>
<td>0.37</td>
</tr>
<tr>
<td><strong>R² = 0.42</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Step 2</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BDI-II</td>
<td>0.63</td>
<td>7.31</td>
<td>&lt;0.001***</td>
</tr>
<tr>
<td>MAST</td>
<td>-0.08</td>
<td>-0.92</td>
<td>0.36</td>
</tr>
<tr>
<td>DAST</td>
<td>0.06</td>
<td>0.68</td>
<td>0.50</td>
</tr>
<tr>
<td>IES-R Intrusion</td>
<td>-0.13</td>
<td>-1.05</td>
<td>0.30</td>
</tr>
<tr>
<td>IES-R Avoidance</td>
<td>0.04</td>
<td>0.35</td>
<td>0.73</td>
</tr>
<tr>
<td>IES-R Hyperarousal</td>
<td>0.14</td>
<td>1.19</td>
<td>0.24</td>
</tr>
<tr>
<td><strong>R² = 0.43</strong></td>
<td></td>
<td></td>
<td>ΔR² = 0.01</td>
</tr>
<tr>
<td><strong>ΔR² = 0.01</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* p ≤ 0.05   ** p ≤ 0.01   *** p ≤ 0.001

Suicide Behavior = SBQ-R = Dependent Variable

Note. IES-R Intrusion=Impact of Events Scale-Revised Intrusion Subscale Score; IES-R Avoidance=Impact of Events Scale-Revised Avoidance Subscale Score; IES-R Hyperarousal=Impact of Events Scale-Revised Hyperarousal Subscale Score; BDI-II=Beck Depression Inventory-II Total Score; MAST=Michigan Alcohol Screening Test Total Score; DAST=Drug Abuse Screening Test Total Score; SBQ-R=Suicide Behavior Questionnaire-Revised Total Score.
**Moderation Analyses**

To test the moderation hypotheses, hierarchical multiple regression analyses were conducted to assess whether the amount of exposure to traumatic events, anxiety sensitivity related to fear of the cognitive features of anxiety, and depressive symptomatology moderate the relationship between total PTSD symptomatology and suicide behavior. According to Baron and Kenny (1986), three causal pathways are considered in moderation analyses. First, the impact of the predictor variable (total PTSD symptomatology) on the outcome variable (suicide behavior) is examined. Second, the impact of the presumed moderators (amount of exposure to traumatic events, anxiety sensitivity related to fear of the cognitive features of anxiety, and depressive symptomatology) on the outcome variable (suicide behavior) is tested. Third, the impact of the interaction, or the product of the predictor variable (total PTSD symptomatology) and presumed moderator (amount of exposure to traumatic events, anxiety sensitivity related to fear of the cognitive features of anxiety, or depressive symptomatology), on the outcome variable (suicide behavior) is examined. Moderation exists when the interaction significantly relates to the outcome variable. There could be main effects for the predictor variable and moderator, but the main effects are not relevant to testing the moderator hypothesis.

**The influence of exposure to traumatic events on the relationship between PTSD and suicide behavior.** The moderation hypothesis suggesting the amount of exposure to traumatic events (the number of traumatic events experienced) strengthens the relationship between total PTSD symptomatology and suicide behavior was examined among the subsample (n=97) of college students who met diagnostic criteria for PTSD,
controlling for depressive symptomatology as well as substance and alcohol abuse. The results of the hierarchical regression analyses are presented in Table 6. They demonstrated there was a significant main effect of total PTSD symptomatology, suggesting total PTSD symptomatology is a significant independent predictor of suicide behavior. However, there was not a significant main effect of amount of exposure to traumatic events. In addition, the results showed that the two-way interaction between total PTSD symptomatology and the amount of exposure to traumatic events was not significant, indicating the amount of exposure to traumatic events did not moderate the relationship between total PTSD symptomatology and suicide behavior. The control variable of depressive symptomatology was a significant independent predictor of suicide behavior in this moderation analysis.
Table 6

*Results of a Multiple Regression Analysis Testing Amount of Exposure to Trauma as a Moderator of the Relationship between Total PTSD Symptomatology and Suicide Behavior in the Subsample (n=97) of Participants Who Met Diagnostic Criteria for PTSD*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Standardized Beta</th>
<th>t</th>
<th>p (two-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BDI-II</td>
<td>0.64</td>
<td>7.80</td>
<td>&lt;0.001***</td>
</tr>
<tr>
<td>MAST</td>
<td>-0.07</td>
<td>-0.79</td>
<td>0.43</td>
</tr>
<tr>
<td>DAST</td>
<td>0.08</td>
<td>0.91</td>
<td>0.37</td>
</tr>
<tr>
<td><em>R² = 0.42</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Step 2</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BDI-II</td>
<td>0.57</td>
<td>6.20</td>
<td>&lt;0.001***</td>
</tr>
<tr>
<td>MAST</td>
<td>-0.09</td>
<td>-1.07</td>
<td>0.29</td>
</tr>
<tr>
<td>DAST</td>
<td>0.07</td>
<td>0.81</td>
<td>0.42</td>
</tr>
<tr>
<td>PCL-C</td>
<td>0.19</td>
<td>2.08</td>
<td>0.04*</td>
</tr>
<tr>
<td>LEC</td>
<td>-0.03</td>
<td>-0.39</td>
<td>0.70</td>
</tr>
<tr>
<td><em>R² = 0.45, ΔR² = 0.03</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Step 3</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BDI-II</td>
<td>0.57</td>
<td>6.16</td>
<td>&lt;0.001***</td>
</tr>
<tr>
<td>MAST</td>
<td>-0.09</td>
<td>-1.07</td>
<td>0.29</td>
</tr>
<tr>
<td>DAST</td>
<td>0.07</td>
<td>0.76</td>
<td>0.45</td>
</tr>
<tr>
<td>PCL-C</td>
<td>0.18</td>
<td>1.89</td>
<td>0.06</td>
</tr>
<tr>
<td>LEC</td>
<td>-0.03</td>
<td>-0.39</td>
<td>0.70</td>
</tr>
<tr>
<td>PCL-C x LEC</td>
<td>-0.01</td>
<td>-0.06</td>
<td>0.95</td>
</tr>
<tr>
<td><em>R² = 0.45, ΔR² = 0.00</em></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* p ≤ 0.05  ** p ≤ 0.01  *** p ≤ 0.001

Note. LEC=Life Event Checklist Total Score; PCL-C=PTSD Checklist-Civilian Version Total Score; BDI-II=Beck Depression Inventory-II Total Score; MAST=Michigan Alcohol Screening Test Total Score; DAST=Drug Abuse Screening Test Total Score; SBQ-R=Suicide Behavior Questionnaire-Revised Total Score.
The influence of anxiety sensitivity on the relationship between PTSD and suicide behavior. The researcher tested the moderation hypothesis suggesting anxiety sensitivity related to fear of the cognitive features of anxiety strengthens the relationship between total PTSD symptomatology and suicide behavior among the subsample \((n=97)\) of college students who met diagnostic criteria for PTSD, again controlling for depressive symptomatology as well as substance and alcohol abuse. The results are presented in Table 7. The results of the hierarchical regression analyses indicated there was a significant main effect of total PTSD symptomatology, suggesting total PTSD symptomatology is a significant independent predictor of suicide behavior. There was not a significant main effect of anxiety sensitivity related to the fear of the cognitive features of anxiety. In addition, the results showed that the two-way interaction between total PTSD symptomatology and anxiety sensitivity related to the fear of the cognitive features of anxiety was not significant, indicating anxiety sensitivity related to the fear of the cognitive features of anxiety did not moderate the relationship between total PTSD symptomatology and suicide behavior. The control variable of depressive symptomatology was again a significant covariate, demonstrating it is an independent predictor of suicide behavior in this moderation analysis as well.
Table 7

Results of a Multiple Regression Analysis Testing Anxiety Sensitivity Related to the Fear of the Cognitive Features of Anxiety as a Moderator of the Relationship between Total PTSD Symptomatology and Suicide Behavior in the Subsample (n=97) of Participants Who Met Diagnostic Criteria for PTSD

<table>
<thead>
<tr>
<th>Variable</th>
<th>Standardized Beta</th>
<th>t</th>
<th>p (two-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BDI-II</td>
<td>0.64</td>
<td>7.80</td>
<td>&lt;0.001***</td>
</tr>
<tr>
<td>MAST</td>
<td>-0.07</td>
<td>-0.79</td>
<td>0.43</td>
</tr>
<tr>
<td>DAST</td>
<td>0.08</td>
<td>0.91</td>
<td>0.37</td>
</tr>
<tr>
<td>( R^2 = 0.65 )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Step 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BDI-II</td>
<td>0.56</td>
<td>6.09</td>
<td>&lt;0.001***</td>
</tr>
<tr>
<td>MAST</td>
<td>-0.09</td>
<td>-1.09</td>
<td>0.28</td>
</tr>
<tr>
<td>DAST</td>
<td>0.06</td>
<td>0.72</td>
<td>0.47</td>
</tr>
<tr>
<td>PCL-C</td>
<td>0.18</td>
<td>1.99</td>
<td>0.05*</td>
</tr>
<tr>
<td>ASI-R-36-Cog Dys</td>
<td>0.01</td>
<td>0.13</td>
<td>0.90</td>
</tr>
<tr>
<td>( R^2 = 0.67 ) ( \Delta R^2 = 0.02 )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Step 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BDI-II</td>
<td>0.55</td>
<td>6.00</td>
<td>&lt;0.001***</td>
</tr>
<tr>
<td>MAST</td>
<td>-0.09</td>
<td>-1.03</td>
<td>0.31</td>
</tr>
<tr>
<td>DAST</td>
<td>0.06</td>
<td>0.69</td>
<td>0.50</td>
</tr>
<tr>
<td>PCL-C</td>
<td>0.19</td>
<td>2.01</td>
<td>0.05*</td>
</tr>
<tr>
<td>ASI-R-36-Cog Dys</td>
<td>-0.002</td>
<td>-0.03</td>
<td>0.98</td>
</tr>
<tr>
<td>PCL-C x ASI-R-36-Cog-Dys</td>
<td>0.01</td>
<td>0.51</td>
<td>0.61</td>
</tr>
<tr>
<td>( R^2 = 0.67 ) ( \Delta R^2 = 0.00 )</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* \( p \leq 0.05 \)  ** \( p \leq 0.01 \)  *** \( p \leq 0.001 \)

Suicide Behavior = SBQ-R = Dependent Variable

Note. Note. ASI-R-36-Cog Dys=Anxiety Sensitivity Index-Revised-36 Cognitive Dyscontrol Subscale Score; PCL-C=PTSD Checklist-Civilian Version Total Score; BDI-II=Beck Depression Inventory-II Total Score; MAST=Michigan Alcohol Screening Test Total Score; DAST=Drug Abuse Screening Test Total Score; SBQ-R=Suicide Behavior Questionnaire-Revised Total Score.
The influence of depression on the relationship between PTSD and suicide behavior. To determine if the comorbidity between PTSD and depression increases an individual’s risk for engaging in suicide behavior, the researchers began by conducting a one-way ANOVA, using the total sample (N=634), to test for mean differences among suicide behavior between participants without PTSD or depressive symptomatology (n=435), participants with depressive symptomatology only (n=102), participants with PTSD symptomatology only (n=30), and participants with both depressive and PTSD symptomatology (n=67). Suicide behavior differed significantly across the four different symptomatology classifications, $F(3, 630)=59.38, p \leq 0.001$. Tukey post-hoc comparisons of the four symptomatology groups indicated the participants with both PTSD and depressive symptomatology reported significantly higher suicide behavior than the group of participants without PTSD or depressive symptomatology, $p \leq 0.001, r=0.43$; the group of participants with PTSD symptomatology, $p \leq 0.001, r=0.26$; and the group of participants with depressive symptomatology, $p \leq 0.001, r=0.18$. Post hoc comparisons using the Tukey HSD test also revealed the participants with depressive symptomatology only reported significantly higher suicide behavior than the group of participants without PTSD or depression symptomatology, $p \leq 0.001, r=0.29$, and the group of participants with PTSD symptomatology only, $p=0.001, r=0.15$. These findings suggest the comorbidity between PTSD and depression increases an individual’s risk for engaging in suicide behavior even more than depression alone. Please see Table 8 for the means, standard deviations, and confidence intervals for each symptomatology classification group.
Table 8

**Results of ANOVA Analyses Examining Differences in Suicide Behavior between Symptomatology Classification Groups for the Total Sample (N=634): Mean Scores, Standard Deviations, and Confidence Intervals**

<table>
<thead>
<tr>
<th>Symptomatology Classification Group</th>
<th>M (SD)</th>
<th>CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>No PTSD or Depressive Symptomatology (n=435)</td>
<td>4.07 (1.87)</td>
<td>3.89-4.26</td>
</tr>
<tr>
<td>Depressive Symptomatology Only (n=102)</td>
<td>6.07 (2.92)</td>
<td>5.49-6.64</td>
</tr>
<tr>
<td>PTSD Symptomatology Only (n=30)</td>
<td>4.20 (1.71)</td>
<td>3.56-4.84</td>
</tr>
<tr>
<td>Both Depressive and PTSD Symptomatology (n=67)</td>
<td>7.73 (3.90)</td>
<td>6.78-8.68</td>
</tr>
</tbody>
</table>

Based on the results of the correlation and ANOVA analyses as well as the comorbidity between depression and PTSD, the moderation hypothesis suggesting depressive symptomatology strengthens the relationship between total PTSD symptomatology and suicide behavior was first investigated among the total sample (N=634) to capture the full range of variability in PTSD and depressive symptomatology, controlling for substance and alcohol abuse. The results of the hierarchical regression analyses are presented in Table 8. The results revealed significant main effects of total PTSD symptomatology and depressive symptomatology, suggesting these variables both independently predict suicide behavior. Depressive symptomatology appeared to be a stronger independent predictor of suicide behavior than PTSD symptomatology. However, most importantly, there was a significant two-way interaction between PTSD symptomatology and depressive symptomatology, indicating depressive symptomatology moderates the relationship between total PTSD and suicide behavior. These results demonstrated individuals with high PTSD symptomatology and high depressive symptomatology reportedly engage in more suicide behavior than individuals with high PTSD symptomatology and low depressive symptomatology. See *Figure 4*.  

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Table 9

Results of a Multiple Regression Analysis Testing Depressive Symptomatology as a Moderator of the Relationship between Total PTSD Symptomatology and Suicide Behavior in the Total Sample (N=634) of Participants Who Met Diagnostic Criteria for PTSD

<table>
<thead>
<tr>
<th>Predictor Variable</th>
<th>Standardized Beta</th>
<th>t</th>
<th>p (one-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MAST</td>
<td>0.15</td>
<td>3.27</td>
<td>0.001***</td>
</tr>
<tr>
<td>DAST</td>
<td>0.13</td>
<td>2.70</td>
<td>0.01**</td>
</tr>
<tr>
<td>$R^2 = 0.06$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Step 2</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MAST</td>
<td>0.04</td>
<td>1.12</td>
<td>0.26</td>
</tr>
<tr>
<td>DAST</td>
<td>0.07</td>
<td>1.18</td>
<td>0.07</td>
</tr>
<tr>
<td>PCL-C</td>
<td>0.10</td>
<td>2.46</td>
<td>0.01**</td>
</tr>
<tr>
<td>BDI-II</td>
<td>0.52</td>
<td>13.09</td>
<td>&lt;0.001***</td>
</tr>
<tr>
<td>$R^2 = 0.37$</td>
<td>$\Delta R^2 = 0.31$</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Step 3</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MAST</td>
<td>0.05</td>
<td>1.30</td>
<td>0.19</td>
</tr>
<tr>
<td>DAST</td>
<td>0.06</td>
<td>1.70</td>
<td>0.09</td>
</tr>
<tr>
<td>PCL-C</td>
<td>0.18</td>
<td>3.99</td>
<td>&lt;0.001***</td>
</tr>
<tr>
<td>BDI-II</td>
<td>0.61</td>
<td>13.17</td>
<td>&lt;0.001***</td>
</tr>
<tr>
<td>PCL-C x BDI-II</td>
<td>0.20</td>
<td>3.79</td>
<td>&lt;0.001***</td>
</tr>
<tr>
<td>$R^2 = 0.39$</td>
<td>$\Delta R^2 = 0.02$</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* $p \leq 0.05$  ** $p \leq 0.01$  *** $p \leq 0.001$

* Suicide Behavior = SBQ-R = Dependent Variable

*Note.* PCL-C=PTSD Checklist-Civilian Version Total Score; BDI-II=Beck Depression Inventory-II Total Score; MAST Total=Michigan Alcohol Screening Test Total Score; DAST Total=Drug Abuse Screening Test Total Score; SBQ-R=Suicide Behavior Questionnaire–Revised Total Score.
Figure 4. Chart of depressive symptomatology moderating the relationship between PTSD symptomatology and suicide behavior among the total sample ($N=634$). This chart illustrates the relationship between PTSD and depressive symptomatology and how this relationship impacts suicide behavior.

The same moderation hypothesis was also tested among the subsample ($n=97$) to determine if depression moderates the relationship between PTSD symptomatology and suicide behavior among college students who met diagnostic criteria for PTSD. The results of the hierarchical regression analyses are presented in Table 9. The results indicated there were significant main effects of total PTSD symptomatology and depression, suggesting these variables both independently predicted suicide behavior. Again, depressive symptomatology appeared to be a stronger independent predictor of suicide behavior than PTSD symptomatology. The results again revealed a significant two-way interaction between PTSD symptomatology and depressive symptomatology, indicating depressive symptomatology moderates the relationship between total PTSD and suicide behavior. These results also showed individuals with high PTSD
symptomatology and high depressive symptomatology reportedly engage in more suicide behavior than individuals with high PTSD symptomatology and low depressive symptomatology. See Figure 5.

Table 10

Results of a Multiple Regression Analysis Testing Depressive Symptomatology as a Moderator of the Relationship between Total PTSD Symptomatology and Suicide Behavior in the Subsample (n=97) of Participants Who Met Diagnostic Criteria for PTSD

<table>
<thead>
<tr>
<th>Predictor Variable</th>
<th>Standardized Beta</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MAST</td>
<td>0.03</td>
<td>0.26</td>
<td>0.80</td>
</tr>
<tr>
<td>DAST</td>
<td>0.19</td>
<td>1.76</td>
<td>0.08</td>
</tr>
<tr>
<td>R² = 0.04</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Step 2             |                   |      |         |
| MAST               | -0.09             | -1.10| 0.28    |
| DAST               | 0.07              | 0.79 | 0.43    |
| PCL-C              | 0.18              | 2.07 | 0.04*   |
| BDI-II             | 0.56              | 6.33 | <0.001*** |
| R² = 0.45          | Δ R² = 0.41       |      |         |

| Step 3             |                   |      |         |
| MAST               | -0.09             | -1.13| 0.26    |
| DAST               | 0.02              | 0.23 | 0.82    |
| PCL-C              | 0.20              | 2.27 | 0.03*   |
| BDI-II             | 0.56              | 6.44 | <0.001*** |
| PCL-C x BDI-II     | 0.16              | 2.04 | 0.04*   |
| R² = 0.47          | Δ R² = 0.02       |      |         |

* p ≤ 0.05          ** p ≤ 0.01          *** p ≤ 0.001

* Suicide Behavior = SBQ-R = Dependent Variable

Note. PCL-C=PTSD Checklist-Civilian Version Total Score; BDI-II=Beck Depression Inventory-II Total Score; MAST Total=Michigan Alcohol Screening Test Total Score; DAST Total=Drug Abuse Screening Test Total Score; SBQ-R=Suicide Behavior Questionnaire–Revised Total Score.
Figure 5. Chart of depressive symptomatology moderating the relationship between PTSD symptomatology and suicide behavior among the subsample (n=97). This chart illustrates the relationship between PTSD and depressive symptomatology and how this relationship impacts suicide behavior.
Chapter Four
Discussion

Conclusions

The primary goals of this study were to determine the prevalence rate of suicide behavior, including suicidal ideation and suicide attempts; to establish PTSD symptomatology as a predictor of suicide behavior among a sample of college students; to examine what dimensions of anxiety and/or PTSD might help explain the relationship between total PTSD symptomatology and suicide behavior among a sample of college students who exhibited significant PTSD symptomatology; and to explore the issue of comorbidity by investigating the impact depressive symptomatology has on the predictive relationship between PTSD and suicide behavior. More specifically, intrusive, avoidance, or hyperarousal symptoms of PTSD were explored as predictors of total PTSD symptomatology and suicide behavior. The amount of exposure to traumatic events, anxiety sensitivity related to the fear of cognitive features of anxiety, and depressive symptomatology were examined as moderators of the predictive relationship between total PTSD symptomatology and suicide behavior.

The results of this study indicated that 15.3% of the total college student sample (N=634) met diagnostic criteria for PTSD. This finding is consistent with prevalence rates reported in previous research. Other research studies have reported PTSD prevalence rates in the range of 6% to 17% among college students (Bernat et al., 1998; Frazier et al., 2009; Lauterbach & Vrana, 2001; Marx & Sloan, 2003; McDevitt-Murphy et al., 2007; Oswalt & Silberg, 1995; Read et al., 2011; Smyth et al., 2008; Twamley et al., 2004; Watson & Haynes, 2007).
Furthermore, this research yielded a suicide attempt prevalence rate of 10.4% among the 634 college students in the total sample and a prevalence rate of 42.4% for suicidal ideation in the past year among those same college students in the total sample. In addition, this research found a suicide attempt prevalence rate of 22.6% and a prevalence rate of 53.6% for suicidal ideation in the past year among the 97 college students in the subsample who met diagnostic criteria for PTSD, meaning over half of the individuals who met diagnostic criteria PTSD experienced suicidal ideation in the past year. Previous research has reported prevalence rates ranging from 4% to 24% for suicidal ideation and prevalence rates ranging from 1% to 2% for suicide attempts within total samples of college students (ACHA, 2012; Arria et al., 2009; Brownson et al., 2011; Westefeld et al., 2005; Wilcox et al., 2010). In this study, the prevalence rates of suicidal ideation and suicide attempts found among the total sample of college students and among the subsample of college students who met diagnostic criteria for PTSD are somewhat higher than the prevalence rates for suicidal ideation and suicide attempts reported in previous research using samples of college students. This could be the result of this research yielding a PTSD prevalence rate on the higher end of the range of PTSD prevalence rates reported in previous research. Consequently, there could be increased pathology (e.g. suicidal ideation and suicide attempts) in both the total sample and subsample.

The results of this study provided further evidence that PTSD independently predicts suicide behavior among college students. Specifically, the research demonstrated increased total PTSD symptomatology significantly predicted suicide behavior among the total college student sample as well as among the subsample of
college students who met diagnostic criteria for PTSD, even after controlling for comorbidity. This finding is congruent with past research that has shown PTSD symptomatology significantly predicts suicide behavior in clinical and community samples, increasing an individual’s risk for engaging in suicide behavior (Cougle et al., 2009; Ferrada-Noli et al., 1998; Kessler et al., 1995; Khan et al., 2002; Kotler et al., 2001; Nepon et al., 2010; Sareen et al., 2005b; Wilcox et al., 2009; Wunderlich et al., 1998). However, although congruent with past research findings, this research uniquely established the predictive relationship between PTSD and suicide behavior among a sample of college students.

In this study, depressive symptomatology was found to be independently predictive of suicide behavior among college students who met diagnostic criteria for PTSD, demonstrated where increased levels of depressive symptomatology were significantly related to and seem to be predictive of suicide behavior among college students who met diagnostic criteria for PTSD. In addition, other research has demonstrated there is a predictive relationship between depressive symptomatology and suicide behavior, where high levels of depressive symptomatology predicted suicide behavior, among college student samples. The results of this study are congruent with these previous research findings that found depressive symptomatology to be an independent predictor of suicide behavior (Barrios et al., 2000; Brener et al., 1999; Garlow et al., 2008; Gibb et al., 2006; Kessler et al., 1995; Kisch et al., 2005; Konick & Gutierrez, 2005; Kotler et al., 2001; Singh & Joshi, 2008; Sokero et al., 2005; Stephenson et al., 2006; Wilcox et al., 2010; Wunderlich et al., 1998; Zisook et al., 2012).
Little research has given consideration to the different dimensions of PTSD that might help explain how the disorder is significantly predictive of suicide behavior. This research attempted to determine if certain symptom clusters of PTSD might help explain the predictive relationship between PTSD and suicide behavior, but the results of this study did not find support for intrusive, avoidance, or hyperarousal symptoms of PTSD as predictors of suicide behavior among college students who met diagnostic criteria for PTSD. Additionally, the current study did not find the amount of exposure to traumatic events or the anxiety sensitivity related to the fear of the cognitive features of anxiety to be moderators of the relationship between total PTSD symptomatology and suicide behavior among college students who met diagnostic criteria for PTSD. This research attempted to explain the connection between PTSD and suicide behavior among college students by examining PTSD symptom clusters as predictors of suicide behavior and other anxiety dimensions as moderators of the relationship between PTSD and suicide behavior, but the results were not congruent with the proposed hypotheses.

However, most importantly, this study yielded findings indicating depressive symptomatology moderates the relationship between total PTSD symptomatology and suicide behavior among college students in both the total sample and subsample of college students. As previously discussed, past research has established that PTSD and depression are highly comorbid (4th ed., text rev.; DSM-IV-TR; APA, 2000; Blaney & Millon, 2009; Lepine, 2002). Several research studies demonstrated there are differences in suicide behavior among individuals with comorbid PTSD and depression, individuals only with a depression diagnosis, and individuals only with a PTSD diagnosis (Campbell et al., 2007; Cougle et al., 2009; Oquendo et al., 2003; Oquendo et al., 2005). These
studies used clinical samples of adult individuals with depression, including military veterans, and a non-clinical sample of adult women. In addition, they utilized descriptive statistics, cor relational analyses, and comparisons of means to determine there is increased suicide behavior among individuals with comorbid PTSD and depression compared to individuals without comorbid PTSD and depression.

Uniquely, the current study used moderational analyses to show the impact of depressive symptomatology on the predictive relationship between total PTSD symptomatology and suicide behavior among adult college students. The results suggested college students with high levels of depressive symptomatology were more susceptible to the relationship between total PTSD symptomatology and suicide behavior, where increased total PTSD symptomatology coupled with increased depressive symptomatology significantly predicts suicide behavior. Controlling for other comorbid mental disorders (substance and alcohol abuse), college students with increased PTSD symptomatology appeared to have the greatest risk for engaging in suicide behavior in the presence of increased depressive symptomatology. These results indicated the comorbidity between PTSD and depression increases suicide behavior among college students.

**Limitations and Future Research**

The current research has limitations which should be taken into consideration. First, this research is cross-sectional, preventing causal conclusions from being made. Future longitudinal research is needed to determine whether total PTSD symptomatology actually predicts suicidal ideation and suicide attempts and whether any of the proposed predictors (intrusive, avoidance, and hyperarousal PTSD symptoms) and moderators
(exposure to traumatic events and anxiety sensitivity related to the fear of the cognitive features of anxiety) in this study help strengthen the predictive relationship between PTSD and suicide behavior among college students who meet diagnostic criteria for PTSD.

Also, the assessment of each variable in this study was based on participants’ self-report. Thus, the impact of shared method variance on the observed relationships among variables is unknown. Furthermore, the prevalence rates of PTSD among the subsample and total sample were elevated; thus, it is possible participants were over reporting their symptoms of PTSD. When seeking to replicate the current findings or exploring new ideas in this area of research, future research should attempt to utilize multi-method assessments of each variable, such as self-report measures accompanied by personal, clinical interviews conducted by the researcher.

Another limitation of this study is the sample. Participants in the current study were university undergraduate students, creating a fairly high functioning sample. Consequently, the current findings may not generalize to other populations. In addition, the participants in this sample were determined to meet diagnostic criteria for PTSD based on their self-report. Perhaps the anxiety dimensions proposed to strengthen and/or explain the relationship between PTSD symptomatology and suicide behavior among college students would be relevant and significant moderators and mediators in a clinical sample, where participants are diagnosed based on clinical interviews. Future research should replicate this research in samples where the levels of total PTSD symptomatology, exposure to traumatic events, anxiety sensitivity related to the fear of the cognitive features of anxiety, intrusive symptoms of PTSD, avoidance symptoms of PTSD,
hyperarousal symptoms of PTSD, depression, and suicide behavior are more severe. Therefore, the hypotheses proposed by this study should be examined among clinical samples, where participants receive a clinical diagnosis based on a structured interview.

Finally, this study only began to explore potential mechanisms that explain or strengthen the relationship between PTSD and suicide behavior. This study only examined PTSD symptom clusters as predictors of suicide behavior and two different dimensions of anxiety (the amount of exposure to traumatic events and anxiety sensitivity related to the fear of the cognitive features of anxiety) as well as depressive symptomatology as moderators of the relationship between PTSD and suicide behavior among college students who met diagnostic criteria for PTSD. Given that little research has explored what aspects of PTSD link the disorder to suicide behavior and what variables help strengthen for the predictive relationship between PTSD and suicide behavior, future research should continue to build and expand the area of research related to suicide prevention as it pertains to identifying predictors of suicide behavior and the factors that moderate those predictive relationships.

Future research can begin by investigating other variables as moderators of the established predictive relationship between total PTSD symptomatology and suicide behavior. Such variables might include perceived burdensomeness and thwarted belongingness, two key psychological states that contribute to one’s desire to die, according to the interpersonal-psychological theory of suicide (Joiner, 2005; Van Orden et al., 2010). Additionally, future research should explore whether the type of traumatic event(s) experienced by individuals serves to moderate the relationship between PTSD and suicide behavior. Perhaps there are certain types of events perceived to be more
traumatic, or more painful, triggering increased psychological distress, such as PTSD symptomatology. Experiencing traumatic events perceived to be intensely painful could contribute the development of one’s acquired capability for suicide, which is the result of an individual experiencing a fearlessness of death and a high tolerance for self-inflicted pain often learned by repeatedly experiencing painful, provocative events, such as past suicide attempts, non-suicidal self-injurious behavior, combat exposure, and physical violence (Joiner, 2005; Van Orden et al., 2010). Combat exposure and physical violence may be two types of events perceived to be more traumatic or painful compared to other types of traumas; thus, these types of traumatic events may moderate, or strengthen, the predictive relationship between PTSD and suicide behavior. For an individual with PTSD, experiencing both a traumatic event and PTSD symptoms perceived to be severely painful could cause an increase in his or her tolerance for self-inflicted pain and, consequently, an increase his or her risk of engaging in suicide behavior (Capron et al., 2012a; Joiner, 2005; Van Orden et al., 2010).

Finally, future research should examine the role of impulsivity in explaining the relationship between PTSD and suicide behavior among college students. Research suggests impulsivity resembles hyperarousal symptoms among individuals with PTSD (Ben-Ya’acov & Amir, 2004). In fact, research has established a positive association between suicide risk and impulsivity among PTSD patients (Kotler et al., 2001). Ben-Ya’acov and Amir (2004) proposed hyperarousal symptoms of PTSD are related to problems with control and regulating impulses. According to the *DSM-IV-TR* (2000) 4th ed., text rev., hyperarousal symptoms include difficulty falling or staying asleep, irritability or outbursts of anger, difficulty concentrating, hypervigilance, and/or an
exaggerated startled response (4th ed., text rev.; DSM-IV-TR; APA, 2000). Therefore, the regulation and control of behavior as it relates to impulsivity and hyperarousal may help explain the predictive relationship between PTSD symptomatology and suicide behavior among college students, particularly among those who meet diagnostic criteria for PTSD.

Other current research indicates interactions between anxiety dimensions may be predictive of suicide behavior. Capron et al. (2012a) utilized an outpatient sample of adults with PTSD symptomatology (N=128) and a sample of military cadets undergoing basic training with PTSD symptomatology (N=1,081) and found that individuals with low anxiety sensitivity to the physical aspects of anxiety and high anxiety sensitivity to the cognitive aspects of anxiety are most vulnerable to suicide attempts. Their research suggests the interaction between high anxiety sensitivity to cognitive aspects of anxiety and low anxiety sensitivity to physical aspects of anxiety increases an individual’s risk of making a suicide attempt. Therefore, future research should continue to explore how different facets of anxiety sensitivity interact with each other to help strengthen or explain the predictive relationship between total PTSD symptomatology and suicide behavior among clinical samples and/or samples of college students clinically diagnosed with PTSD. Also, future research should investigate how anxiety dimensions (e.g. anxiety sensitivity, type of traumatic event, intrusive symptoms of PTSD, avoidance symptoms of PTSD, and hyperarousal symptoms of PTSD) interact with other variables (e.g. the key components of the interpersonal-psychological theory of suicide-thwarted belongingness, perceived burdensomeness, fearlessness of death, and tolerance for self-inflicted pain) and help strengthen the connection between total PTSD symptomatology
and suicide behavior among clinical samples and/or samples of college students clinically diagnosed with PTSD.

**Implications**

Nevertheless, the findings of this research are still robust and important. First, the results demonstrated suicidal ideation and suicide attempts are highly prevalent among college students with PTSD symptomatology. The prevalence rates for suicidal ideation and suicide attempts among the subsample of college students who met diagnostic criteria for PTSD are much higher than the prevalence rates for suicidal ideation and suicide attempts reported both in this study for the total sample of college students and in previous research for overall samples of college students which included more than just those in the sample who met diagnostic criteria for PTSD. Thus, it is evident suicidal ideation and suicide attempts are more prevalent among the subset of college students who suffer from PTSD, suggesting college students who suffer from PTSD are more at risk for experiencing suicidal ideation and making a suicide attempt. Such findings create cause for concern among clinicians in mental health settings, including college counseling centers and community mental health agencies.

Furthermore, this research established total PTSD symptomatology and depressive symptomatology independently predict suicide behavior among college students regardless of whether or not they met diagnostic criteria for PTSD. Therefore, these results suggest research should strive to identify factors linking PTSD to suicide behavior among college students. Moreover, the findings of this study present strong evidence depressive symptomatology moderates the predictive relationship between total PTSD symptomatology and suicide behavior among the subsample of college students.
who met diagnostic criteria for PTSD and among the total sample of college students. This finding indicates depressive symptomatology strengthens the predictive relationship between PTSD and suicide behavior, suggesting comorbidity plays an important role in predicting the likelihood an individual will engage in suicide behavior. Based on the findings of this research, college students who have increased PTSD symptomatology coupled with increased depressive symptomatology have a greater risk for experiencing suicidal ideation and making a suicide attempt than those who experience only increased PTSD symptomatology. Overall, the findings of this research suggest suicide prevention programs, counseling centers, and psychology clinics on college campuses should consider the issue of comorbidity and include PTSD symptomatology as well as depressive symptomatology in their assessment and identification of individuals who may be at risk for engaging in suicide behavior, particularly for individuals who experienced a trauma or meet diagnostic criteria for PTSD.

Clinicians and practitioners can use the comorbidity of PTSD and depression, specifically high levels of PTSD and depressive symptomatology, to identify college students at risk for experiencing suicidal ideation and making a suicide attempt. Knowing an individual’s levels (e.g. high or low) of PTSD and depressive symptomatology could provide important information related to that person’s suicide risk. Thus, an intervention may be made and treatment may be provided before suicidal ideation occurs or a suicide attempt is made in an effort to prevent a person from progressing through the stages of the suicide process to the completion of suicide.
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