# IDENTIFYING THE MISSING PIECE OF SUICIDE PREVENTION: FORMATIVE RISK ASSESSMENT

by

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May, 2014

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Suicide is the third leading cause of death among adolescents and young adults (Centers for Disease Control [CDC], 2011). However, no evidence-based suicide prevention programs currently exist that utilize formative assessment measures to screen for individuals deemed at-risk (National Registry of Evidence-based Programs and Practices [NREPP], n.d.). Given that timely intervention may prevent premature death, there is a dire need to create a direct, formative measure to account for the time-sensitive nature of the data. Glover and Albers (2007) suggest that universal screening measures should be feasible, contextually appropriate, and technically adequate. Borrowing from the literature base of school-based behavior assessment, a widely used, formative measure known as Direct Behavior Rating (DBR; Chafouleas, Riley-Tillman, & McDougal, 2002) was adapted to create a formative suicide risk assessment measure, known as the Direct Behavior Risk Rating (DBRR). The DBRR is a no-cost, 5-item measure that is designed to identify students at-risk for engaging in suicidal activity. The present study tested the hypotheses that DBRRs demonstrate concurrent validity with regard to the *Beck Scale for Suicidal Ideation* (*BSI*; Hypothesis 1), demonstrate overall classification accuracy with regard to *BSI* risk status (Hypothesis 2), and identify cut scores associated with optimal conditional probability statistics (Hypothesis 3). Compared to single DBRR items, the DBRR-Multiple Item

Scale (DBRR-MIS) demonstrated a moderate to strong correlation with the *BSI* and appropriate discriminatory power when modeled against the *BSI* as the criterion, respectively. Adequate cut scores were identified for the DBRR-MIS for potential differentiation of risk status. However, as the purpose of a screening measurement tool is to achieve an optimal percentage of correct decisions (i.e., true positives & true negatives), results of receiver operating characteristic (ROC) curve analyses indicated that the DBRR-MIS displays a disproportionate balance among probability statistics (i.e., positive predictive power & negative predictive power), resulting in over-identification of those at risk. Given that limited resources often thwart screening implementation in educational settings, further research is needed to improve the technical adequacy of the DBRR. Initial findings indicate that, upon continued examination, the DBRR-MIS may be an innovative method of assessing suicide risk among the student population.

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A Dissertation Presented to the

Faculty of the Department of Psychology

East Carolina University

In Partial Fulfillment of the Requirements for the Degree of

Doctor of Philosophy in Psychology

by

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May, 2014

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ACKNOWLEDGEMENTS

I dedicate this manuscript to my husband, Jason. Without your continued love, patience, and support, I do not know how I would have finished this dissertation or graduate program. Years ago, I remember explaining to you that graduate school would be like running a never-ending marathon for me. Thank you so much for running alongside me and picking me up when I tripped and fell. Many thanks are extended to my cheerleading squad of family, friends, and colleagues. Your words of encouragement and positive attitude have kept me going throughout the years.

Thank you to the chair of my dissertation committee, Dr. Christy Walcott, for your continued guidance and confidence in my personal and professional development. Each time we met throughout the years, I left feeling more confident in my skills as a researcher and clinician. A special thank you is extended to committee member, Dr. Steve Kilgus, for helping to inform my analytical approach. Your upbeat attitude and sense of humor kept me laughing yet focused when statistical analyses seemed overwhelming at times.

Thank you to committee member, Dr. Heather Littleton, for your input and edits throughout the writing process. Your attention to detail and superb organizational skills kept my manuscript from growing unwieldy at times. I am grateful for Drs. T. Chris Riley-Tillman and Matthew Dwyer for your consideration, insight, and positivity throughout this process. Lastly, thank you to all those who have supported me in pursuing suicide prevention work throughout the years. My passion for suicide prevention continues to grow because I have continued respect, support, and compassion from many in all walks of my life. For that, I am eternally grateful.

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## CHAPTER I: INTRODUCTION AND REVIEW OF THE LITERATURE

Suicide is a serious problem in the United States (U.S.) and one that warrants the attention of caregivers and professionals who work with adolescents and young adults. In 2010, suicide claimed the lives of 4,600 adolescents and young adults in the U.S., making it the third leading cause of death among 15-24 year olds (Centers for Disease Control [CDC], 2011). Looking at deaths among youth aged 15 to 24; approximately 15% of deaths were attributable to suicide (CDC, 2011). Suicidal ideation and attempts are even more common among adolescents and young adults than death by suicide. The most recent national data for college students, the American College Health Association National College Health Assessment (ACHA-NCHA II), indicate that 4.6% of U.S. college-aged students (4.8% of females & 4.2% of males) reported having seriously considered attempting suicide in the past 12 months (ACHA-NCHA II, 2013). Specific to actual suicide attempts, 0.9% of college-age students (0.9% of females & 0.8% of males) reported one or more suicide attempts during the spring semester of 2013 (ACHA-NCHA II, 2013). Although suicide rates have become startling enough to increase national prevention and intervention efforts (U.S. Department of Health and Human Services [HHS], 2012), suicide remains a taboo topic throughout much of the U.S.

Myths surrounding suicide are also still quite pervasive despite years of descriptive research. Adults may consider adolescence and young adulthood to be a time of great storm and stress (Arnett, 1999); others may minimize the vulnerable period of transition for college students (Arria et al., 2009), thereby considering warning signs to be typical behavior during these stressful stages of development. It is true that many adolescents and young adults experience familial and social stressors that may be difficult to cope with, but a dangerous, yet common myth regarding suicide is that it is caused solely by family and social stress (Moskos,

Achilles, & Gray, 2004). In fact, psychiatric autopsies of those who died by suicide reveal that over 90% of this population struggled with mental health problems (e.g., substance abuse, conduct disorders) and psychiatric disorders (e.g., mood disorders; Brent et al., 1993; Shaffer et al., 1996). Others erroneously assume that young men and women are at equal risk of engaging in suicidal activity. In truth, numerous research studies indicate that a "gender paradox" for suicide exists (Canetto & Sakinofsky, 1998, p. 1); women are more likely than men to express suicidal ideation and make non-fatal attempts, whereas men die by suicide at higher rates than women (Lamis & Lester, 2013). Another common myth about suicide is that if adults talk to adolescents and young adults about suicide, they may be more likely to consider suicidal activity (Kalafat, 2003; Whitney, Renner, Pate, & Jacobs, 2011). There is no empirical evidence to support this claim (Gould et al., 2005). In fact, those who discuss their feelings with trusted individuals can experience beneficial outcomes as can their peers who may also be at-risk for suicidal activity (Mazza, 2006). Some people may believe that those who talk about suicide never actually attempt, while the opposite is true. Indeed, discussing suicidal thoughts and plans with others has been labeled a cry for help and an important indicator of risk (Miller & Eckert, 2009). Unfortunately, adolescents and young adults typically do not communicate their suicidal thoughts and plans to their caregivers or educators (Drum, Brownson, Denmark, & Smith, 2009; Miller & Eckert, 2009). This finding emphasizes the importance of risk assessment in a direct manner in which disclosure is not contingent upon another person's knowledge of one's suicidal behaviors.

Because secondary and post-secondary schools are convenient places to deliver system-level interventions for adolescents and young adults, it is imperative that suicide prevention programming occur within educational institutions. Although evidence-based research suggests

that students will honestly state their suicidal intentions (Joe & Bryant, 2007; Miller & DuPaul, 1996), educational institutions remain hesitant to provide prevention programs due to perceived workload burden, fear of liability, or concerns about iatrogenic effects (Goldston et al., 2010; Moore, 2007; Scherff, Eckert, & Miller, 2005). Currently, U.S. educational institutions are given less choice in the matter due to the Garrett Lee Smith Memorial Act (2004). In 2004, Congress called for early suicide intervention and assessment services to be integrated into numerous community organizations, including educational institutions (Peña & Caine, 2006). However, as described in detail below, implementation fidelity and overall effectiveness of primary and secondary prevention efforts have been called into question (Miller, Eckert, & Mazza, 2009; Schwartz & Friedman, 2009). Stein and colleagues (2010) note that implementation and, thus, success faltered in educational institutions that did not have an organized system to respond to at-risk students, a process for effectively responding to a student who is at risk for suicidal activity, and strong administrative support. However, personnel and financial resources were not sufficient for successful implementation of prevention programs (Stein et al., 2010). The study's findings suggested that dedicating resources without corresponding commitment by leadership fails to create a supportive environment for implementation and, thus, results in lower rates of implementation (Stein et al., 2010). Additionally, the fear of negative publicity and liability may thwart prevention efforts, especially at the university level (Schwartz & Friedman, 2009). Given the shift from an individualized service delivery model to a population-based, public health suicide prevention approach (Berman, 2009; Doll & Cummings, 2008), it is essential that educational systems adopt a defensible and feasible method to consistently identify this at-risk population so that early intervention can be provided.

To this end, this dissertation project examines preliminary evidence for a new formative suicide risk assessment method that could be applied to systematic prevention programming efforts within educational settings. Before this new assessment tool is described, necessary background information is presented to support the rationale for introducing a new method for assessing suicide risk. This review includes a brief overview of theoretical models for understanding suicide, a supported framework for prevention intervention, a critical review of various strategies and evidence-based programs for suicide prevention currently used in educational settings, and examination of currently available suicide assessment tools. Following this review, the formative measure of suicide risk designed for this study is presented along with specific research questions and hypotheses.

**Theoretical Models for Understanding Suicide**

In order to develop effective suicide assessment methods, it is critical to understand why adolescents and young adults attempt suicide. Such an understanding can provide clues as to the predictive factors which would be an essential component of any theoretical model of suicidal activity. To date, the most reliable and robust risk factor for youth suicidal behavior is the presence of psychopathology (Mann, 2003; Miller & Eckert, 2009). Structured interviews with family members and friends of the deceased reveal that approximately 90% of those who died by suicide were experiencing at least one mental disorder at the time of their death (Miller & Eckert, 2009). The most common of these disorders were mood disorders followed by substance-related disorders and disruptive behavior disorders. However, most people with psychiatric illnesses do not experience death by suicide. What then accounts for the predisposition in suicidal behavior? Biologists, sociologists, psychologists, and psychiatrists have offered many theories to explain suicidal behavior. An exhaustive review is outside the scope of this paper (see Berman, Jobes, &

Silverman, 2006; Maris, Berman, & Silverman, 2000 for a review), but neurobiological, interpersonal-psychological, cognitive-behavioral, and developmental explanations will be evaluated below.

**Neurobiological models.** Explanations of suicide using biological knowledge have been limited due to the popularity of social and psychological theories, but recent literature emphasizes the associations between suicide and biological vulnerabilities. One of the most promising areas of research examines potential abnormalities in serotonin systems among previous attempters and those who died by suicide. Suicidal behavior is associated with a relative deficit in the transmission of serotonin (Asberg & Forslund, 2000; Berman et al., 2006; Mann, 1998; 2003; Maris, 2002). The biological marker of the serotonin system most often used is the concentration of the main metabolite of serotonin, 5-hydroxyindoleacetic acid (5-HIAA) in the cerebrospinal fluid (CSF; Asberg & Forslund, 2000). Although CSF 5-HIAA can be found in many areas of the brain, post-mortem studies on those who died by suicide have found potential dysregulation is localized in the prefrontal cortex (Mann, 1998). The prefrontal cortex is involved in the executive function of behavioral and cognitive inhibition. Injury or dysfunction in this area can result in disinhibition and low serotonergic input might contribute to impaired inhibition, creating a greater propensity to act on suicidal, impulsive, or aggressive feelings (Asberg & Forslund, 2000; Mann, 1998, 2003; Maris, 2002). Dysregulation in the serotonin system has been linked with psychiatric illnesses, such as depression, although an association between low CSF 5-HIAA and suicidal behavior has been associated outside the realm of depressive illness as well (Asberg & Forslund, 2000; Mann, 2003). When compared to other psychiatric patients, previous attempters reported higher rates of subjective depression and hopelessness, fewer reasons for living, and higher scores on a suicide ideation scale when

compared to non-attempters. Rates of lifetime aggression and impulsivity were greater among suicidal psychiatric patients when compared to non-suicidal psychiatric patients. Likewise, the former group was more likely to endorse a childhood history of abuse and past head injury than the latter group (Mann, Waternaux, Haas, & Malone, 1999). This suggests the possibility that low serotonergic activity could mediate genetic and psychosocial effects on suicide.

Mann (1998, 2003) sought to elucidate the relationship between psychiatric illnesses and suicidal activity using the stress-diathesis model. Mann (1998) proposed that psychiatric illnesses do not predispose people to suicidal activity; rather the relationship relies on existent vulnerabilities that are exacerbated by acute stressors. Variations in the diathesis (e.g., dysregulation of the serotonin system, familial history of suicidal activity, and early traumatic life experiences) in the presence of acute stressors (e.g., worsening of psychiatric disorder, acute psychosocial stressor, and alcohol/substance abuse issues) may increase one's tendency to engage in impulsive behaviors and experience more suicidal ideation. Mann (2003) posits that the interaction between one's predisposition to engage in impulsive behaviors and acute stressors occurs through two major pathways: one that includes psychiatric state and life events, and a second that includes serotonergic dysfunction.

Although evidence seems to suggest a neurobiological entity to suicidal activity, brain imaging studies yield inconsistent results (Turecki, Ernst, Jollant, Labonte, & Mechawar, 2011). Researchers indicate that methodological issues, heterogeneity among sample characteristics, and the influence of moderators (e.g., cultural context, spirituality) may result in contradictory findings (Lorenzetti, Allen, Fornito, & Yucel, 2009; Wagner et al., 2011). Likewise, additional data, especially longitudinal data, are needed to elucidate the relationship between early life adversity and brain alterations in stress-response systems. Lastly, as researchers continue to

search for a single neurobiological mechanism or biomarker for suicidal activity, practical means of identification and corresponding therapeutic intervention should be investigated as well. Although research continues on the neurobiological factors of suicide in efforts to predict suicidal activity biologically (Kim, 2011), other theorists purport that suicidal activity is best understood within the framework of prolonged behavioral contingencies.

**Interpersonal-psychological theory.** As outlined by Joiner (2005), the interpersonal-psychological theory of suicide supports the previous notion that repeated exposure to trauma increases the likelihood of suicidal behaviors through habituation and opponent processes. That is, people lose some of the fear that is associated with suicidal activity in response to repeated exposure to physically painful and/or fear-inducing experiences. Important for prevention work, Joiner's theory explicitly delineates between those who *would* attempt suicide and those who *would not*. Joiner asserts that people attempt suicide when they acquire the capacity to inflict lethal self-injury and, most importantly, the *desire* to do so. He maintains that, although many people are skilled at inflicting physical harm for the purposes of self-defense, people only become capable of killing themselves when they have habituated to continual pain or fear, such that the evolutionary urge of self-preservation is extinguished. A history of childhood sexual abuse is an example of a traumatic event that typically involves continual pain and fear. This process of habituation may be accelerated by pre-existing factors, such as temperament, impulsivity, and differences in pain tolerance levels (Bender, Gordon, Bresin, & Joiner, 2011; Witte et al., 2008). For instance, impulsive people tend to have a greater capability for suicidal activity. Bender and colleagues (2011) propose that this association is mediated by experiencing painful and provocative events. Still, Joiner (2009) is careful to point out that this habituation

process allows people the *capacity* to enact lethal self-injury, but they may not have the *desire* to do so.

Joiner's explanation of what constitutes suicidal desire is the presence of two interpersonally relevant states of mind: perceived burdensomeness and failed belongingness. Perceived burdensomeness is defined as a view that one's existence burdens family, friends, and/or society, such that the suicidal person erroneously believes that it would be easier on everyone if he or she were no longer living. Failed belongingness refers to the feelings of alienation from a group, such as a peer group, family, or society (Joiner, 2009). When people experience both perceived burdensomeness and failed belongingness, Joiner asserts that people have then acquired suicidal desires, such that they feel there is no purpose in living. What drives a person to eventually inflict lethal self-harm is the combination of the capacity and desire to do so.

Review of the literature indicates that direct tests of Joiner's three tenets (i.e., perceived burdensomeness, failed belongingness, and acquired capability for suicidal activity) have been studied in isolation and as a comprehensive model by many researchers. More evidence exists for the influence of perceived burdensomeness on suicidality (Joiner et al., 2002; Van Orden, Lynam, Hollar, & Joiner, 2006) than for failed belongingness (Conner, Britton, Sworts, & Joiner, 2007). Van Orden and colleagues (2008) found that greater levels of acquired capability were found among those with greater numbers of past attempts and that a history of painful experiences significantly predicted acquired capability scores. Likewise, the interaction between perceived burdensomeness and acquired capability predicted clinician-rated risk for suicidal activity. This theory has also been applied to varying subpopulations (e.g., military, physicians, prisoners), in efforts to study relevant conditions (e.g., sleep disorders; post-traumatic stress

disorder), and to integrate this theory with components of other theories (Davis, Witte, & Weathers, 2013; Pfeiffer et al., 2014). Joiner's theory provides solid theoretical underpinnings for developing suicide risk assessment tools due to the empirical evidence base and indicated variables of interest (e.g., past attempt history).

**Cognitive-behavioral model.** One's biological, interpersonal, and behavioral functioning are also influential aspects of Beck's cognitive-behavioral model (Alford & Beck, 1997; Beck, 1996); however, proponents of a cognitive-behavioral model assert the central pathway for suicidal activity is cognition (Alford & Beck, 1997). Beck's (1996) theory is built on the concept of a mode, which he defines as an organizational unit that contains schemas. Beck (1996) provides a description of how a suicidal mode is formed through an "integrated cognitive-affective-behavioral network that provides a synchronous response to external demands and provides a mechanism for implementing internal dictates and goals" (p. 4). Specifically, Beck (1996) contends that suicidal activity results from maladaptive construction of beliefs regarding the self, one's environment, and future endeavors (i.e., the cognitive triad). This cognitive triad is often described as a view of one's self as a failure, the world as a cruel and overwhelming place, and the future as hopeless. Beck and his contemporaries also contend that suicidal individuals integrate related conditional rules and compensatory strategies, known as the suicidal belief system, into the cognitive triad (Alford & Beck, 1997; Rudd, 2000). This belief system is characterized by themes of unlovability, helplessness, and poor distress tolerance.

Along with the cognitive system, Beck (1996) contends that one's affective and behavioral systems influence the likelihood of suicidal activity. Typically, the affective system produces various emotional states that function to reinforce adaptive behavior. Beck (1996) asserts that repeated negative affective experiences evoke negative emotional values which are

then generalized to similar circumstances. This generalization results in a heightened sensitivity, in turn, creating a lower threshold to activate the suicidal belief system. As this belief system is more readily cued by negatively valenced events, the biological system and the behavioral system (i.e., overt suicidal activity) are enacted simultaneously (Rudd, 2000). Proponents of Beck's model contend that it is the only model to include a conceptual framework that allows for direct clinical application of empirical findings across specific areas of functioning (i.e., cognitive, emotional, biological, behavioral, and interpersonal domains; Rudd, 2000).

Little empirical research exists regarding Beck's theory of suicide. However, Brown and others (2006) contend that, when Beck began developing this theory in the mid-1970s, inconsistency among terminology and lack of measurement tools thwarted empirical investigations. Still, many researchers have studied the effectiveness of cognitive-behavioral therapy (CBT) on reducing suicidal activity among individuals. Recent meta-analyses suggest that mounting evidence exists that CBT can reduce suicidal activity in the short term among adults (Tarrier, Taylor, & Gooding, 2008), but not necessarily among adolescent and young adult populations (Robinson, Hetrick, & Martin, 2011). Robinson and colleagues (2011) contend that the paucity of studies with these younger age groups coupled with limited treatment effects among existing studies suggests that more research is necessary to determine whether CBT is an effective intervention for reducing suicidal activity among adolescents and young adults. Although Beck's theory may help inform intervention work, the limited empirical research base is not conducive in discerning important aspects of suicidality or identifying at-risk individuals.

**Developmental perspective.** Although psychological difficulties and interpersonal relationships certainly influence one's suicidal activity, developmental theorists assert that suicide during adolescence and young adulthood results from difficulties related to identity

formation and poor coping skills throughout the pubescent and young adulthood stages of development. According to Erikson's (1959) developmental stages of psychosocial functioning, adolescents progress through a period of self-discovery in an attempt to resolve the "identity versus identity diffusion" crisis. This tumultuous period is marked by the physiological changes of puberty, new challenges, and unexpected stresses while attempting to create a sense of personal identity. Adolescents may also experience confusion, mood swings, impulsive behavior, and an overall sense of discomfort (Erikson, 1968). If adolescents are unable to cope with the challenging task of creating a personal identity, research supports that these adolescents may be more susceptible to greater levels of inner confusion, agitation, dissatisfaction, and unhappiness (Everall, Bostik, & Paulson, 2005). Therefore, adolescents with identity confusion may be less able to successfully cope with the impending challenges of young adulthood, putting them at risk for engaging in suicidal behaviors.

The transition to young adulthood is also considered to be a high risk period of time as it often coincides with entry into a higher education setting. College students often leave their social support network, thereby experiencing changes in familial relationships and peer groups (Westefeld et al., 2006). Erikson (1968) reminds us that identity formation (i.e., progression in adopting adult roles) is linked with one's ability to form intimate relationships. However, as students have more autonomy in the college setting, there are more opportunities to engage in health risk behaviors, such as alcohol use (Arnett, 2005) and sexual risk behaviors (e.g., casual sex, inconsistent condom use; Bailey, Haggerty, White & Catalano, 2011), which may further complicate this task. Importantly, the incidence of psychiatric disorders (e.g., mood disorders) also increases during this developmental period (Kessler et al., 2005). Failure to secure intimate

relationships and the onset of undiagnosed psychiatric disorder may lead to feelings of unhappiness and isolation, which are important suicide risk factors.

No evidence currently exists that directly tests Erikson's theory. Instead, researchers have investigated individual and social risk factors that influence the developmental transition from adolescence to young adulthood (e.g., self-esteem, family conflict, social connectedness; Hooven, Snedker, & Thompson, 2012). In studying developmental trajectories, research suggests that those at risk during adolescence are more likely to be at risk during young adulthood, compared to those not at risk for suicidal activity (Schulenberg & Zarrett, 2006). Although this trend seems intuitive, researchers have also found that suicide risk can be mitigated by one's achievement of new goals, such as job attainment, romantic involvement, and sense of citizenship (Hooven et al., 2012). As theory is used to drive empirical research, Erikson's theory does not have a strong evidence base and, therefore, is not an ideal choice to support research efforts to identify at-risk individuals.

The aforementioned theories attempt to explain and account for some risk factors associated with suicide. These theories provide clues as to what factors are essential to include when developing a new method of suicide risk identification. Recent review of the literature indicates that serotonergic dysfunction, psychiatric disorders, previous suicide attempts, social isolation, hopelessness, family conflict, and low educational attainment have the most robust support for associations with suicide (Nock et al., 2008). Yet, major limitations of this literature base make the process of detecting suicidal activity extremely difficult. The first limitation is that no comprehensive theoretical model of suicide currently exists that accounts for all of risk factors. Secondly, use of inconsistent nomenclature (e.g., suicidal ideation, suicidal threat, suicidal gestures) among researchers (Silverman et al., 2007a) provides further challenge to

analyze and communicate study findings. Likewise, limited evaluation research of prevention programs brings into question the effectiveness of current prevention efforts. As theoretical models, consistent terminology, and ongoing evaluation research are necessary in developing evidence-based practices, the current research base likely explains the paucity of *effective* suicide prevention programs.

**A Model for Suicide Prevention in Educational Institutions**

According to the CDC's School Health Policies and Programs Study, nearly 80% of U.S. high school systems require suicide prevention programming (Kann, Telljohann, & Wooley, 2007). In addition, as authorized under the Garrett Lee Smith Memorial Act, the Substance Abuse and Mental Health Services Administration (SAMHSA) has provided over $20 million in grant funding for college campus prevention efforts since 2004 (Goldston et al., 2010). While secondary and post-secondary educational institutions work to implement suicide prevention programs, it remains unclear whether present programs effectively identify those at risk of engaging in suicidal behaviors (Miller et al., 2009; Schwartz & Friedman, 2009). Theoretically-based, empirically validated prevention programs are few in number and educational institutions are given little guidance on how to implement, sustain, and evaluate these prevention programs (Miller et al., 2009; Schwartz & Friedman, 2009).

It is essential to identify a hierarchy of student risk and implement different response strategies for each identified level of risk (Peña & Caine, 2006). Thus, most suicide prevention efforts are organized by the tiered classification system that has been adopted by Caplan's (1964) public health model and later tailored specifically to intervention work by Gordon (1983). The foundation, or primary, level of prevention is designed to prevent problems from emerging and, thus, universal strategies are applied to the entire educational institution. The secondary level of

prevention intervention attempts to reverse harm from exposure to known risk factors (e.g., health risk behaviors). A selected group of students are identified for this targeted level of support (Miller & Eckert, 2009). These students may receive individual- or group-based intervention services. The tertiary level of prevention is designed to reduce harm among the most severely involved students. Individualized, comprehensive interventions are often designed for students with chronic problems (e.g., history of multiple suicide attempts). These interventions necessitate continual collaboration with community providers as school-based personnel typically do not receive training to provide such intensive services (Miller & Eckert, 2009), and suicidal college students often do not seek out help from trained university-level counselors (Drum & Denmark, 2009). In addition, suicide postvention has become a logical outgrowth of prevention work, implemented as a reactive method in conjunction with or in lieu of the previously mentioned preventive measures. Suicide postvention is typically defined as a series of activities that are implemented after a suicide occurs (Miller, 2011). The following sections provide a brief description of present methods of suicide prevention. Feasibility, acceptability, and effectiveness research are noted, when available.

**Universal Strategies**

**Curriculum-based programs.** Curriculum-based programming is considered the most popular or commonly applied suicide prevention program in educational settings (Berman et al., 2006; Scherff, et al., 2005). These programs are designed to increase students' understanding and awareness of suicidal activity while instructing students about the importance of symptom identification and promotion of adaptive attitudes (i.e. attitudes which can be expected to contribute to the prevention of suicidal behavior; Aseltine & DeMartino, 2004; Portzky & van Heeringen, 2006). Curriculum-based programs are typically incorporated into the health

education curriculum (Miller et al., 2009) or through institutional websites, social media, and counseling centers (Manning & VanDeusen, 2011; McCarthy & Salotti, 2006). Many colleges have taken a more targeted route to suicide prevention education by involving student leaders of groups formed around racial and ethnic identity, sexual orientation, or gender expression for cross-campus collaboration work (Drum & Denmark, 2009). Although a screening component is not commonly included in curriculum-based programs (e.g., Care, Assess, Respond, Empower [CARE]; Randell, Eggert, & Pike, 2001), the Signs of Suicide (SOS) program includes a self-scored, brief depression screening instrument known as the Columbia Depression Scale (Aseltine & DeMartino, 2004).

Even though curriculum-based programs are considered the most feasible suicide prevention program to implement, efficacy results remain mixed (Gould & Kramer, 2001). Research indicates curriculum-based programs can increase awareness and knowledge about suicidal activity as well as adaptive attitudes (Ciffone, 2007; Cigularov, Chen, Thurber, & Stallones, 2008). Yet, in a controlled study of a school-based prevention program, Portsky and van Heeringen (2006) reported that the program had no effect on students' adaptive attitudes toward suicidal activity in others, ability to cope, or sense of hopelessness. Other drawbacks have been noted; changes in help-seeking behavior have not been consistently noted in evaluation research (Klimes-Dougan, Klingbeil, & Meller, 2013). Also, the conceptual and empirical base of most programs incorporates the stress-model (Garland, Shaffer , & Whittle, 1989), which is contrary to scientifically supported views that suicide is a consequence of a dynamic interplay between psychological, biological, social, and psychiatric factors (Portzky & van Heeringen, 2006). Although curriculum-based programming may increase knowledge and attitudes, there is little research to suggest change in students' affective states and behaviors

related to suicidal activity (Cooper & Clements, 2011). Likewise, very few programs measure suicidal activity as an outcome measure and even fewer programs have demonstrated empirical effectiveness in reducing suicide rates (Hallfors et al., 2006). It appears education alone is not sufficient to provide behavior changes necessary for suicide prevention efforts. Moreover, many curriculum programs lack systematic identification of at-risk students (e.g., screening procedures).

**Means restriction.** Means restriction, or the limitation of lethal methods used for suicide, is considered one of the most effective suicide prevention methods (Daigle, 2005; Mann et al., 2005). There are many different approaches to this type of prevention work, including restricting access to means (e.g., bridge barriers) and strategies to encourage help-seeking (e.g., signs, crisis emergency telephones; Yip et al., 2012). A third approach is to increase the likelihood of intervention by a third party, such as training staff working near a 'suicide hotspot' (Cox et al., 2013). A 'suicide hotspot' is defined as a "specific, accessible and usually public site which is frequently used as a location for suicide and gains a reputation as such" (pg. 1; Cox et al., 2013). The fourth approach involves encouraging responsible media reporting of suicide via guidelines for journalists (Cox et al., 2013; Yip et al., 2012). Individual- and population-level studies suggest that at-risk individuals are less likely to attempt suicide when their preferred method is unavailable or, when delayed, a less lethal method is selected (e.g., drug overdose; Daigle, 2005).

Considering that firearms account for nearly half (i.e., 44.5%) of suicides for adolescents and young adults (CDC, 2011), restriction of firearms is especially important when considering universal strategies of suicide prevention methods. Multiple studies of various types (i.e., psychological autopsy, ecologic, case control studies) have found that firearm access is a risk

factor for suicide in the U.S. (Brent & Bridge, 2003; Miller, Barber, Azrael, Hemenway, & Molnar, 2009). However, individuals who possess firearms are *not* more likely than others to have a psychiatric disorder or have attempted suicide (Miller et al., 2009); the risk is greater among this population because attempters are more likely to die than those who use less lethal methods (Betz, Barber, & Miller, 2011; Miller et al., 2009). Congress introduced the Gun-Free School Act in 1994, which encouraged each state receiving federal funds for education to introduce "zero tolerance" laws to decrease weapons violence in secondary schools (1994). More recently, restrictive weapons policies have increased across college campuses in light of the national tragedies at Virginia Tech and Northern Illinois University. Similarly, more state legislative efforts are being implemented (i.e., stricter gun control laws) in response to growing gun violence at educational institutions (Swanson, 2013). For instance, the New York Secure Ammunition and Firearms Enforcement Act of 2013 was passed less than two months after the Sandy Hook Elementary tragedy (Nahmias, 2013).

Although means restriction prevention methods have been consistently supported at national and international levels (e.g., U.S. Department of HHS Office of the Surgeon General and National Action Alliance for Suicide Prevention, 2012; World Health Organization (WHO), 2012), many barriers impede these efforts. For instance, there are no Child Access Prevention (CAP) laws at the federal level (Law Center to Prevent Gun Violence; LCPGV, 2013). According to LCPGV (2013), CAP laws “impose criminal liability on adults who negligently leave firearms accessible to children or otherwise allow children access to firearms” (p. 1). Twenty-seven states and the District of Columbia have CAP laws in place, although only fourteen of these state laws are based on negligent storage laws (i.e., imposing criminal liability when a minor gains access to a firearm that is negligently stored; LCPGV, 2013). Only the

District of Columbia and the state of Massachusetts require that firearms are stored in locked devices (LCPGV, 2013). This is an important distinction as Grossman and colleagues' (2005) case-control study indicated that case firearms (those used in an incident where a youth under age 20 accessed a gun and shot him or herself intentionally or unintentionally) were less likely to be stored locked, unloaded, separate from ammunition, or with locked ammunition, than control firearms.

Means restriction methods are also limited due to current evaluation research (Cox et al., 2013). Cox and colleagues completed a meta-analysis to evaluate the effectiveness of the aforementioned approaches to means restriction. The strongest evidence base exists for the implementation of physical barriers to suicide hotspots (Cox et al., 2013). In fact, research suggests that suicide rates increased when barriers were removed (Beautrais, 2001; Beautrais, Gibb, Fergusson, Horwood, & Larkin, 2009). Seven of the nine studies were able to confirm that suicide rates remained the same or decreased in alternative suicide hotspots, providing further evidence against the means substitution myth (i.e., that a suicide attempt is a foregone conclusion for actively suicidal people; Cox et al., 2013). Still, evidence for the remaining three approaches is very limited at this time. Lastly, means restriction efforts have no logical connection to screening those at-risk.

**Selective or Targeted Strategies**

**Gatekeeper training.** Cited as one of the most acceptable methods of suicide prevention by academic personnel (Eckert, Miller, DuPaul, & Riley-Tillman, 2003; Scherff et al., 2005; Tompkins, Witt, & Abraibesh, 2010), gatekeeper training programs are designed with the logic that certain employees (e.g., faculty & staff, peer Resident Advisors [RAs]) are often in the position to be among the first to detect signs of suicidal activity and offer assistance. Although

the protocol varies from program to program, training sessions typically address knowledge, attitudes, and skills related to suicidal activity. These in-service training sessions are intended to increase knowledge of risk factors and warning signs of suicidal intentions. In order to intervene with suicidal students, attitudes about suicide are addressed with trainees. Sessions may include training on how to appropriately question at-risk students and raise student awareness of referral protocols (Isaac et al., 2009). An alternative approach to gatekeeper training is to focus time and resources on select personnel that assume the natural gatekeeper role prior to any training.

Although academic personnel find gatekeeper training to be an acceptable method of suicide prevention, research indicates that effectiveness of such methods is questionable (Berman et al., 2006; Isaac et al., 2009; Wyman et al., 2008). Isaac and colleagues (2009) reviewed the current evidence on gatekeeper training and found support that school-based training increases the knowledge, skills, and attitudes of trainees (see Keller et al., 2009; King & Smith, 2000). However, a study by Wyman and colleagues (2008) indicates that gatekeeper training does not increase willingness of academic personnel to assume the gatekeeper role. That is, trained personnel were no more likely to engage with suicidal students or to initiate appropriate referrals post-training. Although increasing awareness and information about suicide for academic personnel is commendable and potentially beneficial for at-risk students, research suggests it does not directly translate into more open communication between academic personnel and at-risk students. Similarly, there is a dearth of studies about the effectiveness of school-based gatekeeper programs in decreasing rates of suicidal ideation, attempts, or deaths by suicide (Isaac et al., 2009).

Given that students are more likely to talk to their peers than to staff about suicidal activity, some researchers suggest that educational institutions adopt peer gatekeeper training

programs (Stuart, Waalen, & Haelstromm, 2003; Walker, Ashby, Hoskins, & Greene, 2009; Wyman et al., 2010). Peer gatekeeper training programs are designed with the logic that suicidal behavior is associated with social connectedness and norms. The Sources of Strength (LoMurray, 2005) school-based prevention program was utilized in a group-randomized trial of eighteen metropolitan and rural high schools to elucidate the role of peer leaders in suicide prevention work. Specifically, Wyman and colleagues (2010) found that training improved the peer leaders' adaptive norms regarding suicide, their connectedness to adults, and their school engagement. In fact, trained peer leaders were four times more likely than untrained peer leaders to refer a suicidal friend to an adult. Among the student population, the intervention increased perceptions of adult support for suicidal youth and acceptability of seeking help. Importantly, perception of adult support increased most in students with a history of suicidal ideation (Wyman et al., 2010).

The evidence for effective peer gatekeeper programs among the college population is limited, however. In a study involving RAs as gatekeepers, Tompkins and Witt (2009) found that RAs' appraisals of preparation, efficacy, and intentions to perform the gatekeeper role improved following gatekeeper training. Importantly, these improvements did *not* result in a sizeable behavior change (e.g., asking about suicidal thoughts, convincing a peer to seek help, escorting them to a counselor; Tompkins & Witt, 2009). In efforts to increase behavior change among gatekeepers, Pasco and colleagues (2012) implemented an RA gatekeeper training program called Campus Connect, which incorporates active and experiential-based learning exercises rather than solely didactic learning. Evaluation results indicated that, compared to didactic training alone, experiential gatekeeper training resulted in improved crisis response skills (e.g., relationship skills, collaborative engagement, & empathic listening skills) and self-efficacy (Pasco, Wallack, Sartin, & Dayton, 2012). Gatekeeper training may be an effective method of

suicide prevention if changes in norms and students' perceptions are altered to increase acceptability of peer, faculty, and staff support for suicidal students. Still, the time-sensitive nature of suicidal activity needs a short-term prevention method while norms and perceptions are altered over a longer period of time. Likewise, although some at-risk students may be noticed and helped, many others may go undetected (e.g., students who live off-campus; part-time students). This suggests the need for a more universal screening effort. In addition, even those connected to a support network may continue to be at risk, suggesting the need for a way to monitor these at-risk individuals over time.

**Screening programs.** Although screening programs are typically administered to a large population, Miller and colleagues (2009) assert that screening programs are generally considered to be selective programs "because their purpose is to identify and intervene with high-risk individuals" (p. 171). Suicide screening programs are defined as the integration of a screening instrument designed to identify suicide risk within a population and the subsequent reactionary procedures (Peña & Caine, 2006). That is, suicide screening programs typically consist of a 3-stage process in which all students complete a self-report screening measure. If students' responses indicate that they may be at risk of engaging in suicidal behaviors based on cutoff scores, selected personnel then follow up with the identified individuals for an in-depth interview. Finally, referrals to campus and community treatment programs are communicated to the student and caregivers, when necessary (Shaffer & Craft, 1999; Taub & Thompson, 2013). In general, suicide screening programs are designed to identify the at-risk population while attempting to minimize false positives, or screen-positive individuals who are not at-risk, and false negatives, or screen-negative individuals who actually are at-risk for engaging in suicidal behavior.

The direct approach of asking students about their thoughts and behaviors in the form of confidential, self-report surveys has proven to be much more efficient and effective in identifying and intervening with suicidal students when compared to the aforementioned approaches to suicide prevention (Eckert, Miller, Riley-Tillman, & DuPaul, 2006; Shaffer & Craft, 1999). In fact, the American Foundation for Suicide Prevention has developed a web-based screening program for the college population (Garlow et al., 2008; Haas et al., 2008). Yet, some educational systems remain hesitant to implement efficacious screening programs for fear that increased discussion about suicide will lead to increased rates of suicidal behavior (Kalafat, 2003). As mentioned previously, Gould and colleagues (2005) found no evidence of adverse, or iatrogenic (i.e., increased suicidal behaviors), effects resulting from suicide screening. Administrators contest that screening programs are expensive to implement as it can be costly to train personnel, purchase screening measures, and finance data management (Scherff et al., 2005). The amount of support needed to implement a screening program is generally not specified, but minimal preparation would logically include: employment of at least a site coordinator, clinician, or case manager to coordinate implementation, a tiered response (i.e., screening, follow-up interviews, referral system), and data management. The SOS program provides a conservative estimate of time (i.e., at least 2 weeks) needed to implement the school-wide prevention program (www.mentalhealthscreening.org/programs/youth-prevention-programs/sos/faqs.aspx). Considering that this period of time must include training material review, selection and orientation of team members, as well as drafting an implementation plan, this time frame seems unrealistic given the competing list of task demands for educational institutions.

Similarly, the initial screening process could identify at least 6% to 10% of students in secondary and post-secondary schools given the national prevalence rates (ACHA-NCHA II, 2013; CDC, 2012). Dependent on the size of the educational institution, staff would be charged with conducting follow-up interviews with a very large number of students. Another indicator that screening programs may be burdensome to implement is due to a shortage of personnel trained to administer follow-up services (e.g., individual interviews, referral to campus and community resources; Drum & Denmark, 2009; Hallfors et al., 2006). Additionally, research by Garrison and colleagues (1991) indicate that the correlation between suicide ideation scores from one year to the next was low (only $r = .35$), suggesting that a single screening score may not be indicative of symptomology over a longer period of time. Therefore, educational institutions would need to employ continual support to implement multiple screening efforts over the school year. Educational institutions may consider partnering with local health departments, health clinics, or mental health agencies to conduct periodic screenings to alleviate burdens related to personnel shortages and time constraints (Hallfors et al., 2006).

Lastly, screening programs alone offer no direct or indirect prevention mechanisms (Ciffone, 2007). Suicide screening programs of any type must be tied to an adequate referral system in order to provide assistance to identified at-risk students. Similarly, screening program development should include mobile crisis teams with detailed response plans as well as ongoing service coordination with community providers (Peña & Caine, 2006). Access to support services must be immediate but accessible on a continual basis, as some suicide risk factors, such as mental health conditions or substance abuse issues, cannot be ameliorated with a single treatment session. One strategy in providing resources and support for these at-risk students is known as crisis intervention, an indicated or individualized strategy described below.

## Indicated or Individualized Strategies

**Crisis intervention.** Crisis intervention services are generally reserved for students already identified with mental health concerns or diagnoses; typically at the extreme end of suicide risk (Drum, et al., 2009). Crisis intervention services are typically implemented when a student discloses suicidal activity or a third party voices concern. In the educational setting, trained staff members (e.g., psychologist or counselor) complete a suicide risk assessment, contact caregivers if the student is under 18 years of age, and, dependent on the risk level, coordinate contact with emergency therapeutic services. In the college setting, suicidal students are typically referred to a crisis hotline or the campus counseling center. In efforts to prevent student deaths by suicide and potential legal ramifications, some universities have implemented mandated counseling following a student suicide threat (Westefeld et al., 2006). For instance, the University of Illinois at Urbana-Champaign (UIUC) created a prevention program which required that a student participate in four counseling sessions following reported suicidal activity, with a comprehensive assessment occurring within one week of incident or hospital release (UIUC, 2012). If the student fails to comply with the counseling sessions, they are referred to the Dean of Students and may face penalties, such as disciplinary action, suspension, or withdrawal (Westefeld et al, 2006). Effectiveness research indicates that UIUC's prevention program is quite a success considering that, of the 18 years in existence, no subsequent suicides of the 1,531 student participants have been documented. In fact, the overall campus suicide rate has decreased by 55% since the inception of this program (Westefeld et al., 2006).

Although crisis intervention methods can provide immediate action for suicidal students, it is a reactive, not proactive approach to suicide prevention. Suicidal students must be identified in some manner, making this narrow, individualized focus dependent upon a school- or campus-

wide screening system. Similarly, most suicidal students do not seek professional help on their own (Drum et al., 2009). In fact, numerous studies suggest that nearly 80% of those who die by suicide never received campus mental health services (Gallagher, 2004; Kisch, Leino, & Silverman, 2005; Schwartz, 2006). When considering students under the age of 18, it further complicates matters that caregivers have the right to refuse emergency services or follow-up care.

**Means-restriction counseling.** Means-restriction (MR) counseling, not to be confused with the aforementioned term, is typically defined as a process in which the mental health provider educates at-risk individuals and supportive others, such as caregivers or peers, about the risks associated with availability of lethal means (Bryan, Stone, & Rudd, 2011). The mental health provider subsequently assists them in developing a plan to limit the at-risk individual's access to lethal means. Current research indicates that MR counseling is typically provided in emergency departments (ED) by physicians, nurses (Betz, et al., 2013), or community-based mental health providers (Johnson, Frank, Ciocca, & Barber, 2011), such as psychiatrists (Price, Kinnison, Dake, Thompson, & Price, 2007) and social workers (Slovak & Brewer, 2010). There is a strong evidence base for the effectiveness of MR counseling. McManus and colleagues (1997) found that, of those caregivers who received MR counseling in the ED, 86% reported locking up firearms or disposing of medications, as compared to 32% of caregivers who did not receive counseling. This effect was seen across potential methods of suicide as well, including prescription medication (75% vs. 48%), over-the-counter medications (48% vs. 22%), alcohol (47% vs. 11%), and firearms (63% vs. 0%; Kruesi et al., 1999). In fact, results of these studies and others led to the inclusion of ED means-restriction education programs in the National Registry of Evidence-Based Programs and Practices (NREPP) of SAMHSA (Betz et al., 2013).

Yet, multiple studies indicate that providers are not consistently offering MR counseling to at-risk individuals and families despite direct care provision to this vulnerable population (Bryan et al., 2011). For instance, results from Grossman and colleagues' (2003) work indicated that only 28% of ED nurses reported providing MR counseling to caregivers although 80% of this sample indicated direct care provision for an adolescent who had attempted suicide in the previous six months. Likewise, Betz and colleagues (2013) found that 49% of ED physicians and 72% of ED nurses "hardly ever" personally counseled at-risk individuals or families on firearm safety. Why do so few health providers implement this effective prevention strategy? In addition to limited training, many providers cite the myth of means substitution (i.e., "suicide is not preventable because they would have died by another available method;" Bryan et al., 2011). Yet, research indicates that 90% of first-time attempters do not eventually die by suicide (Owens, Horrucks, & House, 2002) and means substitution is not likely as most attempters have a preferred method and generally do not switch methods (Daigle, 2005). Mental health providers tend to have inaccurate perceptions about the effectiveness of MR counseling as well (Price et al., 2007). Not surprisingly, Price and colleagues (2007) indicated that clinicians who view MR counseling to be ineffective were five times less likely to provide these services.

**Postvention**

Although postvention is often not considered a preventive measure because it is instituted in the wake of a student suicide, some educational institutions have adopted this approach because research suggests that providing timely assessment and support to survivors may reduce the probability that survivors will develop psychological disorders or die by suicide themselves (Aguirre & Slater, 2010; Andriessen, 2009; Callahan, 1996; Feigelman & Gorman, 2008). Survivors are considered family members, significant others, or acquaintances who have

experienced the loss of a loved one (Reed, 2006). Much like protocols are devised for natural disasters, crisis management teams are often charged with the responsibility of detailing a clearly written plan for postvention work. Researchers indicate that an organized, systematic response following a student's suicide should involve the following steps: 1) inform and prepare staff, 2) ethically and efficiently disseminate information to students, 3) assess risk, 4) determine appropriate services, 5) inform caregivers if required due to student's age , 6) and follow-up (Capuzzi, 2009; Maples et al., 2005). Aguirre and Slater (2010) cite two strategies to link survivors to postvention services. The traditional model places the responsibility on the survivor to seek a provider. The active model involves service providers actively seeking out survivors to help them manage expectations for the future and educate them on where they can go for support. Although the active model is less commonly used, the comparative impact is astounding. In the active model, there is an estimated one month between contact and the survivor receiving services as compared to the estimated average of four and a half years for survivors exposed to the passive model (Aguirre & Slater, 2010; Campbell, Cataldie, McIntosh, & Millet, 2004). This finding is especially important given that suicidal students typically do not seek professional help on their own (Drum et al., 2009).

As mentioned previously, the research base for postvention services is in its infancy. For instance, appropriate outcome variables have yet to be determined (e.g., measures of adjustment or psychopathology, suicidal ideation, or strength of social support networks). In any case, baseline measures are often nonexistent and measurements after suicide are susceptible to retrospective recall bias. It is also unclear whether all students should be studied, or just those deemed at risk (Callahan, 1996). Despite this uncertainty, one of the most commonly available and suggested forms of postvention activities is the creation of community survivor support

groups (Reed, 2006) as the limited research base suggests preliminary effectiveness (Farberow, 1992; Rogers, Sheldon, Barwick, Letofsky, & Lancee, 1982). Although school systems may cite grief counseling groups (e.g., KinderMourn) as analogous to survivor support groups, research suggests that suicide bereavement may be qualitatively different due to feelings of guilt, shame, rejection, self-blame, and social stigma (Andriessen, 2009). Aguirre & Slater (2010) cite that suicide survivors find postvention efforts to be effective because it allows survivors to communicate their grief within the presence of a supportive network. However, of the few randomized controlled trials that have been conducted on survivor support groups, results suggest that the key to effectiveness hinges on the individual's ties with the support group (Leenaars & Leenaars, 2009). That is, debriefing with strangers has shown no efficacy or, in some cases, negative effects such as increased PTSD symptoms in long-term follow-studies (Barlow, 2010). It has been suggested that debriefing with strangers can impede the normal developmental processes, such as relying on one's own support network following a traumatic incident (Leenaars & Leenaars, 2009).

Despite limited research on effectiveness, acceptability, and feasibility of postvention work, it is likely that these techniques will continue to be implemented in educational institutions due to its face validity. Face validity is important when considering that educational institutions may be more likely to implement an intervention that is deemed appropriate, regardless of the evidence base. More related to this study, an important postvention response strategy includes the screening and monitoring of high-risk individuals (Cox et al., 2012; Manning, 2009).

**Identification of Specific Evidence-Based Prevention Programs**

Educational administrators may rely on face validity as a rationale for adopting a suicide prevention program because there is little evaluation research on all prevention program

effectiveness (Gould, Greenberg, Velting, & Shaffer, 2003; Rodgers, Sudak, Silverman & Litts, 2007). Additionally, administrators may find it difficult to efficiently synthesize and critique program evaluations from various sources of information. Fortunately, the Evidence-Based Practices Project (EBPP) for suicide prevention programs was created in 2002 to provide a system of evaluation. In 2005, the responsibility of evaluating suicide prevention program effectiveness was transferred to the SAMHSA, which developed the NREPP (Rodgers et al., 2007).

Only two empirically-based suicide prevention programs were listed on the NREPP website for the general college population (http://nrepp.samhsa.gov/). The Question, Persuade, and Refer (QPR) Gatekeeper Training for Suicide Prevention focused solely on forming a supportive network among the American Indian student population, community tribal leaders, and university program staff, thus, limiting its generalizability to the larger student population (Muehlenkamp, Marrone, Gray, & Brown, 2009). Secondly, the Kognito At-Risk for College Students is a 30-minute, online, interactive training simulation for peer gatekeepers, such as student leaders and RAs, on college campuses (Albright, Himmel, Goldman, & Shockley, 2011). Results indicated that students in the self-selected intervention group felt more prepared to recognize, approach, and refer those students who appeared to be in psychological distress and were more willing to seek out mental health services for themselves compared to the control group (Albright et al., 2011). However, gatekeeper training programs do not provide a systematic approach to identify or monitor at-risk individuals.

Of the eight school-based suicide prevention programs listed to target at-risk adolescents, the majority of these programs are not amenable to school-wide implementation. Selected programs are limited to American Indian populations (American Indian Life Skills Development;

LaFromboise, & Lewis, 2008), adolescents in out-of-home placements, such as psychiatric treatment centers, (Multisystemic Therapy with Psychiatric Supports; Huey et al., 2004), one-on-one (CARE; Eggert, Thompson, Herting, & Nicholas, 1995), small-group format (Coping and Support Training; Eggert, Thompson, Randell, & Pike, 2002), or for adolescents deemed at risk of dropping out with concurrent poor school achievement (Reconnecting Youth; Thompson, Eggert, & Herting, 2000). Three programs remain: The Lifelines Curriculum involves a hybrid of gatekeeper training and curriculum-based programming, (Kalafat, Madden, Haley, & O' Halloran, 2007) while the SOS prevention program incorporates curriculum-based programming along with a screening system (Aseltine & DeMartino, 2004). For thirteen years, Columbia University's TeenScreen Program utilized a screening system with brief clinical interviews (Shaffer et al., 2004) until the program abruptly shut down in December 2012 (TeenScreen National Center for Mental Health Checkups, 2012) due to allegations that TeenScreen was being utilized as a recruitment tool for the pharmaceutical industry (Lenzer, 2012).

As stated previously, curriculum-based programming and gatekeeper training programs do not provide a systematic approach to identifying, assessing, and monitoring those at-risk for suicidal activity. Screening programs that incorporate a multi-stage referral system can provide the necessary information to prevent suicidal activity among at-risk individuals. Still, the effectiveness of screening programs largely hinge on the selected assessment instrument.

**Assessment of Suicide Risk**

The use of standardized assessment instruments, such as self-report questionnaires, can provide a systematic means of selecting samples and provide outcome measures with which to gauge the effectiveness of suicide prevention programs (Goldston, 2003). There are many formats to choose from, including structured and semi-structured psychiatric diagnostic

interviews, clinician-rated indices, self-report scales, and behavior checklists. Likewise, there are several aspects of suicidal activity to investigate, such as ideation and behaviors. Given that some educational institutions have limited resources to carry out prevention programs (Mazza, 1997; Metha, Weber, & Webb, 1998; Shaffer, Garland, Gould, Fisher, & Trautman, 1988), it is essential that an efficient, feasible, and cost-effective detection method be selected for screening purposes. Therefore, psychiatric diagnostic interviews and clinician-rated indices are not appropriate for such purposes as they require an initial individualized approach and specialized consultants, respectively. Similarly, caregiver- or instructor-rated behavior checklists are not optimal measures as research indicates that students are more likely to honestly respond to sensitive questions (e.g., suicidal activity) in a confidential, self-report format (Joe & Bryant, 2007; Miller & DuPaul, 1996) without causing significant distress to the rater (Langhinrichsen-Rohling, Arata, O'Brien, Bowers, & Klibert, 2006). Among self-report scales, those instruments designed to assess for a broad range of behavioral problems, known as broad-band instruments, negate the targeted approach of suicide prevention and necessitate a complex data management system. Narrow-band instruments, or those designed with a small number of items dedicated to the assessment of suicidal activity, provide educational institutions with the ability to quickly screen for the presence and severity of suicidal activity among the student population. However, as one's suicidal risk may change over time (Garrison, Addy, Jackson, McKeown, & Waller 1991; Schulenberg & Zarrett, 2006), it is important to consider whether a summative or formative approach to risk assessment is most appropriate.

**Suicide risk assessment: Summative versus formative measurement.** Generally, there are two types of assessment utilized in educational settings, summative and formative assessment. Summative assessment is defined as any assessment activity resulting in a mark or

grade which is subsequently used as a judgment on student performance or behavior (Pellegrino, Chudowsky, & Glaser, 2001). Summative assessment can be used to inform some type of selection process at the end of a specified period of time, such as invitation to an honors society or eligibility for special education services. Although summative assessment can be effectively used for decision-making purposes that are not time-sensitive, it is not suitable when time-sensitive decisions must be made, such as in the case of suicide risk assessment. No information is provided on students' development over time. Similarly, summative assessment provides only a snapshot of information, which does not provide an indication of the type of interventions needed to ameliorate areas of concern (Pellegrino et al., 2001). The summative approach is not appropriate for suicide risk assessment as it does not provide insight in to the variability of suicidal activity over time, both student-specific and among the student population.

Formative assessment, on the other hand, allows for continued evaluation as it is commonly defined as a reflective process due to the corresponding feedback (e.g., increasing self-awareness of risk status due to frequent assessment). Within the context of educational research, formative assessment is considered far superior in terms of student performance. Marzano's (2006) succinct comparison of the two approaches elucidates this fact.

> Recall the finding from Black and Wiliam's (1998) synthesis of more than 250 studies that formative assessments, as opposed to summative ones, produce the more powerful effect on student learning. In his review of the research, Terrance Crooks (1988) reports that effect sizes for summative assessments are consistently lower than effect sizes for formative assessments. In short, it is formative assessment that has a strong research base supporting its impact on learning. (p. 9)

Just as educators utilize formative assessment measures to inform their instructional decisions, administrators can utilize a formative measure for suicide risk assessment to increase the efficiency of their referral system. If screening measures are used annually or semi-annually, there is little opportunity to measure risk amongst those already identified or identify newly at-

risk individuals. Formative risk assessments allow for on-going monitoring and can be utilized to evaluate the effects of specific interventions (e.g., survivor support groups, sessions with the mental health care provider). Formative measurement informs responsible parties (e.g., administrators) or concerned loved ones of increasing suicidal activity or, better yet, of decreasing suicidal activity, which can also inform treatment plans. Similarly, formative assessment can be a powerful self-monitoring tool as frequent feedback has been linked to behavior change (Clum & Curtin, 1993). It provides a mechanism for systematic feedback to the student regarding behaviors and risk status over time. The self-monitoring aspect of formative assessment may provide a sense of control and increased awareness of escalating risk status for student clients (see Nicol & Macfarlane-Dick, 2007 for a review).

Formative suicide risk assessment is a necessary, but not sufficient, component of suicide prevention. Such assessments can provide some prediction of future behaviors or skill attainment but cannot explain *why* these behaviors occur or *how* to alleviate the students' distress. Similarly, if the feedback is not tied to goals or methods of intervention, then the students may not find the feedback helpful or even informative. Within the realm of suicide risk assessment, it is essential that at-risk individuals are provided support and evidence-based interventions immediately as well as continuous monitoring. This combination will enhance the effectiveness of suicide prevention programming.

**The missing link: Formative suicide risk assessment.** In addition to the time-sensitive and potential lethal ramifications of infrequent suicide risk assessment, a formative method of assessment is needed to link suicide theory and necessary intervention practices. A search of the literature base found no formative measures of suicide risk. It is likely that no formative measures currently exist because of the schism between traditional psychological measurement

and behavioral assessment (i.e., state vs. trait argument about suicidal activity). Logically, some researchers may argue that suicidal activity is best measured in a summative manner due to presumably stable personality, or trait, characteristics, such as abnormalities in serotonin systems, temperament, or poor identity formation. Trait characteristics are assumed to be stable across situations and resistant to environmental influence (Meier, 1994). Studies about personality characteristics and suicidal behaviors have investigated a broad array of factors, such as neuroticism, extroversion, impulsivity, aggression, hostility, self-criticism, perfectionism, and psychoticism (e.g., Brezo, Paris, & Turecki, 2006; O'Connor, 2007). On a similar note, there is strong evidence suggesting that suicide is highly correlated with the presence of psychological disorders (e.g., depression), which can frequently be chronic and persist throughout development if not properly treated (Shaffer et al., 1988).

On the other hand, social and behavioral psychologists purport that great inconsistency occurs between identified traits and actual behaviors exhibited by individuals (Mischel, 1984). Behaviorists argue that psychological phenomena are not real unless behaviors can be operationally defined or directly observable. This poses a problem as much of suicidal activity is not entirely observable, unless verbalized to others (e.g., ideation, intention), and common nomenclature does not exist (Berman, et al., 2006). Still, researchers have argued that personality traits studied within suicidology, such as impulsivity and perfectionism, are not operationally defined (Rogers & Lester, 2010). That is, research studies provide working definitions of these constructs from various theoretical approaches; thus, there is limited consensus regarding operational definitions (Rogers & Lester, 2010). Mischel (1968) contends that personality traits are unstable and have a smaller influence on actual behaviors than environmental context. Behaviorists assert that psychological phenomena are best measured by selected behaviors in

specific situations rather than attempting to measure underlying psychological processes (Silva, 1993). Importantly, measuring current behavior as a means of predicting future behavior is extremely relevant to suicide risk assessment as past suicide attempts is a highly correlated risk factor for engaging in future suicidal behaviors (Miller & Eckert, 2009).

The schism between the two camps has been reduced in light of modern research findings. For instance, West and Graziano (1989) concluded that studies have demonstrated stability of personality in both adults and children. However, they noted that stability declines across longer measurement intervals, is lower in child populations, and depends on the particular traits measured. McCrae and Costa (1990) further suggest that personality characteristics do not stabilize until approximately age 30. Given that suicide is the third leading cause of death among adolescents and young adults ages 15 to 24 years old (CDC, 2011), personality assessment may not provide the most comprehensive explanation of suicidal behavior in this population. Further, predictions of personality from one time point to another typically only account for 25% of the variance, leaving considerable room for environmental influences (Meier, 1994).

Yet, the concept of a trait variable has become more malleable with multiple meanings that support a behavioral assessment component as well. Murphy and Davidshofer (1988) suggest that psychological traits are still regarded as causes of subsequent behavior by most psychologists. Secondly, they contend that traits function as convenient organizational schemes for perceiving and remembering information. For instance, behaviors such as returning someone's lost wallet or paying taxes are deemed as "honest" behaviors even though they are not related. Behavioral psychologists have become interested in measuring constructs of psychological phenomena in which not all factors can be directly observed (e.g., fear, anxiety; Meier, 1994). Lastly and most importantly, traits are considered descriptive summaries of

*behavioral* consistencies (Murphy & Davidshofer, 1988). Current evidence suggests a perspective similar to the age-old argument of nature versus nurture: It is not one or the other, but an interaction between the two variables. That is, suicidal behavior likely occurs in the context of the interaction between trait *and* state variables (Breier, 1995).

As was discussed with the stress-diathesis model, one's attitudes and emotional vulnerabilities place them at a greater risk for depression and suicide when environmental stressors are experienced. The overlapping nature of psychological measurement and behavioral assessment is conducive for developing a formative measure of suicide risk that is a functional, feasible method of identification. When attempting to fill this gap within suicidology and predict future suicidal activity, selection of an appropriate criterion measure is essential.

**Existing measures for monitoring suicide risk.** Although there are many narrow-band, self-report instruments, only instruments with documented and sufficient psychometric properties are mentioned here, as this is the preliminary requirement for considering evidence-based assessment measures. Likewise, it is widely understood that past behavior predicts future behavior, (i.e., previous suicide attempts are one of the strongest risk factors in predicting future suicidal activity); therefore, those instruments that did not include an item relating to suicide attempt history were not considered for this study. Three instruments remain: the Suicidal Behaviors Questionnaire (*SBQ*; Linehan, 1981), the Harkavy Asnis Suicide Scale (*HASS*; Harkavy Friedman, & Asnis, 1989), and the Beck Scale for Suicidal Ideation (*BSI*; Beck & Steer, 1991). The original format of the *SBQ* would not be an ideal choice for a risk assessment tool due to its length (i.e., 7-page questionnaire) and format (i.e., designed to be administered as a structured interview; Linehan, 1981). Cole (1988) created a shortened, 4-item version of the *SBQ* using factor analysis. However, a major disadvantage of this tool is that it does not assess current

suicidal activity (Cotton, Peters, & Range, 1995), rendering it an ineffective current risk assessment tool. The questions on the *HASS* are designed to assess a continuum of non-suicidal and suicidal ideation and behavior; however, questions of substance abuse have also been included because "substance abuse has been found to be associated with suicidal behavior" (Harkavy Friedman, & Asnis, 1989, p. 384). Therefore, the total scores of the *HASS* confound assessment of suicidal activity by including item scores from the questions pertaining to substance abuse (Goldston, 2003). The *BSI*, on the other hand, is an adequate self-report measure of suicide risk given its strong psychometric properties, utility among diverse populations and settings, use in suicide treatment studies, and evidence of predictive validity (Goldston, 2003; Range & Knott, 1997).

The *BSI* was initially created as a 19-item clinical research instrument designed as a clinician-administered semi-structured interview (Beck, Kovacs, & Weissman, 1979). The scale was found to have high internal consistency and moderately high correlations with clinical ratings of suicidal risk and self-administered measures of harm. Furthermore, results indicated that the scale was sensitive to changes in levels of depression and hopelessness over time (Beck, et al., 1979). Others have created adaptations of the *BSI*, including for paraprofessional administration (Miller, Norman, Bishop, & Dow, 1986) and two self-report adaptations, a French self-report adaptation validated with French-speaking adolescents (de Man, Balkou, & Iglesias, 1987; de Man, Leduc, & Labreche-Gauthier, 1993) and Schotte and Clum's (1982) adaptation validated with college students in the U.S.. The original authors (Beck & Steer, 1991; Beck, Steer, & Ranieri, 1988) created the self-report version to increase clinical utility while maintaining the exact translation of the initial 19-item scale's content. Correlations between the self-reported and clinically rated versions for both adult inpatient and outpatient samples were

more than .90, indicating strong concurrent validity (Beck, et al., 1988). This version of the self-report *BSI* is also one of the few suicide assessment measures to document predictive validity for adult patients seeking outpatient psychiatric treatment (Beck, Brown, Steer, Dahlsgaard, & Grisham, 1999; Brown, Beck, Steer, & Grisham, 2000). Specifically, psychiatric patients who scored in the higher risk category were approximately seven times more likely to actually die by suicide than those who scored in the lower risk category (Brown et al., 2000). The *BSI* has also been found to be sensitive to change in randomized clinical trials for patients at high risk for suicide (see Salkovskis, Atha, & Storer, 1990), and those psychiatric patients who were hospitalized because of suicidal risk (Russ, Kashdan, Pollack, & Bajmakovic-Kacila, 1999). When considering feasibility and acceptability in research, it is encouraging that the *BSI* has been standardized in both paper-and-pencil and computerized versions (Beck, et al., 1988).

The *BSI* has been standardized among a wide variety of samples and settings, including elderly clinical populations (Mireault & de Man, 1996; Rifai, George, Stack, Mann, & Reynolds, 1994; Szanto, et al., 1996) as well as adult patients in psychiatric inpatient (Beck, Steer, Kovacs, & Garrison, 1985) and outpatient settings (Beck, Brown, & Steer, 1997). The *BSI* has been administered to pre-adolescent (Kashani, Soltys, Dandoy, Vaidya, & Reid, 1991) and adolescent psychiatric inpatients (Kumar & Steer, 1995; Steer, Kumar, & Beck, 1993) and outpatients (Rathus & Miller, 2002). Importantly, the *BSI* has been administered to high school students (Zhang & Brown, 2007) and college students, (Clum & Curtin, 1993; Clum & Yang, 1995; Dixon, Heppner, & Anderson, 1991) including African American (Blanton-Lacy, 1997; Molock, Kimbrough, Blanton-Lacy, McClure, & Williams, 1994) and international college students (Chioqueta & Stiles, 2006; Zhang & Norvilitis, 2002). The *BSI* has also been utilized in a variety

of settings, such as primary care practices, emergency rooms, rehabilitation programs, and private practice (Brown, 2001; Goldston, 2003).

The *BSI* is one of the most widely-used measures among various populations, settings, and within treatment outcome studies (Goldston, 2003; Range & Knott, 1997). The psychometric properties have been well-established (Beck & Steer, 1991) and it is one of the only suicide assessment measures to establish predictive validity (Beck, et al., 1999; Brown, et al., 2000). Although the *BSI* is an acceptable risk assessment measure, it is retrospective in nature and cost prohibitive for educational institutions. The suicide prevention literature base is lacking a risk assessment tool that can assess suicidality in the moment, formatively over time, and is not a financial barrier to educational institutions.

**DBR: A Potential Model for Formative Suicide Risk Assessment**

As mentioned previously, there are no evidence-based prevention programs that formatively measure suicidal behavior or utilize outcome data to monitor students deemed at-risk (www.nrepp. samhsa.gov). Given the abrupt closure of Columbia University's TeenScreen program (TeenScreen National Center for Mental Health Checkups, 2012), only one prevention program is now considered to be promising that utilizes screening methods (i.e., SOS; Aseltine & DeMartino, 2004). However, the SOS prevention program lacks the ability to briefly measure and monitor student suicidal activity over time. If the purpose of suicide risk assessment is to identify and intervene with at-risk students, implementation of a direct, formative measure is a necessary component to both identify at-risk students and measure their on-going progress during mental health service provision.

Given that feasibility and acceptability often thwart suicide prevention work, educational institutions may be more likely to adopt a risk assessment tool that is mirrored after a familiar

behavior assessment method. Borrowing from the literature base of school-based behavior assessment, a formative measure known as Direct Behavior Rating (DBR; Chafouleas, Riley-Tillman, & McDougal, 2002) could be adapted to inform suicide prevention work. A DBR is "an evaluative rating that is generated at the time and place that behavior occurs by those persons who are naturally occurring in the context of interest" (Christ, Riley-Tillman, & Chafouleas, 2009, p. 205). The formulation of the DBR emerged as an alternative to two common methods of school-based behavior assessment: systematic direction observation (SDO) and behavior rating scales, such as the *Behavior Assessment System for Children-2* (Reynolds & Kamphaus, 2004). SDO requires a period of uninterrupted observation, ranging from 10 to 40 minutes, by a trained rater over multiple observation sessions (Hintze & Matthews, 2004). Although SDO results provide detailed information about the behavior and setting in which it occurs (e.g., frequency, rate, latency, duration), it is also considered an intrusive and time intensive method of data collection (Christ, et al., 2009). In contrast, behavior rating scales do not require extensive training, direct observation, or a lengthy time commitment. However, although a more efficient method of data collection, they lack situation-specific data, are retrospective in nature, and usually lengthy (100+ items).

Research from over a decade indicates that the DBR is a functional solution to student behavior assessment. The DBR provides the specificity of SDO by establishing operationalized target behaviors and time-sensitive data as ratings are recorded on the same day and location as the observed behavior occurred. DBRs also incorporate the efficiency of behavior rating scales by providing a very brief rating scale that can be summed across items (i.e., multi-item scale DBR; DBR-MIS) or analyzed as a single-item scale (DBR-SIS; Christ et al., 2009). The selection of the DBR-MIS format allows the rater to rate specific behaviors within a general

behavior class (e.g., suicidal activity) while DBR-SIS is selected when raters wish to rate a single, broad behavior that represents that general behavior class (e.g., suicidal ideation; Christ et al., 2009). Recent evidence suggests that employing the DBR-MIS method results in a more efficient decision-making process compared to the DBR-SIS (Volpe & Briesch, 2012). This is consistent with the current suicidology literature base as well. One factor has not been identified above all others to predict suicidal risk; instead an aggregation of risk factors are typically incorporated into suicide risk measurement tools (Brown, 2001).

Most relevant to suicide prevention work, DBRs provide a brief behavior assessment that can be used for screening purposes. Psychometric studies suggest that DBRs have adequate concurrent validity with a commonly used criterion measure of school-based social behavior, the *Social Skills Rating System* (SSRS; Gresham & Elliott, 1990), when attempting to assess social risk (Chafouleas, Kilgus, & Hernandez, 2009). DBR ratings are sensitive to change over time during the intervention period (Riley-Tillman, Methe, & Weegar, 2009). This finding is important to the future of formative suicide risk assessment. That is, if this model is adapted for suicide prevention screening efforts and is deemed psychometrically sound, then future research can validate this tool for the use of monitoring responses to suicide prevention interventions.

**Formulation of Direct Behavior Risk Rating (DBRR) for suicide risk assessment.** As noted above, the three defining features of a DBR are Direct, Behavior and Rating. As such, each of those issues needs to be considered when discussing DBR for the purpose of suicide risk assessment, or Direct Behavior Risk Rating (DBRR). DBR appears to be an excellent tool to adapt for the purposes of suicide prevention as it already exists within the educational system as a non-threatening, quick, and free measurement tool. This is extremely important when adapting this tool for the purposes of suicide risk assessment as suicide screening programs have been

plagued with feasibility, acceptability, and iatrogenic effect concerns (Eckert et al., 2003; Gould et al, 2005; Hallfors et al., 2006). Specific aspects detailing the appropriateness of DBR as a formative suicide risk assessment measures are outlined below.

***Direct.*** The *direct* component of the measure implies that the observation and rating occur at the time and place that behavior occurs (Christ, et al., 2009). When attempting to rate suicidal activity, the *direct* component would emphasize that rating occurs at the time and place in which selected behaviors are considered by students during self-report assessment. One advantage of using DBR as a suicide risk assessment measure lies in students' ability to consider their feelings and behaviors in the present moment, negating the use of retrospective recall that is necessary for other rating scales (e.g., *BSI*) and is prone to inaccurate estimation. The direct nature of DBR also aligns with the time-sensitive nature of suicidal activity. Students and responsible parties (e.g., caregivers, administrators, and mental health providers) are able to make decisions based on current ratings, leaving minimal lag time between ratings and subsequent actions (e.g., intervention modification, admission to the hospital).

***Behavior.*** The *behavior* component of DBR establishes that target behaviors must be clearly defined or operationalized to minimize confusion for the rater and to ensure internal validity. This is an especially challenging task in suicide research given that a defined nomenclature for suicidal activity is lacking (O'Carroll, Berman, Maris, & Moscicki, 1996; Silverman, 2006). Still, researchers do agree that suicidal ideation (cognitions), intent (emotions), threats (verbalizations), and gestures (behaviors) are related to the concept of suicide (Silverman, 2006) and, therefore, are necessary measures for the self-report DBRR.

Fleeting thoughts of suicide are considered normative throughout adolescence, but suicidal ideation is considered clinically significant, and worthy of professional intervention,

when thoughts become intrusive and persistent. Thus, statements indicative of passive and active suicidal ideation are necessary to potentially differentiate the intensity of suicidal thoughts. Given the influence of psychopathology (e.g., depression) on suicidal activity (Beck, et al., 1985; Kerfoot, Dyer, Harrington, & Woodham, 1996), the statement, "My life is not worth living," may be indicative of hopelessness and passive suicidal ideation. It is equally important to include a statement that assesses both active suicidal ideation and frequency of thoughts (i.e., "I often think of killing myself").

When considering self-report of suicidal intent, researchers have long discussed the complexities of attempting to measure one's desire or expected consequences of a contemplated behavior (Berman et al., 2006; Freedenthal, 2007). Silverman (2006) suggests that measuring suicidal intent is particularly problematic among youth as some individuals may deny, minimize, or inflate their suicidal intent either to seek a desired response from others or to manage their own anxiety. Typically, suicidal intent is estimated post-attempt by a self-report measure in addition to a clinician's judgment of medical lethality (Linehan, 2000; Wagner, Wong, & Jobes, 2002). Given the degree of ambiguity among suicidal individuals (Harris, McLean, Sheffield, & Jobes, 2010) and suicidal intent measures (Freedenthal, 2007), the DBRR was created from empirically based indicators of intent while attempting to minimize variables that influence subjective responses (e.g., social desirability, inaccurate recall) and indicate purposeful actions (i.e., "I have created a plan to kill myself"). Assessing one's access to a lethal method is another method of assessing intent to kill oneself (i.e., "I have access to a lethal method of harm or an opportunity to kill myself"). Lastly, an essential component of any suicide risk measurement tool is the inclusion of previous attempt history. Previous attempt history is a strong risk factor for engaging in future suicidal activity (Joiner et al., 2005).

***Rating*.** The *rating* component of DBR establishes that the rater's perceptions are recorded. Given that suicidal individuals commonly report a shift in mood prior to an attempt, it is imperative that raters' perceptions are considered instead of outward presentation, as they are often incongruent leading up to a suicide attempt (Miller & Eckert, 2009). Fortunately, the basic psychometric properties of DBR have already been examined (Riley-Tillman, Chafouleas, Sassu, Chanase, & Glazer, 2008; Riley-Tillman, Chafouleas, Christ, Briesch, & LeBel, 2009). The DBR utilizes a unipolar rating scale that is amenable to suicide risk assessment. That is, suicidal activity is best understood as existing on a continuum of varying intensity, which is akin to rating scales (Berman, et al., 2006). A DBR scale is composed of a 105 millimeter line divided into 10 equal gradients, with qualitative anchors included at the 0% (*never*), 50% (*sometimes*), and 100% (*always*) points on the line (Chafouleas, Christ, & Riley-Tillman, 2009). For the purposes of assessing suicide risk, the qualitative anchors were modified to indicate endorsement of provided target statements. Please see Appendix A for review of the DBRR.

In order to increase effectiveness of suicide prevention efforts, all three levels (i.e., universal, selective, indicated) should be connected and coordinated with each other within the context of the educational institution. The DBRR may be applied within this framework to provide a practical identification method of suicide risk that provides an initial screening measure that is an effective method of identifying those at risk for engaging in suicidal activity. The utility of this measurement tool is contingent upon the ability to differentiate two groups of people (i.e., those at-risk and not at risk). In order to discern the presence or absence of risk, an appropriate statistical method must be selected to choose the cut point that best divides the sample into these two groups (Streiner & Cairney, 2007). This process can be best understood when considering signal detection theory (SDT; Streiner & Cairney, 2007).

## Signal Detection Theory

SDT dates back to the development of radar in which the aim of diagnostic assessment systems is to discriminate between two mutually exclusively events (i.e., attempt to identify the particular "signal" while rejecting the "noise;" Swets, 1992). Within the context of psychological research, the signal is typically characterized by the presence of a psychological disorder and the noise refers to a false identification based on misinterpreted information (e.g., absence of symptoms but diagnosis given). The event is considered to be "positive" (where the signal, even if undesirable such as suicide risk, is called positive) when the condition is detected by the screening measure or "negative," which is indicative of the absence of the specified condition (Swets, 1992). However, Swets (1992) affirms that this discrimination is not made perfectly because noise events may mimic signal events.

**Conditional probability statistics**. As positive and negative events are not perfectly separated into two groups, a single value on the continuous screening measure (or positivity criterion) must be identified. This identified cut score provides a metric such that, any value higher than it will result in a positive decision (e.g., diagnosis) and lower values will result in a negative decision (e.g., no diagnosis). The corresponding diagnostic alternatives which, when coupled with the overlapping distributions of probable events, results in a two-by-two contingency table of conditional probabilities. See Table 1. These values result when a group of individuals are administered a screener (e.g., DBRR) and gold standard criterion measure (e.g., *BSI*). Four types of classification can occur: Whenever a positive event occurs, the identified risk status is either positive, resulting in a true positive (TP) or a "hit," or negative, resulting in a false negative (FN). A FN refers to the likelihood that the DBRR failed to accurately identify those students who have been identified by the *BSI* as exhibiting suicidal activity. Whenever a negative

event occurs, the identified risk status is either positive, resulting in a false positive (FP) or a "false alarm," or negative, resulting in true negative (TN). A FP refers to the likelihood that the DBRR failed to accurately identify those students who have been identified by the *BSI* as not exhibiting suicidal activity.

Table 1

*Sample 2 x 2 contingency table*

| | | Event | |
|---|---|---|---|
| | | Positive | Negative |
| Risk status | Positive | TP | FP |
| | Negative | FN | TN |

A number of attributes of the test, or screening measure, can be derived from these numbers. Sensitivity (SN), or the TP rate, is defined as the likelihood that when a positive event is present on the criterion measure, the individual will be identified positively by the predictor measure (Hintze & Silberglitt, 2005). SN refers to the likelihood that the DBRR accurately identified those students who have been identified by the *BSI* as exhibiting suicidal activity. Specificity (SP), or the TN rate, is defined as the likelihood that when a positive event is absent on the criterion measure, the individual will not be identified by the predictor measure. Thus, SP refers to the likelihood that the DBRR accurately identified those students who have been identified by the *BSI* as not exhibiting suicidal activity. Please refer to figures 1 and 2.

$$\text{Sensitivity (SN)} = \frac{\text{\# of true positive (TP) decisions}}{\text{\# of actually positive cases (TP + FN)}}$$

*Figure 1.* Diagnostic accuracy equation for sensitivity

$$\text{Specificity (SP)} = \frac{\text{\# of true negative (TN) decisions}}{\text{\# of actually negative cases (FP + TN)}}$$

*Figure 2.* Diagnostic accuracy equation for specificity

Positive predictive power (PPP) and negative predictive power (NPP) are two other possible outcome proportions that result from a diagnostic accuracy analysis. PPP refers to the likelihood that an individual who scores below a cut score on a predictor measure (i.e., DBRR) will in fact have the condition of interest (i.e., at-risk for suicidal activity), based on the outcome of the criterion measure (i.e., *BSI*). NPP refers to the likelihood that an individual who scores above the cut score on the predictor measure actually does not have the condition based on the criterion measure. That is, the value of NPP indicates the likelihood that those students identified as not reporting suicidal activity on the DBRR was corroborated by the *BSI.* See Figures 3 and 4 for review.

$$\text{Positive Predictive Power (PPP)} = \frac{\text{\# of true positive decisions}}{\text{total \# of positive decisions}}$$

*Figure 3.* Diagnostic accuracy equation for positive predictive power

$$\text{Negative Predictive Power (NPP)} = \frac{\text{\# of true negative decisions}}{\text{total \# of negative decisions}}$$

*Figure 4.* Diagnostic accuracy equation for negative predictive power

It is important to remember that a compensatory relationship exists among the proportions, or probabilities, of the four outcomes. The balance among these proportions, which influences SN, SP, PPP, and NPP, is determined by where the positivity criterion is set on the measurement tool.

**Receiver operating characteristic (ROC) curve analysis.** SDT provides an analytical method to identify this positivity criterion known as receiver operating characteristic (ROC) curve analysis. ROC curve analysis allows for determination of the ability of the DBRR to discriminate between two groups (i.e., at-risk vs. not at-risk for suicidal activity), to choose the optimal cut score, and to compare the performance between the DBRR and *BSI* (Streiner & Cairney, 2007). Points on the ROC curve are determined by converting rating data to various

pairs of true- and false-positive proportions that correspond to the decision criteria provided by the 2 x 2 contingency table (Swets, 1988). The ROC curve is created by plotting SN against (1 – SP) over a range of possible cut score values, illustrating the tradeoff between TP and FP across the range of possible cut scores. See Figure 5 for a sample ROC curve. The closer the curve follows the left-hand border (FP = TP = 0 which produces no positive decisions) and then the top border of the ROC space (FP = TP = 1 which produces only positive decisions), the more accurate the test (Swets, 1992). The solid diagonal line indicates that no information about the test's accuracy is provided with the test's accuracy being equal to chance (0.5). The closer the curve comes to the 45-degree diagonal of the ROC space, the less accurate the test. This area in the upper left-hand corner also depicts high levels of SN, SP, and an available cut point that minimizes the overall number of errors detailed in the contingency table.

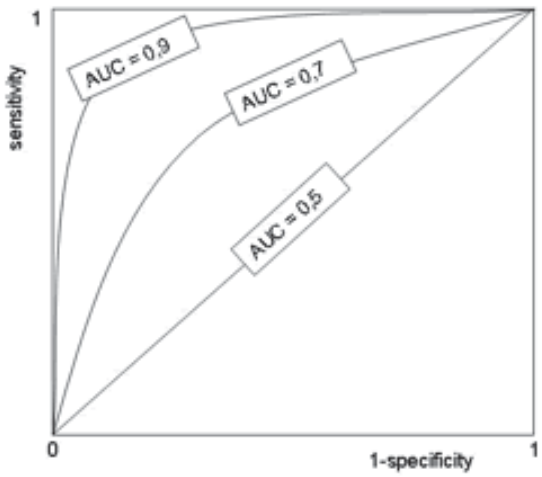


*Figure 5.* Sample Receiver Operating Characteristic Curve. Adopted from Simundic (2009)

The preferred SDT accuracy index is the measure of the proportion of the area of the entire graph that lies beneath the curve, which is referred to as the area under the curve (AUC). The AUC generally refers to the probability that a pair of observations drawn at random from two underlying distributions (at-risk vs. not at-risk) will be classified correctly (Streiner &

Cairney, 2007). For the purposes of this study, AUC is defined as the probability that the DBRR yielded a higher value for a randomly chosen individual at-risk for suicidal activity than for a randomly chosen individual who is not at-risk for suicidal activity. Streiner and Cairney (2007) remind researchers that the accuracy of tests with AUCs between 0.50 and 0.70 is low, between 0.70 and .90 is moderate, and tests with AUCs of 0.90 or more are considered to be highly accurate. Please see Figure 5 for a pictorial representation. The diagonal line indicates that, if two individuals are chosen at random, the probability that one individual will have a higher score than the second individual is due to chance; that is, the newly created measure does not discriminate between groups (e.g., individuals at-risk and not at-risk for suicidal activity). In between the diagonal and slightly rounded lines indicate low accuracy between measures and the space between the slightly rounded and rounded lines indicate moderate accuracy between measures. The area above the rounded line indicates a high level of accuracy between measures such that the probability is nearly 90% that the previously mentioned first individual will have a higher score than the second individual, indicating that the newly created measure demonstrates high levels of discrimination between selected groups. Thus, AUC provides researchers with a useful interpretation of this quantitative procedure.

AUC is a preferred statistic for most researchers because it is unaffected by base rates, not limited to a specific cut point, and it is a non-parametric test so fewer assumptions are made (McFall, 2005). Importantly, this method also provides a common scale for the accuracy of different measures to be compared directly, which is essential when developing new measurement tools, such as a formative measure of adolescent suicide risk (McFall, 2005). As AUC is an estimate, a standard error (SE) is associated with it and "the ratio of the AUC to the

SE is a *t*-test that can be used to see whether the AUC differs significantly from the null" (p. 125; Streiner & Cairney, 2007).

When choosing appropriate statistical methods to guide practical decisions (e.g., suicide risk status) that have real-life implications (e.g., fatality), there are important issues to consider when selecting the optimal decision threshold. Selection of appropriate cut scores is affected by identification of available resources, such as the study recruitment goal or designated personnel for implementing the suicide prevention program. Similarly, researchers determine cut scores based on perceived costs and benefits (McFall, 2005). In the realm of suicide prevention, selection of liberal cut scores may result in over identification of students which may quickly saturate financial and personnel resources, influencing feasibility and acceptability of the prevention program. Yet, selection of stringent cut scores may result in missed opportunities for intervention.

**Purpose of the Study**

The purpose of this study was to provide preliminary evidence for DBRR as a viable formative assessment method of suicide risk. Specifically, the psychometric properties of this newly created measurement tool were identified and evaluated for concurrent validity with regard to a commonly used criterion measure. Concurrent validity is a type of criterion-related validity and refers to the relationship between test scores and criterion measurements given at the same time (Salvia & Ysseldyke, 1991). That is, does knowledge of a person's test score allow for accurate estimation of that person's performance on a criterion measure? The *BSI* was used as the criterion measure given the brief structure, strong psychometric properties, and intended use of the form (Beck & Steer, 1991). It was predicted that the DBRR would provide a diagnostic accuracy indicator with appropriate sensitivity (true positive rate) and specificity (true negative

rate) to utilize in educational settings. Diagnostic accuracy refers to the accuracy of diagnoses made based on DBRR data when using the *BSI* as the criterion measure (Swets, 1988). Sensitivity refers to the likelihood that the DBRR accurately identified those students who have been identified by the *BSI* as exhibiting suicidal activity. Specificity refers to the likelihood that the DBRR accurately identified those students who have been identified by the *BSI* as not exhibiting suicidal activity.

This study contributes to the literature base of suicidology as there are no other formative indicators of suicide risk currently available for use in educational institutions. The DBRR is a no-cost, 5-item measurement tool that was designed to identify students at-risk for engaging in suicidal activity in the present moment. The structure was devised to mirror that of a social behavior measure that is considered to be an acceptable and feasible measurement tool in educational settings (i.e., DBR; Christ et al., 2009). This tool is designed to be administered in-person or via electronic resources. Evidence of concurrent validity as well as classification accuracy of DBRR would render a practical tool to help responsible parties navigate the decision-making process related to identifying at-risk students in need of potential intervention. The purpose of this study was to identify the technical adequacy of DBRR to provide current, formative risk identification data to inform suicide prevention efforts.

**Research Questions and Hypotheses**

The following research questions have been addressed by the subsequent data analyses. Hypotheses have been provided as well.

1. Will DBRRs demonstrate adequate concurrent validity with regard to the *BSI* scale?

$H_1$: DBRR will measure the construct in a similar manner to the *BSI* as evidenced by medium Pearson correlation coefficients (0.59; Chafouleas, et al., 2009; Chafouleas, et al., 2013; Kilgus, Riley-Tillman, Chafouleas, Christ, & Welsh, 2014).

2. Will DBRRs demonstrate overall classification accuracy similar to *BSI* risk?

   $H_2$: It is hypothesized that DBRR will yield moderate classification accuracy as evidenced by an AUC value that is equal to or greater than 0.82 (Kilgus, Chafouleas, Riley-Tillman, & Welsh, 2012; Chafouleas et al., 2013; Kilgus et al., 2014).

3. Will DBRRs identify cut scores associated with optimal conditional probability statistics (scores > 0.75; Swets, 1988)?

   $H_3$: It is hypothesized that identified cut scores will provide high negative predictive power and sensitivity as well as adequate positive predictive power and specificity.

# CHAPTER II: METHOD

## Participants

Participants aged 18 to 24 years were recruited via an experiment management website from introductory psychology classes at East Carolina University (ECU). Assuming the aforementioned prevalence rate of 6%, alpha of .05, and an AUC of .80, it was required that at least 100 participants (*N* at-risk = 6, *N* no risk = 94) complete this study to achieve a power of .80 (PASS 11; Hintze, 2011). Risk status was defined by scores ranging from 1 to 3 on the *BSI*, indicating mild suicidal risk (Holi et al., 2005). One participant was excused due to clinically significant levels of suicidal activity (i.e., *BSI* score = 7), indicating immediate intervention was necessary. Two participants who were not identified as at-risk dropped out prior to the final data collection session. One hundred college students participated in the study, including 18 year olds (38%), 19 year olds (39%), 20 year olds (12%), 21 year olds (8%), 22 year olds (2%) and a 24 year old (1%). Participants were 52% women and 48% men. Race/ethnic group composition was as follows: 71% White; 16% Black/African American; 6% Multi-racial; 2% American Indian/Alaskan Native; 2% Asian; and 1% Native Hawaiian/Pacific Islander. One percent of the sample indicated "Prefer not to answer" and 1% indicated "Other" for race/ethnicity. The participants identified as 97% not Hispanic or Latino and 3% Hispanic or Latino. Of the 100 participants, 92 were not at-risk while 8 were at-risk for engaging in suicidal activity based on the initial responses on the *BSI*. Two female students reported a previous suicide attempt on the initial *BSI* form. This is consistent with the recent national prevalence rate, which indicated approximately 4.4% of college-age students reported seriously considering a suicide attempt and 0.9% reported one or more suicide attempts (ACHA-NCHA II, 2013).

## Measures

**DBRR form.** Single-item DBRR scales of passive and active suicidal ideation, intent to harm, access to lethal means, and attempt history were created by the author using guidelines from previous research (see Silverman et al., 2007b; Goldston, 2003). The first item (i.e., "My life is worth living") assesses passive suicidal ideation and, through reverse scoring, controls for the effects of an agreement or disagreement response bias. Item 2 refers to active suicidal ideation, (i.e., "I often think about killing myself"). Item 3 attends to planning (i.e., "I have created a plan to kill myself"), and Item 4 includes access to lethal methods of harm (i.e., "I have access to a lethal method of harm or an opportunity to kill myself"). DBRR items 1 through 4 were continuous variables in which each scale was composed of a 105 mm lined divided into 10 equal components. Qualitative anchors indicating level of agreement were included at the 0 (*strongly disagree*), 5 (*neither agree nor disagree*), and 10 (*strongly agree*) points on the line. Using this scale, students made ratings corresponding to their level of agreement to each given statement. DBRR Item 5 refers to previous attempt history (i.e., "I have previously attempted to kill myself.") and was created in a Yes/No format. In sum, the DBRR consists of five items that are used to assess one's risk of engaging in suicidal activity. Risk status is defined by scores of 1 to 3 on the *BSI*. Please see Appendix A for review.

***BSI* form.** The *BSI* form is a 21-item self-report questionnaire that is best used to detect and measure severity of suicidal ideation (Beck & Steer, 1991). Scores for each item range from 0 to 2, resulting in a total range of 0 to 38. The questionnaire is divided into two sections: the first five items assess the wish to live, wish to die, reasons to live versus reasons to die, active suicidal ideation, and passive suicidal ideation. If the respondent indicated a score of zero on items 4 and 5, then they were directed to complete items 20 and 21, which assess suicide attempt

history and, if relevant, level of wish to die during the last suicide attempt. If respondents indicated some degree of suicidal ideation (i.e., endorsing items 4 or 5), then they were directed to complete items 6 through 19, which further assess suicidal ideation as well as reasons for and against living, plan, means, expectations about future attempts, and preparations for a potential attempt. The total score of items 1 through 19 yields a severity score (Goldston, 2003).

**Data Collection Procedures**

Participants viewed the study description and requirements through the experiment management system (Sona) website managed by the Psychology department at ECU. This participant management software is used by universities to integrate research administration processes online. The study description on the site informed students that they would be participating in a study designed to evaluate a newly created suicide risk measurement tool; the full description is provided in Appendix B. Students would receive 0.5 credits upon completion of each portion of the study for a total of 1.5 credits earned. If interested, students clicked on the hyperlink entitled, "Timeslots Available" to schedule a 30-minute initial intake session.

Institutional Review Board approval was attained prior to contact with the students. All in-person appointments were facilitated by the principal investigator (PI) and held in a private office to ensure confidentiality and consistency. Students were directed to ask questions or voice concerns about the research study throughout the entire research process. They were also instructed that they could withdraw from the study at any time without penalty. Contact information for the research study and mental health resources were provided.

During the initial session, the purpose and requirements of the study were described in further detail prior to the consent process (See Appendix C). Interested students were informed that the purpose of this research study was to gain a better understanding of suicide risk

assessment tools, specifically to compare two assessment tools, the *BSI* and DBRR. The PI then explained the data collection timeline. This study was divided into three parts: initial in-person meeting (*BSI* 1, DBRR 1), three online surveys (DBRRs 2, 3, and 4), and the final in-person meeting (*BSI* 2, DBRR 5). A total of two (pre- and post-study) *BSI* data points and five continuous DBRR data points were collected within ten days or two consecutive weeks.

The PI then reviewed the potential risks of participating in the research study. Specifically, the PI explained that participation could result in potential harm or discomfort. The PI explained risks that might occur despite the student's interest in remaining in the study. Most notably, the PI explained that if students are at elevated risk of hurting themselves, their safety is more important than participation. Limits of confidentiality were reviewed and further clarification was provided when needed. Participants were also notified that they could be removed from the study if they missed two or more opportunities for data collection. Questions regarding potential risks were answered by the PI.

The PI also explained the potential benefits of participating in this study. Specifically, participants were informed that they may not experience any personal benefit but that the research could provide more information about whether a brief measurement tool will help others, including educational institutions, identify and intervene with those at risk for engaging in suicidal activity. In addition, local and national referral information for mental health services were provided, which may be distributed to participant's family members or friends in need of mental health services.

Participants were notified that all of their information would be kept confidential. No identifying information appeared on any materials with the exception of consent document and the demographic information form. Their questionnaires were coded with numerical identifiers,

and only the PI had access to the names. After signing the informed consent document, the PI conducted the brief interview (Appendix D) to acquire demographic information and a brief psychological history (e.g., past/current diagnoses, treatment, medications, & hospitalizations; please see Appendix E). Participants were then instructed on how to complete the *BSI* form. Upon completion of the *BSI*, participants were screened for elevated suicide risk as the PI immediately reviewed all responses. If participant responses resulted in a score of 4 or above, which is consistent with clinically significant suicide risk (Holi et al., 2005), the PI followed the risk protocol described in Appendix F (Jesse et al., 2010).

All participants who scored below a 4 on the *BSI* were then instructed as to how the DBRR questionnaire should be completed. Upon completion of this questionnaire, participants were provided with a demonstration on how to complete the online phase of the research study. All participants were provided with contact information regarding the research study and local and national suicide prevention resources for use in emergency and non-emergency situations (please see Appendix G).

During the online phase of the research study (sessions 2 through 4), participants received three emails with embedded hyperlinks for DBRR survey completion. These emails were distributed approximately 48 hours after each data collection session, including the initial intake session. In order to collect online data in a time-sensitive and consistent manner, participants were given 24 hours to complete these 1-minute surveys. Participants received automated reminder emails to complete the survey prior to the 24-hour expiration period. Should participants have indicated an increase in suicidal behavior throughout the on-line version of this study (i.e., scores of 6 or higher on questions 2, 3, or 4), then they would have received an automated email (see Appendix H) notifying them of immediate resources and that the PI would

be contacting them as soon as possible. Participants were prompted to preemptively schedule their final in-person session via Sona System for the following week by using the computer in the private office to do so.

The final data collection session mirrored the first session with completion of the *BSI* and DBRR questionnaires. Participants engaged in a debriefing session to reduce any possibility of psychological harm resulting from the study (see Appendix I). In order to assess formal and informal help-seeking behaviors, participants were then asked if they used any of the given resources or talked to family members or friends about their feelings throughout the process, respectively. Participants were also provided with time to ask questions or voice concerns related to their experience during the research study. Contact information for local and national resources was again provided. Upon completion of the study, participants were awarded 1.5 research credits as part of their 5-credit research requirement for PSYC 1000 courses. Credits were awarded within one week of their participation.

All data points were collected within the allotted 24 to 72 hour time range between sessions. All data gathered for this study were double checked for entry accuracy by an undergraduate student who did not interact with the participants or have access to identifying information. Email notifications were automated by Qualtrics survey software or distributed by the PI to ensure time-sensitive distribution of information for both in-person and on-line portions of the study, respectively. Database management was conducted by the PI. No identifying information appeared on any materials with the exception of the consent document and the demographic information form. Questionnaires were coded with numerical identifiers, and only the PI had access to identifying information. All data were stored in a private office using a

double-lock system with paper surveys stored in a locked cabinet and data in an encrypted file on a computer designated for research purposes.

**Data Analysis Procedures**

In addition to the initial double entry system, accuracy of the data entry was evaluated by analyzing the descriptive statistics from the data. Descriptive statistics were analyzed to ensure that variable scores were within the expected range and standard deviations were plausible. Missing values and outliers were assessed and adjusted, if needed. Specifically, participants' data with one missing data point were adjusted using within-participant DBRR mean substitution (i.e., replacing missing data in a variable by the mean of that variable). This method used for handling missing values has been recommended by Tabachnick and Fidell (2007) and is considered to be conservative because the mean for the entire distribution does not change and the researcher is not required to guess or make inferences about the missing values. Listwise deletion was used for participants with two or more missing data points. Importantly, participants were not able to submit their online DBRR surveys if questions were left unanswered (i.e., forced response validation technique was employed in the Qualtrics survey system). When attempting to submit an incomplete survey, participants viewed the following error message: "Sorry, you cannot continue until you correct the following question." Approximately 5% or less of data points missing in a random pattern were expected based on Tabachnick and Fidell's (2007) recommendations for proper data screening prior to analysis. Skewness, or asymmetry of the distribution, and kurtosis, or shape of the distribution compared to the standard bell curve, were examined to evaluate the normality of the data (i.e., skewness = +/- 2; kurtosis = +/- 7, respectively; Curran, West, & Finch, 1996). For all statistical analyses, single item scales (i.e., DBRR-SIS) and the mean of items 1 to 4 (i.e., multiple item scales; DBRR-MIS) were analyzed. DBRR Item 5 was not included in these analyses as it is a dichotomous variable (i.e., it did not

change over time for the enrolled participants as participants consistently indicated their attempt history). Therefore, it was unnecessary to look at this item formatively.

Regarding the first research question, Pearson product-moment correlation coefficients were examined to assess the concurrent validity of DBRR scales as predictors of *BSI* performance. Pearson correlation coefficients were used to measure the strength (i.e., size and direction) of the linear association between the variables. Interpretive benchmarks for small, medium, and large correlation coefficients were derived through a review of previous DBR correlational screening research (Chafouleas, et al., 2009; Chafouleas, et al., 2013; Kilgus, et al., 2014). Electronic databases (i.e., PsycINFO and PsycARTICLES) were searched for empirical DBR correlational screening studies. Three studies were identified that yielded correlation coefficients comparing the DBR to different universal screening measures. In total, 59 coefficients were extracted. Coefficients ranged between .00 and .88, with an arithmetic mean of .58 (SD = .18). Within the approximately normal distribution of correlations, the 25th percentile was equal to .46, 50th percentile to .59, and 75th percentile to .71. Each of these percentiles was considered a cutoff for small, medium, and large correlation coefficients, respectively, within the current investigation.

For the second research question, overall classification accuracy was examined through AUC statistics. The AUC generally refers to the probability that a pair of observations drawn at random from two underlying distributions (at-risk vs. not at-risk) will be classified correctly (Streiner & Cairney, 2007). Interpretive benchmarks for low, moderate, and high accuracy were derived through a review of previous DBR diagnostic accuracy research (Chafouleas et al., 2013; Kilgus, et al., 2012; Kilgus et al., 2014). Electronic databases (i.e., PsycINFO and PsycARTICLES) were searched for empirical DBR correlational screening

studies. Three studies were identified that yielded AUCs comparing the DBR to different universal screening measures. In total, 21 AUCs were extracted. AUC values ranged between .69 and .89. Results indicated that the 25th percentile was equal to .74, 50th percentile to .82, and 75th percentile to .86. Each of these percentiles was considered a cutoff for low, moderate, and high accuracy, respectively, within the current investigation.

For the third research question, ROC curve analyses were completed to identify appropriate DBRR cut scores. Specifically, ROC curve analyses were conducted to gain information about the SN, SP, PPP, and NPP associated with all possible cut scores within each DBRR scale. Swets (1988) indicated that sensitivity and specificity values of .75 or greater for a given cut score would represent adequate discriminatory power. More specifically, previous research indicates that SN values equal to or greater than .80 are considered to be acceptable (Kilgus, Chafouleas, & Riley-Tillman, 2013; Petscher, Kim, & Foorman, 2011), and SN values equal to or greater than .90 are defined as optimal (Streiner, 2003). Likewise, acceptable values of SP equal to or greater than .70 are considered to be acceptable (Kilgus et al., 2014), and SP values equal to or greater than.80 are defined as optimal (Hintze & Silberglitt, 2005). As these values exist in compensatory relationship, it is important to note that SN takes precedence over SP when considering the context of high-stakes decision-making in suicide prevention work. Although it is ineffective to incorrectly identify non-suicidal students as at-risk status (i.e., high FP), it is decidedly more problematic to falsely identify at-risk individuals as non-suicidal in nature (i.e., high FN).

A series of ROC curves were developed that model the diagnostic accuracy of the DBRR items over a range of cut scores. Specifically, five ROC curves were calculated – one curve for the aggregate score (i.e., summation of four items) and one curve for each individual item (i.e.,

four items). Conditional probability statistics were calculated as part of ROC curve analyses to identify DBRR cut scores that best predict suicide risk. A 2 x 2 decision matrix indicating the DBRR and *BSI* diagnoses was created. DBRR decisions indicating at-risk status that are corroborated by the *BSI* decision was called TP decisions. DBRR decisions indicating at-risk status that are not corroborated by the *BSI* decision was called FP decisions. DBRR decisions indicating no risk for suicidal activity that are corroborated by the *BSI* decision was called TN decisions. DBRR decisions indicating no risk for suicidal activity that are not corroborated by the *BSI* decision was called FN decisions. A correct classification rate was then calculated by adding the true decisions (TP+TN) and dividing that number by the total number of cases (N). Please see Table 2 for a pictorial representation of this decision matrix.

Post-hoc analyses examined gender differences to investigate the "gender paradox" described above (see Canetto & Sakinofsky, 1998). Specifically, gender differences in concurrent validity and test-retest reliability were investigated to discern whether DBRRs predict risk equally across male and female students and to evaluate potential differences in response patterns, respectively. Consistent with Cohen's (1988) guidelines for interpretation, correlation coefficients for test-retest reliability were deemed to be small, medium, or large in magnitude based on the values of 0.1, 0.3, and 0.5, respectively. Please see Table 3 for a summary of the aforementioned data analysis plan.

Table 2

*2 x 2 contingency table*

| | *BSI* + Dx | *BSI* – Dx |
|---|---|---|
| DBRR + Dx | TP | FP |
| DBRR – Dx | FN | TN |

*Note*. Dx refers to the determined risk status.

Table 3

*Summary of data analyses*

| Research Questions | Hypotheses | Statistical Method | Statistical Value |
|---|---|---|---|
| Will DBRRs demonstrate adequate concurrent validity with regard to the *BSI* scale? | DBRR will measure the construct in a similar manner to the *BSI* as evidenced by medium Pearson correlation coefficients. | Bivariate correlation analysis | Pearson *r* |
| Will DBRRs demonstrate overall classification accuracy with regard to *BSI* risk? | It is hypothesized that DBRR will yield moderate classification accuracy as evidenced by an AUC value that is equal to or greater than 0.82. | ROC curve analysis | AUC |
| Will DBRRs identify cut scores associated with optimal conditional probability statistics? | It is hypothesized that identified cut scores will provide high negative predictive power and sensitivity as well as adequate positive predictive power and specificity. | ROC curve analysis | SN, SP, PPP, NPP |

# CHAPTER III: RESULTS

## Data Screening

**Accuracy of data entry.** Before data analysis, the scores were examined for accuracy of data entry. All data were initially entered by the PI and double-checked by an undergraduate student to ensure accurate entry. Descriptive statistics were analyzed to ensure that variable scores were within the expected range and standard deviations were plausible.

**Missing data.** Listwise deletion was used for participants with one missing BSI data point or two or more missing DBRR data points, which included three participants. One participant was initially excused from the study for elevated risk status (i.e., *BSI* score of 7) and two participants dropped out prior to the final data collection session. There were no missing values among the 100 remaining participants as all participants attended data collection sessions and completed all DBRR data points within the allotted 24 to 72 hour time frame.

**Descriptive statistics.** Table 4 contains the descriptive statistics for all students who completed the study. Independent *t*-tests were completed to evaluate the presence of gender differences on individual items and the mean of items 1 to 4. No statistically significant gender differences were found. Skewness and kurtosis values were examined to assess the normality of the data. All *BSI* sum scores were positively skewed for the total sample as well as for male and female participants. All DBRR items were positively skewed except Item 1, which displayed a negative skew. It is important to note that DBRR Item 1 is reverse-scored compared to the other scale items. When examining kurtosis, all *BSI* sum scores and DBRR items were found to be leptokurtic, or heavily distributed in the center of the curve. It should be noted that DBRR Item 5 was not included below as it is a dichotomous variable (i.e., it did not change over time for the enrolled participants). Therefore, it is unnecessary to look at this item formatively.

Table 4

*Descriptive statistics*

| | Min | Max | Mean | SD | Skewness | Kurtosis |
|---|---|---|---|---|---|---|
| *BSI* 1 Sum | | | | | | |
| Total | 0 | 3 | .15 | .58 | 4.22 | 17.68 |
| Male | 0 | 3 | .08 | .45 | 6.08 | 38.56 |
| Female | 0 | 3 | .21 | .67 | 3.45 | 11.59 |
| *BSI* 2 Sum | | | | | | |
| Total | 0 | 5 | .14 | .65 | 5.66 | 35.58 |
| Male | 0 | 2 | .10 | .43 | 4.14 | 16.47 |
| Female | 0 | 5 | .17 | .81 | 5.20 | 27.96 |
| DBRR Item 1 | | | | | | |
| Total | 6.9 | 10 | 9.71 | .58 | -3.04 | 10.23 |
| Male | 6.9 | 10 | 9.75 | .62 | -3.72 | 14.58 |
| Female | 7.6 | 10 | 9.68 | .53 | -2.23 | 5.11 |
| DBRR Item 2 | | | | | | |
| Total | 0 | 3.6 | .18 | .45 | 4.86 | 32.32 |
| Male | 0 | 3.6 | .18 | .57 | 4.99 | 28.68 |
| Female | 0 | 1.2 | .18 | .32 | 1.80 | 2.19 |
| DBRR Item 3 | | | | | | |
| Total | 0 | 1.4 | .09 | .23 | 3.62 | 14.15 |
| Male | 0 | 1.4 | .10 | .28 | 3.44 | 12.05 |
| Female | 0 | 1.0 | .07 | .19 | 3.36 | 12.91 |
| DBRR Item 4 | | | | | | |
| Total | 0 | 5.0 | .34 | .87 | 3.92 | 16.93 |
| Male | 0 | 5.0 | .35 | .91 | 3.85 | 16.54 |
| Female | 0 | 5.0 | .34 | .85 | 4.12 | 19.31 |
| DBRR-MIS | | | | | | |
| Total | 0 | 2.25 | .22 | .39 | 2.54 | 7.75 |
| Male | 0 | 2.25 | .22 | .44 | 2.87 | 9.55 |
| Female | 0 | 1.45 | .23 | .34 | 1.85 | 2.96 |

*Note.* Total sample ($N$ = 100); Male participants ($N$ = 48); Female participants ($N$ = 52).

**Hypothesis Testing**

The following sections pertain to the results obtained from each research question posed for this study.

**Hypothesis 1.** DBRR will measure the construct in a similar manner to the *BSI* as evidenced by medium Pearson correlation coefficients (i.e., .59). Table 5 contains correlation coefficients between the *BSI* and DBRR scales. Despite the skewness and kurtosis values mentioned above, the DBRR items and aggregate scale were not transformed as this action

would take away from the interpretability of the ROC analysis results. However, it is important to interpret the following results with caution as the assumption of normality was violated. Analysis of the Pearson product-moment correlation coefficients (*r*) for the total sample indicated a small correlation between the *BSI* 2 sum and Item 1 ($r = -.42$; $p < .001$) as well as the DBRR-MIS ($r = .41$; $p < .001$). Small correlations between the *BSI* 2 sum and DBRR Item 3 ($r = .37$; $p < .001$) and DBRR item 4 ($r = .27$; $p < .001$) were demonstrated as well. The *BSI* 2 sum correlated weakly to DBRR item 2 ($r = .17$; $p > .01$). Results indicate that the correlation between *BSI* administrations was large ($r = .54$; $p < .001$; Cohen, 1988).

Table 5

*Correlation between DBRR single items and mean score with the BSI among total sample (N=100)*

| | *BSI* 1 Sum | *BSI* 2 Sum | Item 1 Mean | Item 2 Mean | Item 3 Mean | Item 4 Mean | DBRR-MIS |
|---|---|---|---|---|---|---|---|
| *BSI* 1 Sum | 1.00 | | | | | | |
| *BSI* 2 Sum | .54*** | 1.00 | | | | | |
| Item 1 Mean | -.21* | -.42*** | 1.00 | | | | |
| Item 2 Mean | .03 | .17 | -.71*** | 1.00 | | | |
| Item 3 Mean | .11 | .37*** | -.48*** | .77*** | 1.00 | | |
| Item 4 Mean | .17 | .27*** | -.18 | .20* | .22* | 1.00 | |
| DBRR-MIS | .19 | .41*** | -.74*** | .78*** | .67*** | .72*** | 1.00 |

*Note.* * $p < .05$. *** $p < .001$.

**Hypothesis 2.** It was hypothesized that DBRR will yield moderate classification accuracy as evidenced by an AUC value that is equal to or greater than 0.82. ROC curve analyses were used to discern whether DBRR individual items and the DBRR-MIS were accurate predictors of *BSI* risk. For graphic representation of results, please see Figure 6. The DBRR-MIS and DBRR Item 4 AUCs demonstrated the best discriminatory power when modeled against the *BSI* as the criterion. Both were statistically significant at the $p < .0001$ level and fell in the high range of diagnostic accuracy, equaling 0.858 (SE = 0.051, CI-95 = 0.774-0.920) and 0.864 (SE = 0.065, CI-95 = 0.781 – 0.925), respectively. At the $p = .02$ significance level, Item 3 had low to

moderate discriminatory power, equaling 0.754 (SE = 0.110, CI-95 = 0.657 – 0.834). Item 1 demonstrated low to moderate discriminatory power equaling 0.75 (SE = 0.115, CI-95 = 0.653 – 0.831) and at the $p$ = .03 significance level. Item 2 revealed poor and non-significant discriminatory power (*AUC* = .70, $p$ =.07). That is, Item 2 was not better than chance at predicting *BSI* risk. Overall, findings suggest that the DBRR-MIS offered the best diagnostic accuracy in predicting student risk for engaging in suicidal behaviors. For a summary of AUC results, please see Table 6.

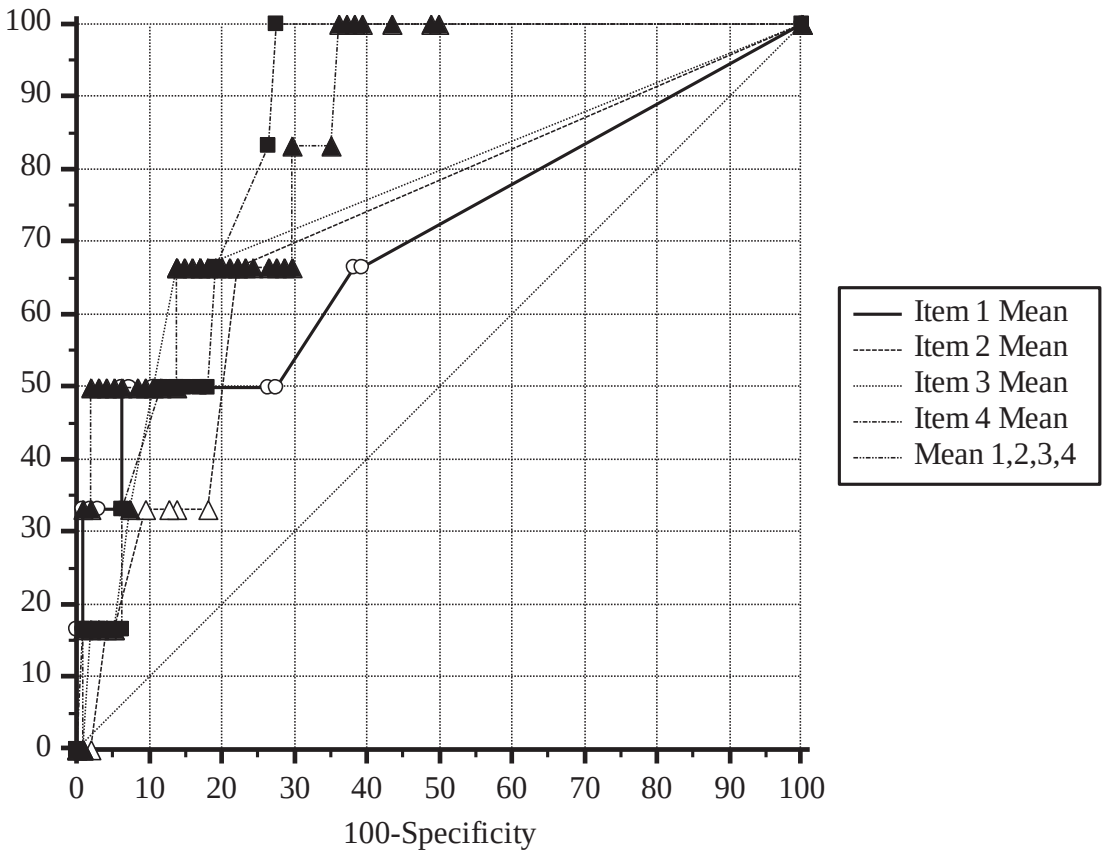


*Figure 6.* Comparison of Receiver Operating Characteristic Curves

Table 6

*Areas under the receiver operating characteristic curves (AUC)*

| DBRR Items | AUC | Std. Error[1] | *p*[2] | 95% CI |
|---|---|---|---|---|
| 1 | .75 | 0.12 | .03 | 0.65 to 0.83 |
| 2 | .70 | 0.11 | .07 | 0.60 to 0.79 |
| 3 | .75 | 0.11 | .02 | 0.66 to 0.83 |
| 4 | .86 | 0.05 | <.0001 | 0.77 to 0.92 |
| DBRR-MIS | .86 | 0.07 | <.0001 | 0.78 to 0.93 |

[1]DeLong et al., 1988

[2] Comparison of observed AUC and the null hypothesis (AUC=.50)

**Hypothesis 3.** It was hypothesized that identified cut scores will provide high negative predictive power and sensitivity as well as adequate positive predictive power and specificity. As the purpose of universal screening programs is to identify all students at-risk, SN is of utmost concern. SN refers to the ability of the DBRR to detect individuals at risk for engaging in suicidal activity. Analysis of SN statistics indicated that adequate cut scores (scores > .75) do exist for some of the DBRR items (i.e., Item 4 and the DBRR-MIS). As seen in Table 7, it is important to put these cut scores in the appropriate context as non-whole numbers can be difficult to interpret. For example, a cut score of .1 on Item 4 is best interpreted as any score above zero across the entire data collection period is cause for concern and follow-up. Likewise, in the context of a suicide prevention screening program, high NPP is important as it indicates that all those not at-risk are being correctly identified. With this in mind, Item 4 and the DBRR-MIS appear to demonstrate the best relationship among SN and SP. A cut score of 0.1 on Item 4 reveals acceptable SN (.83) and SP (.73). There is a disproportionate balance of PPP (.17) and NPP (.99), wherein a large percentage (83%) of those identified at-risk were actually not at-risk. A cut score of 0.1 on the aggregate scale also revealed an appropriate balance among SN and SP but not among PPP and NPP (SN = .83, SP = .70, PPP = .15, NPP = .99). The PPP value of .15 indicates that only 15% of those screened positive would actually be at risk for engaging in suicidal activity. The value of NPP depicts the number of students not at-risk for suicidal activity

(i.e., 99% of non-suicidal students were also identified as not at-risk on the DBRR; Streiner, 2003). Still, the values between PPP and NPP are not surprising given the relatively low prevalence, or base rate, of suicidal activity among college students (Petscher, Kim, & Foorman, 2011).

Table 7

*Predictive Accuracy of DBRR Cut Scores with the BSI*

| DBRR Items | Cut Score | SN | SP | PPP | NPP |
|---|---|---|---|---|---|
| 1 | .1 | .67 | .61 | .1 | .97 |
| | .2 | .67 | .62 | .1 | .97 |
| | .32 | .50 | .72 | .1 | .96 |
| | .4 | .50 | .73 | .11 | .96 |
| | .5 | .50 | .85 | .18 | .96 |
| 2 | .04 | .67 | .78 | .16 | .97 |
| | .2 | .33 | .82 | .11 | .95 |
| | .3 | -- | -- | -- | -- |
| | .4 | .33 | .86 | .13 | .95 |
| | .5 | .33 | .87 | .14 | .95 |
| 3 | .1 | .67 | .86 | .24 | .98 |
| | .2 | .33 | .93 | .22 | .96 |
| | .3 | -- | -- | -- | -- |
| | .4 | .17 | .95 | .17 | .95 |
| | .5 | -- | -- | -- | -- |
| 4 | .06 | .83 | .73 | .17 | .99 |
| | .2 | .67 | .81 | .18 | .97 |
| | .3 | -- | -- | -- | -- |
| | .4 | .50 | .82 | .15 | .96 |
| | .46 | .50 | .83 | .16 | .96 |
| DBRR-MIS | .1 | .83 | .70 | .15 | .99 |
| | .2 | .67 | .73 | .14 | .97 |
| | .3 | .67 | .79 | .17 | .97 |
| | .4 | .67 | .84 | .21 | .98 |
| | .5 | .50 | .86 | .19 | .96 |

**Supplementary Analyses**

**Gender differences.** Analysis of the Pearson product-moment correlation coefficients (*r*) for the male participants indicated a small to medium correlation between the *BSI* 2 sum and

Item 1 ($r$ = -.48; $p$ < .001). The *BSI* 2 sum correlated weakly with DBRR Item 2 ($r$ = .06; $p$ > .001), Item 3 ($r$ = -.02; $p$ > .01), Item 4 ($r$ = .12; $p$ > .01), and the DBRR-MIS ($r$ = .25; $p$ > .01). Results indicate a very large correlation between *BSI* administrations ($r$ = .84; $p$ < .001; Cohen, 1988). Please see Table 8.

Table 8

*Correlation between DBRR single items and mean score with the BSI among male participants (N=48)*

| | *BSI* 1 Sum | *BSI* 2 Sum | Item 1 Mean | Item 2 Mean | Item 3 Mean | Item 4 Mean | DBRR-MIS |
|---|---|---|---|---|---|---|---|
| *BSI* 1 Sum | 1.00 | | | | | | |
| *BSI* 2 Sum | .84*** | 1.00 | | | | | |
| Item 1 Mean | -.16 | -.48*** | 1.00 | | | | |
| Item 2 Mean | .01 | .06 | -.73*** | 1.00 | | | |
| Item 3 Mean | -.03 | -.02 | -.52*** | .88*** | 1.00 | | |
| Item 4 Mean | .05 | .12 | -.21 | .18 | .18 | 1.00 | |
| DBRR-MIS | .08 | .25 | -.78*** | .82*** | .72*** | .68*** | 1.00 |

*Note.* *** $p$ < .001.

Analysis of the Pearson product-moment correlation coefficients ($r$) for female participants indicated a large correlation between the *BSI* 2 sum and Item 3 ($r$ = .75; $p$ < .001) and nearly a medium correlation between the *BSI 2* and DBRR-MIS ($r$ = .58; $p$ < .001; Cohen, 1988). Correlations between *BSI* 2 sum and DBRR Item 1 ($r$ = -.44; $p$ < .001), Item 4 ($r$ = .37; $p$ < .001), and Item 2 ($r$ = .32; $p$ < .05) were deemed to be small. Results indicate that the correlation between *BSI* administrations was medium ($r$ = .44; $p$ < .001; Cohen, 1988). Please see Table 9.

Table 9

*Correlation between DBRR single items and mean score with the BSI among female participants (N=52)*

| | *BSI* 1 Sum | *BSI* 2 Sum | Item 1 Mean | Item 2 Mean | Item 3 Mean | Item 4 Mean | DBRR-MIS |
|---|---|---|---|---|---|---|---|
| *BSI* 1 Sum | 1.00 | | | | | | |
| *BSI* 2 Sum | .44*** | 1.00 | | | | | |
| Item 1 Mean | -.24 | -.44*** | 1.00 | | | | |
| Item 2 Mean | .06 | .32* | -.70*** | 1.00 | | | |
| Item 3 Mean | .27 | .75*** | -.45*** | .51*** | 1.00 | | |
| Item 4 Mean | .26 | .37** | -.14 | .26 | .30* | 1.00 | |
| DBRR-MIS | .30* | .58*** | -.70*** | .73*** | .61*** | .77*** | 1.00 |

*Note.* * $p < .05$. ** $p < 01$. *** $p < .001$.

# CHAPTER IV: DISCUSSION

Suicide prevention efforts have received growing attention since the nation's first youth suicide prevention bill, the Garrett Lee Smith Memorial Act, was signed into law (2004) and numerous key documents have been written to inform the newly revised 2012 National Strategy for Suicide Prevention (U.S. Department of HHS, 2012). However, educational institutions consistently struggle to implement prevention programming that is evidence-based, feasible, and efficient in identifying at-risk individuals. Typically, educational institutions implement curriculum-based or gatekeeper training programs which are designed to increase awareness of suicide warning signs and address knowledge and attitudes related to suicidal activity. Berman and colleagues (2006) remind us that at-risk students may benefit from these programs less than their non-suicidal peers and are less likely to attend preventive education programs. Likewise, education alone is not sufficient in creating behavior change and is not intended to identify at-risk individuals. Although some educational institutions do implement a direct prevention approach (i.e., screening program), it is typically implemented on an annual basis during orientation or through student health services (Suicide Prevention Resource Center; SPRC, 2004). Common myths as well as personnel and financial barriers impede the implementation of suicide screening programs in educational institutions. Therefore, a suicide risk assessment tool is needed that is free, easy-to-use, and designed to measure risk formatively.

Glover and Albers (2007) note that universal screening measures should be technically adequate (i.e., sound psychometric properties), feasible, and contextually appropriate. The DBRR could feasibly be implemented into a current screening program as it is a brief, self-report rating scale containing only 5 items to measure current suicide risk among students. The format of the DBRR is consistent with a popular formative behavioral assessment measure, the DBR, and can be administered in paper/pencil or electronic versions. The DBRR is contextually appropriate as self-report measures are considered to be the ideal method to measure internal psychological states (Spector, 2006). Likewise, individuals are

more likely to respond truthfully to sensitive questions when provided in a self-report format (Krumpal, 2013). The following study findings are reviewed to discuss the technical adequacy of the DBRR within the behavioral assessment literature base.

**Concurrent Validity**

Examination of the correlation coefficients revealed many significant relationships between the individual items (i.e., DBRR-SIS) and aggregate score (i.e., DBRR-MIS) with the *BSI*. DBRR Item 1 (i.e., passive ideation) and the DBRR-MIS correlated most strongly with *BSI*. Correlation coefficients for the remaining items revealed less significant relationships between the *BSI* and Items 3 (planning), 4 (access to lethal means), and 2 (active ideation). The correlations between Item 1, the DBRR-MIS, and the *BSI* provide preliminary evidence that the two instruments may be measuring the same construct: elements that indicate suicide risk. However, it is important to note that the existing literature base suggests that there is no single indicator of risk (Miller & Eckert, 2009). Therefore, the DBRR-MIS may be the more theoretically defensible option as it incorporates important constructs of suicidal risk (e.g., ideation) and provides time-sensitive information (e.g., planning).

**Overall DBRR Diagnostic Accuracy**

For the second hypothesis, ROC curve analyses were used to discern whether DBRR individual items and the DBRR-MIS were accurate predictors of *BSI* risk. As mentioned previously, a ROC curve is created with statistical software by plotting SN and 1-SP values over a range of cut scores on a continuous scale. An indication of how well the DBRR is able to discriminate between at-risk and not at-risk groups is considered through examination of AUC values. The second hypothesis was supported as all items, with the exception of Item 2, demonstrated discriminatory power when modeled against the *BSI* as the criterion. Specifically, AUC values for Item 4 (access to lethal means) and DBRR-MIS demonstrated the best discriminatory power. AUC values for Items 1 and 3 demonstrated low to moderate discriminatory power. Results suggest that, given certain cut scores, DBRR Item 4 as well as

the DBRR-MIS may represent an acceptable measure of suicide risk as measured by the *BSI.* This finding is encouraging as it indicates that those identified at-risk by DBRR Item 4 and the DBRR-MIS will also be in the at-risk category when given the *BSI.* As the primary role of a screening program is to discern between two groups (i.e., those with and without a given condition), these findings indicate that the DBRR-MIS could be used to accurately identify at-risk students and students not at-risk for engaging in suicidal activity. Still, Item 2 revealed poor and non-significant discriminatory power (*AUC* = .70, *p* =.07). Item 2 was not better than chance at predicting *BSI* risk. This finding may indicate that active ideation (Item 2) *by itself* is not an accurate predictor of risk when the *BSI* is used as the criterion measure. Consistent with the previous hypothesis, it appears that the DBRR-MIS offers the best diagnostic accuracy in predicting student risk for engaging in suicidal behaviors while including more information on suicidal activity than individual items.

**DBRR Cut Scores**

For the third hypothesis, ROC curve analyses examined all possible cut scores. Further investigation of sensitivity and specificity values were used to determine optimal cut scores for classification purposes (i.e., at-risk, not at-risk). Swets (1988) indicated that sensitivity and specificity values of .75 or greater for a given cut score would represent adequate discriminatory power. Consistent with current study findings, Item 4 and DBRR-MIS indicated adequate cut scores (SN and SP values ≥ .75). However, there was a disproportionate balance of positive predictive power and negative predictive power, indicating an over-identification of students at-risk for engaging in suicidal activity (i.e., those identified at-risk were actually not at-risk). As the purpose of universal screening programs is to identify all students at-risk and exclude all those not at-risk for engaging in suicidal activity, sensitivity and negative predictive power are of greater importance in this instance.

**Sensitivity and Negative Predictive Power.** Analysis of sensitivity statistics indicated that adequate cut scores do exist for some of the DBRR items (i.e., Item 4 and DBRR-MIS). Sensitivity was

found to be .83 for Item 4 and a DBRR-MIS cut score of .1. Cut scores can be difficult to interpret when they are in decimal format (see Table 7). However, in this context, these small cut scores are best interpreted as any score above zero across the entire data collection period of this length is cause for concern and follow-up. Given the brief nature of the DBRR scale and the potentially lethal ramifications of suicidal activity, it is necessary to have such stringent interpretation of cut scores. Likewise, in a suicide prevention screening program that this measurement tool is intended for, high negative predictive power is important as it indicates that all those not at-risk are being correctly identified and excluded. Nearly perfect negative predictive power values (i.e., .99) were also associated with this stringent cut score for Item 4 and DBRR-MIS. That is, only 1% of participants were erroneously identified as not at-risk. However, Streiner (2003) reminds us that high negative predictive power values should be expected when examining samples with low prevalence rates (i.e., 6% of suicidal activity among college students; ACHA-NCHA II, 2013). Therefore, these values should be evaluated within the context of positive predictive power as well.

**Specificity and Positive Predictive Power.** The aforementioned optimal cut score was found to be associated with only moderate levels of specificity among items with adequate sensitivity (i.e., Item 4). Higher specificity values were associated with this cut score for Item 3. However, the sensitivity value slipped to .67, falling below the preferred .75 value and simultaneously increasing the false negative rate. Other cut scores were also associated with adequate specificity values at the cost of declining sensitivity values (e.g., DBRR Item 1). Still, in the context of suicide risk assessment, it is more important to minimize the amount of at-risk individuals that go undetected. Holding sensitivity values primary, the cut score of .1 for Item 4 and DBRR-MIS have troubling positive predictive power values (i.e., .17 and .15, respectively). As mentioned previously, low positive predictive power rates indicate high false positives. Given that resource shortages often thwart screening efforts (Hallfors et al., 2006), over-identification of students would likely reduce the feasibility and acceptability of using this

measurement tool in educational institutions. However, Elwood (1993) reminds us that low rates of positive predictive power do not necessarily indicate that the DBRR should not be used to screen for suicide risk. Researchers can expect to find low rates of positive predictive power when base rates are low for the given condition (e.g., suicidal activity among college students). Test positive results would have to be interpreted with caution as resulting decisions should reflect the low base rate of suicidal activity in this population (i.e., 6%).

### Additional Findings

The DBRR demonstrated stronger concurrent validity with female participants than male participants. Preliminary findings suggest that the DBRR may be a better predictor of risk for female students than male students. Results indicated high test-retest reliability correlations among male participants, signifying that male respondents indicated little behavior change over the rating period (i.e., only one male participant indicated initial non-risk status and subsequent risk status). On the other hand, medium test-retest reliability correlations among female participants indicate more variability among behavior related to suicide risk. In fact, of the four participants who changed risk status over the course of the study, three were female participants; interestingly, these three participants endorsed no suicidal activity at the end of the study. Variation in suicidal activity over time has been well-documented in the suicide prevention literature base. For instance, it has been estimated that 60% of adolescents think about suicide at least once before age 18 (American Association of Suicidology; AAS, 2013). Likewise, this finding is consistent with the "gender paradox" for suicide, or the repeated finding that women are more likely to express suicidal ideation than men (Canetto & Sakinofsky, 1998, p. 1)

### Implications for Practice

**Use in multiple-gating procedure.** If educational institutions are considering implementation of a suicide screening program, use of the DBRR may be a cost-effective option in a multi-gated effort. The multiple gating procedure has been lauded as a comprehensive approach to screening as multiple

methods and informants are often used to identify those at-risk (e.g., academic failure, disordered behavior; Severson, Walker, Hope-Doolittle, Kratochwill, & Gresham, 2007). Because internal psychological states are best measured with self-report methods (Spector, 2006), educational institutions may prefer to use a free, brief method that is available in electronic format, such as the DBRR, to screen all students for suicide risk. More sensitive, lengthy, and costly self-report measures (e.g., *BSI*) may be utilized at a subsequent screening stage. Educational institutions may wish to conserve personnel resources for the final screening stage (i.e., clinical interviews).

Tracking suicidal activity trends over time could also inform prevention programming efforts. As students' suicidal activity waxes and wanes throughout the academic year, Kilgus and colleagues (2013) remind us that multiple screening opportunities allow for close monitoring of the fluid nature of student needs: those not at-risk, requiring no intervention, those newly or continued at-risk, necessitating intervention or a modification in the intervention plan, and those no longer at-risk, in which the intervention may be removed.

Providing students with a user-friendly format, such as a mobile application, may be optimal when frequent, formative data collection is required. Moving forward, researchers could investigate the tenability of developing the DBRR for progress monitoring use. Raising students' awareness about their risk status via formative, self-assessment may result in a change in suicidal activity. Nicol and Macfarlane-Dick (2007) suggest that the self-monitoring aspect of formative assessment may provide a sense of control and increased awareness of escalating risk status for student clients.

Lastly, screening procedures are not sufficient in preventing suicide. Future efforts should be focused on concurrently developing the student-support network to which DBRR use would be integrated. Open communication among local hospitals, advocacy centers, and educational institutions can facilitate a specialized referral system to ensure closer supervision (e.g., specialized intervention

services, etc.) for at-risk students. Community mental health providers can work with campus personnel to ensure consistent monitoring of suicide risk.

**DBRR-SIS or DBRR-MIS.** The technical adequacy of both single items and the aggregate scale were considered during this research study. Although results indicated that Item 4 demonstrated appropriate levels of overall diagnostic accuracy, there are additional reasons why the DBRR-MIS appears to be the best format for formatively assessing suicide risk. No single item demonstrates appropriate concurrent validity, overall diagnostic accuracy, or is associated with optimal cut scores for decision-making purposes. Results indicate that the DBRR-MIS demonstrates significant concurrent validity with the *BSI,* appropriate levels of discriminatory power, and a cut score with adequate sensitivity was identified. Importantly, DBRR-MIS measures relevant constructs of suicidal activity, assuming equal significance among all behaviors in accordance with the literature base that certain behaviors are *not* more indicative of action (e.g., intention versus access to lethal means).

## Implications for Research

Study findings suggest that formative assessment may be a viable option for a universal suicide risk assessment tool. Still, replications of this study are needed to further investigate and potentially increase the technical adequacy of this measurement tool. Further research is needed to investigate the diagnostic accuracy of the DBRR-MIS. Examination of cut scores and corresponding conditional probability statistics from a larger student sample should be employed to minimize over-identification of at-risk students. Future research should be conducted to examine the degree to which rates of positive predictive power vary across samples; whether these values are influenced by low base rates or indicative of the quality of the measurement tool. Implementing the screening measure in a tri-annual fashion (e.g., Fall, Winter, Spring) could provide information about whether DBRR cut scores and accuracy varies throughout the academic year.

Although preliminary results suggest that the DBRR demonstrated significant concurrent validity with the *BSI*, the DBRR could be compared against other criterion measures to strengthen its psychometric properties. Likewise, increasing the sample size and multi-site administration would allow for a more geographically and demographically diverse population, potentially increasing the generalizability of the study results. For instance, sexual orientation data was not collected as part of the current study. However, inclusion of this demographic information in future research will likely benefit future prevention efforts. Although current research suggests that non-heterosexual orientation status is not a suicide risk factor in and of itself, research from the AAS (2012) indicates that lesbian, gay, bisexual, and transgender (LGBT) individuals are frequently exposed to stressors that are associated with elevated risk for engaging in suicidal activity, such as harassment, discrimination, and victimization.

It is especially important to consider the complex influence of gender on suicidal behaviors, and this topic is worthy of further investigation. More research is needed to discern why initial results indicate that the DBRR may be more conducive for risk assessment of the female student population. The current study supports existing evidence that assessment methods may need to be altered to better assess the male population.

**Limitations**

There are several limitations that must be considered when interpreting these findings. This study involved a small sample of predominantly White college students in the southeastern region of the U.S. Selection of this sample neglects the vulnerable drop-out and non-student population of young adults (Schwartz & Friedman, 2009). Therefore, the results of this study should be carefully considered before application to a wider population of students or non-students. Future studies should include a more diverse student population, multiple campus sites, or various academic settings to increase generalizability of subsequent results. Second, muddled item wording on DBRR Item 4 may have led to

participant confusion and potential inaccurate responses. At times, the PI had to clarify the meaning of DBRR Item 4, "I have access to a lethal method of harm or opportunity to kill myself" to emphasize the intent of the question. That is, "although everyone typically has access to a lethal method of harm (e.g., walking in front of a bus), this item seeks to answer the question - given the opportunity, would you use a lethal method of harm on yourself?"

Third, some may argue that the change in instrument (i.e., paper/pencil versus online format) may have influenced the participants' responses. It should be noted that the question wording and criteria used to evaluate risk remained unchanged. Likewise, the varied dissemination of DBRRs (i.e., in-person versus on-line) may have influenced participants' ratings due to social desirability bias. Still, research suggests that students will honestly state their suicidal intentions (Joe & Bryant, 2007) and the preferred method (i.e., self-report) of disclosing sensitive information was employed in both scenarios (Krumpal, 2013). Lastly, as the same method (i.e., self-report) was used to measure suicide risk, it is likely that the correlations between variables are inflated due to the action of common method variance, or mono-method bias (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). However, some researchers claim that this type of measurement error has been overstated, especially given that alternative methods to measure internal psychological states are likely less accurate (Spector, 2006).

**Conclusion**

The present study tested the hypotheses that DBRRs demonstrate concurrent validity with regard to the *BSI* scale (Hypothesis 1), demonstrate overall classification accuracy with regard to *BSI* risk status (Hypothesis 2), and identify cut scores associated with optimal conditional probability statistics (Hypothesis 3). Consistent with our hypotheses, the DBRR-MIS demonstrated the strongest correlation with the *BSI* and appropriate discriminatory power when modeled against the *BSI* as the criterion, respectively. Adequate cut scores were identified for the DBRR-MIS for potential differentiation of risk status. However, as the purpose of a screening measurement tool is to achieve an optimal percentage of

correct decisions (i.e., true positives & true negatives), ROC curve analyses indicated that the DBRR displays a disproportionate balance among probability statistics (i.e., PPP & NPP), resulting in over-identification of those at risk. Given that limited resources often thwart screening implementation in educational settings, further research is needed to improve the technical adequacy of the DBRR. Initial findings indicate that, upon continued examination, the DBRR-MIS may be an innovative method of assessing suicide risk among the student population.

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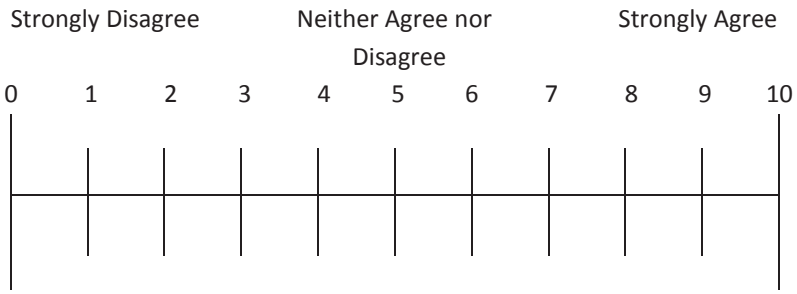
# APPENDIX A

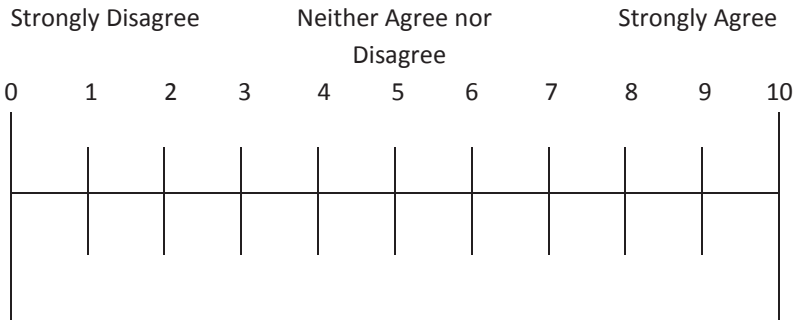
Date: _____ DBRR #_____ Participant ID: _____

Directions: Please mark a dot ( • ) on the scale based on your level of agreement with the statement above.

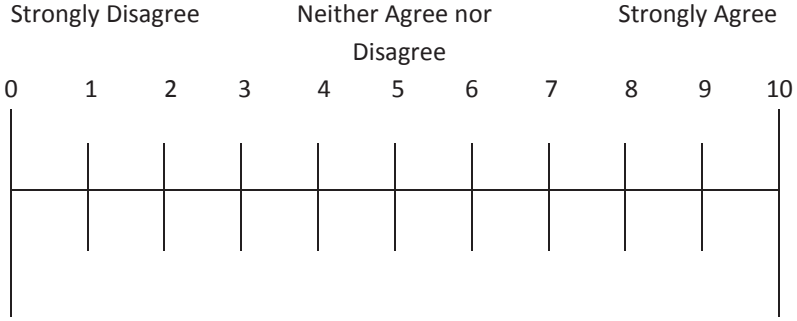
My life is worth living.



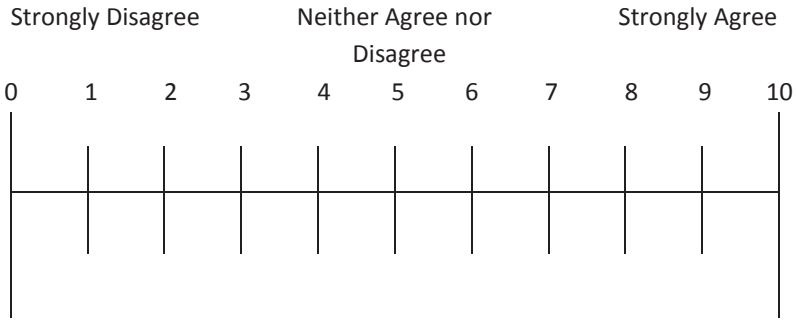

I often think about killing myself.




I have created a plan to kill myself.




I have access to a lethal method of harm or an opportunity to kill myself.




I have previously attempted to kill myself.

Yes o

No o

APPENDIX B

**Sona System Study Description**

Study Name: Identifying the Missing Piece of Suicide Prevention: Formative Risk Assessment

Abstract: This study is designed to evaluate a newly created suicide risk measurement tool.

Description: This study is designed to provide an evaluation of a newly created suicide risk measurement tool. We are seeking a general sample of college students to complete the measures, which includes those at risk and not at risk for suicidal activity. If you choose to participate, you will be asked to complete the program over a two-week period. The first session will be in-person and require 30 minutes of your time. You will then complete an online survey three times over the following ten days. The hyperlink for this survey will be provided through email sent to your ECU email account. The final session will occur in-person and require 30 minutes of your time. All in-person sessions will be conducted in the Rawl Annex Room 145. You will receive 0.5 credits upon completion of each portion of the study for a total of 1.5 credits earned.

Duration: 90 minutes

Pay: None

Restrictions: Participants must be with the age range of 18 to 24 years old.

Participant Sign-Up Deadline: 24 hours before the study is to occur

Participant Cancellation Deadline: 24 hours before the study is to occur

East Carolina University

# Consent to Participate in Research that is Greater than Minimal Risk

## Information to Consider Before Taking Part in This Research

Title of Research Study: Identifying the missing piece of suicide prevention: Formative risk assessment

Principal Investigator: Jessica Tomasula
Institution/Department or Division: ECU Department of Psychology
Address: Rawl Annex Building Room 145
Telephone #: 252-328-5826

Researchers at East Carolina University (ECU) study diseases, health problems, environmental problems, behavior problems and the human condition. Our goal is to try to find better ways to improve the lives of you and others. To do this, we need the help of people who are willing to take part in research.

The person who is in charge of this research is called the Principal Investigator. The Principal Investigator may have other research staff members who will perform some of the procedures. The person explaining the research to you will be the Principal Investigator, Jessica Tomasula. The on-site faculty member who is supervising this research is Christy M. Walcott, PhD.

You may have questions that this form does not answer. If you do have questions, feel free to ask the person explaining the study, as you go along. You may have questions later and you should ask those questions, as you think of them. There is no time limit for asking about this research.

This form explains why this research is being done, what will happen during the research, and what you will need to do if you decide to volunteer to take part in this research.

### Why is this research being done?

The purpose of this research study is to gain a better understanding of suicide risk assessment tools. Specifically, this study is designed to compare two assessment tools, the Direct Behavior Risk Rating (DBRR) questionnaire and the *Beck Scale of Suicidal Ideation* (BSI) questionnaire. The goal of this present study is to determine whether suicide-related thoughts, feelings, and behaviors can be accurately assessed by using a very brief method. We are asking you to take part in this research. However, the decision is yours to make. By doing this research, we hope to learn whether this brief measurement tool provides accurate classification of those who are at risk and those who are not at risk for engaging in suicidal activity. We hope that this information may help suicide prevention efforts for other individuals, communities, and the larger society in the future.

### Why am I being invited to take part in this research?

You are being invited to take part in this research because you are a college student who is 18 to 24 years old and currently enrolled in an Introductory Psychology course. If you volunteer to take part in this study, you will be one of about 100 people to do so.

### Are there reasons I should not take part in this research?

I understand that I should not volunteer for this study if I am under 18 years of age or older than 24 years of age.

### What other choices do I have if I do not take part in this research?

You have the choice of not taking part in this research study.

## Where is the research going to take place and how long will it last?

The research procedures will be conducted at the Rawl Annex Building (Room 145) at ECU and in an online format. This research study is divided into three parts: The first session will be in-person and require 30 minutes of your time. You will then complete a 1-minute online survey three times over the following ten days. The hyperlink for this survey will be provided through email sent to your ECU email account. The final session will occur in-person and require 30 minutes of your time. All in-person sessions will be conducted in the Rawl Annex Room 145. The total amount of time you will be asked to volunteer for this study is less than 90 minutes over the next ten days.

## What will I be asked to do?

The following procedures will be done strictly for research purposes in which you will be asked to do the following:

First Session (30 minutes):

- Complete a brief interview with the principal investigator
- Complete a demographic information sheet (age, gender, ethnicity, etc.)
- Complete the *Beck Scale for Suicide Ideation* (BSI), which is a 21-item self-report questionnaire used to detect and measure severity of suicidal thoughts.
    - This questionnaire will initially be used for screening purposes in order to assess whether participation in this research study is safe for you.
- Complete the newly created measurement tool, Direct Behavior Risk Rating (DBRR), which is a 5-item self-report questionnaire used to assess thoughts, feelings, and behaviors related to suicidal activity.
- Should you have any questions about the research study, contact information will be provided to the principal investigator, faculty supervisor and on-site licensed psychologist, and East Carolina University Institutional Review Board (IRB).
- Should you have any questions related to suicide-related thoughts, feelings, and behaviors, contact information will be provided to the ECU Center for Counseling and Student Development as well as other local and national suicide prevention resources.

Second through Fourth Sessions (1 to2 minutes):

- Complete an online version of the 5-item DBRR questionnaire three times within a ten-day period of your initial session.
- A message will be sent to your ECU email address with a specific, embedded hyperlink that will guide you to the questionnaire. You will have a 24-hour period of time to complete each questionnaire. A reminder email will be sent prior to the link expiration period.
- If your responses indicate significant distress, you will receive an email from the principal investigator with further information, including emergency referral resources.

Fifth Session (30 minutes):

- Complete the BSI questionnaire
- Complete the DBRR questionnaire
- Following data collection, a debriefing session will be completed to provide supplemental information and to answer questions or concerns about the research study.

## What possible harms or discomforts might I experience if I take part in the research?

There are always risks (the chance of harm) when taking part in research. We know about the following risks or discomforts you may experience if you choose to volunteer for this study. These are called side effects. A potential side effect in this study is that you will be asked to assess your own thoughts, feelings, and behaviors related to suicide. Although previous research has found that asking about suicide does not increase the likelihood of someone experiencing suicide-related thoughts, feelings, or behaviors (Gould et al., 2005), we understand that it is a sensitive topic and may result in psychological discomfort. Another potential side effect may be due to a breach of

confidentiality which would occur if your responses warranted immediate intervention to prevent actions that may harm you. When taking part in any research study, procedures may involve risks that are currently unknown and unforeseeable. Therefore, it is important for you to tell us as quickly as possible if you experience a side effect.

### Are there any reasons you might take me out of the research?

If we find it is not safe for you to stay in this study we will take you in person, walk with you to the ECU Center for Counseling and Student Development for further evaluation, and provide resources and referral information for future reference.

### What are the possible benefits I may experience from taking part in this research?

We do not know if you will get any benefits by taking part in this study. That is why we are doing this research. This research should help us learn more about whether a brief measurement tool will help people, including educational institutions, identify and intervene with those at risk for engaging in suicidal activity. In addition, local and national referral information for mental health services will be provided to all participants, which may be distributed to any family members or friends in need of mental health services. There may be no personal benefit from your participation but the information gained by doing this research may help others in the future.

### Will I be paid for taking part in this research?

We will not pay you for the time you volunteer while being in this study.

### What will it cost me to take part in this research?

It will not cost you any money to be part of the research.

### Who will know that I took part in this research and learn personal information about me?

To do this research, ECU and the people and organizations listed below may know that you took part in this research and may see information about you that is normally kept private. With your permission, these people may use your private information to do this research:

- The research team, including the Principal Investigator, Faculty Supervisor, and all other research staff.
- The ECU University & Medical Center Institutional Review Board (UMCIRB) and the staff who have responsibility for overseeing your welfare during this research, and other ECU office staff who oversee this research.

### How will you keep the information you collect about me secure and how long will you keep it?

You have the right to privacy and, as such, all of your identifying information will remain confidential. All data collection sessions will be completed in one-on-one setting to maintain confidentiality. Your answers on all questionnaires will be coded with numerical identifiers, and only the principal investigator, Jessica Tomasula, will have access to the names. No identifying information will appear on any materials with the exception of this form and the demographic information form. Any information obtained in connection with this research that can be identified will remain confidential. The data will be stored in the Rawl Annex Building in Room 145 using a double-lock system. Paper surveys will be stored behind a locked door in a locked cabinet. All data will be stored in an encrypted file on a computer designated for research purposes in Room 145. This information will not be disclosed without your permission or as required by law. The results of this study may be published in scientific journals or be presented at psychological meetings as long as you are not identified and cannot reasonably be identified from it. However, it is possible that under certain circumstances, data could be subpoenaed by court order.

### Limits of Confidentiality

There are some cases in which the law dictates that your signed authorization may not be required in order to release information. This includes:

- If the research team member believes that you are likely to harm yourself and/or another person, they may take action necessary to protect you or others by contacting appropriate referral sources.

As mentioned previously, if your records are requested by a valid subpoena or court order, then the principal investigator will be required by law to submit your information related to this study.

## What if I decide I do not want to continue in this research?

Participating in this study is voluntary. If you decide not to be in this research after it has already started, you may stop at any time. You will not be penalized or criticized for stopping. You will not lose any benefits that you should normally receive.

## Who should I contact if I have questions?

The people conducting this study will be available to answer any questions concerning this research, now or in the future. You may contact the Principal Investigator, Jessica Tomasula at 252-328-5826 (days) or 252-481-1499 (nights and weekends).

If you have questions about your rights as someone taking part in research, you may call the ECU Office for Human Research Integrity (OHRI) at phone number 252-744-2914 (days). If you would like to report a complaint or concern about this research study, you may call the Director of OHRI, at 252-744-1971.

## Is there anything else I should know?

You will receive 1.5 credits toward the research requirement for introductory psychology classes. Should you be unable to complete the entire study, you will receive credit for the components in which you participated (initial in-person session = 0.5 credit, three online surveys = 0.5 credit, final in-person session = 0.5 credit). Your participation may be terminated by the principal investigator without regard to your consent if the initial suicide risk assessment indicates immediate action and/or two or more questionnaires are not completed throughout the study. You will not lose any benefits to which you are otherwise entitled nor will you be penalized. We have tried to explain all of the important details about the study to you. If you have any questions that are not answered here, please request more information at this time.

## I have decided I want to take part in this research. What should I do now?

The person obtaining informed consent will ask you to read the following and if you agree, you should sign this form:

- I have read (or had read to me) all of the above information.
- I have had an opportunity to ask questions about things in this research I did not understand and have received satisfactory answers.
- I understand that I can stop taking part in this study at any time.
- By signing this informed consent form, I am not giving up any of my rights.
- I have been given a copy of this consent document, and it is mine to keep.

_____ _____ _____

**Participant's Name (PRINT)** **Signature** **Date**

**Person Obtaining Informed Consent**: I have conducted the initial informed consent process. I have orally reviewed the contents of the consent document with the person who has signed above, and answered all of the person's questions about the research.

_____ _____ _____

**Person Obtaining Consent (PRINT)** **Signature** **Date**

APPENDIX D

Date: _____ **Initial Intake Form** Participant ID: _____

**Introduction**

"Hello, my name is Jessica Tomasula and I am the principal investigator of this research study. Thank you so much for attending the initial session of this study. The purpose of today's session is to provide an explanation of the study and determine whether you would like to participate in the study based on the provided information. If so, then we would engage in a brief interview to gain some information about you. Afterward, I will provide a demonstration of how you would complete two questionnaires."

**Prior to Consent**

"I will now review the main aspects of this research study and please do not hesitate to ask questions or voice concerns throughout our time here today.

The purpose of this research study is to gain a better understanding of suicide risk assessment tools. Specifically, this study is designed to compare two assessment tools, the Direct Behavior Risk Rating (DBRR) questionnaire and the *Beck Scale of Suicidal Ideation* (BSI) questionnaire. The goal of this present study is to determine whether suicide-related thoughts, feelings, and behaviors can be accurately assessed by using a very brief method.

If you choose to participate in this study, the research procedures will be conducted at the Rawl Annex Building (Room 145) at ECU and in an online format. This research study is divided into three parts: The first session will be in-person and require 30 minutes of your time. You will then complete a 1-minute online survey three times over the following ten days. The hyperlink for this survey will be provided through email sent to your ECU email account. The final session will occur in-person and require 30 minutes of your time. All in-person sessions will be conducted in the Rawl Annex Room 145. The total amount of time you will be asked to volunteer for this study is less than 90 minutes over the next ten days. You will receive 1.5 credits toward the research requirement for introductory psychology classes. Should you be unable to complete the entire study, you will receive credit for the components in which you participated (initial in-person session = 0.5 credit, three online surveys = 0.5 credit, final in-person session = 0.5 credit).

Do you have any questions so far?

It is important to note that participation in any research study could result in discomfort. In this research study, you will be asked to assess your own thoughts, feelings, and behaviors related to suicide. Although previous research has found that asking about suicide does not increase the likelihood of someone experiencing suicide-related thoughts, feelings, or behaviors (Gould et al., 2005), I understand that it is a sensitive topic and may result in psychological discomfort.

There may be reasons I will need to take you out of the study, even if you want to stay in. I may find out that it is not safe for you to stay in the study. For instance, if your scores indicate that you are at elevated risk of hurting yourself, your safety is more important than participation in this study. I would then discuss these results with you in person, walk with you to the ECU Center for Counseling and Student

Development for further evaluation, and provide resources and referral information for future reference. If you miss two or more opportunities for data collection, then you will be excused from the study.

There may be no personal benefit from your participation but the information gained by doing this research may help others in the future. This research should help us learn more about whether a brief measurement tool will help people, including educational institutions, identify and intervene with those at risk for engaging in suicidal activity. In addition, local and national referral information for mental health services will be provided to you, which may be distributed to any family members or friends in need of mental health services.

Do you have any questions about the information that I have just said?

If you would like to take part in this study, today's session will include: a brief interview with me, completion of a demographic information sheet, and completion of two questionnaires. Contact information will be provided to you for questions regarding the research study and suicide prevention resources.

Over the next ten days, you will receive three emails with embedded hyperlinks to complete the DBRR surveys. These emails will be distributed approximately 48 hours after each data collection session, including today's session. You will have 24 hours to complete these 1-minute surveys. You will receive an email reminder to complete the survey prior to the 24-hour expiration period.

Scheduling the final in-person session will occur in much the same way as today's session. You will sign up for an available timeslot through the Sona system within 24 hours of their desired appointment time. Should your schedule unexpectedly change, appointments can be cancelled using the same online system within 24 hours in advance. This 30-minute session would include completion two questionnaires, a review of the research study by myself, and time to discuss your comments, questions, or concerns about the study. Contact information will then be provided to you for questions regarding the research study and suicide prevention resources.

After reading the consent document, please let me know if you have any questions or concerns about the research study. If you do not have any questions or concerns and wish to participate in this study, please print your name and signature at the end of the form."

**Following Consent**

"Now I would like to ask you a few questions about yourself. Following these questions, I will ask you to complete a form that provides us with demographic information, like your gender, birth date, and contact information. Please let me know if you have any questions throughout this process."

➔*See Demographic Form*

**Following Brief Interview**

"The next form, the BSI survey, will take approximately 1-5 minutes to complete. Please read each group of statements below and circle ONE statement that best describes how you have been feeling for the PAST WEEK, INCLUDING TODAY. Please be sure to read all of the statements in the group before responding. After completing questions 1 through 5, please pause and to see question you should complete next. If you circled zero statements for questions 4 and 5, then proceed to questions 20 and 21. If you have marked a 1 or 2 for either questions 4 or 5, then open the flap and proceed to question 6. Then complete the entire questionnaire, including questions 20 and 21. Please do not score the survey when you are finished. Do you have any questions?

➔*Follow Risk Management Protocol if BSI is at or above 4*

**Following BSI Completion**

"The next form, the DBRR survey, will take approximately 1 minute to complete. You will see an online version of this form as three of these surveys will be sent to your ECU email address over the next ten days. To complete this survey, please read the statement to the left, then mark a large dot on the line that corresponds with how much you agree with that statement AT THE CURRENT MOMENT. For instance, I would mark a dot on the line corresponding to zero if I strongly did not agree with the statement, "My life is not worth living." I would mark a dot on the line corresponding to five if I did not agree nor disagree with the statement. I would mark a dot on the line corresponding to ten if I strongly agreed with the statement. Do you have any questions as to how you should complete the first item? Please complete the remaining 3 items. The last item is completed by marking a dot in the Yes or No categories based on your response to the statement, "I have previously attempted to kill myself." Do you have any questions?

**Following DBRR Completion**

"Thank you for all of your hard work today. The last component of today's session will be to provide you with contact information and mental health resources. If you should ever have any questions about the research study itself, please contact the following people:

| | | | |
|---|---|---|---|
| Principal Investigator | Jessica Tomasula | 252-328-5826 | tomasulaj08@students.ecu.edu |
| Faculty Supervisor | Christy Walcott, PhD | 252-328-1378 | walcottc@ecu.edu |
| ECU Office for Human Research Integrity (OHRI) | | 252-744-2914 | |

If you would like to report a complaint or concern about this research study, you may call the Director of OHRI, at 252-744-1971.

If you notice that you or someone you know may be experiencing suicide-related thoughts, feelings, or behaviors, please contact the following resources:

| | |
|---|---|
| Call 911 | |
| REAL Crisis Center, Inc. | 252-758-4357 |
| National Suicide Prevention Lifeline | 1-800-273-8255 |
| ECU Center for Counseling and Student Development | 252-328-6661 |
| ECU Student Health Center | 252-328-6841 |
| ECU Psychiatry | 252-744-1406 |

APPENDIX E

Date_____ **Demographic Information Form** Participant ID_____

Directions: Please print your information in the lines provided below and mark the boxes with an X where appropriate.

First Name: _____ Last Name: _____

Street Address: _____

City:_____ State:_____ Zip code:_____

Best contact number to reach you: _____

Preferred email address: _____

Gender: ☐ M ☐ F ☐ Other

Date of birth: ___/___/___

Age: ☐ 18 ☐ 19 ☐ 20 ☐ 21 ☐ 22 ☐ 23 ☐ 24

Which of the following best describes your racial heritage? (you may choose more than one)

☐ American Indian or Alaskan Native
☐ Asian
☐ Black or African American
☐ Native Hawaiian or other Pacific islander
☐ White
☐ Prefer not to answer
Other _____

Which of the following best describes your ethnic heritage?

☐ Hispanic or Latino
☐ Not Hispanic or Latino

Please mark which periods of time are easiest for you to attend the final 30-min session:

| | | | |
|---|---|---|---|
| ☐ 8:00-8:30am | ☐ 10:30-11:00am | ☐ 1:00-1:30pm | ☐ Thursday |
| ☐ 8:30-9:00am | ☐ 11:00-11:30am | ☐ 1:30-2:00pm | |
| ☐ 9:00-9:30am | ☐ 11:30am-noon | ☐ 2:00-2:30pm | ☐ Friday |
| ☐ 9:30-10:00am | ☐ 12:00-12:30pm | ☐ 2:30-3:00pm | |
| ☐ 10:00-10:30am | ☐ 12:30-1:00pm | ☐ 3:00-3:30pm | |

**TO BE COMPLETED BY RESEARCH STAFF ONLY:**

Have you ever been diagnosed with a psychological or emotional problem?

☐ No
☐ Yes, please specify:_____

Are you currently receiving therapeutic treatment (e.g., counseling or therapy) for any psychological or emotional problems?

☐ No
☐ Yes, please specify:_____

Is a doctor or health care provider currently treating you or prescribing medications for any psychological or emotional problems?

☐ No
☐ Yes, please specify:_____

Have you ever been hospitalized for any psychological problems?

☐ No
☐ Yes➔ Was hospitalization within the last year? ☐ No ☐ Yes

REMEMBER to collect:

- ❑ Signed consent form
- ❑ Demographic information form
- ❑ BSI form
- ❑ DBRR form

APPENDIX F

**Risk Protocol for College Students Endorsing Suicidal Activity during the In-Person Sessions**

Prior to the in-person sessions, contact the ECU Center for Counseling and Student Development (252-328-6661) to let them know of the scheduled interview time slots and that college students endorsing suicidal activity that require immediate action will be escorted to their facility for further evaluation.

**If during an interview a participant scores 4 or above on the Beck Scale for Suicide Ideation (BSI):**

↓

**Stop** the interview
**Review** the participant's elevated items
**Validate** the participant's feelings to provide a supportive environment in case they would like to discuss their suicidal activity with you

"I noticed that your responses indicate that you are currently experiencing thoughts, feelings, or behaviors related to suicide. Thank you for sharing your thoughts with me today as I realize that this may be a difficult time for you."

↓

**Notify** the participant of impeding actions

"You have indicated thoughts, feelings, or behaviors related to suicide that warrants further evaluation to ensure your safety. Because of concerns about your safety, I will need to break confidentiality in order for the ECU Center for Counseling and Student Development to conduct a formal risk assessment. The counselors on staff are trained to assess for suicidal activity and can provide resources, such as treatment services or referrals to support networks. "

↓

**Notify** the participant of their exclusion from the study and awarded credit for their time

"As your safety is more important than participation in this research study, you will be excused from this study. However, you will still be awarded the research credit (0.5) for your time spent today. Do you have any questions before we walk over to the ECU Center for Counseling and Student Development?"

↓

**Escort** the participant to the ECU Center for Counseling and Student Development. If the participant is unwilling or not safe to walk to the Center, then the Principal Investigator will contact ECU Police (252-328-6787).

↓

The participant will be evaluated by the ECU Center for Counseling and Student Development that day. Then the principal investigator will confirm with the ECU Center for Counseling and Student Development the same day or following business day that the at-risk participant was evaluated, appropriate next steps were created (e.g., commitment to treatment contract or crisis response plan), and necessary referral information was provided.

↓

These events, along with updates about the entire recruitment process, will be reviewed during a weekly meeting by the Faculty Supervisor and licensed psychologist, Dr. Christy Walcott.

*Adapted from*: Jesse, D. E., Blanchard, A., Bunch, S., Dolbier, C., Hodgson, J., & Swanson, M. S. (2010). A pilot study to reduce risk for antepartum depression among women in a public health prenatal clinic. *Issues in Mental Health Nursing, 31,* 355-364. doi:10.3109/01612840903427831

APPENDIX G

## Resource List for Students

**Local Emergency Resources**

*ECU Center for Counseling and Student Development*
First floor of Umstead Building, Room 137. Enter through the back entrance facing Slay Building.
Office hours 8-5 M-F **(252) 328-6661**
All ECU students can be seen for free; call the center to schedule an appointment.

Emergency walk-ins are seen on a first come, first serve basis.
Hours for walk-in service: M 9-4, T 10-4, W-F 9-4
After regular business hours, you can reach the On-Call Counselor by contacting the ECU Police Department at 328-6787. The on-call counselor is available 365 days/year.

*REAL Crisis Intervention, Inc.*
600 E 11th Street
The REAL Crisis center provides several types of services:
A 24-hour free and confidential hotline: **252 758 HELP (4357)**
Free individual phone and in-person counseling.

**National Emergency Resources**

| | |
|---|---|
| Call 911 | |
| National Suicide Prevention Lifeline | 1-800-273-8255 |

**Non-emergency Resources**

| | |
|---|---|
| ECU Student Health Center | 252-328-6841 |
| ECU Psychiatry | 252-744-1406 |

**Organizations and Websites**

*American Foundation for Suicide Prevention*
120 Wall Street, 22nd Floor
New York, NY 10005
888-333-AFSP
http://www.afsp.org

- Facts about suicide and depression
- Suicide statistics
- Information about current research and educational projects, including the College Screening Project and the teen public service campaign "Suicide Shouldn't Be a Secret"
- Support for survivors (family and friends who have lost someone to suicide): information, support group directory, healing conferences

*American Association of Suicidology*
4201 Connecticut Avenue, NW, Suite 408
Washington, DC 20008
(202) 237-2280
http://www.suicidology.org

- Facts about suicide and depression

• Support for survivors
• Annual Conference for researchers, clinicians, survivors, school personnel, volunteers, and other mental health professionals
• Directory of Suicide Prevention and Crisis Intervention Agencies in the U.S.

*Jed Foundation*
583 Broadway, Suite 8B
New York, NY 10012
(212) 343-0016
http://www.jedfoundation.org
• Facts about youth suicide
• Information on mental health for parents of college-bound students
• Ulifeline, an online mental health resource for students in participating schools. Students can locate their school's counseling center, take a self-evaluation test and learn more about mental health and medications

*Active Minds on Campus*
4831 36th Street, NW, #309
Washington, DC 20008
(240) 401-3182
http://www.activemindsoncampus.org
• Fact sheets on mental illness
• Information about starting an Active Minds chapter and planning events at your school to create awareness about mental health

*Campus Blues*
http://www.campusblues.com
• Information about common problems in college, including mental disorders

**Personal Accounts about Mental Illness**

• Styron, William
*Darkness Visible*. Random House: 1990

• Jamison, Kay
*An Unquiet Mind*. Knopf: 1995

**Books about Depression and Suicide**

• DePaulo, J. Raymond *Understanding Depression*. Wiley: 2002
Helps the reader understand depression and bipolar disorder while providing a picture of the biological and genetic factors that contribute to these disorders as well as a comprehensive picture of their treatment.

• Hendin, Herbert *Suicide in America*. Norton: 1996
Discusses suicide among the young and among older people; the relation of violence and alcoholism to suicide; the methods and motives for suicide; the treatment of the suicidal patient; and assisted suicide and euthanasia.

• Jamison, Kay *Night Falls Fast*. Knopf: 1996
Explains the psychology, psychopathology, neurobiology and genetics of suicide as well as what we can do to prevent it.

APPENDIX H

**Risk Protocol for College Students Endorsing Suicidal Activity during the On-Line Sessions**

Dear Participant (piped in name),

Your survey responses indicate that you may be experiencing increasing symptoms related to suicidal behavior. I appreciate your honest responses and would like to help you access resources that may help you through this difficult time. If you are receiving this message after 5pm, please refer to any of the following 24-hour services:

| | |
|---|---|
| Call 911 | |
| REAL Crisis Center | 252-758-4357 |
| National Suicide Prevention Lifeline | 1-800-273-8255 |

If you are receiving this email within typical business hours (9am-5pm), please refer to the following resources:

| | |
|---|---|
| ECU Center for Counseling and Student Development | 252-328-6661 |
| ECU Student Health Center | 252-328-6841 |
| ECU Psychiatry | 252-744-1406 |

When you receive this email, please REPLY TO THIS EMAIL so that I can call you at a convenient time to check in. I will be calling you within the hours of 9am-5pm. Also, please know that you are not alone. People are here to help you.

Best,

Jessica Tomasula
Principal Investigator

Subsequent phone conversation will include:

- Brief suicide risk assessment
- Referral to ECU Center for Counseling and Student Development
- Inquiry for provision of additional resources
- Reminder that participation in this study is voluntary and they may drop out at any time

APPENDIX I

Date: _____ **Debriefing Form** Participant ID: _____

"Thank you for completing this research study. I have a few quick pieces of information to review with you and will ask you a few questions throughout this process. Do you have any questions before we begin?"

"During this study, you were asked to assess your own thoughts, feelings, and behaviors related to suicide. Although previous research has found that asking about suicide does not increase the likelihood of someone experiencing suicide-related thoughts, feelings, or behaviors (Gould et al., 2005), it remains a sensitive topic in society and, therefore, may have resulted in psychological discomfort."

1. Did you experience any psychological discomfort while completing the forms for this study?

☐ No
☐ Yes. Can you tell me a little bit about that?

_____

2. Did you utilize any of the resources given to you as a part of this study?

☐ No
☐ Yes. Can you tell me what resource or resources you utilized?

_____

3. Have you talked to any family members or friends about your feelings throughout this process?

☐ No
☐ Yes. Can you tell me your relationship with the person or persons you talked to and what you discussed?

_____

"Based on your participation in this study, do you have any questions, comments, or suggestions?"

_____

_____

"If you should have any questions or concerns about this study, please review your Consent Form and Additional Study Information for contact information regarding this study. Do you need a copy of that form? If you would like to seek out suicide prevention resources for yourself or others, please review the Resource List for Students that has been provided to you today."