BEHAVIORAL HEALTH RISK ASSESSMENT AND ESTIMATION: VALIDATING AN INTEGRATED, MULTI-RISK FACTOR APPROACH AIDED BY TECHNOLOGY

BY

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DISSERTATION

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Dedication

This study is dedicated to those who have suffered from mental illness, to those who lost their lives during military service to our Country, to those who continue to suffer…

… And to those unwavering individuals who embrace the ideals of compassion in action – you make the difference for good.

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For God… thy will be done.

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Abstract

High rates of behavioral health problems in the U.S. require integrated, multi-dimensional approaches. The study of behavioral health risk assessment and estimation aided by technology has the potential to inform assessment and management of behavioral health problems toward the goal of reducing adverse outcomes. The objective of this study is to inform evidence-based behavioral health risk assessment and estimation.

This research examines the U.S. Army Medical Command data within the Behavioral Health Risk Management module (BHRM) to explore behavioral health risk assessment and estimation aided by technology. Analyses are conducted on BHRM data from the records of 30,263 U.S. Army active duty, Guard and Reserve service members assigned to military medical units (U.S. Army Warrior Transition Units) between September 1, 2009 and November 12, 2013. To test risk assessment, responses on the BHRM intake tool (Behavioral Health Risk Assessment-Questionnaire / BHRA-Q) are used to test prevalence, associations, internal reliability and questionnaire's factor group structure. To examine risk estimation, statistical tests are completed on the prevalence and correlations of risk estimates by the BHRM and clinical providers as well as the predictive properties of demographic variables toward risk estimation.

Hypotheses are supported for significant relationships among behavioral health risk variables ($r = \geq .40$); good fit of the data to the eight-factor group structure of the BHRA-Q (Comparative Fit Index = 0.969; Tucker-Lewis Fit Index = 0.967; Root Mean Square Error of Approximation = .029 [90% Confidence Interval 0.029 - 0.030]); significant correlations among BHRM and provider risk estimates (large or medium effect size of BHRM on provider estimates); and three significant demographic predictors of risk estimation (race, religion and military service component). Internal reliability of BHRA-Q is supported (Cronbach's $\alpha = .897$).

Behavioral Health Risk Assessment: An Integrated Approach Aided by Technology

This study tests data related to an integrated, multi-risk factor behavioral health risk assessment questionnaire (BHRA-Q) and risk estimation aided by technology (BHRM). Findings support behavioral health risk assessment and estimation using evidence-based / informed multi-risk factor assessment, aided by technology, to inform clinical decision making. Although demographic variables are not strong predictors of risk estimation, as grouped and tested, further study is recommended.

CHAPTER 1

Introduction

Statement of the Problem

In the United States (U.S.), behavioral health problems are identified as a significant public health concern (National Institutes of Health, National Institute of Mental Health [NIMH], 2008a; Department of Health and Human Services [DHHS], Substance Abuse and Mental Health Services Administration [SAMHSA], 2015). While health is defined as physical and mental well-being, behavioral health is generally defined as mental, psychological, or emotional well-being. Behavioral health problems include diagnosable mental health and substance use disorders as most typically defined by the Diagnostic and Statistical Manual of Mental Disorders, Fourth or Fifth Edition (DSM-IV-Text Revision or DSM-V) (American Psychiatric Association [APA], 2000, 2013).

Behavioral health disorders have remained at high levels since 2008 (CBHSQ, 2013). An estimated 19% of the population suffers from mental illness (SAMHSA, 2013), and an additional 9% experience substance disorders (SAMHSA, Center for Behavioral Health Statistics and Quality [CBHSQ], 2014a). In addition, 36% of those with mental illness have a co-occurring substance use disorder (CBHSQ, 2013).

Behavioral / mental health problems are concerning as they can diminish well-being and contribute to adverse health outcomes. Individuals living with behavioral health disorders are more likely to experience poor outcomes such as early death, suicide (CBHSQ, 2013) and homicide (Hiroeh, Appleby, Mortensen, & Dunn, 2001); major depression (Grant et al., 2004), anxiety (Zimmerman, Chelminski, & McDermut, 2002; Zimmerman, McDermut, & Mattia, 2000), substance dependence or abuse (CBHSQ, 2013, 2014b); higher rates of emergency room

visits (CBHSQ, 2013), and / or poor health (CBHSQ, 2013; McCusker et al., 2007; Roy-Byrne et al., 2008).

Outcomes can be improved through management processes (DeLeo & Heller, 2007; Lambert et al., 2003; Stein & Test, 1980). However, management is often confounded by the multi-factorial nature of behavioral health problems. Generally, management may include assessment (screening, identification and risk estimation), diagnosis, treatment, planning and ongoing monitoring. Managing behavioral health problems is often influenced by multiple contributing biological, psychological and social dimensions. For instance, managing the care of someone with depression may include evaluating the person for depression, suicide-related behaviors, anxiety, substance misuse / abuse, violence, exposure to trauma (mental and physical), emotional and physical symptoms, family history, life experiences and current support systems.

Due to the significance of the potential outcomes and the multi-factorial nature of behavioral health problems, a multi-dimensional management approach that integrates health and behavioral health-related knowledge is required. Assessment processes, in particular, require an integrated approach in order to properly identify, evaluate, and estimate the risk of an adverse event. Integrated assessments may better inform decision making regarding diagnosis, planning and ongoing monitoring.

Use of technology can aid in the integration and synthesis of the high volumes of evidence-based or informed information required to conduct comprehensive assessments. Current methods of behavioral health assessment do not adequately incorporate and utilize available scientific evidence (Beutler, 2000). A review of the literature reveals that the majority of assessment methods focus on a singular aspect of behavioral health problems (like depression,

suicide, anxiety, substance abuse, or trauma) and lack an integrated approach inclusive of co-occurring and influencing factors (like physical symptoms, family history, life experiences, and environmental issues). These assessment methods and authoring sources are detailed in the literature review section of this dissertation. In addition to one dimensional assessment methods, traditional behavioral health risk assessment methods are paper-based, require hand scoring, are not adaptable to specific populations, and do not leverage available technology (ONCHIT, 2013).

Unlike paper-based means, technology can support multi-dimensional knowledge integration, behavioral health data computation and analysis, and consistency in standardization. Innovations in behavioral health assessment using technology have the potential to reduce the prevalence of behavioral health problems. Like research on many health information systems, there is limited research published in peer-reviewed journals (Chiasson & Davidson, 2002, 2005). Expanding scientific knowledge in these areas and addressing deficits in research on health information systems requires study of innovations in behavioral health assessment.

Significance of the Problem

The global burden of behavioral health disorders on health is acknowledged by the World Health Organization (WHO). The WHO states, "[There is] no health without mental health" (Prince, 2007; WHO, 2005) – offering confirmation that behavioral health is essential to human life. Likewise, researchers find that behavioral / mental health problems diminish well-being and contribute to adverse health outcomes (Acierno, Resnick, & Kilpatrick, 1997; Baxter, Charlson, Somerville, & Whiteford, 2011; Scott et al., 2009), including early death (Hiroeh et al., 2001).

Behavioral health problems directly affect one-third of the U.S. population. In any given year, approximately 43.8 million people have a diagnosable mental illness and 7.7 million have a

substance use disorder (CBHSQ, 2014a). The U.S. military is also affected in that 25% of non-deployed soldiers have been found to have a mental disorder (Kessler et al., 2014) and 43% of active duty soldiers admit to substance misuse (Stahre, Brewer, Fonseca, & Naimi, 2009) – making the issue of behavioral health a national security issue (U.S. Department of the Army, 2012).

The estimated annual cost of behavioral health problems in lost earnings, medical costs and disability benefits is 300 billion dollars (Insel, 2008). Despite Americans spending an estimated 101 billion dollars in 2009 for the treatment of behavioral health problems (SAMHSA, 2014), the prevalence of mental health disorders (18%) and substance use disorders (9%) within the U.S. population remain widespread (CBHSQ, 2014a). Projections of costs for mental health care are expected to increase to 280.5 billion by 2020 (SAMHSA, 2014). Moreover, there are high costs associated with public health issues found to contribute to behavioral health disorders. For instance, intimate partner violence against women is estimated to cost six billion dollars annually (Centers for Disease Control, National Center for Injury Prevention and Control [NCIPC], 2003), and child abuse is found to have a total lifetime cost of 124 billion for the one year of substantiated incidents in 2008 (Fang, Brown, Florence, & Mercy, 2012). The average lifetime cost per child victim is found to be approximately $210,000. These high costs are attributed to required child health care, adult medical care, productivity losses, child welfare, criminal justice, and special education services (Fang et al., 2012).

In addition to the high financial costs, behavioral health problems are found to contribute to diminished well-being – personal, social and occupational. Research demonstrates that these individuals have higher rates of unemployment, arrest, and housing instability (CBHSQ, 2013); victimization or perpetration of violence (Hiday, Swanson, Swartz, Borum, & Wagner, 2001;

Riggs, Caufield, & Street, 2000); poor health and increased emergency room visits and significant adverse health outcomes (Acierno et al, 1997; Baxter et al, 2011; Scott et al., 2009), including suicide (Arsenault-Lapierre, Kim, & Turecki, 2004; Harris & Barraclough, 1997). Studies find that those with behavioral health problems are at increased risk of death by suicide and homicide (Hiroeh et al., 2001).

In 2013, 40,229 people died due to suicide within the U.S. (Centers for Disease Control [CDC], 2015) – surpassing the number of deaths due to motor vehicle accidents (30,804) or homicides (16,121) (CDC, National Center for Health Statistics [NCHS], 2013a, 2013b). Rates of suicide increased 16% from 10.1 to 12.1 per 100,000 from 2000 to 2010 (NCHS, 2013c, 2013d). Although suicide rates have increased 16% within the general population, they increased 28% for those ages 35-64, and 80% within the military from 1999-2000 to 2010 (Defense Manpower Data Center [DMDC], 2011; NCHS, 2013c, 2013d).

Research suggests that having a history of a psychiatric disorder is the most important risk factor for suicide (Cavanagh, Carson, Sharpe, & Lawrie, 2003). One study found that 90% of suicides involve a previous diagnosis of a behavioral health disorder, and 60% of those with a prior behavioral health diagnosis have an affective disorder (such as major depression) (Cavanagh, Carson, Sharpe, & Lawrie, 2003).

The proper assessment and management of behavioral health problems offers a means to reduce the prevalence and relieve the suffering of those impacted by these disorders. However, Kapur (2009) states, “The rigorous clinical assessment and treatment of mental disorder is a useful starting point for reducing suicide in the mentally ill, but the evidence base for this is not strong.” National attention and study is required to support novel means of addressing

behavioral health problems, such as innovations in the field of behavioral health risk assessment and estimation assisted by technology.

Innovation in the Field of Behavioral Health

Current methods of behavioral health management are unable to effectively reduce the prevalence of behavioral health problems (CBHSQ, 2013); thus, new innovations in this area of research must be considered. Generally, management includes assessment (screening, identification and risk estimation), diagnosis, treatment, planning and ongoing monitoring. Review of the literature reveals that traditional approaches utilized by behavioral health professionals' for assessments are limited in that they are often singularly-purposed on a specific diagnosis and the formulation of a diagnosis specific treatment plan (APA, 2003; National Institute for Health and Clinical Excellence [NICE], 2011; Department of Veterans Affairs [VA] / Department of Defense [DoD], 2013a). It is important to note that diagnosis is only one part of the assessment. For example, individuals presenting with complaints of depression may not be routinely assessed for other behavioral health issues such as substance use disorders, history of trauma, psychosocial issues, etc. Likewise, these behavioral health assessments often lack the integration of scientific evidence for decision making (Beutler, 2000).

In addition to non-use of integrated approaches, the discipline is slow in adopting available technologies. Reluctance in adopting innovation is attributed to finances (Software and Technology Vendors' Association [SATVA], 2009) and lack of resources, skill, training and agreement on the standards of care and measurement, cost of adoption, poor integration of care between primary and behavioral health providers, and privacy and security issues (ONCHIT, 2012, 2013).

Despite the impediments to innovative change, studies demonstrate the value in the use of technology in the health and behavioral health care settings (Garb, 2007; Garg et al., 2005). Alongside these studies, the NIMH recognizes the importance of support systems for clinical decision making (Clinical Decision Support Systems [CDSS]) in behavioral health care. Two of NIMH's strategic objectives support efforts to innovate and to integrate technology: 1) "chart mental illness trajectories to determine when, where and how to intervene;" and 2) "develop new and better interventions that incorporate the diverse needs and circumstances of people with mental illnesses" (NIMH, 2008b). Critical and systematic research reviews support systems for clinical decision-making within health and behavioral health fields (Garb, 2007; Garg et al., 2005; Hunt, Haynes, Hanna, & Smith, 1998; Johnston, Langton, Haynes, & Mathieu, 1994; Kaplan, 2001). However, these research studies suggest additional research in this area.

Existing innovations in field of health care provide a model for the behavioral health care domain with regard to knowledge integration and technology. Health information technology or "health informatics" has gained wide acceptance in health management. According to the NCHS, 78% of office-based physicians use a type of electronic health record (NCHS, 2014a). Health informatics is defined as "the study and implementation of structures and algorithms to improve communication, understanding, and management of medical information" (Warner, 1988). Informatics involves comprehensive health assessment and management and may include education, administration, communication, process, assessment, management, outcome and decision support, and / or program analytic functionalities. A primary goal is to inform decision making through the integration of information (Young, 2000). The use of integrated approaches aided by technology provides a venue for improved decision making in behavioral health assessment and management. Despite advances by the general health care field in the use of

informatics, the behavioral health field lags behind in adopting informatics (DHHS, National Council for Community Behavioral Healthcare, 2012; SATVA, 2009).

Behavioral health risk assessment involves the screening and identification of multiple risk factors from a variety of scientific fields as well as an estimation of an individual's risk for adverse behavioral health outcomes (like significant injury or death). Technology can support the incorporation of multiple behavioral health factors affording providers a setting for knowledge integration and synthesis. Moreover, this approach has the potential to standardize risk screening and identification processes; promote more informed, evidence-based risk stratification / estimation; and support improved decision making in the effort to reduce adverse behavioral health outcomes. There is a number of emerging behavioral health and social work informatics initiatives; however, upon search and review for behavioral health initiatives, there is limited development and research in the area specific to behavioral health risk assessment and estimation.

Innovations can help the social work profession improve social work practice within the field of behavioral health risk assessment and management. Social workers are often on the front line of the behavioral health profession with regard to helping those with behavioral health problems. The majority of licensed social workers practice in health or mental health settings (National Association of Social Workers, 2006; Whitaker, Weismiller, Clark, & Wilson, 2006) and provide ~70% of mental health care in the U.S .(Zlotnik & Solt, 2006). Additionally, social workers regularly interact with suicidal individuals with 53% reporting having worked with a suicidal client in the past month and 78% reporting having worked with a suicidal client in the past year (Feldman & Freedenthal, 2006).

The research is directly related to the social work profession; in that, the findings may bolster current standards and practices in support of at-risk populations, like the suicidal client. In 2013, over 220 clinical social workers used the Behavioral Health Risk Assessment-Questionnaire (BHRA-Q) and Behavioral Health Risk Management module (BHRM) to support behavioral health risk assessment, estimation and management of the at-risk WTU population. Examination of the BHRA-Q and the social worker's use of the BHRM module have the potential to contribute useful knowledge toward the social work profession's evolution in the area of innovative methods for behavioral health risk assessment, estimation and management in support of at-risk military and civilian populations.

This research is innovative in the area of behavioral health risk assessment and estimation as it seeks to address an apparent void in this area of scientific research. Current knowledge can be expanded through the analysis of existing behavioral health risk assessment and estimation systems, which use an integrated approach. The BHRM is one such novel approach and system utilized by the U.S. Army Medical Command (MEDCOM). The technology is used to conduct behavioral health risk assessment and estimation and is considered a CDSS (MEDCOM, Behavioral Health Service Line [BHSL], 2012b). The BHRM module is hosted on secure military platform called Psychological and Behavioral Health-Tools for Evaluations, Risk and Management (PBH-TERM). In this study, the data within BHRM module are examined to expand knowledge in the area of behavioral health.

Research Questions and Hypotheses

This study tests an integrated, multi-risk factor approach (BHRA-Q) aided by technology (BHRM). The research examines the BHRA-Q response data including: 1) prevalence of individual self-assessed responses; 2) associations between the behavioral health risk factors;

3) internal reliability; and 4) eight-factor group (model) structure. The study analyzes the BHRM risk estimation data including: 1) prevalence and correlations of the BHRM recommended and provider determined estimate; and 2) predictive properties of demographic variables toward BHRM or provider risk estimates. The study seeks to answer nine research questions and test five hypotheses (see Appendix A).

Research question 1. What is the prevalence of endorsement or non-endorsement of behavioral health risk variables (55) by individuals completing the BHRA questionnaire? Behavioral health risk variables are as follows: 1) emotional pain; 2) suicide or self-harm thoughts; 3) suicide or self-harm plan; 4) suicide or self-harm means; 5) self-harm history; 6) hopefulness; 7) self-perception (failure); 8) behavioral health diagnosis history; 9) racing thoughts; 10) special powers; 11) auditory or visual hallucinations; 12) paranoia; 13) anxiety-general; 14) anxiety-panic attacks; 15) anxiety-avoidance; 16) post-traumatic stress-nightmares; 17) post-traumatic stress-avoidance; 18) post-traumatic stress-hypervigilant; 19) post-traumatic stress-detachment; 20) anger; 21) homicidal thoughts; 22) abuse of self or others-recent; 23) abuse of others-history; 24) protective order; 25) assault / battery / abuse of others-history; 26) weapon in the home; 27) relationship break-up; 28) agreement with break-up; 29) substance use-cut down; 30) substance use-annoyed; 31) substance use-guilty; 32) substance use-eye opener; 33) substance use-coping; 34) use of controlled or illegal substances; 35) misuse of medications or supplements; 36) substance treatment failure-history; 37) abuse / neglect-history; 38) relationship satisfaction; 39) problems with partner; 40) safe from domestic violence / abuse; 41) problems with children; 42) child protective services / family advocacy program-history; 43) learning disability; 44) problems-financial; 45) support systems; 46) problems with family / friend; 47) problems-work; 48) problems-legal; 49) physical health; 50) medication use-

prescription; 51) traumatic brain injury; 52) pain-physical; 53) pain-level; 54) pain-treated; and 55) sleep problems (see Appendix B).

Research question 2. What are the relationships among the behavioral health risk variables (55)? Behavioral health risk variables are the same variables identified in research question 1 (see Appendix B). *Hypothesis 1:* There are significant relationships among the behavioral health risk variables.

Research question 3. Does the BHRA questionnaire demonstrate internal reliability? Behavioral health risk variables (55) are the same variables as identified in research question 1 (see Appendix B).

Research question 4. Does the data confirm the eight-factor group structure (model) of the BHRA questionnaire? *Hypothesis 2:* The eight-factor group structure (model) of the BHRA-Q will be confirmed. Factor group variables (8) are as follows: 1) Factor Group 1 – Behavioral Health / Depression / Suicide; 2) Factor Group 2 – Mental Status / Psychosis; 3) Factor Group 3 – Anxiety / Post-Traumatic Stress); 4) Factor Group 4 – Anger / Aggression / Violence; 5) Factor Group 5 – Substance Use / Abuse; 6) Factor Group 6 – Psychosocial History / Relationships; 7) Factor Group 7 – Environment / Support Systems; and 8) Factor Group 8 – Health and Traumatic Brain Injury (for Factor Groups and BHRA-Q, see Appendices C and D). Behavioral health risk variables (55) are the same variables as identified in research question 1 (see Appendices B).

Research question 5. What is the prevalence of the behavioral health risk level estimates (low, moderate, high, or severe) recommended by the BHRM module for each of the eight factor groups and the final risk estimate? Factor group variables are the same as those identified in research question 4 (see Appendix E). The final risk estimate variable is determined

by BHRM module as the highest risk level estimate assigned to any one of the eight factor group estimates (see Appendix F).

Research question 6. What is the prevalence of the behavioral health risk level estimates (low, moderate, high or severe) determined by the clinical provider for each of the eight factor groups and the final risk estimate? The factor group variables (8) are the same as those identified in research question 4 (see Appendix E). Final risk estimate variable is determined by the provider and is generally estimated using the highest risk level estimate assigned to any one of the eight factor group estimates (see Appendix F).

Research question 7. What are the correlations among the risk level estimates (low, moderate, high, or severe) recommended by the BHRM and the risk level estimates determined by the clinical provider for each of the eight factor groups and the final risk estimate? *Hypothesis 3*: There are significant correlations among the risk level estimates recommended by the BHRM and the risk level estimates determined by the clinical provider for each of the eight factor groups and the final risk estimate. The factor group variables (8) are the same as those identified in research question 4 (see Appendix E). Final risk estimate recommended by the BHRM module is the highest risk level estimate assigned to any one of the eight factor group estimates. The final risk estimate determined by the provider is generally estimated using the highest risk level estimate assigned to any one of the eight factor group estimates (see Appendix F).

Research question 8. What are the set of demographic variables (12) that predict a BHRM recommended (individual's self-assessed) risk level estimate (low, moderate, or high) in each of the eight factor groups and the final risk estimate? *Hypothesis 4:* An individual's

demographic variables will predict the BHRM recommended (individual's self-assessed) risk level estimate for each of the eight factor groups and the final risk estimate.

Demographic variables are as follows: 1) age, at the time of the time of enlistment or commissioning; 2) age, at the time of the risk estimate in BHRM; 3) gender (male or female); 4) race; 5) education; 6) religion; 7) marital status; 8) military rank; 9) military service component; 10) length of active duty service length; 11) length of military service; 12) number of deployments before risk estimate (see Appendix G). The factor group variables (8) are the same as those identified in research question 4 (see Appendix E). The final risk estimate recommended by the BHRM module is the highest risk level estimate assigned to any one of the eight factor group estimates (see Appendix F).

Research question 9. What are the set of demographic variables (12) that predict the clinical provider's determined risk level estimates (low, moderate, or high) in each of the eight factor groups and the final risk level estimate? Demographic variables are the same 12 variables identified in research question 8 (see Appendix G). The factor group variables (8) are the same as those identified in research question 4 (see Appendix E). *Hypothesis 5:* An individual's demographic variables will predict the clinical provider's risk level estimates determined for each of the eight factor groups and the final risk estimate. The final risk estimate determined by the provider is generally estimated using the highest risk level estimate assigned to any one of the eight factor group estimates; (see Appendix F).

CHAPTER 2

Literature Review

Theoretical Frameworks

This study examines behavioral health risk assessment including the identification, risk estimation, and assessment of behavioral health risk using an integrated, multi-risk factor approach aided by technology. The theories that support this study may be understood from the view of the individual, provider and organizational levels (framework) and are aligned with the research questions posed.

Individual level – social cognitive and rational choice theories. Individual self-assessment in response to the questions about behavioral health risks can be analyzed within the frameworks of social cognitive and rational choice theories. Social cognitive theory conceptualizes human motivation and action as cognitive, self-reflective, vicarious, and self-regulatory processes (Bandura, 1986), while rational choice theory posits that individual decision making is based upon a cost benefit analysis to ultimately maximize the benefits (Friedman, 1953).

In theory, individuals completing the behavioral health may be influenced by the social environment and utilize self-reflective, cognitive processes to make self-assessment choices. Likewise, selections on responses to the BHRA-Q may be understood in terms of the potential benefit (gain or loss), which is posited by rational choice theory. For example, the individual completing the questionnaire may be living in a beneficial housing environment and determine not to select particular responses (such as suicidal thoughts and possessing a weapon). The individual may choose not to respond truthfully in order to remain in the beneficial housing environment and avoid possible hospitalization and weapon removal. However, all self-

assessment questionnaires are subject to this flaw. Social cognitive and rational choice theory provide a backdrop for examining this study's research questions regarding the individuals' self-identification of behavioral health risk factors and the correlation between those selections.

Research questions 1 through 4 and 8 are directly related to the theoretical propositions of social-cognitive processes and individual choices in that these questions capture the individual's responses to the 55 questions on the BHRA-Q. In addition, these theories provide a basis for examining the demographic (social) characteristics (research question 8) that may contribute to the endorsement or non-endorsement of the behavioral health risk factors.

Provider level – innovation adoption theory. How clinical providers think about and make choices regarding behavioral health risk assessment or estimation may also be influenced by the framework of social cognitive and rational choice theories. However, there is another key concept to behavioral health risk assessment at the provider level, and that is the theory of innovation adoption.

Much like the individuals completing the risk questionnaire, the clinical provider's determinations regarding risk level estimates may be understood within the social cognitive theories of Bandura (1986) and the rational choice theories attributed to Friedman (1953).). In theory, providers completing the behavioral health risk level estimates may be influenced by the social environment and influenced by self-reflective cognitive processes to make their professional determinations. Likewise, selections of estimates may be understood from the potential benefit (gain or loss) the provider believes the individual completing the risk questionnaire may receive. For instance, the provider may consider the recommended risk estimate of the BHRM, but may determine the risk at a lower level. The lower risk level may be chosen to prevent the individual from being placed in a restricted environment or on a "suicide

watch" status. Social cognitive and rational choice theory provide a backdrop for examining this study's research questions regarding the prevalence of the providers' selection of behavioral health risk factors and the correlation between the BHRM recommendation and the actual risk level estimate selected by the provider.

The correlation between the provider's acceptance of the BHRM recommendation and the risk level estimate actually determined by the provider can also be understood in view of innovation adoption theory. Adoption theory proposes that an attitude of acceptance or rejection of something new is formed at first knowledge. The adoption process includes making decisions to implement the innovation. Diffusion of innovation theory attempts to explain how new ideas and innovations are adopted by various cultures (Rogers, 2003). The theory suggests that diffusion is the acceptance and integration of the new innovation. Individuals can be categorized by the timeliness of their adoption of an innovation, ranging from early adopters, early majority, late majority, to laggards.

Although provider use of the web-based, clinical decision support system (BHRM) is mandated by MEDCOM policy, provider adoption of the system's innovations and recommendations varies (U.S. Army, Warrior Transition Command [WTC], 2010). The BHRM calculates and recommends behavioral health risk level estimates to the provider; however, the provider is not required to accept the recommendations and may make an independent determination of the risk level estimate. Risk estimates may be determined as low, moderate, high, or severe by the provider in each of the eight factor groups (behavioral health / depression / suicide; mental status / psychosis; anxiety / post-traumatic stress; anger / aggression / violence; substance use / abuse; psychosocial history / relationships; environment / support systems; and health / traumatic brain injury) and the final risk level estimate.

The decision of providers to utilize BHRM recommendations may be examined through the comparison of the BHRM's risk level estimate recommendations and the provider's actual risk level estimate determinations. The analysis of research questions 5, 6, 7 and 9 sheds light on provider decisions and the adoption of the BHRM's risk level estimate recommendation. Social cognitive, rational choice and innovation adoption theory provide a basis for understanding provider acceptance or rejection of the BHRM's risk estimate recommendation.

Organization level – systems, risk management, multi-criteria decision making, and innovation adoption theories. How organizations choose to conduct behavioral health risk assessment aided by technology can be understood within the framework of four primary theories – systems, risk management, multi-criteria decision making, and innovation adoption.

According to systems theory, systems are made of separate albeit interdependent subsystems (von Bertalanffy, 1969). Likewise, the human itself is a system with subsystems (physical, mental, and behavioral). These subsystems impact one another. Thus, organizations that require health risk management practices may utilize decision models which employ an integrated approach in consideration of the human system and subsystems. The systems approach provides a basis for risk and decision theories in health risk assessment.

Risk and decision theories are widely employed across disciplines including economics, business, law, politics and health. Although there is no agreed upon definition for "risk," risk in terms of health care can be defined as the "probability of an adverse outcome" (Graham & Weiner, 1995). Within the field of behavioral health an exact mathematical "probability" may not be attainable for the prediction of an outcome. However, risk estimation may be employed as a more viable solution than prediction in assessing or evaluating the risk of adverse outcomes. Risk theories assert that uncertainties may be quantified (using probability / prediction methods)

or qualified (using assessment / risk estimation methods), and then evaluated for use in risk management decision making (Rescher, 1983).

Risk management is the effort to direct risk-related activities to control for uncertainty (International Standards Organization, 2002). These theories when applied to behavioral health, suggest that the qualification or quantification of behavioral factors can inform management practices influencing desired outcomes. Theories of risk management provide a framework for behavioral health risk management which includes the identification, assessment, estimation, diagnosis, planning, treatment, documentation, communication, continuous monitoring, and measurement of factors related to behavioral health. Generally, behavioral health risk assessment includes risk identification, evaluation, and estimation.

After risks are identified, the evaluation of those risks requires multiple-criteria decision-making. Decision theory suggests that individual choices determined with uncertainty are based on expected value. Multiple-criteria decision-making (MCDM), a subcomponent of decision theory, involves weighing multiple factors that may influence uncertainty. This theory suggests that complex problems involving multiple criteria may be addressed by structuring and solving decisions and planning problems (Koksalan, Wallenius, & Zionts, 2011). The MCDM methods have been applied to decision making software (Weistroffer, Smith, & Narula, 2005). Using a multi-factorial decision process can be valuable because it manages risk more comprehensively, thus improving the odds of the desired outcome.

The MCDM theory provides a framework for addressing the risk complexity of behavioral health risk assessment and management. In MCDM theory, decisions regarding behavioral health risk include a determination or estimation of risk regarding the likelihood of adverse outcomes. Once risk is determined, decisions regarding the management of the risks

may be prioritized. The ranking of the risks is typically based upon the evaluation of severity or probability of the adverse outcome – higher levels are addressed first. This theory provides a framework for understanding the current study, which includes the evaluation of multi-risk factors in multi-factor groups (clusters) to determine the priority or severity of the risk level in each grouping and ultimately guide subsequent management.

In the current study, the concepts of estimating and managing behavioral health risks are embedded in the BHRM. In diffusion of innovations theory, organizations may go through "innovation-development" and "innovation-decision" processes before fully adopting an innovation (Rogers, 2003). Within theoretical innovation-development process the need is recognized; research is conducted; products are developed, commercialized (or employed for use), disseminated and adopted; and finally, consequences are assessed. The BHRM system was taken through these steps and piloted in 2006. After the "consequences" were assessed, the product was re-aligned, and in July of 2008, the decision was made to re-employ the system. Due to the need for a secure operating environment, the re-employment of the BHRM was delayed in August of 2009. Similarly, the product was subject to the "innovation-decision" processes including: knowledge / awareness, persuasion, decision, implementation, and confirmation. Having gone through this "innovation decision process" from 2006 to 2009, the organization made the decision to fully employ this web-based technology product in August of 2009 (BHSL, 2012b). The innovation supports comprehensive assessments (systems), risk estimation, multi-criteria clinical decision support and overall behavioral health risk management. Within diffusion of innovations theory, the BHRM may be considered as an adopted innovation moving into the research phase of "measuring the attributes of the innovation" (Rogers, 2003).

These four theories – systems, risk management, multi-criteria decision making, and innovation adoption – provide a basis for understanding integrated, behavioral health risk assessment and estimation aided by technology, which is the focus of this study. The theories inform research questions 3 through 9.

Conceptual Models

There are several conceptual models for behavioral health risk assessment and management. Three relevant models, which are based on concepts of legal decision making, include those of Monahan and Steadman (1994), Monahan et al. (2001), Heilbrun (1997), Heilbrun & Kramer (2001), and Hawks (1998). Each of these models includes concepts regarding information gathering, assessment, and communication. Monahan's model is expanded to risk estimation, while Heilbrun suggests that estimation is not required in light of risk management efforts. Hawks' (1998) theoretical model suggests a more universal approach including: 1) assessment (information gathering); 2) estimation; 3) management and; 4) communication.

The theoretical model for this study reflects some of the concepts of the universal approach devised by Hawks (1998) in a continuous risk management process. Many of Dr. Hawks' concepts are applied to behavioral health decision making and are distinct from legal decision making. This study's basic model involves the integration of multi-risk factors from behavioral health-related fields of science – biological, psychological, and sociological – to inform behavioral health risk assessment, estimation and management. The model works on a practical basis as follows: 1) an individual completes a self-assessment by endorsement or non-endorsement of multi-risk factors, which are embedded within the technology-based questionnaire; 2) an individual's responses inform the BHRM risk estimation and influence the

provider's determination of the behavioral health risk level estimate (low, moderate, high, or severe) and required management planning (including communication); 3) the provider's determination of risk level estimate influences the timelines and resources geared toward continuous risk management efforts. The organizational goal is to improve behavioral health risk management, resulting in the reduction of the potential for adverse outcomes (see Figure 1).

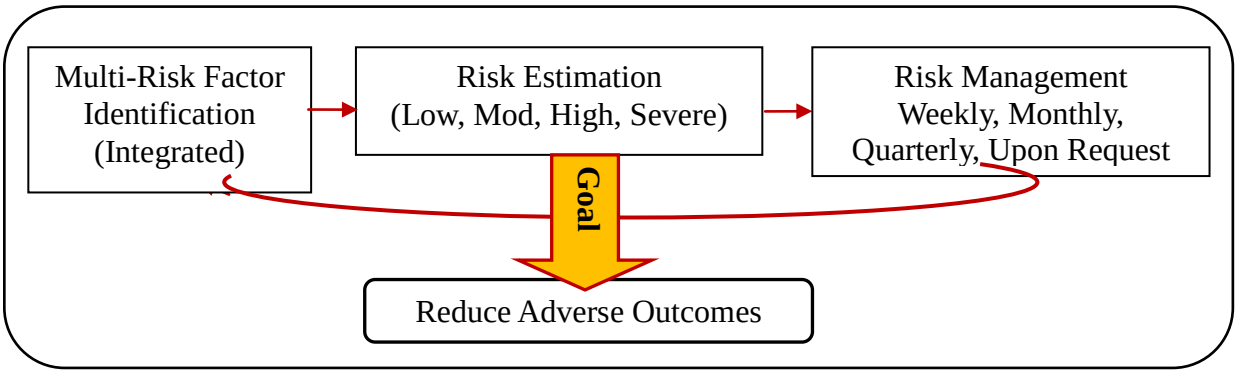

Figure 1. Behavioral Health Risk Assessment, Estimation and Management Model (Basic). The theoretical concept behind this model involves integration of multi-risk factors from behavioral health-related fields of science – biological, psychological, or sociological – to improve behavioral health risk assessment, estimation and management. Individual multi-risk factors influence the level of the behavioral health risk estimate determined (low, moderate (mod), high, or severe) and the intervals and resources allocated for continued risk management. The goal of the process is to reduce adverse outcomes.

The theories discussed are also reflected in the full model of the behavioral health risk assessment (including estimation) and management being studied (see Figure 2, which details the full model). The full model involves expansion of the basic model to delineate the specific multi-risk factors (55); eight factor groups (in which the risk factors are clustered); behavioral health risk estimates (low, moderate, high, or severe); risk management intervals (weekly,

monthly, quarterly, upon request); and continuous management flow and process. The full model identifies specific adverse outcomes, such as suicide, homicide, violence, accidental overdose, and circumstances which may significantly impair functioning. The goal is the same as in the basic model, which is to reduce adverse outcomes.

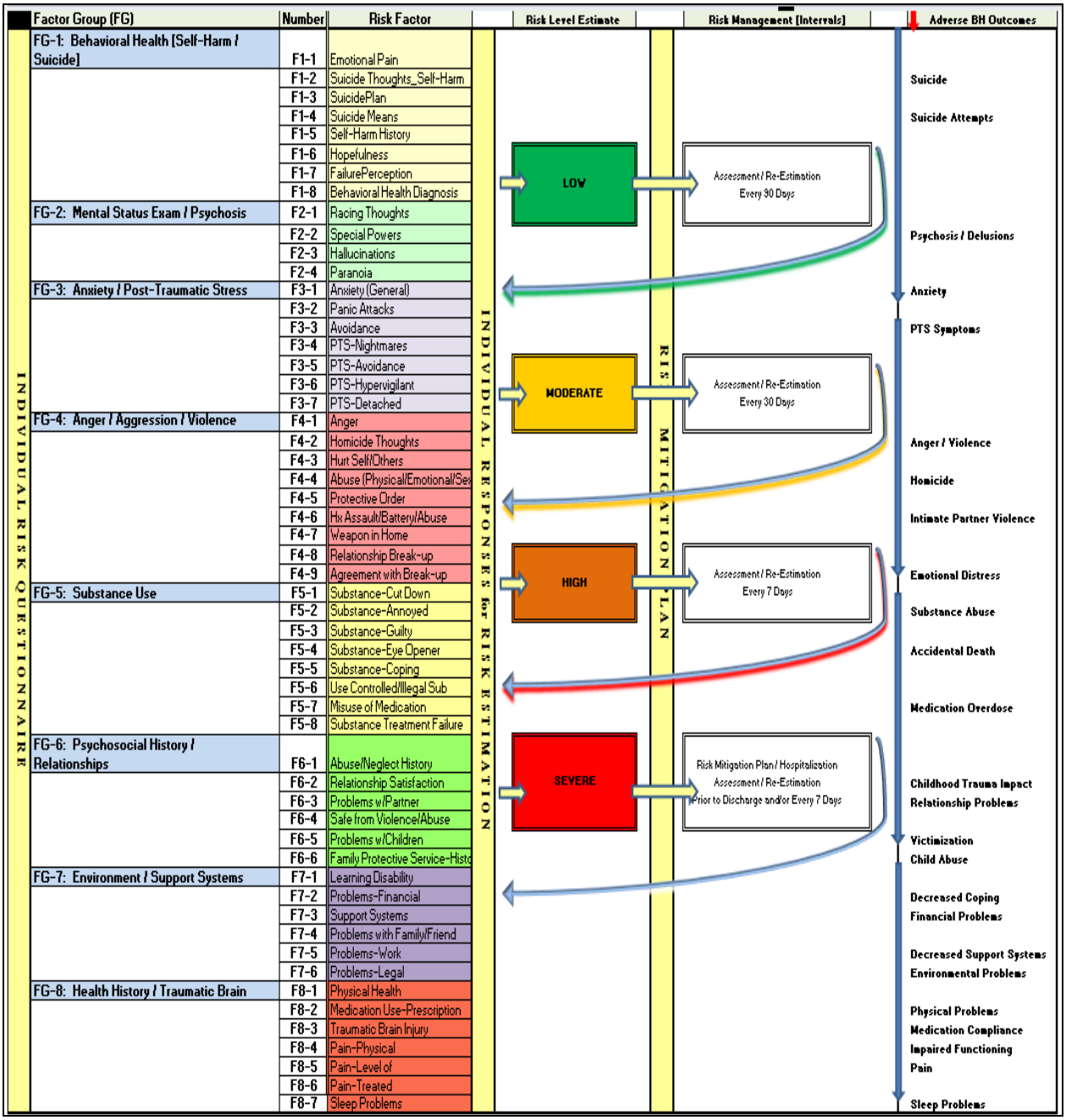

Figure 2. Behavioral Health Risk Assessment (Multi-Factor), Estimation and Management Model (Full). The theoretical model for this study involves integration of multi-risk factors from behavioral health-related fields of science – biological, psychological, or sociological – to improve behavioral health risk assessment, estimation and management. The model integrates 55 evidence-based / informed, multi-risk factors related to behavioral health problems. The risk factors are clustered into eight factor groups based on relatedness. Individual multi-risk factors self-assessed on the questionnaire influence the level of the behavioral health risk estimate (low, moderate, high, or severe) recommended by the BHRM and determined by the provider. The risk level assigned by the provider informs decision making regarding time intervals (weekly, monthly, monthly, quarterly, or upon request) and resources required for ongoing risk management and re-assessment. The goal is to reduce adverse outcomes, such as suicide, homicide, violence, accidental overdose, and other circumstances which may significantly impair functioning.

This study examines the assessment of behavioral health risk assessment on three levels – individual, provider, and organization – within the theoretical frameworks of social cognitive and rational choice; innovation adoption; and systems, risk management and multi-criteria decision making theories. These theories and proposed behavioral health risk management models (basic and full) provide a framework for understanding and advancing knowledge regarding integrated approaches to behavioral health risk assessment using technology.

Overview of Important Literature

Behavioral health risk assessment using an integrated, multi-risk factor approach aided by technology is a relatively new concept. Literature searches using key terms such as "behavior(al) health," "mental health," "behavior(al) health risk," "mental health risk,"

"behavior(al) health risk assessment," "mental health risk assessment," "integrated behavioral health assessment," "integrated mental health assessment," "clinical decision support," "behavioral health clinical decision support," "behavioral health informatics" and "social work informatics" did not reveal studies in peer-reviewed journals specific to the topic of behavioral health risk assessment toward risk estimation aided by technology. Therefore, research is not available specific to the topic of study. Databases explored are as follows: American Psychological Association PsycNet, GoogleScholar; JSTOR; Medline (EBSCO); OneSearch, University of Houston, Library; PsycINFO; ScienceDirect; PubMed; Wiley Online Library; and general internet searches. Despite the lack of empirical evidence, there are related studies and precedents for the utility of integrated approaches to behavioral health risk assessment, which can inform this study.

This overview of important literature examines behavioral health risk assessment-related research and non-research based precedents as well as the integration of the behavioral health risk assessment process into a behavioral health technology. The review includes an overview of behavioral health: 1) problems; 2) risk factors; 3) risk assessment; 4) risk assessment using an integrated approach; 5) risk estimation; and 6) risk assessment using technology as well as a novel approach to behavioral health risk assessment and barriers to integrated and technological approaches.

Behavioral health problems.

Prevalence and outcomes. According to the CBHSQ (2014a), behavioral health problems (mental illness and substance abuse) affect more than one-quarter of the adult population – approximately 44 million adults – and are linked to poor outcomes (Scott et al., 2009). The prevalence of mental health disorders and substance use disorders within the U.S.

population has remained basically unchanged (CBHSQ, 2013). Behavioral health disorders include, but are not limited to, bi-polar, depressive, anxiety, trauma and stress, schizophrenia spectrum, impulse control, substance-related, and personality disorders (APA, DSM-V, 2013).

Depression, anxiety and substance abuse are the most common behavioral health disorders. Depression affects 8% of the population (NCHS, 2012) and is an important risk factor in suicide. Suicide is the 10th leading cause of death in the U.S. with over 40,000 suicides in 2013 (NCIPC, 2012, 2015). Suicide rates have increased 16% within the general population, 28% for those ages 35-64, and 80% within the military from 1999-2000 to 2010 (DMDC, 2011; NCHS, 2013c, 2013d). Rates among former active duty military (veterans) receiving care through the Veterans Health Administration (VHA) are estimated at a rate of 36 per 100,000 , and are believed to be higher for those not provided services through the VHA (VA, Mental Health Services, 2012).

Anxiety disorders affect approximately 18% of the U.S. population (Kessler, Chiu, Demler, & Walters, 2005) and have been found to be a significant risk factor for suicide (Sareen et al., 2005). Anxiety, depression and substance abuse disorders commonly co-occur (CBHSQ, 2014a).

Substance abuse disorders and their effects are also of great concern. It is estimated that approximately 9% of the U.S. population (20.7 million) meets criteria for a substance use disorder and 9% for illicit drug use. In addition, 40% of those with a substance use disorder are found to have a co-occurring mental illness (CBHSQ, 2014b). In 2011, there were over 66,000 drug and alcohol-induced deaths; rates for these types of deaths were 13 (drugs) and 8 (alcohol) per 100,000, respectively (CDC, National Center for Vital Statistics, 2012).

The presence of behavioral health problems often results in a diminished quality of life and results in poor health and behavioral health outcomes (Campbell, 2002; Harris & Barraclough, 1997, 1998; Prince, 2007; Scott et al., 2009; CBHSQ, 2011, 2014a). Individuals with behavioral health problems have a higher prevalence of unemployment, arrest, and housing instability (CBHSQ, 2013). Individuals with major depression are at higher risk for suicide (Cavanagh et al., 2003; Henriksson et al., 1993; Murphy, Wetzel, Robins, & McEvoy, 1992). Additionally, those with serious mental illness are more likely to be perpetrators and victims of violence (Hiday et al., 2001).

A review of the important literature regarding behavior health problems provides an understanding regarding the significance of this topic as a public health concern in the U.S. The published literature also provides the context for the urgency in understanding and improving current methods of behavioral health management.

Behavioral health management. Behavioral health management is important to improving health outcomes and reducing the prevalence of behavioral health problems. Behavioral health management includes assessment (screening, identification, evaluation, and diagnosis) and management (treatment, use and coordination of services, communication, continuous monitoring, and documentation). Behavioral health management, as it currently exists, consists primarily of the utilization of services with some case management effort.

Since 1998, the number of mental health treatment facilities increased to include the expansion of services within community health centers (CBHSQ, 2013). Within the U.S., utilization of behavioral health services has increased including behavioral health treatment and prescription use. Despite the increase in services and utilization, many individuals suffering from behavioral health disorders are reluctant to get help and therefore, their conditions are

unmanaged. The primary reasons for individuals not seeking care include beliefs regarding: 1) the financial cost of care; 2) lack of knowledge about where to receive care; 3) lack of time (CBHSQ, 2014a); and 4) perception that treatment is not needed or that the individual can handle the behavioral health problem (Mojtabai et al., 2011). These individual beliefs evoke concern in that over 32% of individuals with serious behavioral health problems do not receive care (SAMHSA, 2015). The result of not seeking care is that a substantial number of individuals continue to remain untreated, unmanaged and at risk for adverse health outcomes. Poor health and behavioral health management may increase the risk for adverse health outcomes, including events like suicide (Goldacre, Seagroatt, & Hawton, 1993; Harris & Barraclough, 1998).

Beyond utilization of services, behavioral health management practices provide a venue for addressing existing belief systems as well as addressing the costs of care. Proper behavioral health management has the potential to decrease reluctance to seek care as well as increase opportunities to support those with serious behavioral health problems. This is due, in part, to the multiple processes of behavioral health management, which require a multi-faceted, multi-disciplinary collaborative approach at each phase. Costs of collaborative care can be reduced using behavioral health management practices that optimize the use of limited resources. For instance, provision of behavioral health services is determined by proper assessment of the risk and / or severity of the behavioral health condition; those with higher levels of risk or severity are advised to receive a more intensive level of service for treatment and continuous monitoring / management. Likewise, the first step in behavioral health management is assessment, which includes the identification of individuals at risk or in need of care.

The review of the important literature regarding behavior health management provides an overview of the structure of current management practices. It also provides information

regarding the importance of service utilization. The first component which must be addressed is the identification of the problem, which often starts at a sub-component level – the identification of behavioral health risk factors.

Behavioral health risk factors.

Definitions. For this study, behavioral health risk is defined as "the potential for behavioral health-related risk factors to contribute to adverse health outcomes." A risk factor is defined as a characteristic, variable or hazard that increases the likelihood for development of an adverse outcome (Last, 1983) that is measurable and precedes the outcome (Kraemer et al., 1997). Behavioral health-related risk factors are specific variables which may include biological, psychological, or social factors related to an individual characteristics or life experiences. Risk factors may be derived from population health surveillance studies, psychological autopsies (Beskow, Runeson, & Asgard, 1990), clinical consensus (such as risk factors as represented by the APA DSMs [2003, 2013]), quantitative and / or qualitative empirical studies, literature reviews, and meta-analysis studies.

Research. Research has identified a high volume of risk factors which contribute to behavioral health problems and adverse outcomes (NCHS, 2011, 2014b; NIMH, 2013; NCIPC, 2014a, 2014b; CBHSQ, 2015). Generally, each type of behavioral health disorder has specific, multi-risk factors associated with the disorder (Moscicki, 1997). However, these risk factors are often shared and inter-related among the behavioral health disorders. For instance, risk factors for major depression with a resulting outcome of suicide or suicide behaviors include, but are not limited to: having a prior behavioral health diagnosis (Cavanagh et al., 2003; Harris & Barraclough, 1997; Ilgen et al., 2010), history of depression (Coryell & Young, 2005), family history of suicide (Qin, Agerbo, & Mortensen, 2002; Roy, 1983), negative life experience (such

as death of a loved one, unemployment or loss of health) (Murphy, Armstrong, Hemele, Fischer, & Clendenin, 1979), relationship status (Appleby, Cooper, Amos, & Faragher, 1999; Kposowa, 2000), adverse childhood events (Fellitti et al., 1998; Roy, 2011), poverty (Pan, Stewart, & Chang, 2013), intensity of suicidal thoughts and seriousness of behaviors (Coryell & Young, 2005), antisocial and impulsive features (Douglas et al., 2008), and/or access to lethal means (Brent & Bridge, 2003). A number of scientific reviews have resulted in commonly published and accepted compilations of risk factors for suicide (Maris, 1992; NCHS, 2011; NCIPC, 2014a; NIMH, 2013; Roy, 1982; Schoenbaum et al., 2014).

Similarly, studies identify risk factors for committing aggressive and violent acts with a resulting outcome of homicide or intimate partner violence. Studies related to homicide identify risk factors (Loeber et al., 2005) including but not limited to: having a behavioral health disorder (depression, post-traumatic stress disorder, and traumatic brain injury), family history of aggressive or impulsive behavior, adverse life experiences (such as severe sexual and physical abuse, community isolation and violence) (Freedman & Hemenway, 2000; Kantor & Jasinski, 1998); and presence of a firearm in the home (Siegel, Ross, & King, 2013; Wiebe, 2003). Adverse outcomes resulting from the commission of aggressive and violent acts often include problems with legal authorities, incarceration and death (suicide and homicide) (NCHS, 2014b). Studies of perpetration of intimate partner physical abuse include the perpetrator's history of "emotional abuse, forced sex, illicit drug use, attitudes condoning marital violence, marital satisfaction" and "traditional sex-role ideology, anger / hostility, history of partner abuse, alcohol use, depression, and career / life stress" (Kessler, Molnar, Feurer, & Appelbaum, 2001; Stith, Smith, Penn, Ward, & Tritt, 2004). The same study found risk factors for victimization in

intimate partner relationships includes violence toward partner and for females, depression and fear of future abuse.

Risk factors and negative outcomes are found in the research related to alcohol and drug use disorders. Risk factors for substance disorders include, but are not limited to: having "any mental illness" (CBHSQ, 2014b); participation in the behavior during mid-to-late adolescence (Chou & Pickering, 1992; Dewit, Adlaf, Offord, & Ogborne, 2000); early problem behavior, risk taking and high sensation-seeking (Hawkins, Arthur, & Catalano, 1995); availability of drugs (Gorsuch & Butler, 1976). Adverse outcomes for those with substance disorders include increased rates of unemployment, arrest, poor health, increased emergency room visits, and housing instability (CBHSQ, 2013).

Although risk factors are typically identified specifically for singular disorders (like depression and alcohol use disorders), studies find that many behavioral health problems share risk factors. As referenced above, studies find that having a diagnosis of a behavioral health disorder is a shared risk factor for other types of behavioral health disorders. Moreover, depression is a shared risk factor for suicide (Cavanagh et al., 2003; Harris & Barraclough, 1998), violence (Steadman & Silver, 2000) and substance abuse (Conner & Duberstein, 2004; Murphy et al., 1992; Inskip, Harris, & Barraclough, 1998). Likewise, personal loss is a shared risk factor for suicide, alcohol use disorders, and violence (Murphy et al., 1979).

Shared risk factors among disorders are often inter-related and exert influence on each other as co-occurring disorders. For instance, depression is strongly associated with suicide (Beautrais, 2001; Cavanagh et al., 2003; Henriksson et al., 1993; Murphy et al., 1992), and approximately 90% of individual suicides are found to have a mental disorder (Appleby et al., 1999; Arsenault-Lapierre et al., 2004; Cavanagh et al., 2003) – with co-morbidity of mental

disorders increasing the risk of suicide (Henriksson et al., 1993). Studies find that individuals with major depressive disorder often have a co-occurring disorder, particularly anxiety disorders (Zimmerman, Chelminski et al., 2002; Zimmerman, McDermut et al., 2000). Similarly, co-morbid depression and anxiety (panic disorder, generalized anxiety disorder, and anxiety disorder, not otherwise specified) are linked to increased odds of completed suicide (Pfeiffer, Ganoczy, Ilgen, Zivin, & Valenstein, 2009). Moreover, studies find that when affective and substance use disorders co-exist, there is an increased risk of suicide (Cavanagh et al., 2003; Henriksson et al., 1993; Murphy et al., 1992) and suicide attempts (Carra, Bartoli, Crocamo, Brady, & Clerici, 2014). Other studies link risk of suicide to other behavioral health disorders like schizophrenia (Hor & Taylor, 2010); affective disorders and alcohol dependence (Inskip et al., 1998). As demonstrated, behavioral health disorders often share multiple, inter-related, co-occurring, and co-influencing behavioral health-related factors.

Note: Although protective factors are not directly addressed in this literature review, they are an important part of risk assessment. Protective factors may include religious beliefs, support systems, positive therapeutic relationships, connectedness to the community, ability to cope, or responsibility to others (Donald, Dower, Correa-Velez, & Jones, 2006; NCIPC, 2014a, 2014b). Although they may not directly prevent adverse outcomes, protective factors can inform decisions making.

Precedents for behavioral health multi-risk factor approaches – organizational level. The identification of risk factors to assess for multiple types of behavioral health problems has been supported by numerous professional and research organizations (VA / DoD, 2013b; NCIPC, 2014a, 2014b; NIMH, 2013; SAMHSA, 2014a, 2014b). The book *Abnormal Psychology: An Integrative Approach (Sixth Edition)* thoroughly addresses concepts of

examining multiple risk factors from multiple scientific dimensions, including biological, psychological and social aspects (Barlow & Durand, 2011). Additionally, the consensus of researchers and mental health professionals supports the importance of multi-risk factor approaches; this is evidenced by the fact that multiple risk assessment tools are available, which incorporate risk questions to assess singular disorders. Moreover, multi-risk factor approaches are supported by studies which have found that as the number of risk factors increase, the likelihood of an adverse outcome increases (Kessler, Borges, & Walters, 1999; Murphy et al., 1992; Loeber et al., 2005).

The use of multi-risk factor approaches within the practice of behavioral health care is recognized; however, these approaches are not standardized or implemented throughout the field of behavioral health (Simon, 2012). Although there is no recognized national standard, there are national Clinical Practice Guidelines (CPGs) for behavioral health. National CPGs are guidelines for evidence-based practice in a variety of health fields. The APA, NICE, SAMHSA, and the VA / DoD have published CPGs for the assessment of various behavioral health problems (APA, 2003; NICE, 2011; SAMHSA, 2013; VA / DoD, 2013a, 2013b). Many of these CPGs suggest a multi-risk approach to behavioral health problems.

A review of the literature regarding behavior health risk factors and their precedents provides a basis for understanding concepts of behavioral health risk assessment.

Behavioral health risk assessment.

Definitions. Assessment is defined as "the evaluation or estimation of the nature, quality, or ability of someone or something" (Assessment, 2014). Behavioral health risk assessment involves the identification and evaluation of an individual to estimate the likelihood of an adverse health outcome. The assessment is comprehensive in that it involves the integration of

multiple behavioral health-related factors across relevant scientific disciplines (bio-psycho-social) to perform assessment and risk estimation. The result of the assessment informs efforts to manage individual behavioral health risks.

Research. There is no known research regarding comprehensive behavioral health risk assessment, although there are studies related to comprehensive methods for behavioral health diagnosis. Historical approaches to behavioral health assessment have tended to be singularly focused on the evaluation, diagnosis and treatment of a problem; a behavioral health risk level estimate is not typically determined. Various instruments are used within the field of health and behavioral health to *screen* for specific behavioral health problems. These screens are distinct from behavioral health *risk assessment* instruments in that they are typically short questionnaires aimed at problem identification and not aimed at the risk estimation or the identification of the severity of the disorder.

A large volume of the research is available regarding behavioral health problem-specific *screening* instruments. A number of these instruments demonstrate reliability and / or validity for the identification of behavioral health problems such as mood and anxiety disorders, trauma, and substance use. These tools are not intended for use as comprehensive behavioral health assessments or risk assessments; however, they offer an essential component to addressing behavioral health problems – that is, early identification. That being said, some of the instruments may help to evaluate the severity of behavioral health disorders. Examples include, but are not limited to: 1) Physician's Health Questionnaire-9 (PHQ-9), screen for depression (Gilbody, Brealey, & Hewitt, 2007; Gilbody, Richards, Kroenke, Spitzer, & Williams, 2001; Spitzer, Kroenke, & Williams, 1999); 2) Center for Epidemiological Studies-Depression Scale, self-report depression scale (Radloff, 1977); 3) Mood Disorder Questionnaire (MDQ), screen for

bi-polar disorder (Hirschfeld, et al., 2000); 4) Generalized Anxiety Disorder-7 (GAD-7), screen for anxiety (Spitzer, Kroenke, Williams, & Lowe, 2006); 5) Post-Traumatic Stress Disorder-Clinical, screen and assessment tool for Post-Traumatic Stress Disorder (PTSD) (Weathers, Litz, Herman, Huska, & Keane, 1993); 6) Life Events Checklist (LEC), screen for trauma (Gray, Litz, Hsu, & Lombardo, 2004; Weathers et al., 2013); 7) Alcohol Use Disorder Identification Test (AUDIT), screen for alcohol abuse (Saunders, Aasland, Babor, de la Fuente, & Grant, 1993; WHO, 2001); and 8) Drug Abuse Screening Test, screen for drug abuse (Skinner, 1982; Yudko, Lozhkina, & Fouts, 2007). These instruments are important for the screening and identification of individuals with potential or existing behavioral health problems. There are other tools used for diagnostic purposes specifically; however, diagnosis is not a focus of this study.

In addition to the high volume of research available regarding screening instruments, there are an equally large number of studies in the area of suicide and violence *risk assessment*. There are studies available regarding singularly-purposed, behavioral health risk to self (like suicide) and risk of "dangerousness" to others (for violence) (Brooks, 1978; Campbell, Sharps, & Glass, 2001). Examples of singularly-focused risk assessments include those devoted to suicide such as: 1) Scale for Suicide Ideation (Beck, Kovacs, & Weissman, 1979); 2) Beck Hopelessness Scale (Beck & Steer, 1988); 3) Suicidal Behaviors Questionnaire (Linehan, 1996); and the 4) Columbia-Suicide Severity Rating Scale (Posner et al., 2008, 2011). A variety of these types of instruments that measure suicidal behaviors or behaviors closely related to risk for suicide, have been found to improve routine assessments of the potential for suicide (Malone, Szanto, Corbitt, & Mann, 1995; Oquendo, Halberstam, & Mann, 2003).

In addition to suicide, studies support the use of risk instruments in the assessment of potential for violence, particularly within the fields of mental health law (Appelbaum et al.,

2001; Heilbrun, 1997; Heilbrun & Kramer, 2001; Monahan & Steadman, 1994; Monahan et al., 2001, 2005) and domestic violence (Dutton & Kropp 2000; Messing & Thaller, 2013; Websdale, 2000). These are also singularly-focused in the areas of forensic evaluation or violence assessment, and are primarily centered on the risk of dangerousness, lethality or recidivism. A review of domestic violence risk instruments (Websdale, 2000) reveals the predictive validity of five instruments, the Ontario Domestic Assault Risk Assessment (Hilton & Harris, 2009; Hilton et al., 2004), Spousal Assault Risk Assessment (Kropp & Hart, 2000; Kropp, Hart, Webster, & Eaves, 1995, 1998), Danger Assessment (Campbell, 1995), Domestic Violence Inventory (Lindeman & Khandaker, 2011), and the Kingston Screening Instrument for Domestic Violence (Straus & Gelles, 1990). Although one-dimensional in approach (specific to evaluation of potential for domestic violence), many of these types of instruments demonstrate practical utility for incorporation of key risk factors into integrated, multi-dimensional approaches to behavioral health risk assessment.

Precedents for self-assessment – individual level. Use of self-assessment questionnaires for the assessment of risk has been supported by scientific research; however, caution is advised regarding their use. As stated above, use of computer aided self-reporting instruments is found to be beneficial, with an equal amount of advisory caution. (Greist, Gustafson, & Strauss, 1973, Hanscom, Lurie, Homa, & Weinstein, 2002).

Despite support for self-assessments, studies find barriers in their use. Research has found that an individual's responses to self-report instruments may be a result of psychological, sociological, linguistic, experiential, and contextual influences, instead of in response to the actual topic of interest (Harrison, McLaughlin, & Coalter, 1996). In addition, social desirability may influence responses thereby distorting results (Maccoby & Maccoby, 1954). The impact of

social desirability in self-assessment measures is noted throughout scientific literature (Levy, 1981; Peltier & Walsh, 1990; Robinette, 1991). Despite these facts, self-report measures are an important part of understanding humans (Peterson & Kerin, 1981).

The literature regarding behavior health assessment provides a framework for understanding how these efforts might be integrated to inform more comprehensive approaches to behavioral health risk assessment, estimation and management.

Behavioral health risk assessment – integrated approach.

Definitions. For purposes of this study, an integrated approach to behavioral health risk assessment is defined as a multi-dimensional, scientific method of evaluating and estimating the potential for behavioral health-related risk factors to contribute to adverse health outcomes. Integrated health assessment concepts use a systems-type of theoretical approach – moving the field of behavioral health from a one-dimensional approach to a multi-dimensional scientific approach. The key scientific dimensions to behavioral health risk assessment include biology, psychology and sociology (bio-psycho-social). For instance, depression is generally assessed from a biological approach and treated with a biological approach (medication). Likewise, the primary management tool for the treatment of behavioral health disorders is prescription medication (CBHSQ, 2013). The percentage of mentally ill that receive medication and outpatient treatment is estimated to be only 16% (CBHSQ, 2014a).

In a multi-dimensional approach, behavioral health disorders are assessed more comprehensively by integrating knowledge from multiple scientific fields. This may include assessing the individual's physical presentation; genetic and family pre-disposition; emotional states; behavior; history of behavioral health problems; relationships (e.g., family, work, or social); life experiences; environmental factors (e.g., housing, legal issues, or finances). For

instance, any individual seeking care for a single health or behavioral health related problem (like substance abuse) may also be evaluated for depression, anxiety, trauma, mental status, anger / aggression, relationships, environmental and health factors. Unlike current behavioral health disorder-specific risk assessments, the integrated behavioral health risk assessment evaluates multiple influences to improve decision making, management, and outcomes.

Research. Scientific evidence is not available regarding integrated approaches that are specific to integrated behavioral health risk assessments for use in behavioral health settings. However, research in related fields is available. A search of behavior and health risk reveals journal articles related to health and behavior assessment – though not behavioral health risk specifically. The journal articles found, which are related to this study, include screening tools used primarily in health and primary care settings. These tools integrate behavioral health components into their screening and assessment processes. Many of the instruments discussed have demonstrated utility via improved outcomes.

An outcrop of health research, the Medical Outcomes Study (MOS) addresses health and behavioral health problems. The MOSs takes a multi-dimensional approach to health and seeks to monitor health outcomes (Stewart & Ware, 1992; Stewart, Hays, & Ware, 1988; Tarlov et al., 1989). For instance, the MOS Short Form 36 (36-items) is a health questionnaire that contains scales for assessing physical and social functioning (including and emotional and mental health) (McHorney, Ware, & Raczek, 1993; Ware, Snow, Kosinski, & Gandek, 1993). Subsequent research has utilized items from the MOS (Short Form 20) to assess mood disorders, such as bi-polar disorder (Cooke, Robb, Young, & Joffe, 1996). However, the MOS is not generally used in behavioral health care settings. The instrument is more prevalent in primary care settings, which attempt to integrate behavioral health dimensions (mental, psychological and social

health) into current practice. Integrated behavioral health care is often synonymous with the provision of care in primary care settings and primary care-like settings.

Integrative approaches within primary care are found to be essential in the care of those with behavioral health problems. A large portion of individuals presenting with behavioral health problems do so in general medical or primary care settings (Kessler et al., 1999; Reiger, 1993). The CBHSQ (2014a) reports that 57% of those with a major depressive episode are seen by general practitioners or family doctors. Primary care use of integrated methods involves the identification of behavioral health-related factors that contribute to disease states. For instance, even though an individual presents in primary care for the assessment of diabetes, the evaluation may involve multiple and known risk factors for the disease (like diet, exercise, or depressive states). Studies and scientific reviews of primary care settings suggest benefits in the use of integrated, multi-risk factor approaches for assessment and monitoring (Babor, Sciamanna, & Pronk, 2004; Coups, Gaba, & Orleans, 2004; Fine, Philogene, Gramling, Coups, & Sinha, 2001; Pronk, Peek, & Goldstein, 2004).

Primary care settings have demonstrated the usability of integrated health and mental health assessment tools. Examples of evidence-based tools which use integrative, multi-dimensional approaches include: 1) Kessler Screen for Psychological Distress (6 and 10), screening tool to identify psychological distress (Kessler et al., 2002); 2) Primary Care Evaluation of Mental Disorders (PRIME-MD) (Spitzer et al., 1994), tool for diagnosis of mental disorders in primary care; and 3) Duke Health Profile (Duke), tool to assess health (physical mental, social, general, perceived health and self-esteem) and functioning (anxiety, depression, pain and disability) (Parkerson, Broadhead, & Tse, 1990; Parkerson, et al., 1981).

Research supports the validity of integrating health and health behavioral screening tools. Studies demonstrate that health settings, which integrate behavioral health components into their assessment and management processes show improved health outcomes (Stewart et al., 1998). Moreover, integration using collaborative care management in primary care demonstrates improvements in depression (Katon et al., 1995; Wells et al., 2000). The U.S. military has embraced integrated approaches within their routine health screening requirements. Their annual requirement for Periodic Health Assessments (PHAs) has embedded screening questions for health and behavioral health-related problems including depression, alcohol abuse and PTSD (DoD, 2014; U.S. Army Human Resources, 2015). However, the reliability and validity of the PHA is unknown. Within behavioral health research, combining suicide scales is suggested (Blasco-Fontecilla et al., 2012). Likewise mental health and violence research supports the combining of risk assessment tools to support improved risk estimation (Monahan et al., 2001).

Although highly valuable within the primary care settings and supported by research, the previously described instruments and integrated, multi-dimensional approaches do not include essential components required for comprehensive behavioral health risk assessment in behavioral health care settings. Foremost, they do not include a key element of behavioral health assessment – risk estimation.

Precedents for integrated approaches – organizational level. As discussed above, integrated or multi-dimensional approaches to health and behavioral health assessment are supported by research. Although the goals in various settings are similar – improved health outcomes – assessment and management methods may differ dependent upon the setting and expertise of the providers. For instance, behavioral risk approaches in primary care settings tend to focus on changing specific medically-related behaviors or "health behaviors" (like diet,

smoking, and exercise), while behavioral health care settings focus on the treatment of the behavioral / mental health-related problem.

Nonetheless, integrated approaches can be applied to behavioral / mental health models and assessment practices. One such novel approach was developed by the Center for Integrated Primary Care at the University of Massachusetts Medical School (2011). The instrument, called the Patient Stress Questionnaire (PSQ) integrates behavioral health concepts and is aimed at screening for behavioral health symptoms of depression, anxiety, trauma and substance abuse. The questionnaire combines several questions from four validated health and behavioral health instruments: 1) Physician's Health Questionnaire-9 (Kroenke et al., 2001; Spitzer et al., 1999); 2) Generalized Anxiety Disorder-7 (Spitzer et al., 2006); 3) Primary Care-Post-Traumatic Stress Disorder (Prins et al., 2003); and 4) Alcohol Use Disorders Identification Test (AUDIT) (Saunders, et al., 1993; WHO, 2001). The PSQ's psychometric properties are unavailable and require study. Despite this gap and the fact that it is paper-based, the PSQ provides a model for integrating the multi-dimensional components of behavioral health.

Although progress is being made, there is a call to utilize integrated, multi-dimensional approaches within behavioral health care settings (Barlow & Durand, 2011; van Heeringen, Hawton, & Wiliams, 2000).

A review of the literature regarding integrated approaches to behavioral health risk assessment lays a path for comprehensive estimates of behavioral health risk. Behavioral health risk estimation is a key element in identifying those most at risk as well as in determining the level of management required.

Behavioral health risk estimation.

Definitions. For this study, risk estimation is defined as a process of evaluating relevant factors to anticipate (identify) the likelihood of an adverse outcome. The decision regarding risk estimation is a risk level estimate. Risk level estimates may be classified by the significance or potential severity of the risk of an adverse outcome (low, moderate, high or severe). For this study, behavioral health risk estimation is defined as the process of evaluating behavioral health-related factors to forecast the likelihood of an adverse outcome. The result of the behavioral health risk estimation is a risk level estimate, which may be determined as low, moderate, high or severe. Risk estimation is also termed "risk classification," and in the literature is sometimes confused with risk prediction.

The use of the term risk estimation is preferred by some instead of the term prediction. Risk prediction implies the precise "yes" or "no" foretelling [of suicide]. Risk estimation is a more flexible classification as it allows risk to be estimated within a range of terms (like low, moderate or high). In the book *Assessment and Prediction of Suicide*, Motto (1992) offers an integrated approach to suicide risk. He asserts, "The idea and the expression 'prediction of suicide' should have disappeared from our lexicon long ago" (p. 632). Motto further affirms this construct stating, "The phrase 'estimation of risk' would more accurately reflect the reality of what we are learning from our research efforts and what we do in practice" (p. 626). A purpose of risk estimation is the identification and mitigation of the likelihood of adverse outcomes, instead of pinpointing or predicting the outcome.

Research. Research specifically related to integrated, behavioral health risk estimation is not available. However, there is research related to risk assessment and prediction of specific behavioral health problems such as the risk of suicide and violence.

The field of suicide, in particular, has a high volume of research literature related to risk prediction. The evidence for use of suicide risk assessment and prediction varies (VA, Health Research and Development Service, 2012). One study found two risk assessment instruments with predictive validity (Brown, 2002). The instruments are the Scale for Suicide Ideation (Beck et al., 1979) and the Beck Hopelessness Scale (Beck & Steer, 1988).

However, some researchers dispute the claim that suicide can be predicted using high risk group factors in assessment instruments due to over sensitivity of the instruments. Prediction of suicide using instruments has been deemed unsuccessful, not only due to the high sensitivity, but due to the low base rate of suicide within the population (Hawton, 1987; MacKinnon & Farberow, 1976; Pokorny, 1993). Per the National Vital Statistics Report, .016% of the population dies by suicide (NCIPC, 2015). Others suggest that suicide is a multi-determined issue with multivariate risk factors, and that no one risk factor or combination of risk factors can predict suicide (Goldstein, Black, Nasrallah, & Winokur, 1991; Hawton, 1987; Pokorny, 1983). Thus, prediction of suicide is confounded by the highly sensitive nature of existing instruments, low base rates, and the multi-factorial nature of behavioral health problems. Hawton (1987) has suggested that identification of risk factors may be helpful in identifying high risk groups of individuals at risk for suicide, but this approach is not as useful in predicting an individual's suicide.

Within the field of mental health and violence assessment, use of predictive instruments is also viewed with caution. Studies continue to find that the mental health professionals' ability to perform violence risk assessments is modest (Lidz, Mulvley, & Gardner, 1993; Monahan et al., 2001). However, Mossman (1994) previously found "mental health professionals' violence predictions are substantially more accurate than chance" when accounting for sensitivity and

specificity. Websdale (2000), an expert in domestic violence, recommends that domestic violence assessments view risk on a continuum of dangerousness and victim entrapment, instead of predicting lethality. His premise is that predicting lethality is unwise in that violence intensifies over time. In other words, the term "risk estimation" appears to be a more flexible term for reporting the decisions and results of risk assessment instruments. Authors and researchers affiliated with the MacArthur Study of Mental Disorder and Violence suggest that a "decision tree" be created within the field to estimate an individual's level of risk for violence and that risk assessments for mental health and violence be combined to produce better estimates of risk (Monahan et al., 2001). In addition, the researchers seem to support integration of risk assessment models, which contain varied and important factors related to violence.

Precedents for behavioral health risk estimation – provider level. Despite the lack of scientific evidence related to integrated approaches to behavioral health risk estimation, there is precedent for the use of risk estimation within the field of behavioral health and violence prevention. Within behavioral health, a number of CPGs call for standardized assessment of behavioral health-specific conditions and some provide guidelines for suicide risk estimation. Clinical practice guidelines are professionally supported evidence-based practices and protocols for screening, assessment, treatment and management of disease related to a specific health interest (DHHS, Agency for Healthcare Research Quality [AHRQ], 2013). There no CPGs for comprehensive and integrated approaches to behavioral health risk estimation.

Within distinct areas of behavioral health, practice guidelines for the assessment of a variety of behavioral health problems are suggested without prescribing standardized assessment tools (DHHS, AHRQ, 2013). The APA, NICE, and the VA / DoD have published CPGs for the assessment of various behavioral health problems such as depression, substance abuse, and post-

traumatic stress. These CPGs are typically singularly-purposed and behavioral health problem-specific (APA, 2003; NICE, 2011; VA / DoD, 2013a).

There are a few CPGs known to support risk estimation regarding suicide. One tool supported by the APA is the Suicide Assessment Five-Step Evaluation and Triage (SAFE-T) (APA, 2003; Jacobs, 2007). The SAFE-T includes assessment of the risk level (step 4) based on clinical judgment after evaluation of steps 1-3 (identification of risk and protective factors and completion of a suicide inquiry). Risk levels assigned may be high, moderate or low based on risk and protective factors as well as the severity of the individual's suicidality. The SAFE-T also recommends ongoing re-assessment. The SAFE-T for suicide is developed using the APA's clinical practice guidelines for the assessment and treatment of patients with suicidal behaviors. The VA / DoD also has a CPG for determining a level of risk for suicide (VA / DoD, 2013b). The scale levels are as follows: high-acute risk; intermediate-acute risk; and low-acute risk. The level of risk assigned will suggest actions and management. Although not nationally mandated, risk estimation is a recommended practice within the field of behavioral health, particularly for suicide (Motto, 1992).

Despite CPGs, there is a general lack of adherence to these recommended practice standards, which must be noted here. Simon (2012) reports "the extent of suicide risk assessment is usually no more than the statement, 'patient denied HI [homicidal ideation], SI [suicidal ideation], CFS [contracts for safety]' and frequently only contains one line 'patient denied suicidal ideation" (p. 12). Similarly, a study by Malone et al. (1995) found that clinicians failed to properly document past suicidal behaviors at admission and discharge. Although there is no nationally mandated standard, providers are required by health industry standards to identify the risk of suicide or homicide in their individual assessments.

Also of concern, is the lack of compliance with the National Patient Safety Goals on Suicide established by the Joint Commission [for the Accreditation of Hospitals] (Joint Commission [JC], 2007). In 2012, insufficient or absent patient assessment is found to be the root cause in over 80% of suicides in inpatient settings or within 72 hours of discharge (JC, 2012). Although there are recommended practice standards and precedents for behavioral health assessment and risk estimation, current behavioral health providers in some settings do not meet recommended standards. Behavioral health assessment and management aided by technology offer one means of improving the standardization of and compliance with approved clinical practice guidelines.

Within the field of violence prevention, there are a number of instruments which seek to estimate the risk of violence to others. These may be utilized within health, community-based or legal settings. Examples within the field of domestic violence include: 1) Intimate Partner Physical Injury-Risk Assessment Tool (Stith et al., 2014), used to estimate the risk of physical injury; 2) Danger Assessment (Campbell, 1995), used to determine the level of danger; and 3) Domestic Violence Inventory (Lindeman & Khandaker, 2011), used to classify risk of domestic violence. As previously discussed, many of the violence assessment tools attempt to predict, instead of estimate risk.

A review of the important literature regarding integrated approaches to behavior health assessment, including risk estimation, provides the groundwork for understanding how these efforts can be improved, when aided by technology.

Behavioral health risk assessment aided by technology.

Definition. Behavioral health risk assessment using technology is defined as automated, computerized, or web-based systems or applications with the capability to support risk

assessment for mental, emotional or psychological problems. This technological capability falls under the field of behavioral health informatics. Behavioral health informatics involves technology-based initiatives to improve multiple areas within behavioral health problem management. Various types of behavioral health informatics are available. The functionality of these systems may include capabilities which support administrative efficiency, task scheduling and reminders, a number of health processes, decision making, diagnosis, treatment, efficacy, outcomes, data analytics, research, and others. Technology which supports decision making in clinical settings is often termed as a CDSS. A CDSS can assist providers with multiple aspects of health care including diagnosis, treatment planning, review of clinical data, and recommendations for care (Payne, 2000; Sim et al., 2001). Within the field of behavioral health, one purpose of a CDSS is to improve decision making in risk management efforts. The ultimate goal is to reduce the likelihood of adverse outcomes and to improve health outcomes.

Research. Studies of integrated behavioral health risk assessment aided by technology are not available. However, there are a few studies related to the effort which attempt to computerize risk assessment within specific populations and settings. Some of these computerized databases and systems demonstrate credible utility in specific health care settings for specific disorders. Within the field of suicide, research has established the significance of the use of computerized tools for suicide risk assessment (Erdman, Greist, Gustafson, Taves, & Klein, 1987; Levine, Ancill, & Roberts, 1989). In the study by Erdman et al. (1987), suicide risk assessment involved weighted risk factors. The weights are derived from clinical provider estimates of the importance of each risk factor. The findings revealed that the computer is significantly better than providers at identifying those that would attempt suicide; however, providers are significantly better at identifying those that would not attempt suicide. Similarly,

the study by Levine et al. (1989) revealed that the computer appeared to be better at predicting suicidality.

Self-help and diagnostic, web-based questionnaires have also demonstrated relevant levels of reliability and validity. Examples include: 1) Internet-based Self-assessment Program for Depression (Lin et al., 2003, 2007); 2) Web-Based Depression and Anxiety Test (Farvolden, McBride, Bagby, & Ravitz, 2003); 3) Web-Based Screening Questionnaire, a screen for common mental disorders such as depression, anxiety, alcohol abuse / dependence, post-traumatic stress, and obsessive compulsive disorder (Donker, vanStraten, Marks, & Cuipers, 2009; Vrije University of Amsterdam, 2009); and 4) eColumbia-Suicide Severity Rating Scale, a suicide risk assessment scale (Greist, Mundt, Gwaltney, Jefferson, & Posner, 2014). Similar technology-based, behavioral health instruments are used to screen and / or assess individuals for specific behavioral health disorders such as depression, alcohol abuse / dependence, generalized anxiety, post-traumatic stress, social phobia, panic disorder, agoraphobia, specific phobia, and obsessive compulsive disorder.

Scientific research regarding health information systems (health informatics) is also limited (Chiasson & Davidson, 2002, 2005; Kaplan, 2001). Available studies include the use of standardized, computer-based surveys for general health assessment. As early as 1966, the use of technology resulted in improvements in administrative and clinical patient care (Slack, Hicks, Reed, & van Cura, 1966). Studies and reviews of computerized patient surveys / questionnaires demonstrate benefits over paper-based surveys (Bachman, 2003; Choo, Ranney, Aggarwal, & Boudreaux, 2012; Hanscom et al., 2002) particularly in the area of symptom identification (Ruland, Roslien, Bakken, & Kristiansen, 2006). Use of computers for the self-assessment of

mental disorders in primary care has demonstrated some promise of improving clinical outcomes (Lewis, Sharp, Bartholomew, & Pelosi, 1996).

Although studies are generally positive regarding improved efficiencies using technology, research findings on improved health outcomes for these patients are mixed (Garg et al., 2005). Additionally, use of technology to support innovations is impacted by provider adoption. How organizations, providers and users of the technology systems view the product as beneficial influences knowledge diffusion (Martinez-Brawley, 1995). Confidentiality, complexity and the amount of time required to utilize behavioral health technologies are also represented in the research as concerns (Choo, Ranney, Wong, & Mello, 2012; Ranney et al., 2012).

Precedents for use of technology in behavioral health – organizational level. Although a variety of health assessments and health risk assessments utilize technology, behavioral health problem management lags behind in technological development.

The Report on the 2012 National Council Survey on Health Information Technology Adoption and Readiness for Meaningful Use in Community Behavioral Health includes general recommendations for the behavioral health community on improving use of behavioral health information technology (DHHS, National Council for Community Behavioral Health, 2012). Those recommendations include: 1) use of clinical decision support for behavioral health screening; 2) support for those not adopting technologies; and 3) promotion of the development of standards for behavioral health assessment tools (ONCHIT, 2012).

Although research has not been conducted on many of the current behavioral health information technology initiatives, there are a number of systems available or under development for general behavioral health care. Those include systems for the following: 1) use within the

social work service area of the VHA (Grishman, 1995; VA, 2010); 2) decision making using computer technology (Pardeck, 1998); 3) integration of service delivery using rapid assessment methods and collaborative care models (Rapp, Dulmus, Wodarski, & Felt, 1998); and 4) use within behavioral health departments with military settings (BHSL, 2012a, 2012b).

A search of relevant behavioral health technology systems currently available reveals products for behavioral health assessment and management. They include, but are not limited to: 1) electronic Behavior and Symptom Identification Scale (eBASIS®; McLean Hospital, 2013); 2) VA Net Decision Support System (NetDSS): a free web-based decision support system, which includes the PHQ-9; PTSD Checklists, AUDIT, GAD-7, and the MDQ; NetDSS is used by care managers and follows evidence-based practices using self-scoring instruments (VA, 2010); 3) Department of the Army, Behavioral Health Data Portal (BHDP): web-based system allows patients to self-report behavioral health issues using integrated behavioral health concepts; the BHDP uses instruments such as the PHQ-2 and 9, PTSD-Clinical, AUDIT, GAD-7, BASIS-24®, and the Comprehensive Severity Index (CSI®) (CSI®, International Severity Information Systems, Inc., 2015); using BHDP, providers review the analyzed data from the instruments to inform decision making and track clinical outcomes (BHSL, 2012a); 4) Psychological and Behavioral Health-Tools for Evaluation, Risk and Management (PBH-TERM), web-based system: contains one module for behavioral health risk assessment and management called BHRM (BHSL, 2012b), and one for integrative behavioral health case management for use within primary care called FIRST-STEPS (Defense Centers of Excellence, 2015); and 5) Psychological and Behavioral Risk Management System (PBRMS®), web-based modules to address behavioral health risk management in public safety environments such as educational and criminal settings (Note: The developer of PBRMS also developed the PBH-TERM BHRM

module utilizing risk management concepts; parts of the BHRM module are proprietary) (Previdence, 2015). The BASIS-24® is validated for use with adult populations (Eisen, Normand, Belanger, Spiro, & Esch, 2004); however, the validity of the other four systems mentioned is unknown.

There are also commercially developed, technology-based systems developed to support behavioral health clinical decision making. The following are three examples: 1) InterQual®, Evidence-Based Decision Support for Behavioral Health Payors and Providers, a level of care decision support system based on patient-specific behaviors and symptoms, safety risk assessment, level of functioning and level of care (InterQual®, 2010); 2) PsyCheck® Screening Tool, designed to screen individuals with alcohol or drug disorders for other types of mental illness (PsyCheck®, 2015); and 3) Netsmart®, Clinical Decision Support Systems (CDSS) within Behavioral Healthcare Settings (Netsmart®, 2012), the specific capability is unknown. The websites for each of these present some level of evidence-based or scientific support for use; however, except for PsyCheck®, the research is unpublished. A review of user manuals available and relevant websites reveals that some of these systems may have a few capabilities similar to those of BHRM.

There are also systems developed for offender risk assessment and management. Examples include: 1) Level of Service / Risk, Need, Responsivity®: public safety tool; evidence-based, assesses needs, risk of recidivism, and management for offenders (Andrews, Bonta, & Wormith, 2009); and 2) Level of Service / Case Management Inventory® (Andrews, Bonta, & Wormith, 2005). These tools are used to assess the rehabilitation needs of offenders, risk of recidivism and management requirements. Similar systems in education include the Behavior Intervention Monitoring Assessment System® (BIMAS), a web-based technology used

to screen, evaluate and monitor children with emotional and behavioral problems (McDougal, Bardos, & Meier, 2011). The scientific evidence supporting these systems is also unknown.

A review of the important literature regarding integrated approaches to behavior health assessment, aided by technology, provides a context for the study of innovative methods.

A novel approach: Behavioral Health Risk Management. The BHRM is a web-based technology application (module) designed to support clinical decision making with regard to behavioral health risk assessment, estimation and management. The BHRM module seeks to standardize behavioral health risk assessment, estimation, and management (BHSL, 2012b). A primary goal is to reduce the risk of adverse behavioral health outcomes.

The basic conceptual model and full practice model for the BHRM are represented in Figures 1 and 2. The BHRM application standardizes risk assessment and management methods in support of professional decision making. The risk assessment feature is a questionnaire containing 55 evidence-based / informed questions related to risk factors for adverse behavioral health events (see Figure 3). The risk factor questions utilized in the BHRM are clustered into the eight-factor group structure with the BHRA questionnaire. The behavioral health risk factor questions are derived from research and / or from existing behavioral health assessment tools. For instance, the first question in Factor Group 1, regarding emotional pain, is supported through the research related to psychological distress (Bryan & Rudd, 2012; Bryan, Rudd, & Wertenberger, 2013; Loewenstein, Weber, Hsee, & Welch, 2001). References for research which supports the use of the BHRA questions, which are not derived from an existing instrument, are available for viewing within the BHRM module (BHSL, 2012b). In addition to research, questions from validated behavioral health tools are included. The instruments and their questions included in the BHRM questionnaire are as follows: 1) four questions from the

PTSD Checklist (Blanchard, Jones-Alexander, Buckley, & Forneris, 1996; Weathers et al., 1993); questions are embedded in Factor Group 3 (anxiety / post-traumatic stress); and 2) four questions of the CAGE (cut-down, annoyed, guilty, eye-opener) questionnaire regarding alcohol use (Bush, Shaw, Cleary, Delbanco, & Aronson, 1987; Ewing, 1984); questions are embedded in Factor Group 5 (substance use / abuse).

Based on an individual's self-assessed responses to the BHRM, the system auto-calculates a recommended behavioral health risk estimate based on pre-assigned weights. The weights applied to each question are determined by professional clinical consensus under the advice of a national risk expert, Rick Hawks, Ph.D., of Previdence Corporation® (2015). The BHRM assigns a liability percentage to each factor group based on the weighting. The liability weighting for each factor group is calculated as follows: the total score of the liability weight divided by the sum of the liability weight, asset and unknown scores. The BHRM has pre-assigned risk level boundaries based on the liability percentages. Risk level boundaries are as follows: 1) 0 to 49% = low or guarded risk; 2) 50 to 79% = elevated / moderate risk; 3) 80 to 94% = high risk; and 4) 95 to 100% = severe risk (see Appendix F and Figure 4). The liability boundaries support the clinical decision regarding the risk level estimate determined by the provider. The provider may override the risk level estimate recommendation of BHRM by justification of the increase or decrease in the risk level estimate.

The provider determines the individual's risk level (low, moderate, high, or severe) in each of the eight factor groups and then determines a final (overall) risk level (see Figures 5 and 6). The risk level is assigned estimating the risk for an adverse health event. Individuals deemed at higher levels of risk are assessed and managed more frequently (see Figures 1 and 2).

In addition to decision support for risk estimation, the BHRM acts as a decision support tool for management of the identified risk. Generated from the risk factors / questions positively endorsed by an individual, the BHRM module auto-populates recommendations and clinical warnings (for instance, possession of a weapon, thoughts of suicide, risk of violence, etc.) into a recommended management plan. The recommendations assist the provider in devising an appropriate risk mitigation, treatment and management plan.

The BHRM application addresses many of the difficulties related to behavioral health risk assessment and management. However, the BHRM has limitations, which include: 1) additional time required to input information into the module and then transfer screen shots of the risk estimates and management plan into the electronic health record; 2) lack of visibility of the BHRM information to other professionals outside the MEDCOM Warrior Transition Command (WTC) who are also providing behavioral health care for the same individual; and 3) lack of interoperability with other relevant military behavioral health technology applications.

Despite limitations, the BHRM module is used by the WTC to conduct behavioral health risk assessment, estimation and management for the purpose of reducing the risk of adverse behavioral health events of their at-risk medical population. The WTC is a U.S. military medical unit which supports and houses military members in need of more than six months of rehabilitative care. To date, over 55,000 military members have been assigned to the WTC for medical purposes (including behavioral health related issues). Approximately 42,000 of the 55,000 have been assessed and / or managed by 220 clinical social workers using BHRM. While the efficacy of BHRM has yet to be studied regarding improved individual outcomes, the results of this initial study can provide key insights into the potential of systems like the BHRM.

The findings of this study may result in the need to make adjustments to the BHRM module. The process by which DoD information systems are certified is called the Defense Business Systems Management (DBSM). The PBH-TERM, BHRM module is DBSM certified; however, DBSM guidance requires completion of a "Problem Statement." The Problem Statement involves identification of business need, recommending a course of action and providing a cost estimate. The entire DBSM process – from completion of the Problem Statement to deployment on the website for use – may take several years.

The presentation of this novel approach provides background and context for the current study of behavioral health risk assessment and estimation using an integrated approach aided by technology. However, there are barriers to these types of approaches.

Barriers to integrated and technological approaches. There are limitations to the use of integrated technological approaches. Barriers to use include ethical considerations (Cwikel & Cnaan, 1991; Pardeck, 1997); required level of skill and experience to use technology, user-friendliness of the system, and beliefs about usefulness in work (Burton & van den Broek, 2009; Carrilio, 2007); loss of social context (Pardeck, 1997); resistance due to perception of limited involvement in the design and implementation process (Burton & van den Broek, 2009), and failure of the organization to acknowledge the time required to produce reports (Burton & van den Broek, 2009). In addition, the integration of scientific knowledge about behavioral health requires reviewing a high volume of research to produce a valid, comprehensive behavioral health risk assessment tool. Despite validation of such a tool, the behavioral-health-specific risk assessments will still be required in certain health settings.

Limitations specific to the use of technology include: 1) lack of evidence or inconsistent results regarding improved patient outcomes (Garg et al., 2005); 2) individual user's reluctance

to disclose sensitive mental health information on a computer; 3) professional user resistance to change and use of technology; 4) technological "glitches," like connectivity issues; and 5) costs for development, testing, training and fielding of systems. For military populations, limitations may also include a service member's reticence in providing honest responses due to stigma and uncertainty of consequences (Warner et al., 2011).

Summary of Overview. Although limited research is available, integrated approaches to behavioral health risk assessment and estimation using technology are supportable within a number of theoretical frameworks, existing research and historical precedents for use. Innovations using technology allow for the integration, standardization and management of high volumes of information about behavioral health. Thus, technology has the potential to advance integrated behavioral health care to better inform decision making in support of behavioral health risk assessment, estimation and management efforts.

Even though similar technological systems are evolving, the BHRM is the only known technology, which specifically utilizes an integrated approach for behavioral health risk assessment and risk estimation. Study findings support that ongoing estimation of behavioral health risks and case management are important components in reducing the risk of adverse outcomes, especially for high risk populations (Deleo & Heller, 2007). The efficiency, efficacy, and effectiveness of evolving innovations in behavioral health informatics may prove beneficial to those at risk for adverse behavioral health outcomes. Accordingly, scientific study is required as there continue to be research deficits in these areas.

CHAPTER 3

Methods

Design

This study involves a secondary data analysis of de-identified data. Data are extracted from the BHRM (located on the PBH-TERM platform) and the Defense Manpower Data Center (DMDC) databases. Examination of data seeks to answer nine research questions and test five hypotheses (see Appendix A). The study analyzes the response data of WTU service members to the BHRA-Q (embedded in the BHRM module) including: 1) prevalence of individual self-assessed responses; 2) associations among the behavioral health risk factors; 3) internal reliability; and the 4) eight-factor group structure. Additionally, the study uses BHRM data to explore the prevalence and association of the BHRM recommended and clinical provider determined behavioral health risk estimates and uses the BHRM and demographic data from the DMDC to identify demographic variables that may predict the risk estimates.

The study analyzes data from the first BHRA-Q (self-assessment) completed by each service member. The variables involved in examining each of the nine research questions are discussed within the specific research question's section below.

Sample

There are no human subjects in this study. The behavioral health risk data examination from the BHRM module includes information regarding 30,265 service members assigned to Warrior Transition Units for medical management. The de-identified data tested in this study includes males and females between the ages of 18 and 70. Service members who completed the BHRA-Q and whose responses are entered into the BHRM module from September 1, 2009 to November 12, 2013 are included in the study. Exclusion criteria: Records (data) of subjects

(service members) with missing, unknown or incomplete data for the entire questionnaire or risk estimate are removed from the study. For research questions 1 through 7, two subjects are removed from the original 30,265 subjects due to lack of responses on the BHRA-Q.

For research questions 8 and 9, the sample study began with the 30,265 subjects. However, the total included in the analysis of these two questions is 27,675. The total number of subjects removed for the ordinal logistic regression analysis is 2,590 subjects (8.6%); n = 27,675 (93.4%). Two subjects are removed for non-responses and 648 removed for lack of demographic variables in greater than nine categories. Additionally, 1,940 subjects are removed from the study when the response is "unknown" to six demographic variables (i.e., age at risk estimate, marital status, education, age at military entry, active duty service length at risk estimate, and military service length at risk estimate). The subjects with "unknown" responses in the remaining categories are filtered into the testing to ensure each category has the requisite 27,675. For each demographic variable the data is grouped into sub-categories to support ordinal categories. Race and religion variables required dummy coding due to their non-ordinal nature.

Population characteristics are derived from the DMDC data for the 29,615 subjects in research questions 1 through 7 (see Table 1) and for the 27,675 subjects included in research questions 8 and 9 (see Table 19).

Data Collection Protocols and Procedures

The U.S. Army Institutional Review Board (IRB), San Antonio Military Medical Complex (Brooke Army Medical Center) at Joint Base San Antonio (JBSA), Fort Sam Houston, Texas agreed to the University of Houston's IRB protocols and did not require a separate military IRB process for this study (see Appendix H). The University of Houston IRB proof of

submission is available at Appendix I. Upon approval of the IRB, the Data Sharing Agreement (DSA) with MEDCOM was submitted to request approval for use of data.

After approval by of the DSA between Patient Administration Systems & Biostatistics Activity and US Army Medical Information Technology Center (USAMITC) in June of 2015, data were requested from USAMITC. The BHRM data are hosted on the PBH-TERM platform behind a secure setting at the Defense Health Agency Health Information Technology (DHA HIT) North Beach Pavilion Local Area Network (formerly USAMITC). The initial data received from DHA HIT did not meet the requirements for the study and additional requests for the data were required. Due to delays in data acquisition, an extension of the DSA was required. The revised and final BHRM risk data were received December 28, 2016. The demographic data could not be requested from DMDC until the data were received from DHA HIT. Upon receipt of the appropriate BHRM data, the DMDC demographic data were requested. The de-identified DMDC demographic data were received on April 11, 2017. The DMDC demographic data provided did not include data for 648 of the requested 30,263 service members. The demographic data for 29,675 service members are provided.

Demographic information available from DMDC include gender; age at risk estimate; marital status at risk estimate; race; religion; education; age at risk estimate; rank at risk estimate; military service component at risk estimate; active duty service length at risk estimate; military service length at risk estimate; and deployments before risk estimate. The DMDC could not provide data on the original variable request for “combat deployments (non-direct and direct).” Instead, DMDC provided data for “deployments before risk estimate,” which is included in the study. The analysis of the data is conducted on a military computer provided by

MEDCOM, which is secure and subject to military information assurance regulatory requirements. This study is conducted at MEDCOM at JBSA, Fort Sam Houston, Texas.

Data Analysis and Procedures

Testing of assumptions is conducted for all statistical analyses. As a result of the assumptions testing, transformation of some data and adjustments to the statistical procedures for data analyses is required. Details regarding data transformation and statistical testing are discussed within the results section for each research question. Adjustments to testing procedures are due to the non-normal distribution of data.

An analysis of the demographic characteristics available from DMDC for 29,675 of the 30,263 subjects is conducted by examining frequencies and descriptives (see Table 1). To address research questions 8 and 9, identification of sub-categories to the demographic variables and data transformation is required (discussed below in research questions 8 and 9), which reduces the total subjects for these two questions to 27,675. Thus, a second analysis was conducted on the frequencies and descriptives of the demographics of subjects by sub-categorization (see Table 19).

Research question 1 – Endorsement of Risk Variables. What is the prevalence of endorsement or non-endorsement of behavioral health risk variables (55) by individuals completing the BHRA questionnaire? To address this research question (of prevalence / proportion), descriptive and frequency analyses are completed. Behavioral health risk variables are as follows: 1) emotional pain; 2) self-harm or suicidal thoughts; 3) self-harm plan; 4) self-harm means; 5) self-harm history; 6) hopefulness; 7) self-perception (failure); 8) behavioral health diagnosis history; 9) racing thoughts; 10) special powers; 11) auditory or visual hallucinations; 12) paranoia; 13) anxiety-general; 14) anxiety-panic attacks; 15) anxiety-

avoidance; 16) post-traumatic stress-nightmares; 17) post-traumatic stress-avoidance; 18) post-traumatic stress-hypervigilant; 19) post-traumatic stress-detachment; 20) anger; 21) homicidal thoughts; 22) abuse of self or others-recent; 23) abuse of others-history; 24) protective order; 25) assault / battery / abuse of others-history; 26) weapon in the home; 27) relationship break-up; 28) agreement with break-up; 29) substance use-cut down; 30) substance use-annoyed; 31) substance use-guilty; 32) substance use-eye opener; 33) substance use-coping; 34) use of controlled or illegal substances; 35) misuse of medications or supplements; 36) substance treatment failure-history; 37) abuse / neglect-history; 38) relationship satisfaction; 39) problems with partner; 40) safe from domestic violence / abuse; 41) problems with children; 42) child protective services / family advocacy program-history; 43) learning disability; 44) problems-financial; 45) support systems; 46) problems with family / friend; 47) problems-work; 48) problems-legal; 49) physical health; 50) medication use-prescription; 51) traumatic brain injury; 52) pain-physical; 53) pain-level; 54) pain-treated; 55) sleep problems (see Appendix B).

The behavioral health risk variables (responses to BHRA-Q questions) are reported including percentages, number, mean, standard deviation, and median as appropriate (see Table 2). The data are transformed and assigned values to support the analysis. For the three continuous variables, a response of "0" is identified as "no" and a response of 1-10 is identified as "yes." These three variables are also examined for the average rating (1 to 10). The International Business Machines, Statistical Package for Social Sciences (IBM SPSS) version 24.0 is used to analyze data (IBM SPSS, 2014). The sample size for this question is 30,263.

Research question 2 – Associations among Risk Variables. What are the relationships among the behavioral health risk variables (55)? *Hypothesis 1:* There are significant relationships among the behavioral health risk variables (55). The behavioral health risk

variables are the same as identified in research question 2 (see Appendix B). To address this research question (of association) and test hypothesis 1, the relationships among the behavioral health risk variables (55 items) is measured using Pearson's correlation (Chi-Square). The IBM SPSS version 24.0 is used to analyze data (IBM SPSS, 2014). The sample size for this question is 30,263.

Data transformation is required to support the analysis of research question 2. Data are re-coded to align the question responses into binomial data ("yes" or "no"). A "no" response is deemed to be desirable and assigned a value of "0." A "yes" response is deemed to be less desirable and is assigned a value of "1."

The BHRA-Q contains two ordinal items / questions (with four response options); six dichotomous questions which are reversed ("yes" is listed first, instead of "no"); three contingency questions (if true, then response "yes," "no" or "not applicable"); five questions which allow "not applicable" selection; and 55 questions that allow selection of "unknown." For the three continuous questions, Item 1 (Factor Group 1, question 1), Item 28 (Factor Group 6, question 2), and Item 53 (Factor Group 8, question 5), a rating of "0" is identified as "no" and a rating of 1 through 10 is identified as "yes" (see Appendix C and D).

For two ordinal items, Items 7 (Factor Group 1, question 7) and 49 (Factor Group 8, question 1) are converted to binomial variables. For Item 7 (never, rarely, occasionally, frequently), responses of "never" or "rarely" are assigned to the "no" category, and responses of "occasionally" or "frequently" are assigned to the "yes" category. For Item 49 (poor, fair, good, excellent), responses of "poor" or "fair" are assigned to the "no" category, and responses of "good" and "excellent" are assigned to the "yes" category.

For the six dichotomous questions, response values are appropriately reversed to align responses properly with “good” and “less desirable” responses including Item 6 (Factor Group 1, question 6); Item 28 (Factor Group 4, question 9); Item 40 (Factor Group 6, question 4); Item 45 (Factor Group 7, question 3); Item 50 (Factor Group 8, question 2); and Item 54 (Factor Group 8, question 6). Responses of "not applicable" are replaced with "no" responses and include contingency questions.

To transform the “unknown” responses, the percentage of “yes,” “no” and “unknown” responses for each question item is calculated. Responses of "unknown" are apportioned by replacement with "no" based on the percentage of "no" responses on the question item, plus 1/2 the percentage of "unknown.” Responses are replaced with "yes" based on the percentage of "yes" responses on the question item, plus 1/2 percentage of "unknown" responses.

To calculate the percentages and assign to a “yes” or “no” response, the number of “unknowns” in the question item is multiplied times the “yes” percentage to determine the assignment of “unknowns” to “yes;” the number of “unknowns” in the question items is multiplied by the “no” percentage to calculate the number of responses that would be assigned a “no” response; and the “unknown” responses to the question item is assigned using half of the “unknown” percentage to assigned the “unknown” response as “yes” or “no.”

Research question 3 – Internal Reliability. Does the BHRA questionnaire demonstrate internal reliability? The variables for research question 3 are the same as those identified in research question 1 and 2 (see Appendix B). To address this research question, Cronbach’s alpha statistical test is conducted to examine the BHRA-Q’s internal reliability (Cronbach, 1951). The IBM SPSS version 24.0 is used to analyze data (IBM SPSS, 2014). The sample size for this question is 30,263.

Data are transformed in the same manner identified in research question 2. The transformed data is tested to determine impact on the internal reliability results; the re-coding did not affect reliability results in any noteworthy manner. For final testing using Cronbach's alpha, five items that are ordinal or continuous (FG1Q1, FG1Q7, FG6Q2, FG8Q1, and FG8Q5) are converted to a "yes" or "no" to meet the assumption that the scores have the same meaning.

Research question 4 – BHRA-Q Model Structure. Does the data confirm the eight-factor group structure (model) of the BHRA questionnaire? *Hypothesis 2:* The eight-factor group structure (model) of the BHRA questionnaire will be confirmed. The behavioral health risk variables (55) are the same as identified in research questions 1, 2, and 3. The eight factor group variables are as follows: 1) Factor Group 1 – Behavioral Health / Depression / Suicide; 2) Factor Group 2 – Mental Status / Psychosis; 3) Factor Group 3 – Anxiety / Post Traumatic Stress); 4) Factor Group 4 – Anger / Aggression / Violence; 5) Factor Group 5 – Substance Abuse; 6) Factor Group 6 – Psychosocial History / Relationships; 7) Factor Group 7 – Environment / Support Systems; and 8) Factor Group 8 – Health and Traumatic Brain Injury (see Appendix C and E).

To address this research question, the eight-factor group structure of the BHRA-Q is analyzed using structural equation modeling to conduct confirmatory factor analysis (SEM-CFA). The test determines whether data supports or "is a good fit" for the eight-factor group structure (model) of the BHRA-Q (see Appendix C and D). The data set for the SEM-CFA analysis is transformed in the same manner as in research question 3; however, the three continuous variables are treated as continuous variables; they are not transformed. Due to data being non-normally distributed, data are tested using M*plus* 8 (Muthén & Muthén, 2007-2017)

and assesses the Weighted Least Squares, Means and Variance (WLSMV) as recommended by Byrne (2012). The sample size for this question is 30,263.

The BHRA-Q 55 risk variables (three continuous and 52 categorical) are clustered by relatedness into the eight factor groups which are used to test the eight-factor group structure. The number of dependent variables is 55, independent variable is zero (0), and continuous latent variables are eight (8). The dependent variables represent the observed indicator variables (three continuous and 52 categorical behavioral health risk factors). The continuous latent variables are represented by the eight factor groups, which includes Factor Group 1 (behavioral health / depression / suicide), Factor Group 2 (mental status / psychosis), Factor Group 3 (anxiety / post-traumatic stress), Factor Group 4 (anger / aggression / violence), Factor Group 5 (substance abuse / use), Factor Group 6 (psychosocial history / relationships), Factor Group 7 (environment / support systems), and Factor Group 8 (health / traumatic brain injury).

Research question 5 – Prevalence of Risk Estimates by BHRM. What is the prevalence of the behavioral health risk level estimates (low, moderate, high, or severe) recommended by the BHRM module for each of the eight factor groups and the final risk estimate? The eight factor groups are the same as identified in research question 4 (see Appendix E and F). The service member's self-assessment on the BHRA-Q is weighted by BHRM and considered the BHRM recommended risk estimate.

To address this research question (prevalence), the risk level estimates and the final risk level estimate recommended by the BHRM are measured by univariate statistical analysis, providing an output of mean, median, mode, standard deviation, and percentages, where applicable. Data used to analyze the risk estimates of the BHRM module and providers is obtained from PBH-TERM which is managed by DHA HIT Infrastructure and Operations

database administrator (formerly USAMITC). The IBM SPSS version 24.0 is used to analyze data (IBM SPSS, 2014). The sample size for this question is 30,263.

To support understanding and appropriate analysis, the risk estimations require re-labeling. From 2009-2013, the risk estimation scale was a four-point scale, which includes guarded. This study uses a four-point scale where "low" and "guarded" categories are combined. The low and guarded are labeled as "low;" the term "elevated" is labeled as "moderate;" and the term "severe / imminent" is shortened to severe. The result is four categories – low, moderate, high and severe.

The BHRM module risk estimate calculator generates a liability percentage based on weighted responses of the service members to the BHRA-Q. The liability percentage generated is then compared to standardized boundaries (percentage ranges) for determining the appropriate level of risk. The liability percentages ranges that represent the four risk categories are as follows: 0 to 49% liability percentage is equivalent to low risk; 50 to 79%=moderate; 80-94%=high; 95-100%=severe. Thus, BHRM generated liability percentage of 73% would fall in the moderate risk range and be estimated as moderate risk by BHRM. These percentages are used to represent the BHRM recommendation of low, moderate, high or severe to inform the actual risk determination by the provider in each of the factor groups. Risk estimates assigned as "unknown" by the BHRM module (individual's self-assessment) are transformed to "moderate." There is no missing data.

For the analysis of research question 5 – the risk level estimates recommended by BHRM, the liability percentage ranges are utilized to determine the risk level estimates for each factor group (low, moderate, high, or severe). Data for the study required transformation and is value coded with risk level estimates of low = 1; moderate risk = 2; high risk = 3; and severe risk

= 4. A final risk (overall) estimate is recommended the BHRM and guided by MEDCOM policy. The policy requires selection of the highest level of risk estimated in any factor group to be assigned as the final risk estimate level, unless the provider makes a note in the system justifying the reason for the change in estimation. For the final BHRM risk level estimate, a score of 1, 2, 3, or 4 is assigned in accordance with the highest risk estimate level (low, moderate, high, or severe) recommended by BHRM in any one factor group. The data are tested for prevalence utilizing this transformed / coded data (see Appendix F).

Research question 6 – Prevalence of Risk Estimates by Provider. What is the prevalence of the behavioral health risk level estimates (low, moderate, high or severe) determined by the clinical provider for each of the eight factor groups and the final risk estimate? The eight factor groups are the same as identified in research question 4 (see Appendix E and F).

To address this research question (prevalence), the risk level estimates and the final risk level estimate recommended by the BHRM are measured by univariate statistical analysis, providing an output of mean, median, mode, standard deviation, and percentages, where applicable. The IBM SPSS version 24.0 is used to analyze Data (IBM SPSS, 2014).

The subjects in research question 6 are the same as those for research question 5. Data for research question 6 are transformed in the similar manner as research question 5. However, for this analysis of the risk level estimates determined by the provider, the risk level estimates (low, moderate, high, or severe) for each factor group and the final risk estimate selected by the provider requires value coding. Similar to research question 5, a risk level estimate assigned by a provider as low is assigned a value of "1;" moderate risk a value of "2;" high risk a value of "3;" and severe risk a value of "4." Data are tested for prevalence utilizing this transformed data

(see Appendices E and F). Risk estimates assigned as "unknown" by the provider transformed to "moderate." There is no missing data.

Research question 7 – Correlations among Risk Estimates. What are the correlations among the behavioral health risk level estimates (low, moderate, high, or severe) recommended by the BHRM and the risk level estimates determined by the clinical provider for each of the eight factor groups and the final risk estimate? *Hypothesis 3:* The BHRM module data will demonstrate significant correlations between the risk level estimates recommended by the BHRM and the risk level estimates determined by the clinical provider for each of the eight factor groups and the final risk estimate. The eight factor groups are the same as identified in research question 4 (see Appendix E and F).

To address this research question of association and test hypothesis 3, the relationship between the risk level estimates recommended by the technology-based, clinical decision support system (BHRM module) and the risk level estimates determined by the clinical provider is measured using Spearman's Rho. The IBM SPSS version 24.0 is used to analyze data (IBM SPSS, 2014). The sample size for this question is 30,263.

The BHRM data used to analyze the risk estimates of the BHRM module and providers is the same data used in research question 5 and 6. Data transformation is conducted in the same manner as for questions 5 and 6.

Research question 8 – Demographic Variables Predicting Risk Estimates by BHRM. What are the set of demographic variables (12) that predict an BHRM recommended (individual's self-assessed) risk level estimates in each of the eight factor groups and the final risk estimate (low, moderate or high)? *Hypothesis 4:* An individual's demographic variables will predict the BHRM modules' (individual's self-assessed) risk level estimates assessed for

each of the eight factor groups and the final risk estimate. The eight factor groups are the same as identified in research question 4 (see Appendix E and F).

Demographics available from DMDC include gender; age at risk estimate, race, religion, education, marital status at risk estimate, military Service component at risk estimate, age at military entry, rank at risk estimate, active duty service length at risk estimate, military service length at risk estimate, and deployments before risk estimate. The DMDC could not provide data on the original variable request for "combat deployments (non-direct and direct)." Instead, data provided by DMDC reflects "deployments before risk estimate," which are included in the study (see Appendix G).

To address this research question and test hypothesis 4, a univariate and bivariate analysis (Pearson's Chi-Square) of the risk estimates recommended by BHRM are conducted followed by ordinal logistic regression. The IBM SPSS version 24.0 is used to analyze data (IBM SPSS, 2014). The sample size for this question is 27,675 (reduced due to missing information including lack of demographic information on subjects and "unknown" responses).

Assumptions are tested. Demographics are grouped into categories to ensure appropriate assumptions for statistical examination are met (see Table 19). The bivariate analysis (using Pearson's Chi-Square) is conducted prior to the ordinal logistic regression to assess the relationship between the variables. Once significance is established, those demographic variables and risk estimates by BHRM module are tested using ordinal logistic regression. Proportional odds are reported.

Independent Variables. There are 12 independent variables, which are continuous and categorical. However, sub-categories are re-grouped such that all are categorical. Variable categories are combined to ensure the number of responses in each category is near 15% of the

population. They include gender (male and female); age at risk estimate (18-24 years, 25-34 years, 35-44 years, and > 44 years; subjects with unknown age are removed from the study), marital status at risk estimate (married and not married; unknowns are removed); race (white, other and unknown), religion (Christian, other, unknown), education (less than high school or graduate diploma equivalency, high school and some college, and college graduate; unknowns are removed), military service component at risk estimate (active duty or Guard/Reserve), age at military entry (18-24 years, > 24 years; unknowns are removed), rank at risk estimate (enlisted ranks 1-4, enlisted ranks 5-7, enlisted ranks 8-9 and officers), active duty service length at risk estimate (0-4 years, 5-10 years, > 10 years; unknowns removed), military service length at risk estimate (0-4 years, 5-10 years, 11-15 years, >16 years; unknowns removed), and deployments before risk estimate (0, 1, 2, and > 2). Race and religion variables are dummy coded prior to the statistical testing with ordinal logistic regression. The frequencies and percentages for each of the demographic categories are examined.

Dependent Variables. There are three dependent variables, which are ordinal (low, moderate, or high). High and severe risk estimates are combined to ensure the number of responses in each category is near 15% of the population. The frequencies and percentages for responses to risk estimates for the population by BHRM and by provider are examined.

Research question 9 – Demographic Variables Predicting Risk Estimates by Provider. What are the set of demographic variables (12) that predict the clinical provider's determined behavioral health risk level estimates (low, moderate, or high) in each of the eight factor groups and the final risk level estimate? *Hypothesis 5:* An individual's demographic variables will predict the clinical provider's risk level estimates determined for each of the eight factor groups and the final risk estimate. The eight factor groups are the same as identified in

research question 4 (see Appendix E and F). The demographic variables are the same as those used in research question 8 (see Appendix G).

To address this research question and test hypothesis 5, a univariate and bivariate analysis of the risk estimates determined by the provider is conducted followed by ordinal logistic regression. The IBM SPSS version 24.0 is used to analyze data (IBM SPSS, 2014). The sample population for this question is 27,675; the same as research question 8.

Assumptions are tested. Demographics are grouped into categories to ensure appropriate assumptions for statistical examination are met (see Table 19). Two variables – race and religion – require dummy coding prior to analysis. A bivariate analysis is conducted prior to the ordinal logistic regression to assess the relationship between the variables. Once significance is established, those demographic variables and risk estimates by the provider are tested using ordinal logistic regression. Proportional odds are reported.

The subjects in research question 8 are the same as those in research question 9. Data for research question 9 are transformed in the same manner as research question 8.

CHAPTER 4

Results

Introduction

Chapter 4 presents the results of this study. Nine research questions are examined and five hypotheses tested to study behavioral health risk assessment and estimation aided by technology (see Appendix A). Results include frequencies and descriptives of the characteristics of the study population; prevalence of responses, associations, internal reliability, and eight-factor group structure of the BHRA-Q; prevalence, associations, and correlations among BHRM and provider risk estimates; and service member demographic variables that predict risk estimates using the BHRM module. This chapter's sections are organized by an introduction, testing assumptions (where relevant), results, and summary.

Characteristics of Study Population

The study population data includes the BHRM records for 30,265 military service men and women between the ages of 18 and 70 assigned to a Warrior Transition Unit (WTU) from September 1, 2009 and November 12, 2013. Two of the 30,265 subjects are removed due to lack of response to any of the questions. The total number of subjects in the study is 30,263.

The WTU was established in 2007 during a time when the United States was involved in two major conflicts (Iraq and Afghanistan) and required an increase in medical rehabilitative units to address the increase in need. The WTU is a military medical rehabilitation unit for military members requiring greater than six months of medical care. Service members assigned to the WTU are assessed by clinical providers using the PBH-TERM, BHRM module for behavioral health risk assessment and estimation.

The BHRM module data tested in this study are extracted from the PBH-TERM electronic health records of the WTU service members. The demographic data is obtained from DMDC and matched to the BHRM module data.

The demographics are not available from DMDC for 648 of the service members. The frequency and percentages of the demographic information available for those included in the study are presented in Table 1 (N = 30,265-650; n = 29,615). Most of the study subjects are males (25,400/86%) with females representing 14% of the population (4,175). Thirty-eight percent of the subjects at the time of the first risk estimate are between the ages of 25 and 34 (11,134), 25% are 35 to 44 years of age (7,292), 21% are under 25 (6,217), 16.5% above 44 (4,884) with 88 identified as age "unknown." The majority of the subjects are white (21,183/72%), married (18,677/63%), Christian (20,058/68%), high school graduates (16,729/57%), entered the Service before the age of 20 (16,636/56%), and are enlisted at the rank of Specialist (E-4), Sergeant (E-5) or Staff Sergeant (E-6) (19,647/66%). The majority has an active duty service length of 6 to 10 years (6,361/22%), and the next largest group has an active duty service length less than one year (4,263/14%). Likewise, the group with the highest number of service members has a total military service length between 6 to 10 years (6,270/21%), and the next largest group has a total military service length of 11 to 15 years (4,288/15%). Approximately half of the subjects are regular (active duty) service members (14,990/51%) and half are Guard or Army Reserve soldiers (14,625/49%). Sixty-three percent have been on at least one military deployment prior to the risk estimate (18,802) and 25% have completed at least two deployments (7,311). At least 80% have deployed at least once. The majority of the subjects are in the Army (29,524/>99%), with Marines (68) and Navy, Air Force or Coast Guard (23) making up less than one percent.

Table 1. *Demographic Characteristics of Subjects* (*N = 30,265-650; n = 29,615*)*

Variables	Category	Frequency	Percent
Gender	Male	25,440	85.9
	Female	4,175	14.1
Age at Risk Estimate	18-24 years	6,217	21.0
	25-34 years	11,134	37.6
	35-44 years	7,292	24.6
	> 44 years	4,884	16.5
	Unknown	88	0.0
Race	White	21,183	71.5
	Black	5,983	20.2
	Asian	722	2.4
	Other	456	1.5
	Unknown	1,271	4.3
Ethnicity: Hispanic		3,113	10.5
Religion	Christian	20,058	67.7
	Other Religion	693	2.3
	No Preference / None	7,098	24.0
	Unknown	1,766	6.0
Education	Less than High School	2,954	10.0
	Graduate Equivalent Diploma	3,423	11.6
	High School	16,729	56.5
	Some College	290	1.0
	College Graduate	5,882	19.9
Marital Status at Risk Estimate	Married	18,677	63.1
	Never Married	8,108	27.4
	Previously Married	2,821	9.5
	Unknown	9	0.0
Military Service Component	Regular	14,990	50.6
	Guard or Reserve	14,625	49.4
Age at Military Entry	17-20 years	16,636	56.2
	21-24 years	7,566	25.5
	25-29 years	3,191	10.8
	30-44 years	2,161	7.3
	45 and above years	61	0.2

*Of the original 30, 265 subjects, 650 are not included in this table due to non-response to the questionnaire or non-availability of demographic information.

Table 1 cont'd. *Demographic Characteristics of Subjects (N = 30,265-650; n = 29,615)*

Variables	Category	Frequency	Percent
Rank at Risk Estimate	Enlisted, E1-2	650	2.2
	Enlisted, E3	2,257	7.6
	Enlisted, E4	9,199	31.1
	Enlisted, E5	6,197	20.9
	Enlisted, E6	4,251	14.4
	Enlisted, E7-9	3,702	12.5
	Warrant Officers	542	1.8
	Officers, O1-3	1,457	4.9
	Officers, O4 and above	1,360	4.6
Active Duty Service Length at Risk Estimate	Less than 1 year	4,263	14.4
	1 year	2,950	10.0
	2 years	2,752	9.3
	3 years	2,841	9.6
	4 years	2,600	8.8
	5 years	1,999	6.7
	6-10 years	6,361	21.5
	11-15 years	2,642	8.9
	16-19 years	1,182	4.0
	20+ years	660	2.2
	Unknown	1,365	4.6
Military Service Length at Risk Estimate	Less than 1 year	317	1.1
	1 year	1,884	6.4
	2 years	2,441	8.2
	3 years	2,399	8.1
	4 years	2,220	7.5
	5 years	1,802	6.1
	6-10 years	6,270	21.2
	11-15 years	4,288	14.5
	16-19 years	2,419	8.2
	20+ years	5,575	18.8
Deployments before Risk Estimate	0	6,106	20.6
	1	11,491	38.8
	2	7,311	24.7
	> 2	4,707	15.9
Unknown		650	2.0
Valid Demographics		29,615	98%
Total		30,265	100%

*Of the original 30, 265 subjects, 650 are not included in this table due to non-response to the questionnaire or non-availability of demographic information.

The characteristics of the subjects involved in this study meet some of the general Army population characteristics including race, gender, and enlisted rank; however, there appear to be some differences between age, marital status, and education among active duty and the Guard/Reserve soldiers within the WTU/BHRM population. Comparisons are discussed in Chapter 5.

Prevalence, Associations, Internal Reliability and Model Testing of the BHRA-Q

In this study, data from the first BHRA-Q completed by a service member assigned to a WTU is subjected to statistical analysis. The prevalence of endorsement of behavioral health risk factors, risk factor associations, internal reliability of the BHRA-Q, and the eight-factor group structure of the BHRA-Q are explored.

Research Question 1 – Endorsement of Risk Factors (Variables).

Introduction. Research question 1 examines the endorsement of risk factors on the first BHRA-Q completed by the service member. Subsequent risk estimates are conducted in accordance with the risk estimate level assigned at the last appointment with the provider; however, are not included in this study. The behavioral health risk factors and their related questions in the BHRA-Q are listed in Appendices B, C and D. The International Business Machines, Statistical Package for the Social Sciences (IBM SPSS) version 24 is employed to conduct statistical tests of frequencies and descriptives for the 30,263 subjects providing responses to the BHRA-Q. Details of data screening are described in the Methods section.

Results. Prevalence of service member responses to the BHRA-Q reveals several key risk factors for the studied population. They include: 72% with current physical pain; 64% being treated for pain; 54% with a pain rating greater than mild; 62% endorsing sleep problems; 54% with fair or poor physical health; 26% endorsing having a concussion or traumatic brain

injury due to deployment; 38% of the study population endorsing a history of a behavioral health diagnosis; one-third endorsing perception of self as a failure, emotional pain greater than mild (rating > 3), and racing thoughts; ~ 40% with anxiety and 36% post-traumatic stress; 23% with current anger, 23% possessing a weapon; 19% reported abuse as children; 502 (1.66%) with suicidal thoughts and 514 (1.70%) homicidal thoughts; 24% relationship dissatisfaction greater than mild (> 3 rating; higher rating = greater dissatisfaction). Ninety-two service members (.003%) endorsed suicide thoughts or self-harm and homicidal thoughts or homicide plan. Note: Average rating of emotional pain (without 0) is 2.68 (higher score = greater pain); average of rating > 3 is 3.99 (34.80%). Average rating of relationship dissatisfaction (without 0) is 2.21 (lower score is greater satisfaction); average of rating > 3 is 4.03 (24.06%). Average rating of physical pain (without 0) is 3.68 (higher score = greater pain); average of rating > 3 is 4.56 (53.80%). Table 2 delineates the full examination of the endorsed risk factors.

Table 2. *Endorsement of Behavioral Health Risk Assessment-Questionnaire – Frequencies and Percentages (N = 30,263)*

N =30,263	Risk Factor / Variables (55)	Select 0, No, Never-Rarely, Poor-Fair	% Select 0, No, Never-Rarely, Poor-Fair	Select 1-10, Yes, +, Occassionally-Frequently, Good-Excellent	% Select 1-10, Yes, +, Occassionally-Frequently, Good-Excellent	Select Unknown	% Select Unknown
Factor Group 1	**Behavioral Health (Depression/Suicide)**						
Question 1	Emotional Pain (*n* =29,861)	9,824	32.90%	20,037	67.10%	402	1.35%
Question 2	Suicide Thoughts	29,689	98.10%	502	1.66%	72	0.24%
Question 3	Suicide Plan	30,050	99.30%	143	0.47%	70	0.23%
Question 4	Suicide Means (Not applicable=30,082/99%)	89	0.29%	71	0.23%	21	0.07%
Question 5	History of Self-Harm	27,180	89.81%	2,965	9.80%	118	0.39%
Question 6	Hopefulness *(Yes = +)*	1,846	6.10%	26,901	88.89%	1516	5.01%
Question 7	Failure Perception	19,377	64.03%	10,382	34.31%	504	1.67%
Question 8	Behavioral Health Diagnosis-History of	18,405	60.82%	11,393	37.65%	465	1.54%
Factor Group 2	**Mental Status/Psychosis**						
Question 1	Racing Thoughts	19,665	64.98%	10,392	34.34%	206	0.68%
Question 2	Special Powers	29,888	98.76%	257	0.85%	118	0.39%
Question 3	Hallucinations	28,427	93.93%	1,670	5.52%	166	0.55%
Question 4	Paranoia	26,538	87.69%	3,448	11.39%	277	0.92%
Factor Group 3	**Anxiety/Post-Traumatic Stress**						
Question 1	General Anxiety-History of	17,030	56.27%	12,934	42.74%	299	0.99%
Question 2	Panic Attacks	18,980	62.72%	11,015	36.40%	268	0.89%
Question 3	Avoidance	18,053	59.65%	11,958	39.51%	252	0.83%
Question 4	Post-Traumatic Stress-Nightmares	18,793	62.10%	11,285	37.29%	185	0.61%
Question 5	Post-Traumatic Stress-Avoidance	19,728	65.19%	10,364	34.25%	171	0.57%
Question 6	Post-Traumatic Stress-Hypervigilance	18,172	60.05%	11,911	39.36%	180	0.59%
Question 7	Post-Traumatic Stress-Emotional Detachment	19,964	65.97%	10,047	33.20%	252	0.83%
Factor Group 4	**Anger/Aggression/Domestic**						
Question 1	Anger	22,999	76.00%	6,963	23.01%	301	0.99%
Question 2	Homicidal Thoughts	29,572	97.72%	514	1.70%	177	0.58%
Question 3	Abuse-Self or Others-History of	28,368	93.74%	1,777	5.87%	118	0.39%
Question 4	Abuse-Current_of Others	29,977	99.05%	189	0.62%	97	0.32%
Question 5	Protective Order	29,985	99.08%	186	0.61%	92	0.30%
Question 6	Charged/Convicted Abuse	29,372	97.06%	776	2.56%	115	0.38%
Question 7	Weapons Possession	22,767	75.23%	7092	23.43%	404	1.33%
Question 8	Relationship Breakup-Domestic Violence	28,593	94.48%	1,486	4.91%	184	0.61%
Question 9	Agreement w/Breakup *(Yes = +)* (Not applicable=28,788/95%)	322	1.06%	1,000	3.30%	153	0.51%
Factor Group 5	**Substance Abuse/Use**						
Question 1	Cut Down on Alcohol Use	27,261	90.08%	2,809	9.28%	193	0.64%
Question 2	Annoyed by Others	28,393	93.82%	1,710	5.65%	160	0.53%
Question 3	Guilty for Use	28,145	93.00%	1,959	6.47%	159	0.53%
Question 4	Eye Opener Required	28,808	95.19%	1,319	4.36%	136	0.45%
Question 5	Use Alcohol-Cope with Stress	28,138	92.98%	1,945	6.43%	180	0.59%
Question 6	Use Illegal Substances	28,225	93.27%	1,944	6.42%	94	0.31%
Question 7	Misuse Prescription Medications	30,064	99.34%	131	0.43%	68	0.22%
Question 8	SubstanceTreatment_Drop-Fail	29,977	99.05%	204	0.67%	82	0.27%
Factor Group 6	**Psychosocial History/Relationships**						
Question 1	Abused as Child	24,146	79.79%	5,663	18.71%	454	1.50%
Question 2	Relationship Satisfaction (*n* =26,648)	12,118	45.30%	14,630	54.70%	3,515	13.14%
Question 3	Relationship Problem-Intimate Partner	22,420	74.08%	5,451	18.01%	2,392	7.90%
Question 4	Safe from Abuse *(Yes = +)*	376	1.24%	28,315	93.56%	1,572	5.19%
Question 5	Problems-Children (Not applicable=9,430/31%)	18,487	61.09%	2,089	6.90%	257	0.85%
Question 6	History_Protective Services Involvement	27,875	92.11%	1,759	5.81%	629	2.08%
Factor Group 7	**Environment/Support System**						
Question 1	Learning Disability	27,299	90.21%	2,741	9.06%	223	0.74%
Question 2	Problems-Financial	26,781	88.49%	3,205	10.59%	277	0.92%
Question 3	Support Systems *(Yes = +)*	2,115	6.99%	27,779	91.79%	369	1.22%
Question 4	Problems-Family/Friends	26,365	87.12%	3,591	11.87%	307	1.01%
Question 5	Problems-Job or Military	24,996	82.60%	4,741	15.67%	526	1.74%
Question 6	Problems-Legal	28,603	94.51%	1,484	4.90%	176	0.58%
Factor Group 8	**Health History/Traumatic Brain Injury**						
Question 1	Physical Health	16,241	53.67%	13,712	45.31%	310	1.02%
Question 2	Rx Medications-Taking as Prescribed *(Yes = +)* (Not applicable=2,937/10%)	1,511	4.99%	25,616	84.64%	199	0.66%
Question 3	Concussion/Head Injury	21,634	71.49%	7,751	25.61%	878	2.90%
Question 4	Pain-Current	8,251	27.26%	21,841	72.17%	171	0.57%
Question 5	Pain Level (n=29,950)	5,776	19.29%	24,174	80.71%	313	1.05%
Question 6	Pain-Treatment *(Yes = +)* (Not applicable=6,519/22%)	3,977	13.14%	19,353	63.95%	414	1.37%
Question 7	Problems-Sleep	11,163	36.89%	18,855	62.30%	245	0.81%

Summary. Examination of the BHRA-Q reveals key risk factors. As expected for a medical population, health problems are identified as a primary risk factor, including high rates of physical pain (greater than mild); fair or poor health; sleep problems; and for those identifying any level of pain above zero, the average pain level (above zero) is approximately five (on an increasing scale, 1 to 10). Concussions or traumatic brain injuries are also self-identified in high proportions. Per the CDC, NIH, DoD, and VA Leadership Panel (2013), from 2000 through 2011, only 4% of military service members are diagnosed with a traumatic brain injury as compared to the 26% of the study population. Behavioral health factors are also a concern with more one-third of the study population endorsing an emotional pain level greater than 3 (on increasing scale, 1 to 10); history of a behavioral health diagnosis; perception of self as a failure; racing thoughts; anxiety; and post-traumatic stress. Although the percentage of service members in the BHRM study endorsing having suicidal or self-harm thoughts is 1.66% and having homicidal thoughts is 1.70%, being able to identify 502 service members endorsing suicidal or self-harm thoughts and 514 having homicidal thoughts seems significant in light of the increasing rates of suicide within the Army during the study dates (DMDC, 2011). Additionally, 92 service members endorse having both suicide or self-harm thoughts and homicide thoughts or plan for homicide.

Research Question 2 – Associations among Risk Variables.

Introduction. Research question 2 analyzes the BHRA-Q response data related to the first BHRA-Q completed by 30,263 service members to identify relationships among the behavioral health risk factors (variables) (see Appendix B). Each question in the BHRA-Q is associated with a behavioral health risk factor (55 questions = 55 risk factors / items). The IBM

SPSS, version 24 is employed to conduct statistical tests using Pearson's correlation (IBM SPSS, 2014).

Results. The hypothesis posing that there are significant relationships among the behavioral health risk factors is supported. Among the behavioral health risk factors, several key relationships are found. Reported in Table 3 are the most significant relationships where the correlation is greater than .40 ($r = \geq .40$).

Significant relationships for Factor Group 1: Behavioral Health - Depression: Emotional pain is associated with anxiety (.42), avoidance (.40), and PTS-emotional detachment (.40). Suicide plan is associated with suicide means (.60). Failure perceptions is associated with a history of a behavioral health diagnosis (.41), racing thoughts (.41), anxiety (.43), panic attacks (.41), avoidance (.43), PTS-avoidance (.40), and PTS-emotional detachment (.46). Having a history of a behavioral health diagnosis is associated with, failure perceptions (.41), racing thoughts (.40), anxiety (.58), panic attacks (.53), avoidance (.54), PTS-nightmares (.47), PTS-avoidance (.49), PTS-hypervigilant (.47), and PTS-emotional detachment (.51).

Factor Group 2: Mental Status – Psychosis: Racing thoughts is associated with failure perceptions (.41), prior BH diagnosis (.40), anxiety (.49), panic attacks (.48), avoidance (.48), PTS-nightmares (.44), PTS-avoidance (.46), PTS-hypervigilant (.45), and PTS-emotional detachment (.49). Paranoia is associated with hallucinations (.40) and PTS-emotional detachment (.40).

Factor Group 3: Anxiety - Post Traumatic Stress: General Anxiety is associated with emotional pain (.42), failure perceptions (.43), prior behavioral health diagnosis (.58), racing thoughts (.49), panic attacks (.70), avoidance (.68), PTS-nightmares (.55), PTS-avoidance (.57), PTS-hypervigilant (.57), PTS-emotional detachment (.58), and sleep problems (.40). Panic

attacks is associated with failure perceptions (.41), prior behavioral health diagnosis (.53), racing thoughts (.48), anxiety (.70), avoidance (.66), PTS-nightmares (.53), PTS-avoidance (.56), PTS-hypervigilant (.55), and PTS-emotional detachment (.59).

Avoidance is associated with emotional pain (.40), failure perceptions (.43), prior behavioral health diagnosis (.54), racing thoughts (.48), anxiety (.68), panic attacks (.66), PTS-nightmares (.59), PTS-avoidance (.65), PTS-hypervigilant (.61), PTS-emotional detachment (.64), and sleep problems (.40). Post-Traumatic Stress-nightmares endorsement is associated with having a history of a behavioral health diagnosis (.47), racing thoughts (.44), anxiety (.55), panic attacks (.53), avoidance (.59), PTS-avoidance (.74), PTS-hypervigilant (.65), PTS-emotional detachment (.61), and sleep problems (.40). The PTS-avoidance endorsement is associated with failure perceptions (.40), prior behavioral health diagnosis (.49), racing thoughts (.46), anxiety (.57), panic attacks (.56), avoidance (.65), PTS-nightmares (.74), PTS-hypervigilant (.66), and PTS-emotional detachment (.67). The endorsement of PTS-hypervigilant is associated with having a prior behavioral health diagnosis (.47), racing thoughts (.45), anxiety (.57), panic attacks (.55), avoidance (.61), PTS-nightmares (.65), PTS-avoidance (.66), and PTS-emotional detachment (.65). The endorsement of PTS-emotional detachment is associated with emotional pain (.40), failure perceptions (.46), prior behavioral health diagnosis (.51), racing thoughts (.49), paranoia (.40), anxiety (.58), panic attacks (.59), avoidance (.64), PTS-nightmares (.61), PTS-avoidance (.67), and PTS-hypervigilant (.65).

Factor Group 4: Anger - Aggression – Violence: Recent relationship breakup due to domestic violence is associated with the disagreement with the breakup (.44).

Factor Group 5: Substance Use – Abuse: Annoyed by criticism of an individual's drinking is associated with endorsement of the need to cut down on drinking (.55). Feeling

guilty about drinking is associated with the need to cut down on drinking (.67) and feeling annoyed by criticism (.55). The need for an individual to have an eye opener is associated with the need to cut down (.42), annoyed by criticism (.42), and feeling guilty (.41). The use of alcohol to cope with stress is associated with the endorsement of the need to cut down on drinking (.43), feeling annoyed by criticism of drinking (.40), and feeling guilty (.40).

Factor Group 6: Psychosocial History - Relationships: Problems with intimate partner and is associated with relationship satisfaction (.40).

Factor Group 7: Environment - Support Systems: No significant associations are found.

Factor Group 8: Health - Traumatic Brain Injury: Pain level is associated with having a current pain level above 1 (.78). Sleep problems is associated with general anxiety (.40), avoidance (.40), and PTS-nightmares (.40).

Table 3. *Significant Relationships among Behavioral Health Risk Variables in the Behavioral Health Risk Assessment-Questionnaire, r ≥ .40 (Pearson's Chi-Square) (N = 30,263)*

	r						
Risk Factor (Indicator)	FG1Q1_ Emotional Pain	FG1Q3_ Suicide Plan	FG1Q7_ Failure Perception	FG1Q8_ History BH Diagnosis	FG2Q1_ Racing Thoughts	FG2Q3_ Hallucinations	FG2Q4_ Paranoia
FG1Q4_SuicideMeans		0.60					
FG1Q8_History BH Diagnosis			0.41				
FG2Q1_RacingThoughts			0.41	0.40			
FG2Q4_Paranoia						0.40	
FG3Q1_AnxietyGeneral	0.42		0.43	0.58	0.49		
FG3Q2_PanicAttacks			0.41	0.53	0.48		
FG3Q3_Avoidance	0.40		0.43	0.54	0.48		
FG3Q4_PTS_Nightmares				0.47	0.44		
FG3Q5_PTS_Avoidance			0.40	0.49	0.46		
FG3Q6_PTS_Hypervigilant				0.47	0.45		
FG3Q7_PTS_Emotion Detached	0.40		0.46	0.51	0.49		0.40
	FG3Q1_ Anxiety General	FG3Q2_ Panic Attacks	FG3Q3_ Avoidance	FG3Q4_ PTS_ Nightmares	FG3Q5_ PTS_ Avoidance	FG3Q6_ PTS_ Hypervigilant	FG4Q8_ Relationship Breakup
FG3Q2_PanicAttacks	0.70						
FG3Q3_Avoidance	0.68	0.66					
FG3Q4_PTS_Nightmares	0.55	0.53	0.59				
FG3Q5_PTS_Avoidance	0.57	0.56	0.65	0.74			
FG3Q6_PTS_Hypervigilant	0.57	0.55	0.61	0.65	0.66		
FG3Q7_PTS_Detached	0.58	0.59	0.64	0.61	0.67	0.65	
FG4Q9_AgreementBreakup_Rev							0.44
FG8Q7_ProblemsSleep	0.40		0.40	0.40			
	FG5Q1_ Substance Use _CutDown	FG5Q2_ Substance Use _Annoyed	FG5Q3_ Substance Use _Guilty	FG6Q2_ Relationship Satisfaction	FG8Q4_ Pain Physical		
FG5Q2_SubstanceUse_Annoyed	0.55						
FG5Q3_SubstanceUse_Guilty	0.67	0.55					
FG5Q4_SubstanceUse_EyeOpener	0.42	0.42	0.41				
FG5Q5_SubstanceUse_Coping	0.43	0.40	0.40				
FG6Q3_ProblemsPartner				0.40			
FG8Q5_PainLevel					0.78		
Pearson's Correlation significant for all variables (2-tailed) at .01							
r = association; FG = Factor Group; Q = Question; PTS = Post-Traumatic Stress; Rev = Reversed							

Summary. The analysis of the BHRA-Q response data reveals significant relationships among the behavioral health risk variables endorsed by service members. The hypothesis, "There are significant relationships among the behavioral health risk variables," is accepted; the

null hypothesis is rejected. The majority of significant relationships are among the risk factors emotional pain, suicide, perceptions as failure, history of behavioral health diagnosis, psychosis (racing thoughts, hallucinations, paranoia), anxiety, post-traumatic stress (PTS), substance use, relationship problems, problems sleeping, and physical pain.

The most significant relationships where the correlation is greater than .70 ($r = \geq .70$) include risk factor variables: 1) pain and pain level; 2) anxiety-general and panic attacks; 3) PTS-nightmares and avoidance. Those where the correlation is greater than .60 ($r = \geq .60$) include: 1) suicide plan and means; 2) general anxiety and avoidance; 3) panic attacks and avoidance; 4) avoidance and PTS-avoidance, PTS-hypervigilant, and PTS-emotional detachment; 5) PTS-nightmares and PTS-hypervigilant and PTS-emotional detachment; 6) PTS-avoidance and PTS-hypervigilant and PTS-emotional detachment; 7) PTS-hypervigilant and PTS-emotional detachment; 8) substance use - need to cut down on alcohol use and feeling guilty about use. Variables with a correlation greater than .50 ($r = \geq .50$) include: 1) prior behavioral health diagnosis and general anxiety, panic attacks, avoidance, and PTS-emotional detachment; 2) general anxiety and PTS-nightmares, PTS-avoidance, PTS-hypervigilant, and PTS-emotional detachment; 3) panic attacks and prior behavioral health diagnosis, PTS-nightmares, PTS-avoidance, PTS-hypervigilant, and PTS-emotional detachment; 4) avoidance and PTS-nightmares; 5) substance use-need to cut down on alcohol use and feeling annoyed by others criticism about use; 6) substance use-feeling annoyed by others criticism about alcohol use and feeling guilty about use. Significant relationships where the correlation is greater than .40 ($r = \geq .40$) include: 1) emotional pain and general anxiety, avoidance and PTS-emotional detachment; 2) perceptions of failure and a prior behavioral health diagnosis, racing thoughts, general anxiety, panic attacks, avoidance, PTS-avoidance, PTS-emotional

detachment; 3) prior behavioral health diagnosis and perceptions of failure, racing thoughts, PTS-nightmares, PTS-avoidance, PTS-hypervigilant; 4) racing thoughts and perceptions of failure, prior behavioral health diagnosis, general anxiety, panic attacks, avoidance, PTS-nightmares, PTS-avoidance, PTS-hypervigilant, and PTS-emotional detachment; 5) hallucinations and paranoia; 6) paranoia and PTS-emotional detachment; 7) problems sleeping and anxiety, avoidance, PTS-nightmares; 8) relationship break-up and disagreement with breakup; 9) substance use-need to cut down on alcohol use, being annoyed by criticism of use, feeling guilty about use and the need for eye-opener; 10) substance use-alcohol use to cope with stress and need to cut down, annoyed by criticism, feeling guilty about use; 11) relationship satisfaction and problems with partner (see Table 4 in the Tables section).

Research Question 3 – Internal Reliability.

Introduction. Internal reliability and the face and content validity of the BHRA-Q are examined. Research question 3 examines the internal reliability (consistency) of the BHRA-Q items. The BHRA-Q contains 55 risk factors / items that are clustered based on their relatedness into eight factor groups. Internal reliability addresses the degree that all scale items measure the same trait or construct. Cronbach's alpha, the most commonly used measure of internal consistency, is used to test the BHRA-Q. Testing with Cronbach's alpha assumes that each test item measures the same latent trait on the same scale. The construct (latent trait) being tested for the BHRA-Q is behavioral health risk (for adverse outcomes). Spearman-Brown coefficient (Split-Half) is used as a secondary test to examine internal reliability as well as each of the eight factor groups is tested separately using Cronbach's alpha. The face and content validity of the BHRA-Q are also discussed this section.

Assumptions. The assumptions for testing internal consistency are analyzed and meet the requirement for testing. These assumptions include: errors should be uncorrelated; coding should have the same meaning across items; in split-half tests, the assignments of subjects are assumed random; observations are independent of each other; and the variances are equivalently assumed. Reliability estimates demonstrate the amount of measurement error in a test. As the estimate of reliability increases, the fraction of a test score that is attributable to error will decrease. Squaring this reliability correlation (Cronbach's alpha) and subtracting from 1.00 results in the measurement error. In this study, the reliability correlation (r) is 0.897, r^2 is .80, and r^2 minus 1 is 0.20; therefore, the error variance (random error) in the scores reveal the measurement errors have a low correlation.

Results. Testing of the BHRA-Q items for internal reliability resulted in Cronbach's alpha equal to 0.897 ($\alpha > .70$ is acceptable). Based on the results, the BHRA-Q items appear to have a high degree of internal reliability (consistency). Spearman-Brown coefficient (Split-Half) test is conducted and results in $r = .793$. The split-half test verifies a good internal consistency for the questions / risk variables within the BHRA-Q. The results are available at Table 5.

Table 5. *Internal Reliability of Behavioral Health Risk Assessment-Questionnaire (Cronbach's Alpha and Spearman-Brown Coefficient [Split-Half])(N = 30,263)*

Test	***α / r***	**Items**	**Mean**	**Variance**	**SD**
Cronbach Alpha	.897				
Cronbach Alpha, Split Half					
Part 1	.886	28	5.41	23.489	4.847
Part 2	.772	27	5.22	9.163	3.027
Both		55	10.63	51.923	7.206
Between Forms	.657				
Spearman-Brown, Split Half	.793 (equal and unequal length)				
Part 1, 28 Items: FG1Q1-FG1Q8, FG2Q-FG2Q4, FG3Q1-FG3Q7, FG4Q1-FG4Q9					
Part 2, 27 Items: FG4Q9, FG5Q1-FG5Q8, FG6Q1-FG6Q6, FG7Q1-FG7Q6, FG8Q1-FG8Q7					
α = Alpha; *r* = association; SD = Standard Deviation; FG = Factor Group; Q = Question					

Statistical testing conducted to determine if a risk factor / item deletion would improve internal reliability reveal that the questionnaire would not be significantly improved if specific questions are removed (see Table 6).

Table 6. *Behavioral Health Risk Assessment-Questionnaire, Item-Total Statistics and Cronbach's Alpha, if Deleted (N = 30,263)*

#	Factor Group / Question	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
1	FG1Q1	9.96	48.359	0.512	0.893
2	FG1Q2	10.61	51.568	0.184	0.897
3	FG1Q3	10.62	51.814	0.106	0.897
4	FG1Q4	10.62	51.851	0.094	0.897
5	FG1Q5	10.53	50.468	0.323	0.895
6	FG1Q6R	10.56	50.752	0.315	0.895
7	FG1Q7	10.28	48.013	0.558	0.892
8	FG1Q8	10.25	47.606	0.608	0.891
9	FG2Q1	10.28	47.806	0.592	0.891
10	FG2Q2	10.62	51.773	0.107	0.897
11	FG2Q3	10.57	50.814	0.324	0.895
12	FG2Q4	10.51	49.714	0.468	0.894
13	FG3Q1	10.20	46.979	0.692	0.890
14	FG3Q2	10.26	47.273	0.667	0.890
15	FG3Q3	10.23	46.940	0.707	0.889
16	FG3Q4	10.25	47.328	0.655	0.890
17	FG3Q5	10.28	47.188	0.691	0.890
18	FG3Q6	10.23	47.227	0.663	0.890
19	FG3Q7	10.29	47.072	0.715	0.889
20	FG4Q1	10.40	48.916	0.479	0.893
21	FG4Q2	10.61	51.526	0.204	0.896
22	FG4Q3	10.57	50.713	0.344	0.895
23	FG4Q4	10.62	51.766	0.132	0.897
24	FG4Q5	10.62	51.810	0.095	0.897
25	FG4Q6	10.60	51.544	0.156	0.897
26	FG4Q7	10.39	51.373	0.061	0.899
27	FG4Q8	10.58	51.110	0.247	0.896
28	FG4Q9R	10.62	51.707	0.139	0.897
29	FG5Q1	10.53	50.525	0.317	0.895

= Question Number; FG = Factor Group; Q = Question; R = Reversed

Table 6 cont'd. *Behavioral Health Risk Assessment-Questionnaire, Item-Total Statistics and Cronbach's Alpha, if Deleted (N = 30,263)*

#	Factor Group / Question	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
30	FG5Q2	10.57	50.873	0.302	0.896
31	FG5Q3	10.56	50.779	0.308	0.896
32	FG5Q4	10.58	51.125	0.258	0.896
33	FG5Q5	10.56	50.699	0.332	0.895
34	FG5Q6	10.56	51.527	0.095	0.897
35	FG5Q7	10.62	51.837	0.086	0.897
36	FG5Q8	10.62	51.785	0.111	0.897
37	FG6Q1	10.44	49.906	0.336	0.895
38	FG6Q2	10.09	49.633	0.291	0.897
39	FG6Q3	10.43	49.637	0.379	0.895
40	FG6Q4R	10.61	51.748	0.094	0.897
41	FG6Q5	10.56	51.051	0.217	0.896
42	FG6Q6	10.57	51.234	0.187	0.897
43	FG7Q1	10.54	51.244	0.145	0.897
44	FG7Q2	10.52	50.568	0.287	0.896
45	FG7Q3R	10.56	50.713	0.313	0.895
46	FG7Q4	10.51	49.824	0.435	0.894
47	FG7Q5	10.47	49.896	0.366	0.895
48	FG7Q6	10.58	51.258	0.199	0.896
49	FG8Q1	10.09	49.294	0.340	0.896
50	FG8Q2R	10.58	51.854	0.007	0.898
51	FG8Q3	10.36	49.663	0.333	0.895
52	FG8Q4	9.90	50.258	0.232	0.897
53	FG8Q5	9.82	50.658	0.198	0.897
54	FG8Q6R	10.49	51.122	0.141	0.897
55	FG8Q7	10.00	48.410	0.488	0.893

= Question Number; FG = Factor Group; Q = Question; R = Reversed

When each of the eight factor groups is tested separately for internal consistency, the reliability is not as strong. The BHRA-Q model clusters related questions / risk factors into eight factor groups, which make up the eight factor groups. Table 7 reveals the results for each factor group tested separately using Cronbach's alpha. The findings reveal strong internal reliability

for Factor Group 3, anxiety and post-traumatic stress (α = .919); and Factor Group 5, substance use / abuse (α = .714). Moderate internal reliability is found for Factor Group 1, behavioral health / depression / suicide risk factors (α = .614); Factor Group 2, mental status / psychosis (α = .514); Factor Group 6, psychosocial history and relationships (α = .475); Factor Group 7, environment and support systems (α = .520); and Factor Group 8, health history and traumatic brain injury (α = .587). Low internal reliability is shown for Factor Group 4, anger / aggression / domestic violence (α = .362). Results of testing for the internal consistency of each factor group individually reveals that items with the factor group are not as strong for each factor group's the latent construct as the combined factor group latent construct of behavioral health risk.

Table 7. *Internal Reliability of Behavioral Health Risk Assessment-Questionnaire – Factor Groups tested Separately (Cronbach's alpha)* (*N* = 30,263)

Factor Group, Latent Construct	α / *r*
All Factor Groups	.897
FG1, Behavioral Health / Depression / Suicide	.614
FG2, Mental Status / Psychosis	.514
FG3, Anxiety / Post-Traumatic Stress	.919
FG4, Anger / Aggression / Domestic Violence	.362
FG5, Substance Use / Abuse	.714
FG6, Psychosocial History / Relationships	.475
FG7, Environment / Support Systems	.520
FG8, Health History / Traumatic Brain Injury	.587

α = Alpha; *r* = Correlation; FG = Factor Group

Validity of the BHRA-Q. BHRA-Q demonstrates face validity and content validity. Face validity is demonstrated in that each risk factor / question on the questionnaire is selected based on evidence-informed or evidence-based criteria and/or from existing evidence-based behavioral health assessment instruments. For instance, the risk factor emotional pain (Factor Group 1, Question 1) is supported through research related to psychological distress (Bryan & Rudd, 2012; Bryan, Rudd, & Wertenberger, 2013; Loewenstein, Weber, Hsee, & Welch, 2001).

Questions in the BHRA-Q, which are from validated behavioral health instruments, are as follows: 1) four questions from the Post-Traumatic Stress Disorder (PTSD) Checklist (Blanchard, Jones-Alexander, Buckley, & Forneris, 1996; Weathers et al., 1993) are embedded in Factor Group 3 (Anxiety and Post-Traumatic Stress), and four questions of the Cut-down-Annoyed-Guilty-Eye Opener (CAGE) tool regarding alcohol use (Bush, Shaw, Cleary, Delbanco, & Aronson, 1987; Ewing, 1984) are embedded in Factor Group 5 (Substance Abuse).

The evidence of content validity is based on the premise of clinical consensus among experts. The BHRA-Q items are founded upon the agreement among subject matter experts that developed the instrument. The experts determined by clinical consensus that the items are either essential or useful in solidifying the construct of behavioral health risk assessment and estimation for this specific military population. This method for determining content validity is supported by Lawshe (1975).

Summary. Face and content validity of the BHRA-Q are established by research and clinical consensus, which supported development. This validity seems to support the results of internal reliability testing. Analysis of the BHRA-Q using Cronbach's alpha supports the strong internal consistency of the BHRA-Q when all 55 items in the questionnaire are tested together. The Spearman-Brown (split-half) test is used to test the 55-items in two groups (28 to 27 items) and supports good internal consistency of the BHRA-Q. When factor groups are tested separately for their internal reliability, the Cronbach's alpha remains high for two of the factor groups (Factor Groups 3 and 5) ; moderate for five of the factor groups (1, 2, 5, 7 and 8)); low for one factor group (4) .

Research Question 4 – BHRA-Q Model Structure.

Introduction. Structural equation modeling (SEM) is used to conduct a confirmatory factor analysis (CFA) statistical test. The SEM-CFA is used to examine the existing eight-factor group model of the BHRA-Q. Data are examined for model goodness-of-fit, parameter estimates, standard errors, critical ratio, factor loadings, and statistical significance using M*plus* 8 (Muthén & Muthén, 2007-2017). The IBM SPSS, version 24 and Amos 23 (IBM SPSS, 2014; Arbuckle, 2014) are used to compliment the analysis.

Assumptions. In testing assumptions, all assumptions are met – except for normality. The data are tested visually for normal distribution using histograms and tested statistically for skewness and kurtosis. The results of the visual and data analysis reveal that data related to all 55 items is non-normally distributed; therefore, data distribution violated the assumption of normality. Based on the non-normality of the data, M*plus* 8 is used to perform the SEM-CFA using Weighted Least Squares, Means and Variance (WLSMV).

Data are tested for outliers using lists and boxplots as well as Mahalanobis distance and met the assumption for no critical outliers. All Mahalanobis d-squared values are less than the Chi-Square critical value of 1490.222 (*degrees of freedom [df]* = 1402, $p \leq .05$). Data are tested for linearity and directionality using Pearson's correlation. The results reveal linear relationships for all variables; thus, BHRA data meets this assumption. Of the 2,790 possible associations, there 33 with negative relationships, all are near .00, with the largest being $r = -.063$; therefore, are included in the SEM-CFA analysis. Data are tested for multi-collinearity using IBM SPSS, linear regression collinearity diagnostics and met the assumption for testing. Each independent variable is compared against all other independent variables in separate tests. The Variance Inflation Factor (VIF) and tolerance are within normal limits (VIF < 3 and tolerance near 1).

Although three items (current pain and pain level; anxiety and panic attacks; and nightmares and avoidance) are found to have high correlation (r = > .70), the correlations are not above .80 and are left in the study. The residuals covariance's (R minus reproduced R) reveal small covariances, centered around zero with a symmetric distribution of errors.

Model Identification. The BHRA-Q model is identified through literature reviews and research which supports behavioral health risk factors and assessment. The hypothesized model includes 55 question-items which seek to identify risk factors related to behavioral health risk for adverse behavioral health events. The BHRA-Q hypothesized model clusters related questions/risk factors into eight factor groups, which make up the eight-factor group structure model of the BHRA-Q (see Appendices C and D). The model is diagrammed using IBM SPSS Amos, version 23 (Arbuckle, 2014) (see Figure 7). However, Amos 23 is not used to conduct the SEM-CFA due to its inability to handle the non-normally distributed data / conduct asymptotic distribution free analysis required for this study using Amos 23.

Model Testing (Estimation and Fit). To estimate BHRA data fit to the eight-factor group model using SEM-CFA, the model is tested using the WLSMV. Brown (2006) and Byrne (2012) support the use of WLSMV as the best estimator for non-normally distributed, categorical and continuous data. M*plus* 8 (Muthén & Muthén, 2007-2017) is used to run the SEM-CFA using the WLSMV test on the BHRM model and data. Summary of the variable information from the M*plus* 8 SEM-CFA is available at Table 8.

Table 8. *Output for Hypothesized Behavioral Health Risk Assessment-Questionnaire Model: Selection Summary of Variable Information and Estimator from Structure Equation Modeling, Confirmatory Factor Analysis using Mplus 8 (N = 30,263)*

Number of groups	1
Number of observations	30,263
Number of dependent variables	55
Number of independent variables	0
Number of continuous variables	8

Observed Dependent Variables (55)

Continuous (3)

FG1Q1	FG6Q2	FG8Q5

Binary and Ordered Categorical (52)

-------	FG1Q2	FG1Q3	FG1Q4	FG1Q5	FG1Q6R	FG1Q7	FG1Q8
FG2Q1	FG2Q2	FG2Q3	FG2Q4				
FG3Q1	FG3Q2	FG3Q3	FG3Q4	FG3Q5	FG3Q6	FG3Q7	
FG4Q1	FG4Q2	FG4Q3	FG4Q4	FG4Q5	FG4Q6	FG4Q7	FG4Q8
	FG4Q9R						
FG5Q1	FG5Q2	FG5Q3	FG5Q4	FG5Q5	FG5Q6	FG5Q7	FG5Q8
FG6Q1	-------	FG6Q3	FG6Q4R	FG6Q5	FG6Q6		
FG7Q1	FG7Q2	FG7Q3R	FG7Q4	FG7Q5	FG7Q6		
FG8Q1	FG8Q2R	FG8Q3	FG8Q4	-------	FG8Q6R	FG8Q7	

Continuous Latent Variables (8)

FG1	FG2	FG3	FG4	FG5	FG6	FG7	FG8

Estimator	WLSMV

FG = Factor Group; Q = Question; R = Reversed; WLSMV = Weighted Least Squares, Means and Variances

Based on the findings using the WLSMV estimator, the eight-factor group model of the BHRA-Q is supported as a good fit; thus, the hypothesis that the eight-factor group structure (model) of the BHRA-Q is supported and the null hypothesis rejected. Table 9, Output for Hypothesized Behavioral Health Risk Assessment-Questionnaire: Summary of Categorical Proportions from Structural Equation Modeling, Confirmatory Factor Analysis (see Tables section), demonstrates the proportions of the respondents endorsement of each categorical variable (Category 1 = no or Category 2 = yes). Factor Group 1, Question 2 (FG1Q2) asks

subjects “Are you having thoughts of harming or killing yourself?” Endorsement of category 1 reveals 98% (.983) of respondents are not having self-harm or suicidal thoughts. For all seven categorical items in Factor Group 1, the majority did not endorse depressive symptoms or a history of a behavioral health diagnosis. However, 35% endorse feelings of failure and 38% having a prior behavioral health diagnosis. For the full delineation of each factor group and related questions see Table 9 in the Tables section.

The model fit indices for the BHRA-Q eight-factor group model demonstrate a good fit with the data. Goodness of fit indices are derived from the dissertation of Yu (2002). The fit indices results are as follows: Comparative Fit Index / CFI = 0 .969 (good fit = > .96); Tucker-Lewis Fit Index / TLI = 0.967 (good fit = > .96); and Root Mean Square Error of Approximation / RMSEA = .029 (90% Confidence Interval: .029-0.030) (good fit = < .06).

Results of the biased Chi-Square and *p* values in this study may be due to the large sample size (30,263). Research supports use of SEM with significant probability level ($p < .05$) where there is a large sample group (Bentler et al., 1983). However, Chi-Square tests are found to be overly sensitive and are more likely to indicate a lack of model-data fit (Kline, 2011); thus, the Chi-Square is noted, but is not deemed appropriate as an indices for this study.

Goodness of fit statistics displayed in Table 10 reveal WLSMV $X^2_{(141)}$ of 38146.408. The Chi-square difference tests are not permitted when testing with WLSMV estimate, per Muthén and Muthén (2007-2010) [M*plus* computer software developers]. When using WLSMV with non-normal data, the degrees of freedom are estimated differently than when CFA procedures are conducted with normally distributed continuous data.

Per Muthén (2008), the Weighted Root Mean Square Residual (WRMR) is a not a good indicator of model fit when using SEM. Therefore, only the fit indices CFI, TLI, RMSEA are used to interpret the results of testing the BHRA-Q model for goodness of fit (see Table 10).

Table 10. *Output for Hypothesized Behavioral Health Risk Assessment-Questionnaire Model: Selected Goodness-of-Fit Statistics from Structural Equation Modeling, Confirmatory Factor Analysis (Mplus 8) (N = 30,263)*

Tests of Model Fit	
Chi-Square Test of Model Fit*	
Value	38146.408*
Degrees of freedom	1402**
p-value	0.0000
Comparative Fit Index (CFI) / Tucker-Lewis Index (TLI)	
CFI	0.969
TLI	0.967
Number of free parameters	141
Root Mean Square Error of Approximation (RMSEA)	
Estimate (90% Confidence Interval)	0.029 (0.029-0.030)
Probability RMSEA ≤ .05	1.000
Weighted Root Mean Square Residual (WRMR)	
Value	5.139

*For Chi-Square difference tests using Weighted Least Squares, Means and Variance (WLSMV), Chi-Square value cannot be used.
**When using WLSMV, degrees of freedom are calculated differently than Confirmatory Factor Analysis procedures using normally distributed data (Muthén and Muthén, 2007-2017; Byrne, 2012).

Parameter Estimates, Standard Errors, Critical Ratio, and Statistical Significance.

After goodness of fit, the data are examined by assessing the parameter estimates, standard errors and statistical significance of the estimates. In the Tables section, the unstandardized estimates are provided in Table 11. The standardized parameter estimates, used to interpret the findings, are available at Table 12. The standardized parameter estimates (factor loadings), which demonstrate the viability of the estimated value, are within normal ranges (positive and $r < 1.00$). For the standardized estimates, all correlations are positive and less than 1. Standard

errors demonstrate the precision of the estimation. The analysis reflects that all standard errors are small values, suggesting accurate estimation. The critical ratio (estimate divided by the standard estimate) reveals all variables are within an acceptable standard (greater than plus or minus 1.96). This result reveals that the hypothesis that the estimate equals 0.0 can be rejected. Review of first and second order parameter estimates (factor loadings) reveals all to be statistically significant ($p \leq .05$), except for first order factor loading for FG8 with FG8Q2R, which did not find significance ($p \geq .05$). The FG8Q2R (Factor Group 8, Question 2) asks the respondents, "Are you currently using/taking your prescribed medications as prescribed?" Not taking medications as prescribed is considered a contributor to increasing behavioral health risk. It would appear that most are taking medications as prescribed (85%). Therefore, this question is puzzling and requires further study.

The thresholds for each risk factor are delineated in Table 11. The residual variances for the three continuous variables in the study reveal significance ($p \leq .05$). For FG1Q1, the Estimate [Est.]/standard error [SE] = 89.687; FG6Q2 is 87.833; and FG8Q5 is 90.349. Residual variances for the observed categorical variables are not calculated when SEM models involve categorical rather than continuous variables, per Brown (2006). The correct analysis is the correlation matrix; nonetheless, the correlation matrix includes continuous variable y* and therefore, the residual variances of categorical variables are not identified/estimated (Byrne, 2012).

Standardized parameter estimates are examined due to use of categorical variables in the CFA analysis. The *y** variances are standardized to 1.0. The parameter estimates (factor loading) for categorical variables are based on the squared standardized factor loadings.

The observed variables and the results of the CFA testing for the reliability estimates (factor-loading) are delineated in Table 13, Output for Hypothesized Behavioral Health Risk Assessment-Questionnaire Model: Reliability Estimates and Modification Indices from Structural Equation Modeling, Confirmatory Factor Analysis (see Tables section). An example of how the proportion variance is derived can be demonstrated using Factor Group 1, Question 1 (FG1Q1) estimate (factor loading). By squaring the estimate of .744, the proportional variance result is .553. The results for the FG1Q1 suggest that 55% of the variance (as represented by the latent continuous aspect of this item) can be explained by the construct of Behavioral Health / Depression. Thus, representing the proportion of the variance in the underlying continuous and latent aspect of (y*) that can be explained by Factor Group 1 of the hypothesized model. For each of the Factor Groups, those with an $R^2 \geq .40$ are considered significant contributors to the variance in their Factor Group; those < .39 are not considered to be statistically significant as ~60% of their variance is considered "noise."

Table 14 details each variables' contribution to the Factor Groups' variance. Those considered significant include: FG1Q1, emotional pain (R^2 = .553); FG1Q3, plan for suicide (R^2 = .572); FG1Q4, means for suicide (R^2 = .707); FG1Q6R, hopefulness (R^2 = .415); FG1Q7, feelings of failure (R^2 = .606); FG1Q8, history of behavioral health diagnosis (R^2 = .757); FG2Q1, racing thoughts (R^2 = .739); FG2Q3, hallucinations (R^2 = .547); FG2Q4, paranoia (R^2 = .726); FG3Q1, general anxiety (R^2 = .870); FG3Q2, panic attacks (R^2 = .820); FG3Q3, avoidance (R^2 = .866); FG3Q4, PTS-nightmares (R^2 = .823); FG3Q5, PTS-avoidance (R^2 = .885); FG3Q6, PTS-hypervigilant (R^2 = .804); FG3Q7, PTS-emotional detachment (R^2 = .865); FG4Q1, anger (R^2 = .695); FG4Q2, homicidal thoughts (R^2 = .513); FG4Q3, anger or abuse of self or others (R^2 = .653); FG4Q4, current abuse of others (R^2 = .438); FG4Q8,

relationship break-up due to violence (R^2 = .499); FG4Q9R, agreement with relationship break up due to violence (R^2 = .604); FG5Q1, substance use_cut down (R^2 = .863); FG5Q2, substance use_felt criticized by others (R^2 = .809); FG5Q3, substance use_felt guilty (R^2 = .901); FG5Q4, substance use_needed eye-opener (R^2 = .666); FG5Q5, substance use_to cope (R^2 = .792); FG5Q8, failed substance abuse treatment (R^2 = .418); FG6Q1, abused as child (R^2 = .415); FG6Q3, problems with partner (R^2 = .516); FG7Q3R, support systems (R^2 = .486); FG7Q4, problems with family or friends (R^2 = .678); FG7Q5, problems with job (R^2 = .429); FG8Q3, history of concussion or traumatic brain injury (R^2 = .401); FG8Q7, problems sleeping (R^2 = .869).

Those not considered significant contributors to variance in the Factor Groups include: FG1Q2, thoughts of suicide or self-harm (R^2 = .381); FG1Q5, history of self-harm (R^2 = .366); FG2Q2, special powers (R^2 = .221); FG4Q5, protective order (R^2 = .248); FG4Q6, charge or conviction of assault/abuse (R^2 = .266); FG4Q7, weapons access (R^2 = .007); FG5Q6, using controlled or illegal substances (R^2 = .072); FG5Q7, misuse of prescription medications (R^2 = .349); FG6Q2, satisfaction with relationship (R^2 = .215); FG6Q4R, safe from abuse (R^2 = .149); FG6Q5, problems with children (R^2 = .260); FG6Q6, history of protective services (R^2 = .223); FG7Q1, learning disability (R^2 = .088); FG7Q2, problems with finances (R^2 = .317); FG7Q6, legal problems (R^2 = .246); FG8Q1, health rating (R^2 = .370); FG8Q2R, taking medications as prescribed (R^2 = .000); FG8Q4, current pain (R^2 = .201); FG8Q5, pain level (R^2 = .203); FG8Q6R, treatment for pain (R^2 = .074) (see Table 14).

Table 14. *Summary of Behavioral Health Risk Assessment-Questionnaire Model: Reliability Estimates from Structural Equation Modeling, Confirmatory Factor Analysis – Variance Contribution (Mplus 8)*

Behavioral Health Risk Variables – Variance					
Significant (35 items)		$R^2 \geq .40$	Non-Significant (20 items)		$R^2 < .40$
FG1Q1	Emotional pain	.553	FG1Q2	Suicide Thoughts	.381
FG1Q3	Suicide Plan	.572	FG1Q5	Self-Harm History	.366
FG1Q4	Suicide Means	.707	FG2Q2	Special Powers	.221
FG1Q6R	Hopeless	.415	FG4Q5	Protective Order	.248
FG1Q7	Feelings of Failure	.606	FG4Q6	Charge_Assault-Abuse	.266
FG1Q8	Prior BH Diagnosis	.757	FG4Q7	Weapons Access	.007
FG2Q1	Racing Thoughts	.739	FG5Q6	SubstanceUse_Illegal	.072
FG2Q3	Hallucinations	.547	FG5Q7	Misuse Prescriptions	.349
FG2Q4	Paranoia	.726	FG6Q2	Relationship Satisfaction	.215
FG3Q1	Anxiety-General	.870	FG6Q4R	Safe from Abuse	.149
FG3Q1	Panic Attacks	.820	FG6Q5	Problems_Children	.260
FG3Q1	Avoidance	.866	FG6Q6	ProtectiveServices_Prior	.223
FG3Q1	PTS-Nightmares	.823	FG7Q1	Learning Disability	.088
FG3Q1	PTS-Avoidance	.885	FG7Q2	Problems_Finances	.317
FG3Q1	PTS-Hypervigilant	.804	FG7Q6	Problems_Legal	.246
FG3Q1	PTS-Emotional Detached	.865	FG8Q1	Problems_Health	.370
FG4Q1	Anger	.695	FG8Q2R	Take Meds_asPrescribed	.000
FG4Q2	Homicide Thoughts	.513	FG8Q4	Pain_Current	.201
FG4Q3	Abuse_Self or Others	.653	FG8Q5	Pain_Level	.203
FG4Q4	Abuse Others_Current	.438	FG8Q6R	Pain_Treated	.074
FG4Q8	Breakup_Violence	.499			
FG4Q9R	Agreement_Breakup	.604			
FG5Q1	Substance Use_CutDown	.863			
FG5Q1	SubstanceUse_Agitated	.809			
FG5Q1	SubstanceUse_Guilty	.901			
FG5Q1	SubstanceUse_EyeOpener	.666			
FG5Q1	SubstanceUse_Cope	.792			
FG5Q8	Substance_TreatmentFail	.418			
FG6Q1	Abused as Child	.415			
FG6Q3	Problems_Partner	.516			
FG7Q3R	Support Systems	.486			
FG7Q4	Problems_Family-Friends	.678			
FG7Q5	Problems_Job	.429			
FG8Q3	Traumatic Brain Injury	.401			
FG8Q7	Problems_Sleeping	.869			

R^2 = variance; FG = Factor Group; Q = Question; R = Reversed; BH = Behavioral Health; PTS = Post Traumatic Stress

Although 20 of the 55 questions have non-significant factor-loadings, re-specification may not be warranted, due to the additional purposes they serve. Some of the questions serve the purpose of multi-risk factor assessment, some to capture risk when items are not endorsed, and some are simply appropriate for behavioral health risk assessment of at-risk populations. When assessed singularly, the questions are not as strong as when considered and assessed together. For instance, a person who endorses suicide and having access to a weapon or a person who endorses alcohol use and prescription medication misuse. Questions like FG5Q7 "Are you currently misusing prescribed medications, herbal supplements/remedies, or sports nutritional supplements?" and FG8Q2R "Are you are currently using/taking your prescribed medications as prescribed" have every low factor-loadings; however, the purpose of these questions is to address the potential for accidental overdose by the service members in the WTU. These individuals may have a medical condition, be on opioids due to high levels of pain, and using alcohol. When assessed for all of those risk factors, the provider has an improved opportunity to reduce the risk of death or an adverse event.

Beyond the stigma of mental illness, there are occasions when service members fear the consequences of endorsing particular questions, like suicide, homicide or alcohol use. Endorsing these questions may result in increased oversight by the service member's commander and military chain of command. Using the multi-risk factor approach affords the service member the opportunity to not endorse items that would require commander oversight, but would alert the provider to risk. For instance, if the service member does not endorse suicide, but endorses a history of a behavioral health diagnosis, history of self-harm, feelings of failure, hopelessness, post-traumatic stress, relationship problems, possession of a weapon, and/or high levels of pain, the provider would be able to properly assess the risk as high and implement an appropriate risk

care management plan. Asking one or two questions, “Are you thinking of suicide or homicide?” limits the assessment, estimation and the care plan.

Additionally, some of the questions that are not found to be significant, such as FG1Q2 “Are you having thoughts of harming or killing yourself?” and FG1Q5 “Have you ever tried to harm yourself?” are standard questions that help with a more comprehensive behavioral health assessment. The question for FG4Q7 “Do you have weapons in your home (firearms, switchblades, knife collections, etc.)?” is used to assess the availability of weapons and is particularly helpful in risk management planning when a service member endorses suicidal or homicidal thoughts. The low rates of endorsement of suicide and homicide may affect the factor-loadings, but are still highly relevant especially when examined together. Ninety-two service members endorse having both suicide or self-harm thoughts and homicide thoughts or plan for homicide.

Beyond lack of contributions to variance, there are items that demonstrated high inter-factor correlations where the correlation is greater than .70 ($r = \geq .70$). These items are discussed in research question 2 and include FG8, pain and pain level ($r = .78$), and FG3, anxiety and panic attack ($r = .70$), and post-traumatic stress-nightmares and avoidance ($r = .74$).

Results and Summary. The hypothesis that the eight-factor group model of the BHRA-Q will be confirmed is supported. The null hypothesis is rejected. There is confidence that the eight-factor group structure (model) of the BHRA-Q is a good fit for the data associated with the service members assigned to the WTU. Although the BHRA-Q could be re-specified to provide a more efficient tool, it demonstrates a good fit with the data, lacks misspecification indicators, has multi-risk factor approach benefits, and is appropriate in meeting standards for behavioral health assessment for the WTU.

Prevalence, Correlation, and Prediction of Risk Estimates using BHRM Module

This section discusses the prevalence, correlation, and predictive properties of the demographic variables toward risk estimation. The data from the first BHRA-Q completed by the service member is used to examine the risk estimates recommended by the BHRM module (through service member self-assessment) and determined by the provider. The prevalence of the risk estimations by the BHRM and the provider as well as the correlations among the risk estimates is identified. Additionally, the demographic variables of the service members are tested for their ability to predict the BHRM and provider risk estimates.

Research Questions 5 and 6 – Prevalence of Risk Estimates.

Introduction. Clinical social workers (providers) assigned to the WTU are responsible for conducting behavioral health risk estimates on service members within 24 hours of their assignment to the WTU. As a part of the risk estimation, the service member completes responses to the BHRA-Q and is interviewed by a provider. The provider enters the responses into BHRM module to obtain the risk estimate for each factor group and the final risk estimate recommended by the BHRM module. The providers use the BHRM recommendations to support their determination in each factor group and the final risk estimate. Thus, there are two risk estimation processes – BHRM module recommended (using only the responses from the self-assessment of the service member on the BHRA-Q) and provider determined (using the BHRM recommendation and their clinical interview and judgment). Research questions 5 and 6 examine the frequency of the BHRM recommended risk estimate and the provider determined risk estimate. The statistical tests are conducted using IBM SPSS, version 24 (IBM SPSS, 2014). The frequencies and descriptives for the risk estimates recommended by the BHRM

module and actually determined by providers are displayed in Table 15. Additionally, the frequencies and percentages are displayed graphically in Figures 8 and 9.

Results. When examining the frequencies and proportions of risk estimations by BHRM and the provider, the results reveal distinct differences in the estimations. The findings of the risk estimates by the BHRM module and provider are available in Table 15. For Factor Group 1 (behavioral health / depression / suicide) the data reveals the BHRM module tends to recommend the majority of risk estimates as low or moderate, while providers tend to estimate the risk of service members as low. The BHRM recommended risk estimate of low is 22 percentage points lower (15,117/50%) than the estimate actually determined by the provider (21,668/72%). The BHRM recommended risk estimate of moderate is 19 percentage points higher (11,602/38%) than the estimate actually determined by the provider (5,607/19%). The BHRM recommended risk estimate of high is about the same as (3,361/11%) the estimate actually determined by the provider (2,572/9%). The BHRM recommended risk estimate of severe is approximately half of the percentage points (183/0.6%) of the estimate actually determined by the provider (416/1.4%). Providers tend to estimate the risk in Factor Group 1 as severe more often than the BHRM recommends.

For Factor Group 2 (mental status / psychosis), the BHRM tends to recommend a risk estimate for two-thirds of service members as low and about one-fourth as moderate, while the providers tend to recommend the majority as low (83%). The BHRM recommended risk estimate of low is 16 percentage points lower (19,256/67%) than the estimate actually determined by the provider (25,096/83%). The BHRM recommended risk estimates of moderate is five percentage points higher (7,624/25%) than the estimate actually determined by the provider (3,397/11%). The BHRM recommended risk estimate of high is 3 percentage points

higher (2,405/8%) than the estimate actually determined by the provider (1,432/5%). The BHRM recommended risk estimate of severe is 2 percentage points higher (978/3%) than the estimate actually determined by the provider (338/1%).

For Factor Group 3 (anxiety / post-traumatic stress), the BHRM tends to recommend a risk estimate of low or severe for two-thirds of the service members (69%), while providers tend to estimate the majority of service members in the low risk category (60%). The BHRM recommended risk estimate of low is 15 percentage points lower (13,663/45%) than the estimate actually determined by the provider (18,126/60%). The BHRM recommended risk estimate of moderate is slightly lower (4,778/16%) than the estimate actually determined by the provider (5,139/17%). The BHRM recommended risk estimate of high is approximately the same (4,492/15%) as the estimate actually determined by the provider (4,300/14%). The BHRM recommended risk estimate of severe 15 percentage points higher (7,330/24%) than the estimate actually determined by the provider (2,698/9%).

For Factor Group 4 (anger / aggression / violence), the BHRM tends to recommend a risk estimate of low or moderate (95%), while providers tend to rate more subjects in the low risk category (85%). The BHRM recommended risk estimate of low is 20 percentage points lower (19,710/65%) than the estimate actually determined by the provider (25,831/85%). The BHRM recommended risk estimate of moderate is 18 percentage points higher (9,148/30%) than the estimate actually determined by the provider (3,473/12%). The BHRM recommended risk estimate of high is about the same as (1,383/5%) the estimates actually determined by the provider (829/3%). The BHRM recommended risk estimate of severe is 0.3 percentage points lower (22/0.1%) than the estimate actually determined by the provider (130/0.4%).

For Factor Group 5 (substance use / abuse), the BHRM tends to recommend a risk estimate of low (85%) and providers tended agree; however, providers tend to rate more in the low risk category (92%). The BHRM recommended risk estimate of low is seven percentage points lower (25,741/85%) than the estimate actually determined by the provider (27,776/92%). The BHRM recommended risk estimate of moderate is double the number (3,535/12%) of the risk estimates actually determined by the provider (1,758/6%). The BHRM recommended risk estimate of high is about the same as (956/3%) the estimate actually determined by the provider (617/2%). The BHRM recommended risk estimate of severe is 0.3 percentage points higher (31/0.1%) than the estimate actually determined by the provider (112/0.4%).

For Factor Group 6 (psychosocial history / relationships), the BHRM tends to recommend a risk estimate of low or moderate (89%), while providers tend to rate more in the low risk category (81%). The BHRM recommended risk estimate of low is 16 percentage points higher (19,662/65%) than the estimate actually determined by the provider (24,534/81%). The BHRM recommended risk estimate of moderate is 10 percentage points higher (7,306/24%) than the estimate actually determined by the provider (4,124/14%). The BHRM recommended risk estimate of high is 5 percentage points higher (3,103/10%) than the estimate actually determined by the provider (1,393/5%). The BHRM recommended risk estimate of severe is about the same as (192/0.6%) the estimate actually determined by the provider (212/0.7%).

For Factor Group 7 (environment / support systems), the BHRM tends to recommend a risk estimate of low or moderate (94%), while providers tend to rate the majority in the low risk category (85%). The BHRM recommended risk estimate of low is 15 percentage points lower (21,163/70%) than the estimate actually determined by the provider (25,740/85%). The BHRM recommended risk estimate of moderate is 13 percentage points higher (7,171/24%) than the

estimate actually determined by the provider (3,365/11%). The BHRM recommended risk estimate of high is double the percentage (1,783/6%) of the actual estimate determined by the provider (983/3%). The BHRM recommended risk estimate of severe is about the same (146/0.5%) than the estimate actually determined by the provider (175/0.6%).

For Factor Group 8 (health / traumatic brain injury), the BHRM tends to recommend a risk estimate of moderate or high (74%), while providers tend to estimate the majority of service members in the low or moderate risk category (83%). The BHRM recommended risk estimate of low is 28 percentage points lower (7,064/23%) than the estimate actually determined by the provider (15,358/51%). The BHRM recommended risk estimate of moderate is 6 percentage points higher (11,455/38%) than estimate actually determined by the provider (9,551/32%). The BHRM recommended risk estimate of high is 21 percentage points higher (11,002/36%) the estimates actually determined by the provider (4,561/15%). The BHRM recommended risk estimate of severe is about the same (742/3%) as the estimate actually determined by the provider (793/3%).

For the Final Risk Estimate, the BHRM tends not to recommend a risk estimate of low (2,711/9%) and for the most part evenly distributes risk estimates between moderate (9,869/33%), high (9,700/32%) and severe (7,983/26%), while providers tend to estimate the majority of service members as low risk (18,062/60%) or moderate (7,388/24%) and are less apt to estimate the risk as high (3,870/13%) or severe (943/3%).

Table 15. *Behavioral Health Risk Estimates by Behavioral Health Risk Management and Provider – Frequencies and Descriptives (N=30,263)*

	BHRM Recommended				Provider Determined			
	Frequency	%	M	SD	Frequency	%	M	SD
Factor Group 1 - Behavioral Health / Depression / Suicide								
			1.62	0.702			1.4	0.701
Low	15,117	50.0			21,668	71.6		
Moderate	11,602	38.3			5,607	18.5		
High	3,361	11.1			2,572	8.5		
Severe	183	0.6			416	1.4		
Factor Group 2 - Mental Status / Psychosis								
			1.51	0.776			1.24	0.587
Low	19,256	63.6			25,096	82.9		
Moderate	7,624	25.2			3,397	11.2		
High	2,405	7.9			1,432	4.7		
Severe	978	3.2			338	1.1		
Factor Group 3 – Anxiety / Post Traumatic Stress								
			2.18	1.239			1.72	1.01
Low	13,663	45.1			18,126	59.9		
Moderate	4,778	15.8			5,139	17.0		
High	4,492	14.8			4,300	14.2		
Severe	7,330	24.2			2,698	8.9		
Factor Group 4 – Anger / Aggression / Violence								
			1.4	0.579			1.18	0.479
Low	19,710	65.1			25,831	85.4		
Moderate	9,148	30.2			3,473	11.5		
High	1,383	4.6			829	2.7		
Severe	22	0.1			130	0.4		
Factor Group 5 – Substance Use / Abuse								
			1.18	0.468			1.11	0.401
Low	25,741	85.1			27,776	91.8		
Moderate	3,535	11.7			1,758	5.8		
High	956	3.2			617	2.0		
Severe	31	0.1			112	0.4		

BHRM = Behavioral Health Risk Management; % = Percentage; M = Mean;
SD = Standard Deviation

Table 15 cont'd. *Behavioral Health Risk Estimates by Behavioral Health Risk Management and Provider – Frequencies and Descriptives (N=30,263)*

	BHRM Recommended				Provider Determined			
	Frequency	%	M	SD	Frequency	%	M	SD
Factor Group 6 – Psychosocial History / Relationships								
			1.47	0.701			1.25	0.567
Low	19,662	65.0			24,534	81.1		
Moderate	7,306	24.1			4,124	13.6		
High	3,103	10.3			1,393	4.6		
Severe	192	0.6			212	0.7		
Factor Group 7 – Environment / Support System								
			1.37	0.616			1.19	0.506
Low	21,163	69.9			25,740	85.1		
Moderate	7,171	23.7			3,365	11.1		
High	1,783	5.9			983	3.2		
Severe	146	0.5			175	0.6		
Factor Group 8 – Health History / Traumatic Brain Injury								
			2.18	0.814			1.7	0.819
Low	7,064	23.3			15,358	50.7		
Moderate	11,455	37.9			9,551	31.6		
High	11,002	36.4			4,561	15.1		
Severe	742	2.5			793	2.6		
Final Risk Estimate								
			2.76	0.943			1.59	0.827
Low	2,711	9.0			18,062	59.7		
Moderate	9,869	32.6			7,388	24.4		
High	9,700	32.1			3,870	12.8		
Severe	7,983	26.4			943	3.1		

BHRM = Behavioral Health Risk Management; % = Percentage; M = Mean;
SD = Standard Deviation

Summary. Examination of the frequencies and percentages of the BHRM recommended risk estimate and the provider determined risk estimate reveals distinct differences. Generally, the BHRM module (by individual's self-assessment) tends to estimate the risk as low, moderate or high, while the providers tend to estimate as low or moderate. The pattern of distribution of the BHRM's recommendation for the final risk estimation demonstrates about one-third being

recommended as moderate, high, or severe, and then 10% being recommended as low risk. Providers, however, consistently determined the final risk estimate lower than the BHRM module. The pattern of distribution of the provider's determination for the final risk estimation demonstrates about two-thirds of service members being estimated as low, one-quarter being estimated as moderate, 13% estimated as high, and less than 5% being estimated as severe risk (see Table 16).

Table 16. *Summary of Behavioral Health Risk Estimates by Behavioral Health Risk Management and Provider*

	Risk Estimate	
Factor Group	BHRM	Provider
1	Low or Moderate	Low*
2	Low or Moderate	Low
3	Low or Severe	Low
4	Low or Moderate	Low
5	Low	Low
6	Low or Moderate	Low
7	Low or Moderate	Low
8	Moderate or High	Low or Moderate
Final	Moderate, High or Severe	Low or Moderate

*Providers tended to estimate more as severe than BHRM

BHRM – Behavioral Health Risk Management

Research Question 7 – Correlations among Risk Estimates.

Introduction. Research question 7 examines relationships and correlations among the risk level estimates (low, moderate, high or severe) recommended by the BHRM and the risk level estimates determined by the clinical provider for each of the eight factor groups and the final risk estimate. *Hypothesis 3*: There are significant correlations among the risk level estimates recommended by the BHRM and the risk level estimates determined by the clinical provider for each of the eight factor groups and the final risk estimate. Pearson's Chi-square

statistical test is used to examine the relationships among the BHRM and provider risk estimates. Spearman's Rho test is used to assess the correlations between the risk estimates. These tests are acceptable for use when analyzing categorical data. The eighteen risk estimate variables, which include the eight factor group estimates and the final risk estimate for the BHRM recommended (9) and the provider determined (9) estimates, are tested. The statistical tests are conducted using IBM SPSS, version 24 (IBM SPSS, 2014). Data from responses to the first BHRA-Q completed by 30,263 service members are used to conduct the analyses.

Results. The hypothesis suggesting that the BHRA-Q will demonstrate significant correlations between the risk level estimates recommended by the BHRM and the risk level estimates determined by the clinical provider for the eight factor groups and the final risk estimate is supported. Pearson's Chi-square test of the relationships among the BHRM recommended and provider determined risk estimates for Factor Groups 1 through 8 and the Final Risk Estimate reveals significant associations. All nine risk estimates by the BHRM and provider were found to be significant at $p < .05$ for each of comparisons (see Table 17).

Table 17. *Relationships of Behavioral Health Risk Management and Provider Risk Estimates (Pearson's Chi-Square) (N = 30,263; df = 9)*

Factor Group – BHRM by Provider	**Estimate**				X^2	*p*
	Low	Mod	High	Severe		
Factor Group 1 – Behavioral Health / Depression / Suicide					16995.62[a]	.001
Low	14,695	341	76	5		
Moderate	6,411	4,136	940	115		
High	555	1,117	1,466	223		
Severe	7	13	90	73		
Factor Group 2 – Mental Health / Psychosis					19195.43	.001
Low	19,060	138	53	5		
Moderate	5,163	2,223	215	23		
High	749	773	799	84		
Severe	124	263	365	226		

a. 1 cell (6.3%) have expected count < 5; minimum expected is 2.52.

BHRM = Behavioral Health Risk Management module; df = degrees of freedom; X^2 =Chi-Square; *p* = asymptotic significance (2-sided); Mod = Moderate

Table 17 cont'd. *Research Question 7. Relationships of Behavioral Health Risk Management and Provider Risk Estimates (Pearson's Chi-Square) (N = 30,263; df = 9)*

Factor Group – BHRM by Provider	**Estimate**				X^2	*p*
	Low	Mod	High	Severe		
Factor Group 3 – Anxiety / Post-Traumatic Stress					24058.62	.001
Low	13,476	159	24	4		
Moderate	2,966	1,597	186	29		
High	1,165	1,648	1,468	211		
Severe	519	1,735	2,622	2,454		
Factor Group 4 – Anger / Aggression / Violence					12221.22[b]	.001
Low	19,103	526	72	9		
Moderate	6,391	2,453	265	39		
High	336	490	482	75		
Severe	1	4	10	7		
Factor Group 5 – Substance Use / Abuse					16199.37[c]	.001
Low	25,320	325	90	6		
Moderate	2,228	1,144	138	25		
High	226	282	374	74		
Severe	2	7	15	7		
Factor Group 6 – Psychosocial History / Relationships					15120.40[d]	.001
Low	19,104	470	75	13		
Moderate	4,455	2,510	303	38		
High	960	1,091	939	113		
Severe	15	53	76	48		
Factor Group 7 – Environment / Support System					17592.66[e]	.001
Low	20,859	278	24	2		
Moderate	4,438	2,428	250	55		
High	429	627	649	78		
Severe	14	32	60	40		
Factor Group 8 – Health History / Traumatic Brain Injury					10238.71	.001
Low	6,368	629	61	6		
Moderate	5,911	4,639	814	91		
High	2,977	4,062	3,432	531		
Severe	102	221	254	165		
Final Estimate – Overall Risk					8167.023	.001
Low	2,559	133	17	2		
Moderate	7,827	1,761	265	16		
High	5,658	2,497	1,453	92		
Severe	2,018	2,997	2,135	833		

b. 3 cells (18.8%) have expected count < 5; min expected is 0.09; c. 4 cells (25%) have expected count < 5; min expected is 0.11; d. 1 cell (6.3%) has expected count < 5; min expected is 2.52; e. 2 cells (12.5%) have expected count < 5; min expected count is .84.

BHRM = Behavioral Health Risk Management module; df = degrees of freedom; X^2 =Chi-Square; *p* = asymptotic significance (2-sided); Mod = Moderate

The nine risk level estimates (Factor Groups 1-8 and Final Risk Estimate) demonstrate statistically significant relationships and positive relationships (both increasing) between all of the BHRM risk level estimates and the provider determined risk level estimate ($p < .01$). The effect size for Factor Groups 1 ($r_s = .630$) , 2 ($r_s = .624$) , 3 ($r_s = .807$), 5 ($r_s = .588$) , 6 ($r_s = .598$) , 7 ($r_s = .611$) and 8 ($r_s = .521$) indicates a large effect of the BHRM risk level estimates on the provider risk level estimates ($r_s > .50$ = large effect) and for Factor Group 4 ($r_s = .484$) and the Final Risk Estimate ($r_s = .494$) a medium effect ($.50 > r_s > .30$ = medium effect) (see Table 18).

Table 18. *Correlation of Behavioral Health Risk Management and Provider Risk Estimates (Spearman's Rho) (N = 30,263)*

Factor Group – Latent Construct	**Correlation Coefficient (*r*)***	**Effect Size****
Factor Group 1 - Behavioral Health / Depression / Suicide	0.630	*r* >.50=large
Factor Group 2 - Mental Status / Psychosis	0.624	*r* >.50=large
Factor Group 3 – Anxiety / Post-Traumatic Stress	0.807	*r* >.50=large
Factor Group 4 – Anger / Aggression / Violence	0.484	.50 > *r* > .30=medium
Factor Group 5 - Substance Use / Abuse	0.588	*r* >.50=large
Factor Group 6 - Psychosocial History / Relationships	0.598	*r* >.50=large
Factor Group 7 – Environmental / Support Systems	0.611	*r* >.50=large
Factor Group 8 - Health / Traumatic Brain Injury	0.521	*r* >.50=large
FINAL Risk Estimate	0.494	.50 > *r* > .30=medium

*All are significant at .001 ($p < .01$) and exhibit positive relationships.
**Cohen's criteria for effect size.

r = correlation; BHRM = Behavioral Health Risk Management module

Summary. The BHRM data demonstrates significant correlations among the risk level estimates recommended by the BHRM and the risk level estimates determined by the clinical provider for the eight factor groups and the final risk estimate. The nine risk level estimates for Factor Groups 1-8 and the Final Risk Estimate demonstrate statistically significant relationships

and a positive relationship (both increasing) among all of the BHRM risk level estimates and the provider determined risk level estimate ($p < .01$).

Research Questions 8 and 9 – Demographic Variables Predicting Risk Estimates by BHRM and Provider.

Introduction. In this section, the results of the examination of demographic variables predicting the BHRM module (individual's self-assessment) and the provider determined risk estimate are explained. Demographic variables are grouped into categories to ensure each category have a minimum number required for analysis or to ensure the ordinal nature of the category (see Table 19). For research questions 8 and 9, n = 27,675 (93.4%), two subjects are removed for non-responses, 648 removed for lack of demographic variables in greater than nine categories. Additionally, 1,940 subjects are removed from the study when the response is "unknown" to six demographic variables (i.e., age at risk estimate, marital status, education, age at military entry, active duty service length at risk estimate, and military service length at risk estimate). The subjects with "unknown" responses in the remaining categories are filtered into to testing to ensure each category has the requisite 27,675. Categories are assigned to ensure ordinal nature. Demographic variables with "unknown" responses in the remaining categories are filtered during the analyses to ensure the total sample 27,675 is represented. The total number of subjects removed for the ordinal logistic regression analysis is 2,590 subjects (8.6%).

Table 19. *Demographic Characteristics of Subjects (Grouped) (n = 27,675)*

Variables (Grouped)	Category	Frequency	%
Gender	Male	23,754	85.8
	Female	3,921	14.2
Age at Risk Estimate	18-24 years	5,908	21.3
	25-34 years	10,469	37.8
	35-44 years	6,751	24.4
	> 44 years	4,547	16.4
	Unknown (Removed)	88	
Marital Status at Risk Estimate	Married	17,529	63.3
	Not Married	10,146	36.7
	Unknown (Removed)	9	
Race (Dummy coded)	White	19,792	71.5
	Other	6,718	24.3
	Unknown	1,165	4.2
Religion (Dummy coded)	Christian	18,881	68.2
	Other	7,107	25.7
	Unknown	1,687	6.1
Education	< High School or Graduate Equivalency	3,870	14.0
	High School or Some College	19,533	70.6
	College Graduate	4,272	15.4
	Unknown (Removed)	333	
Age at Military Entry	18-24 years	22,651	81.8
	> 24 years	5,024	18.2
	Unknown (Removed)	185	
Rank at Risk Estimate	Enlisted, E1-4	11,317	40.9
	Enlisted, E5-7	12,214	44.1
	Enlisted_E8-9 and Officers	4,144	15.0
Military Service Component	Regular (Active Duty)	14,646	52.9
	Guard or Reserve	13,029	47.1
Active Duty Service Length at Risk Estimate	0-4 years	15,153	54.8
	5-10 years	8,226	29.7
	> 10 years	4,296	15.5
	Unknown (Removed)	1,365	

% = Percentage

Table 19 cont'd. *Demographic Characteristics of Subjects (Grouped) (n=27,675)*

Variables (Grouped)	Category	Frequency	%
Military Service Length at Risk Estimate	0-4 years	6,952	25.1
	5-10 years	7,487	27.1
	11-16 years	4,516	16.3
	> 16 years	6,952	25.1
	Unknown (Removed)	2	
Deployments before Risk Estimate	0	5,650	20.4
	1	10,744	38.8
	2	6,852	24.8
	> 2	4,429	16.0
Unknown		650	2.0
Valid (InStudy)		27,675	93.4
Missing (Unknown = 650+1940 Removed)		2,590	8.6
Total		30,265	100.0

% = Percentage

The process flow for analysis of data prior to the ordinal logistic regression includes the characteristics of the sample, univariate and bivariate testing, assumptions testing. The characteristics of population sample for research questions 8 and 9 are discussed prior to the univariate examination (frequencies and percentages) of the independent variables (demographic variables) and dependent variables (factor group risk estimates by BHRM module and the provider) (see Tables 19 and 20). Assumptions' testing is then discussed, followed by the bivariate analysis of conducted between the demographic variables and the risk estimates by the BHRM and the provider to determine significance. The bivariate analysis results are displayed in Table 21a through 21r (see Tables section). The significance results from the bivariate analysis, identified as *p* values only, are available at Table 22 (see Tables section); those that are significant ($p < .05$) are included in the testing using ordinal logistic regression. Table 23 reveals the bivariate analysis of demographic variables and risk estimates, including frequencies and Chi-Square, where significant relationships are identified. The results of the ordinal logistic

regression are available in Tables 24 and 25. Table 24 demonstrates those relationships that violate the proportional odds assumption (test of parallel lines is significant), and Table 25 demonstrates those that do not violate the proportional odds assumptions (test of parallel lines is not significant).

Independent Variables. There are 12 independent (demographic) variables in examined in this research question, which include gender, age at risk estimate, marital status at risk estimate, race, religion, education, age at military entry, rank at risk estimate, military service component, active duty service length at risk estimate, military service length at risk estimate, and deployments before risk estimate. Table 22 details the frequencies and percentages (n = 27,675) of demographic variables.

Dependent Variables. There are three dependent (risk estimate) variables, which are ordinal (low, moderate, or high). Table 20 represents the frequencies and percentages of risk estimates for the population for low, moderate and high (severe) risk estimates (n = 27,675).

Table 20. *Behavioral Health Risk Estimates by Behavioral Health Risk Management and Provider (Low, Moderate, High) – Frequencies and Percentages (n = 27,675)*

	BHRM			Provider		
Factor Group	Risk Estimate	#	%	Risk Estimate	#	%
FG1_Behavioral Health / Depression / Suicide	Low	13,788	49.8	Low	19,761	71.4
	Mod	10,600	38.3	Mod	5,162	18.7
	High	3,287	11.9	High	2,752	9.9
FG2_Mental Status / Psychosis	Low	17,590	63.6	Low	22,921	82.8
	Mod	6,965	25.2	Mod	3,116	11.3
	High	3,120	11.3	High	1,638	5.9
FG3_Anxiety / Post-Traumatic Stress	Low	12,478	45.1	Low	16,546	59.8
	Mod	4,352	15.7	Mod	4,704	17.0
	High	10,845	39.2	High	6,425	23.2
FG4_Anger / Aggression / Violence	Low	18,060	65.3	Low	23,633	85.4
	Mod	8,335	30.1	Mod	3,162	11.4
	High	1,280	4.6	High	880	3.2
FG5_Substance Use / Abuse	Low	23,556	85.1	Low	25,401	91.8
	Mod	3,219	11.6	Mod	1,608	5.8
	High	900	3.3	High	666	2.4
FG6_ Psychosocial History / Relationships	Low	17,956	64.9	Low	22,421	81.0
	Mod	6,694	24.2	Mod	3,784	13.7
	High	3,025	10.9	High	1,470	5.3
FG7_ Environment / Support Systems	Low	19,364	70.0	Low	23,535	85.0
	Mod	6,543	23.6	Mod	3,077	11.1
	High	1,768	6.4	High	1,063	3.8
FG8_ Health / Traumatic Brain Injury	Low	6,475	23.4	Low	14,036	50.7
	Mod	10,448	37.8	Mod	8,714	31.5
	High	10,752	38.9	High	4,925	17.8
FINAL Risk Estimate	Low	2,464	8.9	Low	16,476	59.5
	Mod	9,034	32.6	Mod	6,766	24.4
	High	16,177	58.5	High	4,433	16.0

BHRM = Behavioral Health Risk Management; # = Number of Estimates; % = Percentage; FG = Factor Group; Mod = Moderate

Assumptions. Assumptions for ordinal logistic regression are tested and meet the requirements. The first assumption that the dependent variable is ordinal is met; second assumption that one or more of the independent variable are continuous, ordinal or categorical is

met; and third, that ordinal variables are treated as categorical in the test. The fourth assumption for multi-collinearity is met and is a tested using linear regression statistical estimates for collinearity diagnostics with IBM SPSS, version 24. The tolerances are all near one (1) and the VIFs for all variables are under 5.30 (acceptable is under or near 5).

Bivariate Comparison. The bivariate relationships between demographic variables and the BHRM and provider risk estimates are conducted using Chi-Square to determine the demographic variables and risk estimates with significant relationships. Those found to have significant relationships are tested using ordinal logistic regression. Table 21 (a through r) demonstrates the results of the frequencies, percentages, and bivariate analysis (Chi-Square). Table 21 and subsets are provided in the Tables section.

Results of the bivariate analysis demonstrate significance in the relationships between the demographic variables and the BHRM and provider risk estimates. However, no significant relationships are found among risk estimates by BHRM (individual self-assessment) or by the provider for the seven demographic variables: gender, age at military entry, marital status at risk estimate, rank at risk estimate, active duty service length at risk estimate, and deployment before risk estimate.

Significant relationships are found for six demographic variables and the BHRM and provider risk estimates. The six demographic predictors significantly associated BHRM estimates in any factor group include: race, education, religion, age at risk estimate, military service component at risk estimate, and military service length at risk estimate. The two demographic predictors significantly associated with a provider estimate in any factor group include: religion and military service component.

Among the six demographic variables and BHRM and provider risk estimates, there are 13 significant associations (where $p \leq .05$). For race and education, there is a significant relationship between the final risk estimate by BHRM (individual self-assessment); between race and the final risk estimate ($p \leq .05$) [1] and between education and Factor Group 8 ($p \leq .05$) [2]. For religion, there is a significant relationship between final risk estimate and the BHRM estimate ($p \leq .05$) [3], Factor Group 2 ($p \leq .05$) [4], Factor Group 4 ($p \leq .05$) [5]; between the final risk estimate and the provider risk estimate ($p \leq .05$) [6] and Factor Group 8 ($p \leq .05$) [7]. For age at risk estimate, there is a significant relationship between Factor Group 3 and the BHRM risk estimate ($p \leq .05$) [8]. For military service component at risk estimate, there is a significant relationship between Factor Group 1 ($p \leq .05$) [9] and Factor Group 2 ($p \leq .05$) [10] and the BHRM risk estimate and between Factor Group 2 and the provider risk estimate ($p \leq .05$) [11]. For military service length at risk estimate, there is a significant relationship between Factor Group 3 ($p \leq .05$) [12] and Factor Group 2 ($p \leq .05$) [13].

Table 22 delineates the significance (p values) of the relationships between the variables (see Tables section). Those found to be significant (p value $\leq .05$) are included in the ordinal logistic regression test and are summarized in Table 23.

Table 23. *Demographic Variables and Risk Estimates by Behavioral Health Risk Management and Provider with Significant Relationships (Pearson's Chi-Square) (n = 27,675; p ≤ .05)*

Variable	**Low**		**Moderate**		**High**		X^2**(df)**	***Sig.***
	#	%	#	%	#	%		
BHRM - Final Risk Estimate								
Race							10.994(4)	.027
White	1,772	9	6,562	33.2	11,458	57.9		
Non-White	600	8.9	2,097	31.2	4,021	59.9		
Unknown	92	7.9	375	32.2	698	59.9		
Religion							9.677(4)	.046
Christian	1,739	9.2	6,194	32.8	10,948	58.0		
Other	589	8.3	2,307	32.5	4,211	59.3		
Unknown	136	8.1	533	31.6	1,018	60.3		
Provider - Final Risk Estimate								
Religion							11.122(4)	.025
Christian	11,282	59.8	4,549	24.1	3,050	16.2		
Other	4,181	58.8	1,830	25.7	1,096	15.4		
Unknown	1,013	60.0	387	22.9	287	17.0		
BHRM - Factor Group 1_Risk Estimate								
Military Service Component							6.934(2)	.031
Regular	7,189	49.1	5,681	38.8	1,776	12.1		
Guard or Reserve	6,599	50.6	4,919	37.8	1,511	11.6		
BHRM - Factor Group 2_Risk Estimate								
Religion							9.429(4)	.051
Christian	12,096	64.1	4,682	24.8	2,103	11.1		
Other	4,463	62.8	1,818	25.6	826	11.6		
Unknown	1,031	61.1	465	27.6	191	11.3		
Provider - Factor Group 2_Risk Estimate								
Military Service Component							7.292(2)	.026
Regular	12,067	82.4	1,661	11.3	918	6.3		
Guard or Reserve	10,854	83.3	1,455	11.2	720	5.5		
BHRM - Factor Group 3_Risk Estimate								
Age at Risk Estimate							17.611(6)	.007
18-24 years	2,625	44.4	997	16.9	2,286	38.7		
25-34 years	4,679	44.7	1,680	16.0	441	39.3		
35-44 years	3,116	46.2	1,022	15.1	2,613	38.7		
45+ years	2,058	45.3	653	14.4	1,836	40.4		

BHRM = Behavioral Health Risk Management; X^2(df) = Chi-Square (degrees of freedom); *Sig.* = Significance; # = Number of Estimates; % = percentage; GED = Graduate Equivalency Degree

Table 23 cont'd. *Demographic Variables and Risk Estimates by Behavioral Health Risk Management module (BHRM) and Provider with Significant Relationships (Pearson's Chi-Square) (n = 27,675; p ≤ .05)*

Variable	**Low**		**Moderate**		**High**		***X*²(df)**	***Sig.***
	#	%	#	%	#	%		
BHRM - Factor Group 3_Risk Estimate								
Military Service Length at Risk Estimate							19.039(6)	.004
0-4 years	3,814	43.7	1,470	16.9	3,436	39.4		
5-10 years	3,420	45.7	1,169	15.6	2,898	38.7		
11-16 years	2,046	45.3	698	15.5	1,772	39.2		
17+ years	3,198	46.0	1,015	14.6	2,739	39.4		
BHRM - Factor Group 4_Risk Estimate								
Religion							10.364(4)	.035
Christian	12,356	65.4	5,632	29.8	893	4.7		
Other	4,632	65.2	2,148	30.2	327	4.6		
Unknown	1,072	63.5	555	32.9	60	3.6		
Military Service Length at Risk Estimate							14.212(6)	.027
0-4 years	5,701	65.4	2,623	30.1	396	4.5		
5-10 years	4,918	65.7	2,269	30.3	300	4.0		
11-16 years	2,922	64.7	1,349	29.9	245	5.4		
17+ years	4,519	65.0	2,094	30.1	339	4.9		
BHRM - Factor Group 8_Risk Estimate								
Education							9.273(4)	.055
< High School/GED	895	23.1	1,478	38.2	1,497	38.7		
High School	4,653	23.8	7,317	37.5	7,563	38.7		
College Graduate	927	21.7	1,653	38.7	1,692	39.6		
Military Service Component							5.868(2)	.053
Regular	3,469	23.7	5,432	37.1	5,745	39.2		
Guard or Reserve	3,006	23.1	5,016	38.5	5,007	38.4		
Provider - Factor Group 8_Risk Estimate								
Religion							10.043(4)	.040
Christian	9,657	51.1	5,886	31.2	3,338	17.7		
Other	3,530	49.7	2,320	32.6	1,257	17.7		
Unknown	849	50.3	508	30.1	330	19.6		

BHRM = Behavioral Health Risk Management; X^2(df) = Chi-Square (degrees of freedom); *Sig.* = significance; # = Number of Estimates; % = percentage; GED = Graduate Equivalency Degree

Ordinal Logistic Regression. The 13 variables with significant relationships are subjected to Ordinal Logistic Regression (OLR) using IBM SPSS, version 24 (IBM SPSS, 2014). Assumptions for OLR include: dependent variable should be measured at the ordinal

level; independent variables are ordinal or nominal and ordinal independent variables are treated as categorical; reflects independence of observations; dependent variable has mutually exclusive and exhaustive categories; no multi-collinearity; no outliers or high leverage values or highly influential points; and non-significant Chi-Square for the test of proportional odds.

Ordinal logistic regression assumes that the coefficients that describe the relationship between categories (such as low, moderate, high) of the response are the same as those that describe the relationship between the next lowest category and all higher categories, etc. The assumption is called the proportional odds or parallel regression assumption. The test of proportional odds is conducted using the test of parallel lines. The null hypothesis of this Chi-Square test is that there is no difference in the coefficients between models. The desired result is a non-significant Chi-Square.

Of the 13 significant associations between demographic variables and the BHRM and provider estimates, eight violated the test of parallel lines. Those violating proportional odds include: 1) age at risk estimate and 2) and military service length with self-assessed / BHRM Factor Group 3 risk estimate (X^2 = .002); 3) religion and 4) military service length with self-assessed / BHRM Factor Group 4 risk estimate (X^2 = .001); 5) education and 6) military service component with self-assessed / BHRM Factor Group 8 risk estimate (X^2 = .027); 7) religion with provider Factor Group 8 risk estimate (X^2 = .044); 8) religion with provider final risk estimate (X^2 = .005) (see Table 24, a through e).

Table 24. *Results of Ordinal Logistic Regression – Demographic Variables and Risk Estimates by Behavioral Health Risk Management and Provider with Significant Relationships (Pearson's Chi-Square) violating Proportional Odds (n = 27,675, p ≤.05)*

Table 24a. *Results of Ordinal Logistic Regression – Demographic Variables predicting Behavioral Health Risk Management - Factor Group 3 Risk Estimate (n = 27,675; p ≤.05)*

BHRM – Factor Group 3_Risk Estimate				
Variable	B(SE)	Wald X^2	*Sig.*	OR (95% CI)
FG3_RiskEstimate_BHRM, Low	-.213 (.025)	70.373	.001	.808 (.769-.849)
FG3_RiskEstimate_BHRM, Mod	.424 (.025)	276.861	.001	1.528 (1.453-1.606)
FG3_RiskEstimate_BHRM, High	0			1.0
Age at Risk Estimate, 18-24 years	.089 (.056)	2.485	.115	1.093 (.979-1.220)
Age at Risk Estimate, 25-34 years	.022 (.046)	.223	.637	1.022 (.934-1.118)
Age at Risk Estimate, 35-44 years	.044 (.036)	1.552	.213	1.045 (.975-.1.121)
Age at Risk Estimate, 45+ years	0			1.0
Military Service Length, 0-4 years	-.090 (.049)	3.345	.067	.914 (.831-1.006)
Military Service Length, 5-10 years	-.059 (.042)	1.998	.157	.942 (.868-1.023)
Military Service Length, 11-16 years	-.075 (.034)	4.906	.027	.928 (.868-.991)
Military Service Length, 17+ years	0			1.0
*Test of parallel lines: X^2 = .002				

BHRM = Behavioral Health Risk Management; B(SE) = Beta (Standard Error);
Wald X^2 = Chi-Square; *Sig.* = Significance; OR = Odds Ratio (Beta exponent);
CI = Confidence Interval; Mod = Moderate

Table 24b. *Results of Ordinal Logistic Regression – Demographic Variables predicting Behavioral Health Risk Management - Factor Group 4 Risk Estimate (n = 27,675; p ≤.05)*

BHRM – Factor Group 4_Risk Estimate*				
Variable	B(SE)	Wald X^2	*Sig.*	OR (95% CI)
FG4_RiskEstimate_BHRM, Low	.569 (.060)	89.071	.001	1.767 (1.570- 1.988)
FG4_RiskEstimate_BHRM, Mod	2.965 (.065)	2050.369	.001	19.400 (17.063-22.057)
FG4_RiskEstimate_BHRM, High	0			1.0
Religion, Unknown	-.064 (.053)	1.501	.220	.938 (.846-1.039)
Religion, Non-Christian	-.011 (.029)	.135	.713	.989 (.935-1.047)
Religion, Christian	0			1.0
Military Service Length, 0-4 years	.024 (.034)	.492	.483	1.024 (.959-1.093)
Military Service Length, 5-10 years	.042 (.038)	1.219	.269	1.043 (.968-1.123)
Military Service Length, 11-16 years	-.021 (.033)	.411	.522	.979 (.918-1.044)
Military Service Length, 17+ years	0			1.0
*Test of parallel lines: X^2 = .001				

BHRM = Behavioral Health Risk Management; B(SE) = Beta (Standard Error);
Wald X^2 = Chi-Square; *Sig.* = Significance; OR = Odds Ratio (Beta exponent);
CI = Confidence Interval; Mod = Moderate

Table 24 cont'd. *Results of Ordinal Logistic Regression – Demographic Variables and Risk Estimates by Behavioral Health Risk Management and Provider with Significant Relationships (Pearson's Chi-Square) violating Proportional Odds (n = 27,675, p ≤.05)*

Table 24c. *Results of Ordinal Logistic Regression – Demographic Variables predicting Behavioral Health Risk Management - Factor Group 8 Risk Estimate (n = 27,675, p ≤.05)*

BHRM – Factor Group 8_Risk Estimate*				
Variable	B(SE)	Wald X^2	*Sig.*	OR (95% CI)
FG8_RiskEstimate_BHRM, Low	-1.194 (.032)	1366.811	.001	.303 (.284-.323)
FG8_RiskEstimate_BHRM, Mod	.446 (.032)	200.197	.001	1.562 (1.468-1.661)
FG8_RiskEstimate_BHRM, High	0			1.0
Education, < High School/GED	.059 (.042)	1.989	.158	1.061 (.977-1.151)
Education, High School	-.013 (.033)	.154	.695	.987 (.926-1.052)
Education, College Graduate	0			1.0
MilSrvCompo, Guard or Reserve	-.017 (.023)	.557	.455	.983 (.940-1.028)
MilSrvCompo, Regular (Active)	0			1.0

*Test of parallel lines: X^2 = .027

BHRM = Behavioral Health Risk Management; B(SE) = Beta (Standard Error);
Wald X^2 = Chi-Square; *Sig.* = Significance; OR = Odds Ratio (Beta exponent);
CI = Confidence Interval; Mod = Moderate; MilSrvCompo = Military Service Component

Table 24d. *Results of Ordinal Logistic Regression – Demographic Variables predicting Provider - Final Risk Estimate (n = 27,675; p ≤.05)*

Provider - Final Risk Estimate*				
Variable	B(SE)	Wald X^2	*Sig.*	OR (95% CI)
Final_RiskEstimate_Provider, Low	.369(.055)	44.253	.001	1.446 (1.297-1.612)
Final_RiskEstimate_Provider, Mod	1.639(.056)	842.990	.001	5.153(4.613-5.756)
Final_RiskEstimate_Provider, High	0			1.0
Religion, Unknown	-.004(.050)	.006	.938	.996 (.903-1.099)
Religion, Non-Christian	-.019(.027)	.457	.499	.982 (.930-1.036)
Religion, Christian	0			1.0

*Test of parallel lines: X^2 = .005

BHRM = Behavioral Health Risk Management; B(SE) = Beta (Standard Error);
Wald X^2 = Chi-Square; *Sig.* = Significance; OR = Odds Ratio (Beta exponent);
CI = Confidence Interval; Mod = Moderate

Table 24 cont'd. *Results of Ordinal Logistic Regression – Demographic Variables and Risk Estimates by Behavioral Health Risk Management and Provider with Significant Relationships (Pearson's Chi-Square) violating Proportional Odds (n = 27,675, $p \leq .05$)*

Table 24e. *Results of Ordinal Logistic Regression – Demographic Variables predicting Provider - Factor Group 8 Risk Estimate (n = 27,675, $p \leq .05$)*

Provider – Factor Group 8_Risk Estimate*				
Variable	B(SE)	Wald X^2	*Sig.*	OR (95% CI)
FG8_RiskEstimate_Provider, Low	-.058 (.053)	1.204	.273	.943 (.850-1.047)
FG8_RiskEstimate_Provider, Mod	1.443 (.054)	712.088	.001	4.235 (3.809-4.708)
FG8_RiskEstimate_Provider, High	0			1.0
Religion, Unknown	-.058 (.048)	1.466	.226	.943 (.859-1.037)
Religion, Non-Christian	-.044 (.026)	2.741	.098	.957 (.909-1.108)
Religion, Christian	0			1.0
*Test of parallel lines: X^2 = .044				
B(SE) = Beta (Standard Error); Wald X^2 = Chi-Square; *Sig.* = Significance; OR = Odds Ratio (Beta exponent); CI = Confidence Interval; Mod = Moderate				

There are five significant relationships among three demographic variables and three BHRM and provider risk estimates that did not violate the test of proportional odds. Additionally, they meet all testing assumptions required for ordinal logistic regression. They include: 1) race, 2) and religion and the self-assessed / BHRM final risk estimate (X^2 = .285); 3) military service component and the self-assessed / BHRM Factor Group 1 risk estimate (X^2 = .742); 4) religion and self-assessed / BHRM Factor Group 2 risk estimate (X^2 = .327); and 5) military service component and the provider Factor Group 2 risk estimate (X^2 = .106) (see Table 25, a through d). In addition to the five significant relationships, two subcategories under religion (religion "unknown" or non-Christian) are found to have a significant relationship with the BHRM final risk estimate and the BHRM Factor Group 2 risk estimate.

Results. Hypothesis for research questions 8 and 9 is supported for three predictive demographic variables including race and religion for the BHRM risk estimate and military service component for the BHRM and provider risk estimate. Seven significant relationships are

found including among race (1) and religion (2 & 3) and the BHRM final risk estimate; military service component (4) and BHRM Factor Group 1 risk estimate; religion (5 & 6) and BHRM Factor Group 2; military service component (7) and provider Factor Group 2 risk estimate.

Race and BHRM Final Risk Estimate (#1). The bivariate relationship between race and the BHRM final risk estimate is significant at $p \leq .05$ ($X^2 = 10.994$; df = 4). For the self-assessed / BHRM final risk estimates (overall behavioral health risk) and race, tests reveal that when compared to whites, non-whites are 8% less likely to self-assess using BHRM as high risk in their final risk estimate. The odds of non-whites to self-assess as high risk in the final risk estimate is .927 (95% CI, .877-.979) times that of whites, a statistically significant effect, Wald $X^2(1) = 7.279$, $p \leq .05$ (see Table 25a).

Table 25. *Results of Ordinal Logistic Regression – Demographic Variables and Risk Estimates by Behavioral Health Risk Management and Provider with Significant Relationships (Pearson's Chi-Square) not violating Proportional Odds (n = 27,675, p ≤.05)*

Table 25a. *Results of Ordinal Logistic Regression – Demographic Variables predicting Behavioral Health Risk Management-Final Risk Estimate (n = 27,675, p ≤.05)*

BHRM - Final Risk Estimate*				
Variable	B(SE)	Wald (X^2)	*Sig.*	OR (95% CI)
Final_RiskEstimate_BHRM, Low	-2.626 (.089)	880.354	.001	.072 (.061-.086)
Final_RiskEstimate_BHRM, Mod	-.641 (.087)	54.843	.001	.527 (.444-.624)
Final_RiskEstimate_BHRM, High	0			1.0
Race, Unknown	-.096 (.060)	2.546	.111	.908 (.807-1.022)
Race, Non-White	-.076 (.028)	7.279	.007	. 927 (.877-.979)
Race, White	0			1.0
Religion, Unknown	-.107 (.051)	4.457	.035	.898 (.813-.992)
Religion, Non-Christian	-.066 (.028)	5.736	.017	.936 (.886-.988)
Religion, Christian	0			1.0

Bivariate association: race – p =.027, $X^2 = 10.994(4)$ and religion – p = .046, $X^2 = 9.677(4)$;
*Test of parallel lines: X^2 = .285

BHRM = Behavioral Health Risk Management; B(SE) = Beta (Standard Error);
Wald X^2 = Chi-Square; Sig. = Significance; OR = Odds Ratio (Beta exponent);
CI = Confidence Interval; Mod = Moderate

Religion and BHRM Final Risk Estimate (#2 and #3). The bivariate relationship between the BHRM final risk estimate and religion is significant at $p \leq .05$ ($X^2 = 9.677$; df = 4). For the self-assessed / BHRM final risk estimates (overall behavioral health risk) and religion, two significant results are found. First, when compared to Christians, individuals with unknown religion are 11% less likely to self-assess using BHRM as high risk in their final risk estimate. The odds of those identified as religion "unknown" to self-assess as high risk in the final risk estimate is .898 (95% CI, .813-.992) times that of Christians, a statistically significant effect, Wald $X^2(1) = 4.457$, $p \leq .05$. Second, when compared to Christians, those identifying as having a non-Christian religion are 7% less likely to self-assess using BHRM as high risk in their final risk estimate. The odds of those identified as non-Christian to self-assess as high in the final risk estimate (overall behavioral health risk) is .936 (95% CI, .886-.988) times that of Christians, a statistically significant effect, Wald $X^2(1) = 5.736$, $p \leq .05$ (see Table 25a).

Military Service Component and BHRM Factor Group 1 Risk Estimate (#4). The bivariate relationship between the BHRM Factor Group 1 risk estimate and military service component is significant at $p \leq .05$ ($X^2 = 6.934$; df = 2). For the self-assessed / BHRM Factor Group 1 (behavioral health / depression / suicide risk factors) risk estimates and military service component, tests reveal that when compared to regular (active duty) Army, Guard or Reserve service members are 6% less likely to self-assess using BHRM as high risk for behavioral health / depression / suicide risk factors (Factor Group 1). The odds of those in the Guard or Reserve to self-assess as high risk in behavioral health / depression / suicide risk factors (Factor Group 1) is .942 (95% CI, .900-.985) times that of regular Army service members, a statistically significant effect, Wald $X^2(1) = 6.825$, $p \leq .05$ (see Table 25b).

Table 25b. *Results of Ordinal Logistic Regression – Demographic Variables predicting Behavioral Health Risk Management-Factor Group 1 Risk Estimate (n = 27,675, $p \leq .05$)*

BHRM – Factor Group 1_Risk Estimate*				
Variable	B(SE)	Wald (X^2)	*Sig.*	OR (95% CI)
FG1_RiskEstimate_BHRM, Low	-.036 (.016)	4.809	.028	.965 (.935-.996)
FG1_RiskEstimate_BHRM, Mod	1.976 (.021)	8509.168	.001	7.215 (6.918-7.524)
FG1_RiskEstimate_BHRM, High	0			1.0
MilSrvCompo, Guard or Reserve	-.060 (.023)	6.825	.009	.942(.900-.985)
MilSrvCompo, Regular (Active)	0			1.0
Bivariate association: $p = .026$, $X^2 = 6.934(2)$; *Test of parallel lines: $X^2 = .742$				
BHRM = Behavioral Health Risk Management; B(SE) = Beta (Standard Error); Wald X^2 = Chi-Square; *Sig.* = Significance; OR = Odds Ratio (Beta exponent); CI = Confidence Interval; Mod = Moderate; MilSrvCompo = Military Service Component				

Religion and BHRM Factor Group 2 Risk Estimate (#5 and #6). The bivariate relationship between the BHRM Factor Group 2 risk estimate and religion is significant at $p \leq .05$ ($X^2 = 9.429$; df = 4). For the self-assessed / BHRM Factor Group 2 (mental status / psychosis risk factors) risk estimates and religion, two significant results are found. First, when compared to Christians, individuals with unknown religion are 12% less likely to self-assess using BHRM as high risk for mental status / psychosis risk factors (Factor Group 2). The odds of soldiers identified with their religion as "unknown" to self-assess as high risk in mental status / psychosis risk factors (Factor Group 2) is .897 (95% CI, .812-.991) times that of Christians, a statistically significant effect, Wald $X^2(1) = 4.557$, $p \leq .05$. Second, compared to Christians, those identifying as having a non-Christian religion are 5% less likely to self-assess using BHRM as high risk for mental status / psychosis risk factors (Factor Group 2). The odds of those identified as non-Christian to self-assess as high for mental status / psychosis risk factors (Factor Group 2) is .948 (95% CI, .897-1.002) times that of Christians, a statistically significant effect, Wald $X^2(1) = 3.621$, $p \leq .05$(see Table 25c).

Table 25c. *Results of Ordinal Logistic Regression – Demographic Variables predicting Behavioral Health Risk Management-Factor Group 2 Risk Estimates (n = 27,675; $p \leq .05$)*

BHRM – Factor Group 2_Risk Estimate*				
Variable	B(SE)	Wald (X^2)	*Sig.*	OR (95% CI)
FG2_RiskEstimate_BHRM, Low	.414 (.056)	53.937	.001	1.513 (1.355- 1.690)
FG2_RiskEstimate_BHRM, Mod	1.921 (.058)	1093.861	.001	6.831 (6.096-7.655)
FG2_RiskEstimate_BHRM, High	0			1.0
Religion, Unknown	-.109 (.051)	4.557	.033	.897 (.812-.991)
Religion, Non-Christian	-.054 (.028)	3.621	.057	.948 (.897-1.002)
Religion, Christian	0			1.0
Bivariate association: $p = .051$, $X^2 = 9.429(4)$; *Test of parallel lines: $X^2 = .327$				

BHRM = Behavioral Health Risk Management; B(SE) = Beta (Standard Error);
Wald X^2 = Chi-Square; *Sig.* = Significance; OR = Odds Ratio (Beta exponent);
CI = Confidence Interval; Mod = Moderate

Military Service Component and Provider Factor Group 2 Risk Estimate (#7). The bivariate relationship between the provider Factor Group 2 risk estimate and military service component is significant at $p \leq .05$ ($X^2 = 7.292$; df = 2). The only significant relationship for demographic variables and the provider determined risk estimates is among military service component and Factor Group 2 (mental status / psychosis risk factors). Tests find that when compared to regular (active duty) Army, Guard or Reserve service members are 6% less likely to be estimated by a provider as high risk for mental status / psychosis risk factors (Factor Group 2). The odds of those in the Guard or Reserve to be estimated by a provider as high risk for mental status / psychosis risk factors (Factor Group 2) is .933 (95% CI, (.877-.993) times that of regular Army service members, a statistically significant effect, Wald $X^2(1) = 4.696$, $p \leq .05$ (see Table 25d).

Table 25d. *Results of Ordinal Logistic Regression – Demographic Variables predicting Provider-Factor Group 2 Risk Estimates (n = 27,675; p ≤.05)*

Provider – Factor Group 2_Risk Estimate*				
Variable	B(SE)	Wald (X^2)	*Sig.*	OR (95% CI)
FG2_RiskEstimate_Provider, Low	1.541 (.022)	5071.909	.001	4.669 (4.475-4.871)
FG2_RiskEstimate_Provider, Mod	2.734 (.029)	8681.027	.001	15.394 (14.534-16.306)
FG2_RiskEstimate_Provider, High	0			1.0
MilSrvCompo, Guard or Reserve	-.069 (.032)	4.696	.030	.933 (.877-.993)
MilSrvCompo, Regular (Active)	0			1.0
Bivariate association: p = .033, X^2 = 7.292(2); *Test of parallel lines: X^2 = .106				
B(SE) = Beta (Standard Error); Wald X^2 = Chi-Square; *Sig.* = Significance; OR = Odds Ratio (Beta exponent); CI = Confidence Interval; Mod = Moderate; MilSrvCompo = Military Service Component				

Summary. Using ordinal logistic regression, tests reveal three significant predictive demographic variables for determining the likelihood of risk estimations by self-assessment / BHRM module or by the clinical provider (see Table 26). Those with significant predictive properties include three demographic variables. They include race, religion, and military service component for the BHRM risk estimate and military service component for the provider risk estimate. Among the three demographic variables that predict the risk estimates, there are seven significant findings. For the demographic variables predicting BHRM risk estimates, they include six findings: 1) compared to whites, non-whites are 8% less likely to self-assess as high in the final risk estimate; 2) compared to Christians, those with "unknown" religion are 11% less likely to self-assess as high in the final risk estimate; 3) compared to Christians, those with "non-Christian" religion are 7% less likely to self-assess as high in the final risk estimate; 4) compared to regular (active duty) Army, Guard or Reserve are 6% less likely to self-assess as high risk for behavioral health / depression / suicide risk factors (in Factor Group 1); 5) compared to Christians, those with "unknown" religion are 12% less likely to self-assess as high risk for mental status / psychosis risk factors (Factor Group 2); and 6) compared to Christians, those with

non-Christian religions are 5% less likely to self-assess as high risk for mental status / psychosis risk factors (Factor Group 2). For the demographic variables predicting provider risk estimates, there is one significant relationship; that is (#7), compared to regular (active duty) Army, Guard or Reserve are 6% less likely to be estimated by a provider as high risk for mental status / psychosis risk factors (Factor Group 2).

Table 26. *Demographic Variables predicting Behavioral Health Risk Estimates by Behavioral Health Risk Management and Provider - Significant Predictors (7)*

Demographic	**#**	**Comparison**
Race	1	Non-white service members are 8% less likely than whites to self-assess using ***BHRM*** as high in the final risk estimate.
Religion	2	Service members with "unknown" religion are 11% less likely than Christians to self-assess using ***BHRM*** as high in the final risk estimate.
	3	Service members with "unknown" religion are 12% less likely than Christians to self-assess using ***BHRM*** as high risk for mental status / psychosis risk factors (Factor Group 2).
	4	Service members with non-Christian religions are 7% less likely than Christians to self-assess using ***BHRM*** as high in the final risk estimate.
	5	Service members with non-Christian religions are 5% less likely than Christians to self-assess using ***BHRM*** as high risk for mental status / psychosis risk factors (Factor Group 2).
Military Service Component	6	Guard and Reserve are 6% less likely than active duty (regular) Army to self-assess using ***BHRM*** as high risk for behavioral health / depression / suicide risk factors (Factor Group 1).
	7	Guard and Reserve are 6% less likely than active duty (regular) Army to be estimated by a ***Provider*** as high risk for mental status / psychosis risk factors (Factor Group 2).

BHRM = Behavioral Health Risk Management

CHAPTER 5

Discussion

Introduction

In Chapter 5, a discussion is offered along with a critique of the study; limitations, identification of the strengths of the study; general, policy and research implications; and a conclusion.

Behavioral health problems are a significant public health concern, which are often difficult to assess and manage as they have multiple contributing factors (NIMH, 2008a; DHHS, SAMHSA, 2015). Traditional approaches have not been successful in reducing the prevalence of this issue (CBHSQ, 2013). Innovations in integrated behavioral health risk assessment, aided by technology, have the potential to reduce the prevalence of behavioral health problems. The purpose of this study is to explore and expand scientific knowledge in the area of behavioral health and examine a recent innovation, which may offer promise in behavioral health risk assessment and estimation.

Study Summary

In this study, we examined the population characteristics; prevalence, associations, internal reliability, and model structure of the BHRA-Q; the BHRM module and provider risk estimates; and the predictive properties of the demographic data toward risk estimation. Each is addressed after a discussion of the population's characteristics as they relate to other populations.

Characteristics of Population. Population characteristics of the WTU service members examined within the study appear to generally represent the overall active duty and Guard / Reserve military population serving from 2009 to 2013. Therefore, the study findings may be of value in behavioral health risk assessment and estimation of other at-risk, military behavioral

health populations. However, there are limitations for purposes of generalization as there appear to be some differences. The dissimilarity between active duty service members and Guard / Reserve soldiers is related to age, marital status, and education level. In comparison to active duty, the Guard/Reserve represents an older population, are less likely to be married, and less likely to have an education level above a high school diploma (see Table 27).

Comparison of military to civilian populations regarding behavioral health concerns is sometimes problematic. A large number of agencies collect and analyze behavioral health data. Each agency has their own method of defining and capturing the data. Successful comparison of military to civilian populations is highly dependent on how the data is defined, collected, and reported (frequencies, percentages, or rates; time frames – current experience, within last 30 days, or lifetime; grouping-by age, race, gender; etc.) as well as on the availability of the data by year (agencies publishing at different times). For example, the most recent report available from CDC MMWR (2011) reports that in 2008-2009, an estimated 3.7% of the adults reported having suicidal thoughts, 1% reported having made suicide plans, and approximately 0.5% reported making a suicide attempt *in the past year*, while a study by Nock et al. (2014) conducted in 2011 reports a *lifetime prevalence* of 14% of suicide thoughts and 2.4% of suicide attempts by Army soldiers.

Prevalence, Associations, Internal Reliability and Model Testing of the Behavioral Health Risk Assessment-Questionnaire (BHRA-Q). As expected for a medical population, high prevalence / proportion of risk factors are associated with health problems, including high rates of physical pain (greater than mild); fair or poor health; sleep problems; and concussion / traumatic brain injury. The prevalence of behavioral health risk factors is also a concern in that 38% of the study subjects endorsed a history of a behavioral health diagnosis; one-third

endorsing perception of self as a failure, emotional pain greater than mild (rating >3), and racing thoughts; ~ 40% with anxiety and 36% post-traumatic stress; and for those identifying any emotional pain above 3, the average rating is approximately 4 (on a 10-point, ascending severity scale).

The associations which demonstrate significance also followed the prevalence of the endorsement of risk factors. The analysis of the BHRA-Q response data revealed significant relationships among the behavioral health risk variables related to health and behavioral health. The majority of significant relationships are among the risk factors emotional pain, suicide, perceptions as failure, history of behavioral health diagnosis, psychosis (racing thoughts, hallucinations, paranoia), anxiety, post-traumatic stress, substance use, relationship problems, problems sleeping, and physical pain.

In analysis of the data, we find significant relationships, strong internal consistency of the BHRA-Q, and that the data are a good fit for the eight-factor group (model) structure of the questionnaire. To assess whether the BHRA-Q is capturing the actual construct of behavioral health risk, the reliability (internal consistency) of the instrument is analyzed using statistical tests of Cronbach's alpha and Spearman-Brown (split-half) correlation. The BHRA-Q is found to have strong internal consistency when all 55 items within the eight factor groups are tested together. The results suggested that the BHRA-Q instrument is measuring the same construct – behavioral health risk.

In order to determine if the eight-factor group structure of the BHRA-Q is a good fit for the data, the model is tested using structural equation modeling to conduct a confirmatory factor analysis. The results suggest that the eight-factor group model represents the data being gathered and offers a good fit for the existing structure.

The face and content validity of the BHRA-Q is identified to support the BHRA-Q in its current eight-factor group model. Research informs each question-item and expert clinical consensus has guided its development.

Prevalence and Correlation of Risk Estimates using BHRM Module. The frequency of the BHRM recommended risk estimate and the provider determined risk estimate revealed interesting findings. When examining the frequencies and percentages, the data suggests that the BHRM module tends to assign the final risk estimate the risk as moderate or high. The distribution pattern of the BHRM final risk estimation recommendations bears out at about one-third of subjects being assigned to moderate, high, severe, and then 10% being assigned as low risk. Providers tend to estimate the final risk lower more frequently than the BHRM module. The distribution pattern of provider final risk estimation determinations reflects that about two-thirds of service members are being estimated as low, one-quarter estimated as moderate, 13% estimated as high, and less than 5% are estimated as severe risk.

Contrary to the frequencies and percentages, the analysis of the BHRM data demonstrates significant correlations among the BHRM recommended and provider determined risk for the eight factor groups and the final risk estimate. The nine risk level estimates for Factor Groups 1-8 and the Final Risk Estimate demonstrate statistically significant relationships and a positive relationship (both increasing) between all of the BHRM recommended and the provider determined risk level estimates ($p < .01$). Although, the frequencies and percentages and the correlations appear to be at odds, there is still much to be learned from future research. Re-examination of the clinical consensus used to derive the liability percentages for the risk estimations may offer improved risk assessment and estimation.

Demographic Variables Predicting Behavioral Health Risk Estimation using the BHRM Module (Self-Assessment) and Clinical Provider. Examination of the demographic predictors of risk estimation by the BHRM module or the provider using ordinal logistic regression reveals three predictive demographic variables for determining the likelihood of risk estimations by self-assessment / BHRM module or by the clinical provider. The three demographic variables include race, religion and military service component. Among the three demographic variables that predict the risk estimates, there are seven significant findings. For the demographic variables predicting BHRM risk estimates, there are six significant findings: 1) compared to white service members, non-whites are 8% less likely to self-assess as high in the final risk estimate; 2) compared to Christian service members, those with "unknown" religion are 11% less likely to self-assess as high in the final risk estimate; 3) compared to Christian service members, those with identifying a non-Christian religion are 7% less likely to self-assess as high in the final risk estimate; 4) compared to regular (active duty) Army, Guard or Reserve are 6% less likely to self-assess as high risk for behavioral health / depression / suicide risk factors (in Factor Group 1); 5) compared to Christian service members, those with "unknown" religion are 12% less likely to self-assess as high risk for mental status / psychosis risk factors (Factor Group 2); and 6) compared to Christian service members, those with non-Christian religions are 5% less likely to self-assess as high risk for mental status / psychosis risk factors (Factor Group 2).

For the set of demographic variables predicting provider risk estimates, the study findings reveal there is only one significant relationship; that is, compared to regular (active duty) Army, Guard or Reserve are 6% less likely to be estimated by a provider as high risk for mental status / psychosis risk factors (Factor Group 2). The limited results may be an indication of the unbiased risk estimation by the provider, which may be viewed as a beneficial finding.

The studies' findings appear to support efforts to find improved approaches to behavioral health risk management using technology. The integrated, multi-risk factor approach of the BHRA-Q has demonstrated internal consistency as well as a good fit for the factor group structure of the tool. The BHRM module risk estimation tool appears to largely support clinical decision support by clinical providers. Although demographic variables, as grouped in this study, are not strong predictors of the risk estimation through self-assessment using the BHRM module and even less by the provider, further study is required.

Critique of Study

This study is quite complex and involved multiple agencies, which required intense perseverance by the researcher. The use of study data requires permissions from the University of Houston, U.S. Army Medical Command and their subordinate agencies, DMDC, and DHA HIT. Data is requested by the researcher a couple of times due to missing or invalid data. From the initial request to final receipt of the data, delivery of the correct data is approximately two years.

Once the final data are received, the data require transformation due to the scale design of the BHRA-Q. The questionnaire uses multiple scales (0 to 10, "yes" and "no," and two questions are ordinal). Data transformation is required for each statistical test, which may limit study findings.

This initial study addresses frequencies, descriptives, relationships, internal reliability, structural fit of the BHRA-Q, correlations of risk estimations, and the demographic predictors for risk estimation. The researcher limited the focus of this study to the analysis of the BHRM data related to the first behavioral health risk estimate conducted using BHRM. The service member may have completed the BHRA-Q more than once (e.g., if determined as high risk, the service

member would have completed the BHRA-Q at least once a week for the length of time assigned to the WTU). Studies of the risk estimations conducted after the first BHRA-Q are suggested.

Strength of Study

There are a number of strengths to this study. The study is the first known effort to analyze behavioral health risk estimation data in the military. The strength in being the first is that hopefully this study's findings will lead to new innovations and studies to help reduce the risk of adverse behavioral health events, particularly those that result in death.

The large number of subjects in the study allows statistical testing, which would otherwise not be available with a smaller number of subjects. The population studied appears to represent the general military population serving from 2009 to 2013; therefore, the study findings may be of value in risk assessment and estimation of the select at-risk military populations.

The availability of the BHRM risk estimation data are a strength; in that, there are no other systems like PBH-TERM that gather the degree of behavioral health risk estimation data for military populations like what is available in BHRM. The BHRM module is specifically built to hold the behavioral health risk data and supports efforts toward improved risk estimation.

The greatest strength of this study is the dedication of the Army WTU social workers. These devoted providers assess the service members on a daily basis and consistently input the BHRA-Q data into the BHRM module. Their dedication allows current efforts to reduce the risk of adverse events using technology to advance the state of scientific knowledge. The BHRM's contribution to the future of behavioral health assessment and risk estimation is part of their legacy.

Limitations

There are a few limitations to this study including generalizability, data integrity, and complexity of the BHRA-Q instrument.

Generalization. Generalization to populations outside the military medical community is limited. Comparison of the WTU service member population demographics to the active duty and Guard / Reserve populations reveal some population differences (see Table 27).

Demographic data from 2011 for the Army is used as a comparison population to the WTU population. The year 2011 is the mid-point year for the WTU data used, which was 2009 to 2013 (Office of the Deputy Under Secretary of Defense [ODUSD], 2011). In this study, the majority of the subjects are white (72%), males (86%), ages 17 to 34 (59%), married (63%), high school diploma and above (76%), and enlisted at the rank of Specialist (E-4), Sergeant (E-5) or Staff Sergeant (66%). Active duty Army demographic for those years represents the majority of service members are white (70%), males (86%), ages 17 to 35 (78%), married (57%), high school diploma or above (94%), and enlisted at the rank of Specialist (E-4), Sergeant (E-5) or Staff Sergeant (52%). Guard and Reserve Army demographic for those years represents the majority of service members are white (76%), males (82%), ages 18 to 35 (80%), married (48%), high school diploma or above (88%), and enlisted at the rank of Specialist (E-4), Sergeant (E-5) or Staff Sergeant (66%) (ODUSD, 2011). The age difference between the service members in the BHRM data (59%) and the active duty (78%) and Guard / Reserve (80%) is reflective of having an older population in the WTU. Soldiers in the WTU that are entered in the BHRM are more likely to be married (63%) as compared to the active duty (57%) and Guard / Reserve (48%) populations. They are also less likely to have the higher education levels above a high

school diploma (76%) than the active duty (94%) and Guard / Reserve (88%) populations of 2011.

Table 27. *Demographic Comparison of WTU Service Members with Army Active Duty and Guard / Reserve Populations**

Variable	WTU %	Active Duty (AD) %	Guard/Reserve %	WTU Population
White	72	70	76	
Male	86	86	82	
Ages – 17-34	59	78	80	Older
Married	63	57	48	More likely married
High School Diploma +	76	94	88	Less education
Enlisted (E4-6)	66	52	66	> # of E4-6

*Office of the Deputy Under Secretary of Defense (ODUSD) 2011 population data is compared to Warrior Transition Unit (WTU) 2009-2013. *Ages in ODUSD = 17 to 34; WTU = 18 to 34.*

In addition to population differences, the BHRM module is not used to manage other populations. This study examined only the WTC population, which is a singular, military-specific, at-risk medical population; thus, findings cannot be globally generalized to all medical, behavioral health, and / or military or civilian populations.

Data Integrity. Another limitation is the threat to data integrity. The requirement for providers to input data from the BHRA-Q by hand into the BHRM poses a risk to the integrity of data entered. Entering the responses to 55 questions into the BHRM on every service member can be tedious and errors may occur. Additionally, providers have varying degrees of experience with behavioral health risk estimation and this impacts the actual risk estimation selected. The experience of the researcher with BHRM users is that the more social work experience a clinical provider has, the less receptive they are to use of BHRM.

Survey Complexity. Finally, the BHRA-Q is a complex survey. The questionnaire is made up of nominal, ordinal and continuous variables. This design makes data analysis very

difficult as multiple data transformations and groupings are required. Streamlining the scaling of the BHRA-Q would benefit future studies.

General Implications

This is the first known study of behavioral health risk assessment and estimation using a multi-dimensional, integrated approach aided by technology. The results of this study can inform military and civilian behavioral health care provision in the area of behavioral health risk assessment, estimation and care / case management. Civilian organizations that support behavioral health populations may benefit from using integrated, multi-risk assessments, such as BHRA-Q or from using technologies, such as BHRM.

Policy Implications

The study has implications for military behavioral health policy as well as their design, purchase, and management of behavioral health information technology. The military values evidence-based practice; thus, this study can support their values and create policy in efforts to manage their most vulnerable populations, which have chronic behavioral health issues. The results of this study can inform military guidelines on the behavioral health risk assessment, estimation and management of at-risk service members. Similarly, this research has policy implications for civilian communities who support at-risk populations.

Research Implications

Implications for research in the field of behavioral health and risk assessment aided by technology seem apparent; in that, more research needs to be done in this area of study. This study provides a mere first step in examining toward future research. The next steps for future studies may include: 1) behavioral health risk estimation and effect on outcomes; 2) behavioral health assignment or assessment of case complexity; 3) behavioral health risk management;

4) individual goal setting and progress; 5) provider competency; 6) advantages using technology in training behavioral health risk assessment and estimation; 7) qualitative studies on professional perceptions regarding use of technology toward assessment and estimation; and 8) analysis by regions and demographics.

Conclusion

Innovations in behavioral health risk assessment and estimation, which include an integrated, multi-risk factor approaches aided by technology, may offer promise in the effort toward reducing adverse outcomes related to behavioral health problems. Using technology to embed a behavioral health risk assessment and estimation tool (like the BHRA-Q and the BHRM module) may be a viable option for standardized, evidence-based risk assessment in support of clinical decision making. The results of this research regarding the relationships, reliability, and model fit of the BHRA-Q, suggest that the integrated, multi-risk factor assessment tool captures the construct of behavioral health risk and is a good fit for the WTU population data. Analysis of risk estimations by the BHRM module and provider appear to support use of risk estimation tools for clinical decision support. The results found do not appear to be due to the large sample size as testing of smaller samples reveals similar results for the BHRA-Q testing and the effect size is large or medium for the risk estimations.

Although examination of the demographic variables as predictors of risk estimations (as grouped into sub-categories) did not reveal them to be not strong predictors of behavioral health risk estimation, further study is recommended. Suggested future research of integrated, multi-dimensional behavioral health risk assessment should include studies of risk assessment and estimation and their effect on reducing adverse behavioral health outcomes as well as examining behavioral health risk estimation over time.

Appendices

Appendix A

Research Questions and Hypothesis

Prevalence, Associations, Reliability and Model Testing of the Behavioral Health Risk Assessment questionnaire (BHRA-Q)

Research Question 1: What is the prevalence of endorsement or non-endorsement of behavioral health risk variables (55) by individuals completing the Behavioral Health Risk Assessment questionnaire (BHRA-Q)?
Examine: Descriptives and Frequencies

Research Question 2: What are the relationships among the behavioral health risk variables?
Hypothesis 1: There are significant relationships among the behavioral health risk variables (55).
Test: Pearson's Chi-Square

Research Question 3: Does the BHRM questionnaire demonstrate internal reliability?
Test: Alpha Reliability (Cronbach's alpha)

Research Question 4: Does the data confirm the eight-factor group structure (model) of the BHRA-Q?
***Hypothesis 2*:** The eight-factor group structure (model) of the BHRA-Q will be confirmed.
Test: Structural Equation Modeling, Confirmatory Factor Analysis

Prevalence and Correlation of Risk Estimates using the BHRM Module

Research Question 5: What is the prevalence of the behavioral health risk level estimates (low, moderate, high, or severe) recommended by the BHRM for each of the eight factor groups and the final risk estimate?
Examine: Descriptives and Frequencies

Research Question 6: What is the prevalence of the behavioral health risk level estimates (low, moderate, high or severe) determined by the clinical provider for each of the eight factor groups and the final risk estimate?
Examine: Descriptives and Frequencies

Research Question 7: What are the correlations among the risk level estimates (low, moderate, high or severe) recommended by the BHRM and the risk level estimates determined by the clinical provider for each of the eight factor groups and the final risk estimate?
***Hypothesis 3*:** There are significant correlations among the risk level estimates recommended by the BHRM and the risk level estimates determined by the clinical provider for each of the eight factor groups and the final risk estimate.
Test: Spearman's Rho

Appendix A cont'd. Research Questions and Hypothesis

Demographic Variables Predicting Behavioral Health Risk Estimation using the BHRM Module (Self-Assessment) and Clinical Provider

Research Question 8: What are the set of demographic variables (12) that predict the BHRM recommended (individual's self-assessed) risk level estimates in each of the eight factor groups and the final risk estimate (low, moderate or high)?
***Hypothesis 4*:** An individual's demographic variables will predict the BHRM recommended (individual's self-assessed) risk level estimates for each of the eight factor groups and the final risk estimate (low, moderate or high).
Test: Ordinal Logistic Regression

Research Question 9: What are the set of demographic variables (12) that predict the clinical provider's determined risk level estimates in each of the eight factor groups and the final risk level estimate (low, moderate or high)?
***Hypothesis 5*:** An individual's demographic variables will predict the clinical provider's risk level estimates determined for each of the eight factor groups and the final risk estimate (low, moderate or high).
Test: Ordinal Logistic Regression

Appendix B

Behavioral Health Risk Variables / Items (55)

Item	Factor Group	Question		Risk Factor / Variables
	Factor Group 1			**Behavioral Health /Depression/Suicide**
1		Question 1	FG1Q1	Emotional Pain
2		Question 2	FG1Q2	Suicide Thoughts
3		Question 3	FG1Q3	Suicide Plan
4		Question 4	FG1Q4	Suicide Means
5		Question 5	FG1Q5	History of Self-Harm
6		Question 6	FG1Q6	Hopefulness
7		Question 7	FG1Q7	Failure Perception
8		Question 8	FG1Q8	Behavioral Health Diagnosis-History
	Factor Group 2			**Mental Status/Psychosis**
9		Question 1	FG2Q1	Racing Thoughts
10		Question 2	FG2Q2	Special Powers
11		Question 3	FG2Q3	Hallucinations
12		Question 4	FG2Q4	Paranoia
	Factor Group 3			**Anxiety/Post-Traumatic Stress (PTS)**
13		Question 1	FG3Q1	General-History Anxiety
14		Question 2	FG3Q2	General-Panic Attacks
15		Question 3	FG3Q3	General-Avoidance
16		Question 4	FG3Q4	PTS-Nightmares
17		Question 5	FG3Q5	PTS-Avoidance
18		Question 6	FG3Q6	PTS-Hypervigilant
19		Question 7	FG3Q7	PTS-Emotional Detached
	Factor Group 4			**Anger/Aggression/Domestic**
20		Question 1	FG4Q1	Anger
21		Question 2	FG4Q2	Homicidal Thoughts
22		Question 3	FG4Q3	Anger/Abuse-Self or Others
23		Question 4	FG4Q4	Abuse-Current_of Others
24		Question 5	FG4Q5	Protective Order
25		Question 6	FG4Q6	Charged/Convicted Abuse
26		Question 7	FG4Q7	Weapons Possession
27		Question 8	FG4Q8	Relationship Breakup-Domestic Violence
28		Question 9	FG4Q9	Agreement w/Breakup-Domestic Violence

FG = Factor Group; Q = Question

Appendix B cont'd. Behavioral Health Risk Variables / Items (55)

Item	Factor Group Question			Risk Factor / Variables
	Factor Group 5			**Substance Use / Abuse**
29		Question 1	FG5Q1	Cut Down
30		Question 2	FG5Q2	Annoyed
31		Question 3	FG5Q3	Guilty
32		Question 4	FG5Q4	Eye Opener
33		Question 5	FG5Q5	Use Alcohol-Coping
34		Question 6	FG5Q6	Using Illegal Substances
35		Question 7	FG5Q7	Misuse Prescription Meds
36		Question 8	FG5Q8	Substance Treatment_Drop-Fail
	Factor Group 6			**Psychosocial History/Relationships**
37		Question 1	FG6Q1	Abused as Child
38		Question 2	FG6Q2	Relationship Satisfaction
39		Question 3	FG6Q3	Relationship Problems-Intimate Partner
40		Question 4	FG6Q4	Safe from Abuse
41		Question 5	FG6Q5	Problems-Children
42		Question 6	FG6Q6	Child Protective Service/Family Advocacy
	Factor Group 7			**Environment/Support System**
43		Question 1	FG7Q1	Learning Disability
44		Question 2	FG7Q2	Problems-Financial
45		Question 3	FG7Q3	Support Systems
46		Question 4	FG7Q4	Problems-Family/Friends
47		Question 5	FG7Q5	Problems-Job or Military
48		Question 6	FG7Q6	Problems-Legal
	Factor Group 8			**Health History/Traumatic Brain Injury**
49		Question 1	FG8Q1	Physical Health
50		Question 2	FG8Q2	Prescription Meds-Taking as Prescribed
51		Question 3	FG8Q3	Concussion/Traumatic Brain Injury
52		Question 4	FG8Q4	Pain-Current
53		Question 5	FG8Q5	Pain Level
54		Question 6	FG8Q6	Pain-Treatment
55		Question 7	FG8Q7	Problems-Sleep

FG = Factor Group; Q = Question

Appendix C

Behavioral Health / Social Work Risk Assessment-Questionnaire, Page 1

Directions: Please circle the appropriate response.

FACTOR GROUP 1 (F1) – **BEHAVIORAL / MENTAL HEALTH (Self-Harm/Suicide Factor)**												
F1-1: On a scale of 0-10, "10" having totally disabling emotional pain or distress and "0" having no emotional pain or distress, how would you ***rate your emotional pain or distress***?												
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	Unknown
F1-2: Are you having thoughts of harming or killing yourself?										**No**	**Yes**	Unknown
F1-3: Do you have a plan to harm yourself (shoot, cut, or hang yourself; overdose; etc.)?										**No**	**Yes**	Unknown
F1-4: Do you access to means to carry out that plan (knives, rope, gun, drugs/medications)?										**No**	**Yes**	Unknown N/A
F1-5: Have you ever tried to harm yourself?										**No**	**Yes**	Unknown
F1-6: Are you hopeful about your future?										**Yes**	**No**	Unknown
F1-7: How often do you perceive you have failures in your life? **Never Rarely Occasionally Frequently** Unknown												
F1-8: Have you ever been diagnosed with a mental health condition/illness by a health care provider?										**No**	**Yes**	Unknown
FACTOR GROUP 2 (F2) – **MENTAL STATUS**												
F2-1: During the past week, have you had thoughts "racing" through your head?										**No**	**Yes**	Unknown
F2-2: Do you believe you have special powers?										**No**	**Yes**	Unknown
F2-3: Do you hear voices or are you "seeing things" [that others do not see or hear]?										**No**	**Yes**	Unknown
F2-4: Do you believe that people are watching you (paranoia)?										**No**	**Yes**	Unknown
FACTOR GROUP 3 (F3) – **ANXIETY AND PTSD**												
F3-1: Do you have any problems with anxiety, "nerves" or panic attacks?										**No**	**Yes**	Unknown
F3-2: Have you ever experienced a sudden surge of overwhelming discomfort or extreme "anxiety" that came on without any warning or for no apparent reason?										**No**	**Yes**	Unknown
F3-3: Do you avoid certain people, places, conversations, or other non-combat situations because you are concerned that you may experience a sudden surge of overwhelming discomfort or anxiety?										**No**	**Yes**	Unknown
*In your life, have you ever had any experience that was so frightening, horrible or upsetting that **in the past month**, you….*												
F3-4: Had nightmares about it or thought about it when you did not want to?										**No**	**Yes**	Unknown
F3-5: Tried hard not to think about it or went out of your way to avoid situations that reminded you of it?										**No**	**Yes**	Unknown
F3-6: Were constantly on guard, watchful, or easily startled?										**No**	**Yes**	Unknown
F3-7: Felt numb or detached from others, activities, or your surroundings?										**No**	**Yes**	Unknown
FACTOR GROUP 4 (F4) – **ANGER / AGGRESSION INCLUDING DOMESTIC VIOLENCE**												
F4-1: Are you currently angry at anyone or about any situation?										**No**	**Yes**	Unknown
F4-2: Do you have thoughts or plans to harm or kill another person?										**No**	**Yes**	Unknown
F4-3: Have you recently broken objects or hurt yourself, others (emotionally, physically, sexually), or an animal due to your anger?										**No**	**Yes**	Unknown
F4-4: Are you currently involved in physical, emotional or sexual abuse of anyone (including family members)?										**No**	**Yes**	Unknown
F4-5: Do you currently have a restraining or protection order in place against you?										**No**	**Yes**	Unknown
F4-6: Have you ever been charged or convicted of an offense of assault or abuse?										**No**	**Yes**	Unknown
F4-7: Do you have weapons in your home (firearms, switchblades, knife collections, etc.)?										**No**	**Yes**	Unknown
F4-8: Have you recently had a relationship break-up, separation, or divorce due to you or your intimate partner's anger/aggressive behavior?										**No**	**Yes**	Unknown
F4-9: If you have recently had a relationship break-up, separation, or divorce due to you or your intimate partner's anger/aggressive behavior, are you in agreement with the break-up/separation/divorce?										**Yes**	**No**	Unknown N/A

Appendix C cont'd. Behavioral Health / Social Work Risk Assessment-Questionnaire, Page 2

FACTOR GROUP 5 (F5) – **SUBSTANCE ABUSE**				
F5-1: Have you ever felt you should cut down on your drinking?	No	Yes	Unknown	
F5-2: Have people annoyed you by criticizing your drinking?	No	Yes	Unknown	
F5-3: Have you ever felt bad or guilty about your drinking?	No	Yes	Unknown	
F5-4: Have you ever had a drink first thing in the morning to steady your nerves or to get rid of a hangover (eye opener)?	No	Yes	Unknown	
F5-5: Do you drink alcohol or use drugs to cope with stress?	No	Yes	Unknown	
F5-6: Are you currently using any controlled or illegal substances (i.e., marijuana, cocaine, crack, stimulants, sedatives, tranquilizers, heroin, opiates, psychedelics)?	No	Yes	Unknown	
F5-7: Are you currently misusing prescribed medications, herbal supplements/remedies, sports nutritional supplements?	No	Yes	Unknown	
F5-8: Have you ever dropped out or failed any prior alcohol or drug treatment?	No	Yes	Unknown	
FACTOR GROUP 6 (F6) – **PSYCHOSOCIAL HISTORY / RELATIONSHIPS**				
F6-1: Were you emotionally, physically or sexually abused, neglected or sexually assaulted as a child or an adult?	No	Yes	Unknown	
F6-2: On a scale of 0 – 10, "10" being *Very Dissatisfied* with your marriage/relationship and "0" being *Very Satisfied*, How do you rate your satisfaction with your marriage/relationship? 0 1 2 3 4 5 6 7 8 9 10			Unknown	N/A
F6-3: Are you experiencing any problems with your spouse or intimate partner?	No	Yes	Unknown	N/A
F6-4: Do you and your children feel safe from domestic abuse at home?	Yes	No	Unknown	
F6-5: Are you currently having any problems with your children?	No	Yes	Unknown	N/A
F6-6: Have you, your family or person you are currently in a relationship with ever been to counseling or had involvement with any agency such as Child Protective Services or Family Advocacy due to physical, sexual, or emotional abuse or neglect?	No	Yes	Unknown	
FACTOR GROUP 7 (F7) – **ENVIRONMENT / SUPPORT SYSTEMS**				
F7-1: Were you ever in special education classes or did you have a learning disability?	No	Yes	Unknown	
F7-2: Do you currently have any financial problems?	No	Yes	Unknown	
F7-3: Do you have good social support systems (friends, family, neighbors, co-workers, organizations, etc.)?	Yes	No	Unknown	
F7-4: Are you having trouble in your relationship with family or friends?	No	Yes	Unknown	
F7-5: Are there any problems with your civilian or military job?	No	Yes	Unknown	
F7-6: Do you presently have any legal problems?	No	Yes	Unknown	
FACTOR GROUP 8 (F8) – **HEALTH HISTORY AND TRAUMATIC BRAIN INJURY**				
F8-1: How would you describe your physical health?	Excellent	Good	Fair	Poor	Unknown
F8-2: Are you currently using/taking your prescribed medications as prescribed?	Yes	No	Unknown	N/A
F8-3: Did you have any concussions or closed head injuries during deployment?	No	Yes	Unknown	
F8-4: Are you experiencing physical pain today?	No	Yes	Unknown	
F8-5: On a scale of 0 – 10, "10" having *Totally Disabling* physical pain and "0" being *Pain Free*, how serious do you rate your physical pain? 0 1 2 3 4 5 6 7 8 9 10			Unknown	
F8-6: *If* you have physical pain, are you being treated for that pain?	Yes	No	Unknown	N/A
F8-7: Are you experiencing difficulty sleeping?	No	Yes	Unknown	

Appendix D

Behavioral Health (BH) Risk Factors (Variables) and
Questions (55) in the Behavioral Health Risk Assessment-Questionnaire (BHRA-Q)

BH Risk Factors	**Questions**
Emotional Pain	On a scale of 0-10, "10" having totally disabling emotional pain or distress and "0" having no emotional pain or distress, how would you ***rate your emotional pain or distress***?
Suicide	Are you having thoughts of harming or killing yourself?
Suicide Plan	Do you have a plan to harm yourself (shoot, cut, or hang yourself; overdose; etc.)?
Suicide Means	Do you access to means to carry out that plan (knives, rope, gun, drugs/medications)?
History Self-Harm	Have you ever tried to harm yourself?
Hopefulness	Are you hopeful about your future?
Failure Perception	How often do you perceive you have failures in your life?
BH Diagnosis-History	Have you ever been diagnosed with a mental health condition/illness by a health care provider?
Racing Thoughts	During the past week, have you had thoughts "racing" through your head?
Special Powers	Do you believe you have special powers?
Hallucinations	Do you hear voices or are you "seeing things" [that others do not see or hear]?
Paranoia	Do you believe that people are watching you (paranoia)?
General-Anxiety	Do you have any problems with anxiety, "nerves" or panic attacks?
General-Panic Attacks	Have you ever experienced a sudden surge of overwhelming discomfort or extreme "anxiety" that came on without any warning or for no apparent reason?
General-Avoidance	Do you avoid certain people, places, conversations, or other non-combat situations because you are concerned that you may experience a sudden surge of overwhelming discomfort or anxiety?
Post-Traumatic Stress _Nightmares	*In your life, have you ever had any experience that was so frightening, horrible or upsetting that in the past month, you…* Had nightmares about it or thought about it when you did not want to?
Post-Traumatic Stress _Avoidance	*In your life, have you ever had any experience that was so frightening, horrible or upsetting that in the past month, you…* Tried hard not to think about it or went out of your way to avoid situations that reminded you of it?

Appendix D cont'd. Behavioral Health (BH) Risk Factors (Variables) and Questions (55) in the Behavioral Health Risk Assessment-Questionnaire (BHRA-Q)

BH Risk Factors	**Questions**
Post-Traumatic Stress _Hypervigilant	*In your life, have you ever had any experience that was so frightening, horrible or upsetting that in the past month, you…* Were constantly on guard, watchful, or easily startled?
Post-Traumatic Stress _Detached	*In your life, have you ever had any experience that was so frightening, horrible or upsetting that in the past month, you…* Felt numb or detached from others, activities, or your surroundings?
Anger	Are you currently angry at anyone or about any situation?
Homicide Thoughts	Do you have thoughts or plans to harm or kill another person?
Anger/Abuse Self/Others	Have you recently broken objects or hurt yourself, others (emotionally, physically, sexually), or an animal due to your anger?
Abuse Others	Are you currently involved in physical, emotional or sexual abuse of anyone (including Family members)?
Protective Order	Do you currently have a restraining or protection order in place against you?
History Assault/Abuse	Have you ever been charged or convicted of an offense of assault, battery or abuse?
Weapons Home	Do you have weapons in your home (firearms, switchblades, knife collections, etc.)?
Relationship Breakup due to Domestic Violence	Have you recently had a relationship break-up, separation, or divorce due to you or your intimate partner's anger/aggressive behavior?
Agreement Breakup-Domestic Violence	***If*** you have recently had a relationship break-up, separation, or divorce due to you or your intimate partner's anger/aggressive behavior, are you in agreement with the break-up/separation/divorce?
SubstanceUse_CutDown	Have you ever felt you should cut down on your drinking?
SubstanceUse_Annoyed	Have people annoyed you by criticizing your drinking?
SubstanceUse_Guilty	Have you ever felt bad or guilty about your drinking
SubstanceUse_EyeOpener	Have you ever had a drink first thing in the morning to steady your nerves or to get rid of a hangover (eye opener)?
SubstanceUse_Coping	Do you drink alcohol or use drugs to cope with stress?
SubstanceUse_Controlled/ Illegal	Are you currently using any controlled or illegal substances (i.e., marijuana, cocaine, crack, stimulants, sedatives, tranquilizers, heroin, opiates, psychedelics)?
SubstanceUse_Medication Misuse	Are you currently misusing prescribed medications, herbal supplements/remedies or sports nutritional supplements?
History Substance AbuseTreatment Failure	Have you ever dropped out or failed any prior alcohol or drug treatment?

Appendix D cont'd. Behavioral Health (BH) Risk Factors (Variables) and Questions (55) in the Behavioral Health Risk Assessment-Questionnaire (BHRA-Q)

BH Risk Factors	**Questions**
Adverse Child Events	Were you emotionally, physically or sexually abused, neglected or sexually assaulted as a child or an adult?
Relationship Satisfaction	On a scale of 0 – 10, "10" being *Very Dissatisfied* with your marriage/relationship and "0" being Very Satisfied, How do you rate your satisfaction with your marriage/relationship?
Problems-Partner	Are you experiencing any problems with your spouse or intimate partner?
Safe from Abuse	Do you and your children feel safe from domestic abuse at home?
Problems-Children	Are you currently having any problems with your children?
History Protective Services	Have you, your Family or person you are currently in a relationship with ever been to counseling or had involvement with any agency such as Child Protective Services or Family Advocacy due to physical, sexual, or emotional abuse or neglect?
Learning Disability	Were you ever in special education classes or did you have a learning disability?
Problems-Financial	Do you currently have any financial problems?
Support Systems	Do you have good social support systems (friends, Family, neighbors, co-workers, organizations, etc.)?
Problems Family/Friends	Are you having trouble in your relationship with Family or friends?
Problems-Work	Are there any problems with your civilian or military job?
Problems-Legal	Do you presently have any legal problems?
Physical Health	How would you describe your physical health?
Medications As Prescribed	Are you currently using/taking your prescribed medications as prescribed?
Traumatic Brain Injury	Did you have any concussions or closed head injuries during deployment?
Pain-Current	Are you experiencing physical pain today?
Pain Level	On a scale of 0 – 10, "10" having *Totally Disabling* physical pain and "0" being *Pain Free*, how serious do you rate your physical pain?
Pain Treated	***If*** you have physical pain, are you being treated for that pain?
Problems-Sleep	Are you experiencing difficulty sleeping?

Appendix E

Factor Group Variables (8)

Factor Group	Risk Factor Group Topic
1	Behavioral Health / Depression / Self-Harm / Suicide
2	Mental Status / Psychosis
3	Anxiety / Post Traumatic Stress
4	Anger / Aggression / Violence
5	Substance Use / Abuse
6	Psychosocial History / Relationships
7	Environment / Support Systems
8	Health History / Traumatic Brain Injury
Final Estimate	by Behavioral Health Risk Management module or Provider

Appendix F

Risk Level Estimates (4), Liability Percentages and Study Values

Risk Level Estimate	**BHRM Liability Percentages**	**Study Value**
Low [Low or Guarded in BHRM]	0- 49%	1
Moderate [Elevated in BHRM]	50-79%	2
High	80-94%	3
Severe	95-100%	4

Appendix G

Demographic Variables (12)

#	**Variable**
1	Gender
2	Age at Risk Estimate
3	Marital Status at Risk Estimate
4	Race / Ethnicity
5	Religion
6	Education
7	Age at Military Entry
8	Rank at Risk Estimate
9	Military Service Component at Risk Estimate
10	Active Duty Service Length at Risk Estimate
11	Military Service-Length at Risk Estimate
12	Deployments before Risk Estimate

Appendix H

U. S. Army Approval for use of University of Houston Institutional Review Board

From: Torres, Brenda C CIV USARMY MEDCOM BAMC (US)
To: Foreman, Kathleen Putnam COL USARMY MEDCOM HQ (US)
Subject: RE: IRB Amendment - Process for Project 371295-1 - Duplicate IRBs? (UNCLA
Date: Monday, October 27, 2014 6:59:14 AM

Classification: UNCLASSIFIED
Caveats: NONE

Hello COL Foreman,

Since the protocol deems to be research not involving human subjects and if you have all your impact statements in place, our HPA is fine with the university IRB reviewing this for you.

Hopefully, this will go quicker for you.

Brenda

-----Original Message-----
From: Foreman, Kathleen Putnam COL USARMY MEDCOM HQ (US)
Sent: Sunday, October 26, 2014 2:39 PM
To: Torres, Brenda C CIV USARMY MEDCOM BAMC (US)
Cc: Robichaux, Rene J CIV USARMY MEDCOM HQ (US)
Subject: RE: IRB Amendment - Process for Project 371295-1 - Duplicate IRBs? (UNCLASSIFIED)

Okay… thank you.

I am quite surprised that the Army IRB would not require their IRB approval as we are using Army data.

Thanks,

COL kpf

-----Original Message-----
From: Torres, Brenda C CIV USARMY MEDCOM BAMC (US)
Sent: Thursday, October 23, 2014 1:59 PM
To: Foreman, Kathleen Putnam COL USARMY MEDCOM HQ (US)
Subject: RE: IRB Amendment - Process for Project 371295-1 - Duplicate IRBs? (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: NONE

Hello COL Foreman,

I spoke with our HPA and one of our HSPS regarding your protocol.

Your initial protocol received IRB office review as it met the definition of research not involving human subjects. The changes made still fit the definition, but they are numerous and would require a new submission.

With your new status as a reservist and the project not requiring BAMC IRB review, we advise you submit the protocol to your University IRB for review.

If your University IRB requires anything from us, please feel free to contact me and we may be able to provide a letter for you.

I hope this helps.

Sincerely, Brenda

-----Original Message-----
From: Foreman, Kathleen Putnam COL USARMY MEDCOM HQ (US)
Sent: Tuesday, October 21, 2014 3:26 PM
To: Torres, Brenda C CIV USARMY MEDCOM BAMC (US)
Subject: RE: IRB Amendment - Process for Project 371295-1 - Duplicate IRBs? (UNCLASSIFIED)

Okay… attached is the DRAFT ONLY (unapproved, in the works, IRB).

The data will still be de-identified when I receive it for analysis of the research questions.

thanks,

COL kpf

From: Torres, Brenda C CIV USARMY MEDCOM BAMC (US)
Sent: Tuesday, October 21, 2014 3:14 PM
To: Foreman, Kathleen Putnam COL USARMY MEDCOM HQ (US)
Subject: RE: IRB Amendment - Process for Project 371295-1 - Duplicate IRBs? (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: NONE

Yes, please

-----Original Message-----
From: Foreman, Kathleen Putnam COL USARMY MEDCOM HQ (US)
Sent: Tuesday, October 21, 2014 3:14 PM
To: Torres, Brenda C CIV USARMY MEDCOM BAMC (US)
Subject: RE: IRB Amendment - Process for Project 371295-1 - Duplicate IRBs? (UNCLASSIFIED)

I have a document in draft… but is has not been approved by the research committee for release. Will that do? At least it will give you an idea…

thank you

Appendix I
University of Houston, Institutional Review Board Approval

UNIVERSITY OF HOUSTON
Learning. Leading.

UNIVERSITY OF HOUSTON
Division of Research
Institutional Review Board Application

Generated at: 3/16/2015 11:27:48 PM

Institutional Review Board Application ID :	12388-EX - (5641)
Title :	Behavioral Health Risk Assessment: An Integrated Approach aided by Technology

Appendix J

Acronyms

α	Alpha
AHRQ	Agency for Healthcare Research Quality
AMOS	International Business Machines, AMOS package
APA	American Psychiatric Association
AUDIT	Alcohol Use Disorder Identification Test
B	Beta
BASIS	Behavior and Symptom Identification Scale
BHDP	Behavioral Health Data Portal
BHRA-Q	Behavioral Health Risk Assessment-Questionnaire
BHRM	Behavioral Health Risk Management
BHSL	Behavioral Health Service Line [MEDCOM]
CAGE	Cut down, Annoyed, Guilty, or Eye Opener
CBHSQ	Center for Behavioral Health Statistics and Quality [DHHS, SAMHSA]
CDC	Centers for Disease Control [DHHS]
CDSS	Clinical Decision Support System
CFA	Confirmatory Factor Analysis
CI	Confidence Interval
CPG	Clinical Practice Guidelines
DBSM	Defense Business Systems Management
df	degrees of freedom
DHHS	Department of Health and Human Services
DoD	Department of Defense
DMDC	Defense Manpower Data Center
DSM IV-TR	Diagnostic and Statistical Manual-Text Revision
DSM-V	Diagnostic and Statistical Manual-V
eBASIS	electronic Behavior and Symptom Identification Scale
expB	B Exponent
FG	Factor Group
GAD	Generalized Anxiety Disorder
GED	Graduate Equivalency Degree
IBM	International Business Machines
IRB	Institutional Review Board
JBSA	Joint Base San Antonio
JC	Joint Commission [for the Accreditation of Hospitals]
LEC	Life Events Checklist
M	Mean
MCDM	Multiple Criteria Decision Making
MDQ	Mood Disorder Questionnaire
MEDCOM	U.S. Army Medical Command
MMWR	Mortality and Morbidity Weekly Report

Appendix J cont'd. Acronyms

MOS	Medical Outcomes Study
N or n	Number
NCIPC	National Center for Injury Prevention and Control
NCHS	National Center for Health Statistics
NetDSS	Net Decision Support System
NICE	National Institute of Health and Clinical Excellence
NIMH	National Institute of Mental Health
ODUSD	Office of Deputy Under Secretary of Defense
ONCHIT	Office of the National Coordinator for Health Information Technology
OR	Odds Ratio
OLR	Ordinal Logistic Regression
p	Statistical Significance value
PBH-TERM	Psychological and Behavioral Health-Tools for Evaluation and Risk Management
PBRMS	Previdence Behavioral Risk Management System
PHQ-9	Physician's Health Questionnaire
PSQ	Patient Stress Questionnaire
PTS	Post-Traumatic Stress
PTSD	Post-Traumatic Stress Disorder
Q	Question
r	Correlation
REV	Reversed
SAF-T	Suicide Assessment Five-Step Evaluation and Triage
SAMHSA	Substance Abuse and Mental Health Services Administration
SATVA	Software and Technology Vendors' Association
SD	Standard Deviation
SE	Standard Error
SEM	Structural Equation Modeling
Sig.	Significance
SPSS	Statistical Package for Social Sciences
TBI	Traumatic Brain Injury
U.S.	United States
USAMITC	U.S. Army Medical Information Technology Centetr
VA	Veterans Administration
VHA	Veteran's Health Administration
WHO	World Health Organization
WLSMV	Weighted Least Squares, Means and Variances
WTC	Warrior Transition Command
WTU	Warrior Transition Unit
X^2	Chi-Square
%	Percentage

Figures

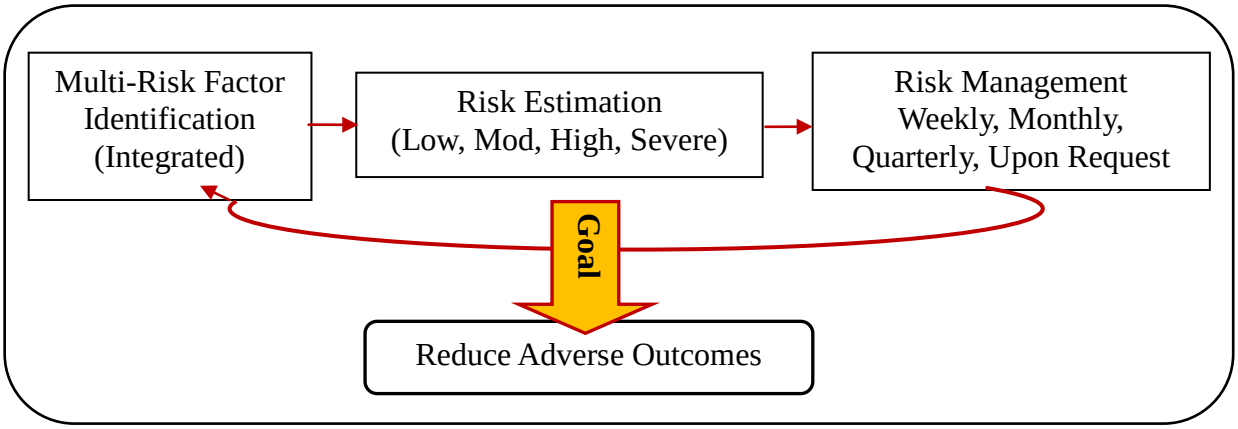

Figure 1. Behavioral Health Risk Assessment, Estimation and Management Model (Basic). The theoretical concept behind this model involves integration of multi-risk factors from behavioral health-related fields of science – biological, psychological, or sociological – to improve behavioral health risk assessment, estimation and management. Individual multi-risk factors influence the level of the behavioral health risk estimate determined (low, moderate, high, or severe) and the intervals and resources allocated for continued risk management. The goal of the process is to reduce adverse outcomes.

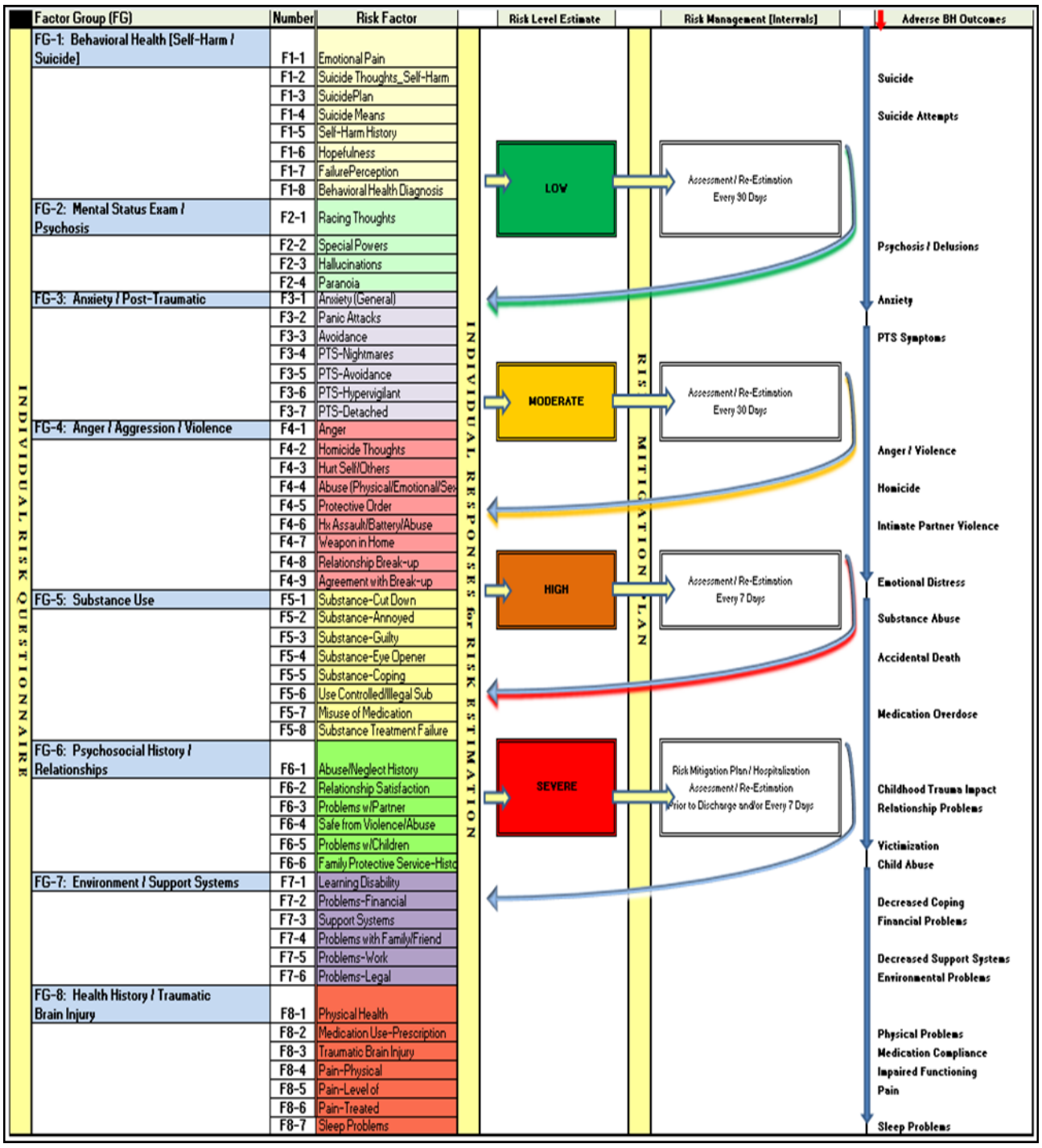

Figure 2. Behavioral Health Risk Assessment, Estimation and Management Model (Full). The theoretical model for this study involves integration of multi-risk factors from behavioral health-

Figure 2 cont'd. Behavioral Health Risk Assessment, Estimation and Management Model (Full).

related fields of science – biological, psychological, or sociological – to improve behavioral health risk assessment, estimation and management. The model integrates 55 evidence-based / informed, multi-risk factors related to behavioral health problems. The risk factors are clustered into eight factor groups based on relatedness. Individual multi-risk factors self-assessed on the questionnaire influence the level of the behavioral health risk estimate (low, moderate, high, or severe) recommended by the BHRM and determined by the provider. The risk level assigned by the provider informs decision making regarding time intervals (weekly, monthly, monthly, quarterly, or upon request) and resources required for ongoing risk management and re-assessment. The goal is to reduce adverse outcomes, such as suicide, homicide, violence, accidental overdose, and other circumstances which may significantly impair functioning.

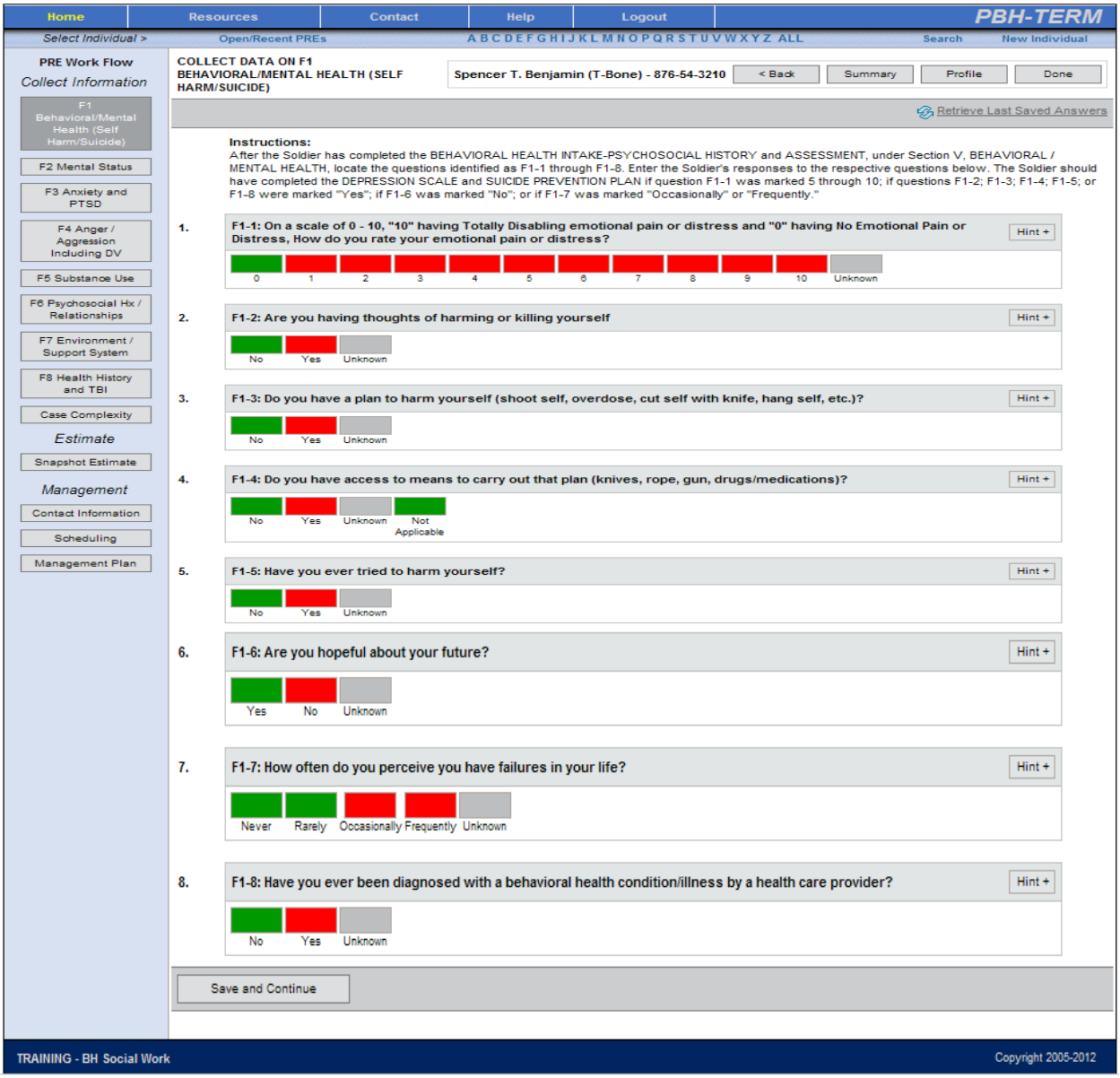

Figure 3. Behavioral Health Risk Management (BHRM) module – Behavioral Health Risk Assessment Questions, Individual (Self-Assessed) / Technology Aided (Example: Factor Group 1). An individual completes the Behavioral Health Risk Assessment-Questionnaire. The responses are registered for each Factor Group within the BHRM module. Above is an example of Factor Group 1 (Behavioral / Mental Health) and embedded questions.

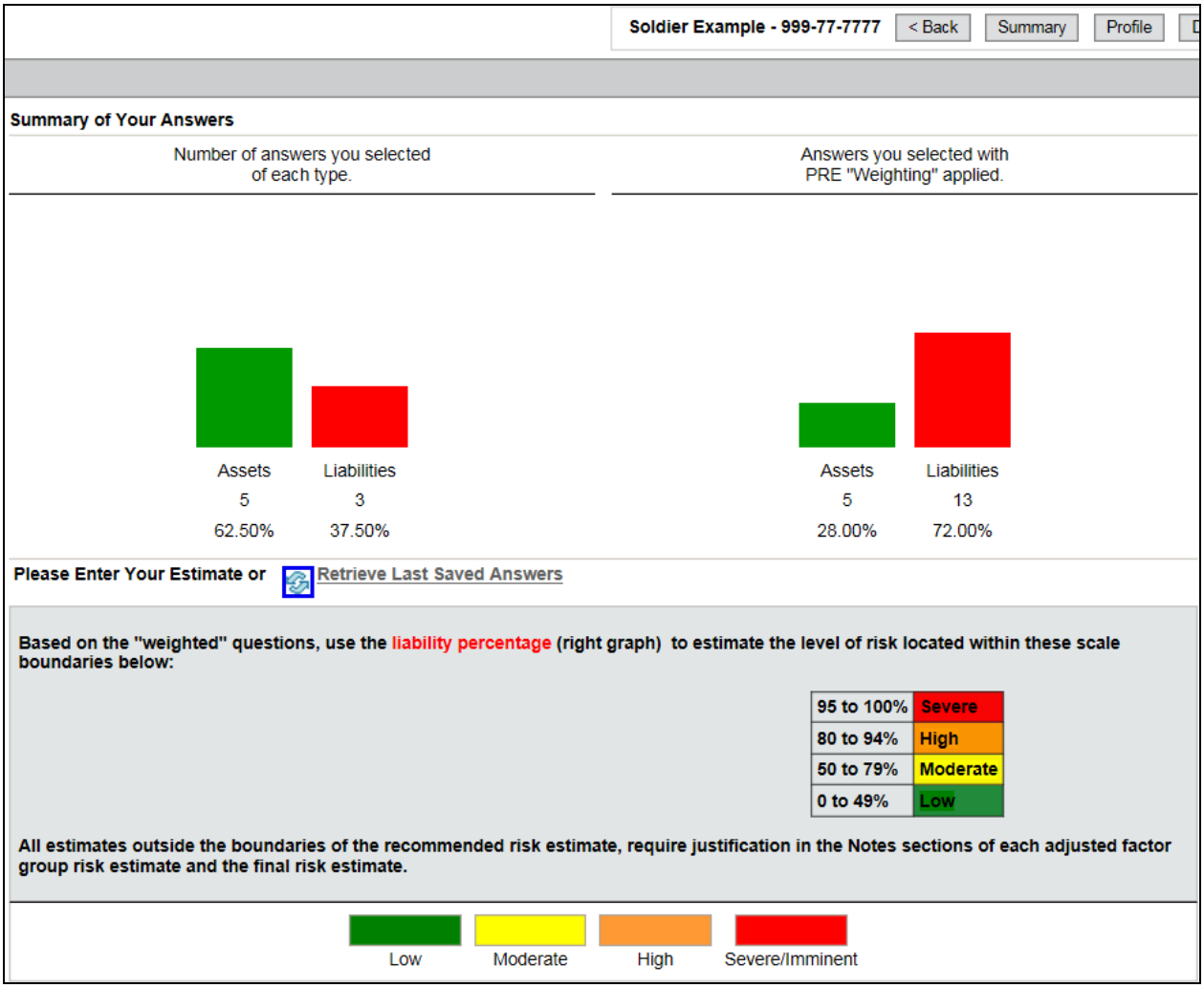

Figure 4. Behavioral Health Risk Management (BHRM) module – Behavioral Health Risk Estimates, Individual (Self-Assessed) / Technology Aided (Example: Factor Group 1). After individual responses to the questionnaire are entered in the BHRM module in the appropriate factor group, the BHRM auto-calculates the asset and liability percentages. The BHRM indicates to the provider recommended boundaries for the risk estimate. In the example above, a liability percentage of 72% would fall within the boundary of moderate risk (50 to 79%). The provider may select the risk level estimate as high (within recommended boundaries) or use clinical judgment to determine a greater or lesser level of risk.

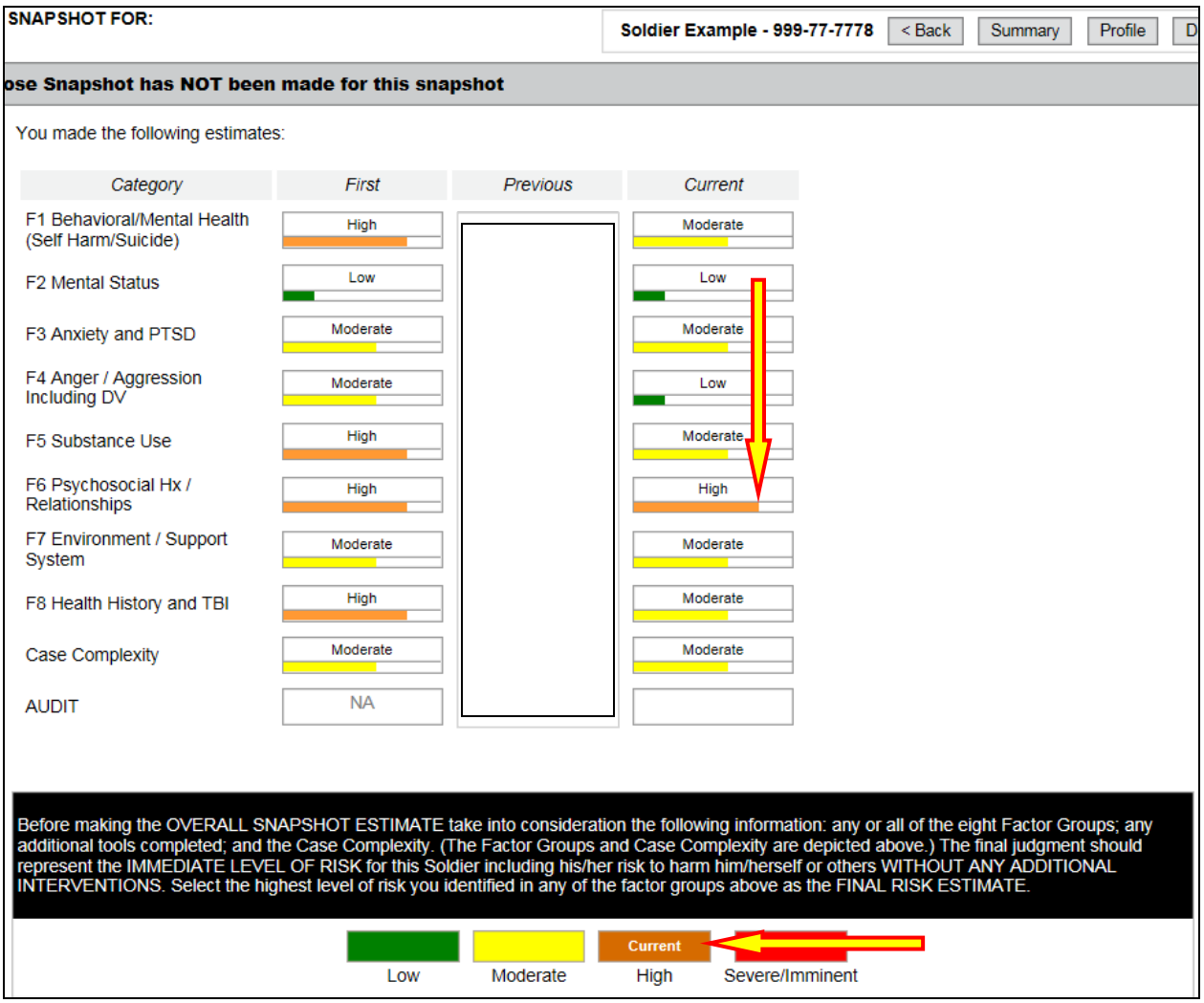

Figure 5. Behavioral Health Risk Management module – Behavioral Health Risk Estimates, Clinical Provider / Technology Aided. After each risk level estimate is determined by the provider, the provider selects the final (or overall) risk estimate. The final estimate is assigned (by policy directive) based on the highest level of risk determined to any factor group. In the example above, the highest level of risk assigned to any factor group is high; therefore, the overall risk estimate is determined as high risk.

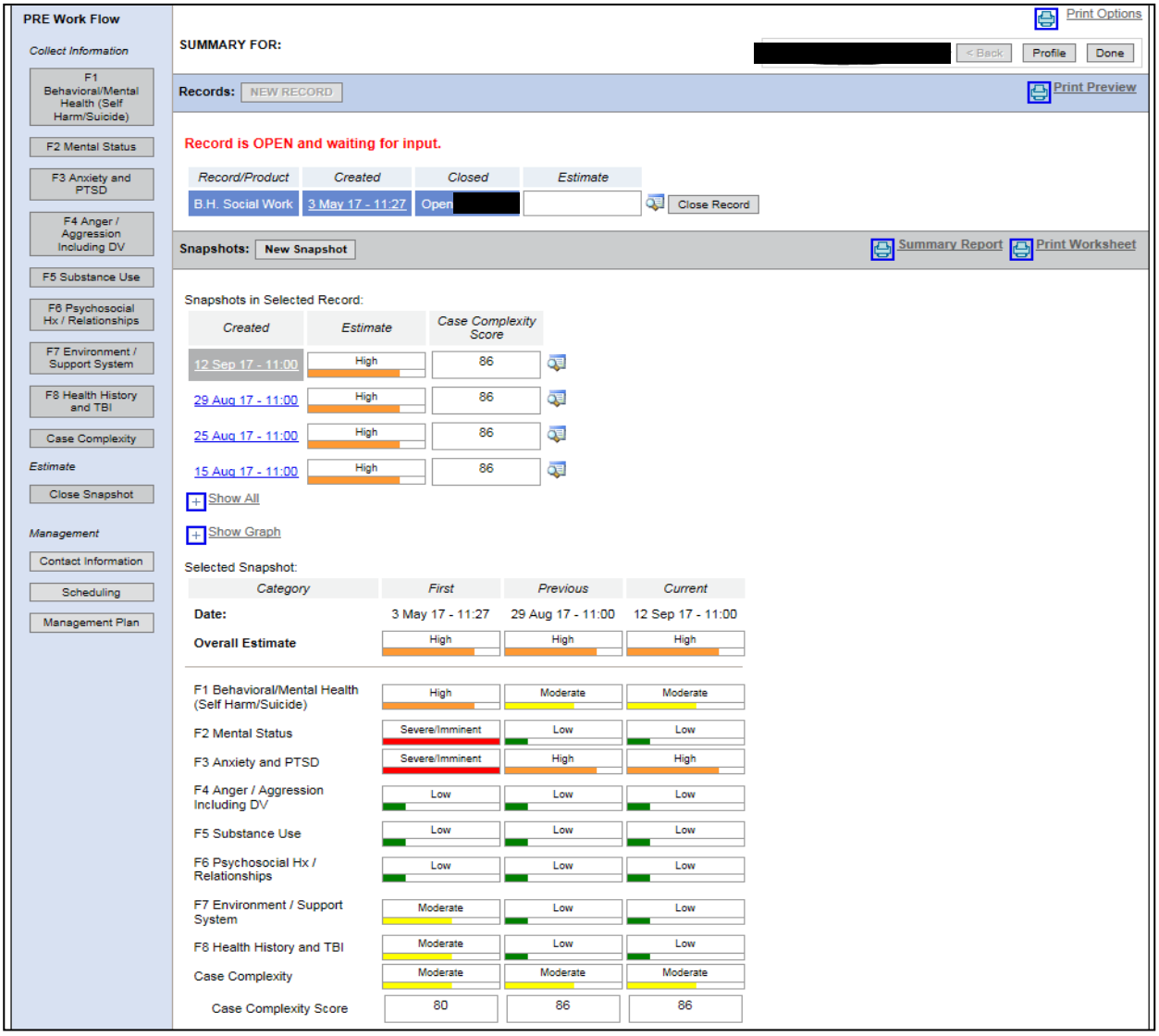

Figure 6. Behavioral Health Risk Management (BHRM) module – Summary Page. Behavioral Health Risk Estimates and Final Risk Estimate (Completed). After all factor group risk level estimates are completed and a final level of risk is estimated, the BHRM module registers the risk level estimate determined on the individual's summary page.

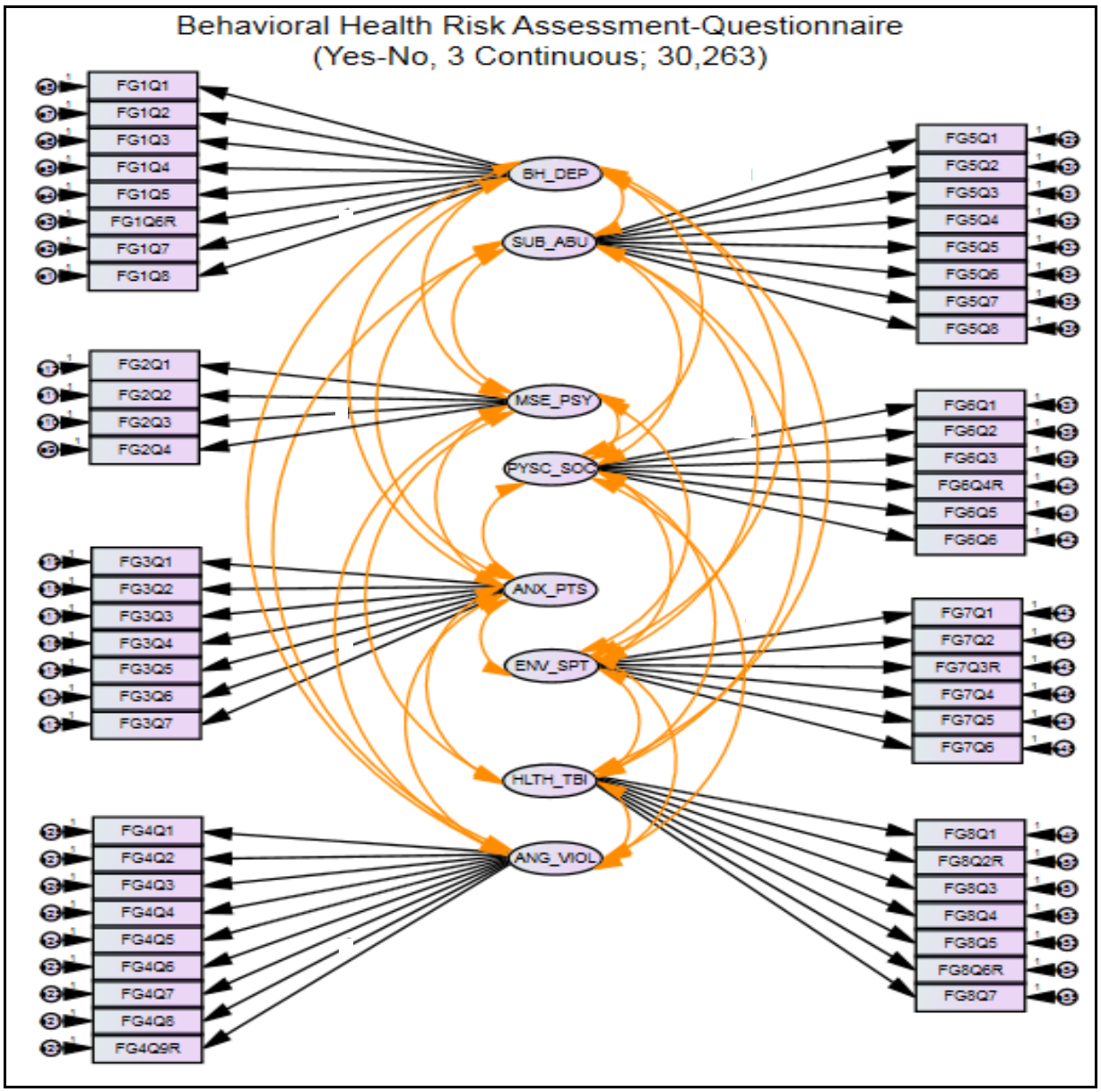

Figure 7. Behavioral Health Risk Assessment-Questionnaire (BHRA-Q), Factor Group Structure (Model). The BHRA-Q is modeled using AMOS 23 for Structural Equation Modeling (Arbuckle, 2014 [IBM Amos 23]). The model identifies three continuous and 52 categorical variables in the model examined in the study (N = 30,263 subjects). The BHRA-Q contains 55-item questions (observed variables) labeled in this figure within their Factor Groups as

Figure 7 cont'd. Behavioral Health Risk Assessment-Questionnaire (BHRA-Q), Factor Group Structure (Model)

rectangles. For example, FG1Q1 equates to Factor Group 1, Question 1 (emotional pain level) and FG8Q7 to Factor Group 8, Question 7 (sleeping difficulty). The latent variables are identified in the center of the figure (as ovals) (BH_DEP = behavioral health, depression; SUB_ABU = substance use / abuse; MSE_PSY = mental status evaluation, psychosis; PSYC_SOC – psychosocial; ANX_PTS = anxiety, post-traumatic stress; ENV_SPT = environment, support system; HLTH_TBI = health, traumatic brain injury; ANG_VIOL = anger, violence). Error terms are modeled within the figure as e1 through e55 (as small circles). Single arrows demonstrate regression of the latent variable on the question item. Double arrows demonstrate the covariance between latent variables.

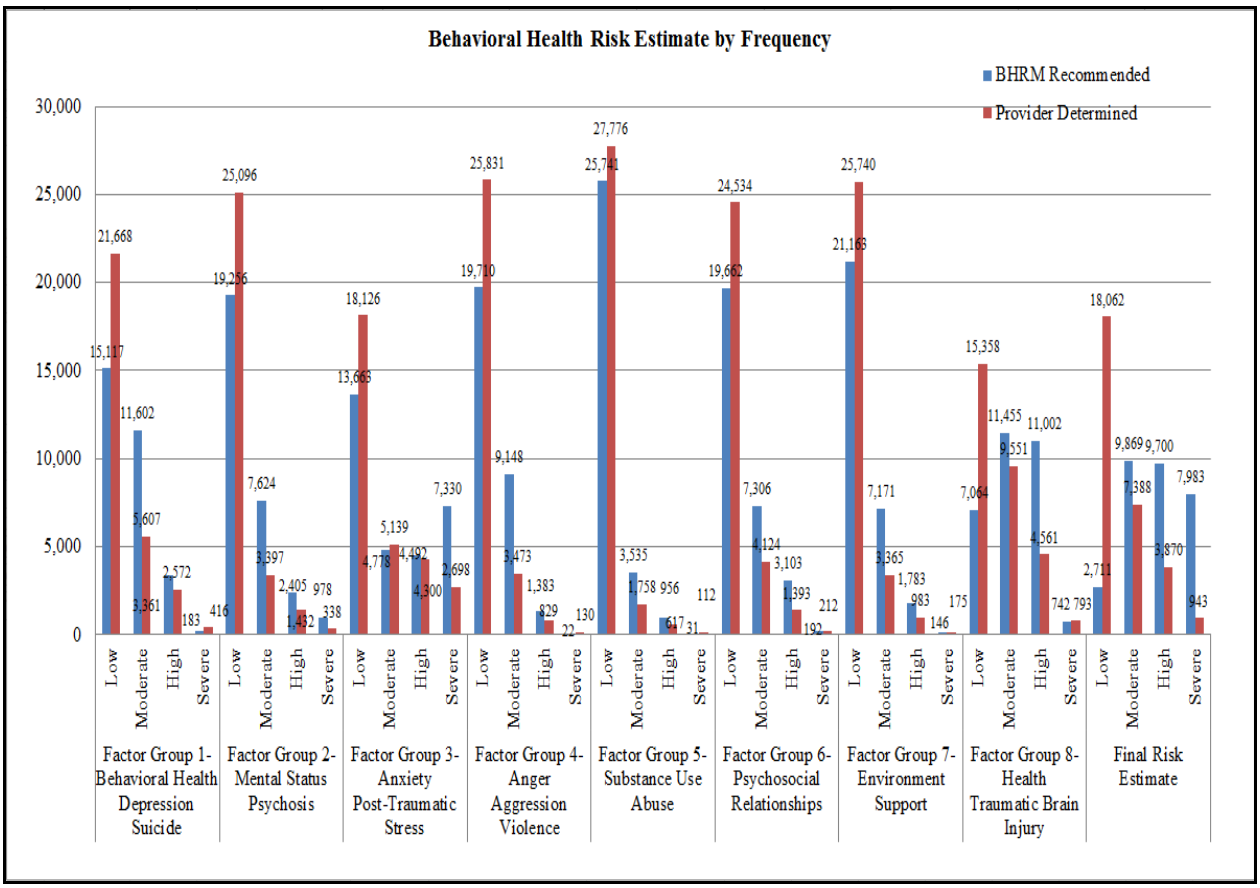

Figure 8. Behavioral Health Risk Estimates by Frequency – Behavioral Health Risk Management (BHRM) Recommended and Provider Determined. Factor Groups 1 through 8 and the Final risk estimate are displayed by the frequency of risk level estimates by BHRM and the provider (low, moderate, high, and severe). (N = 30,263)

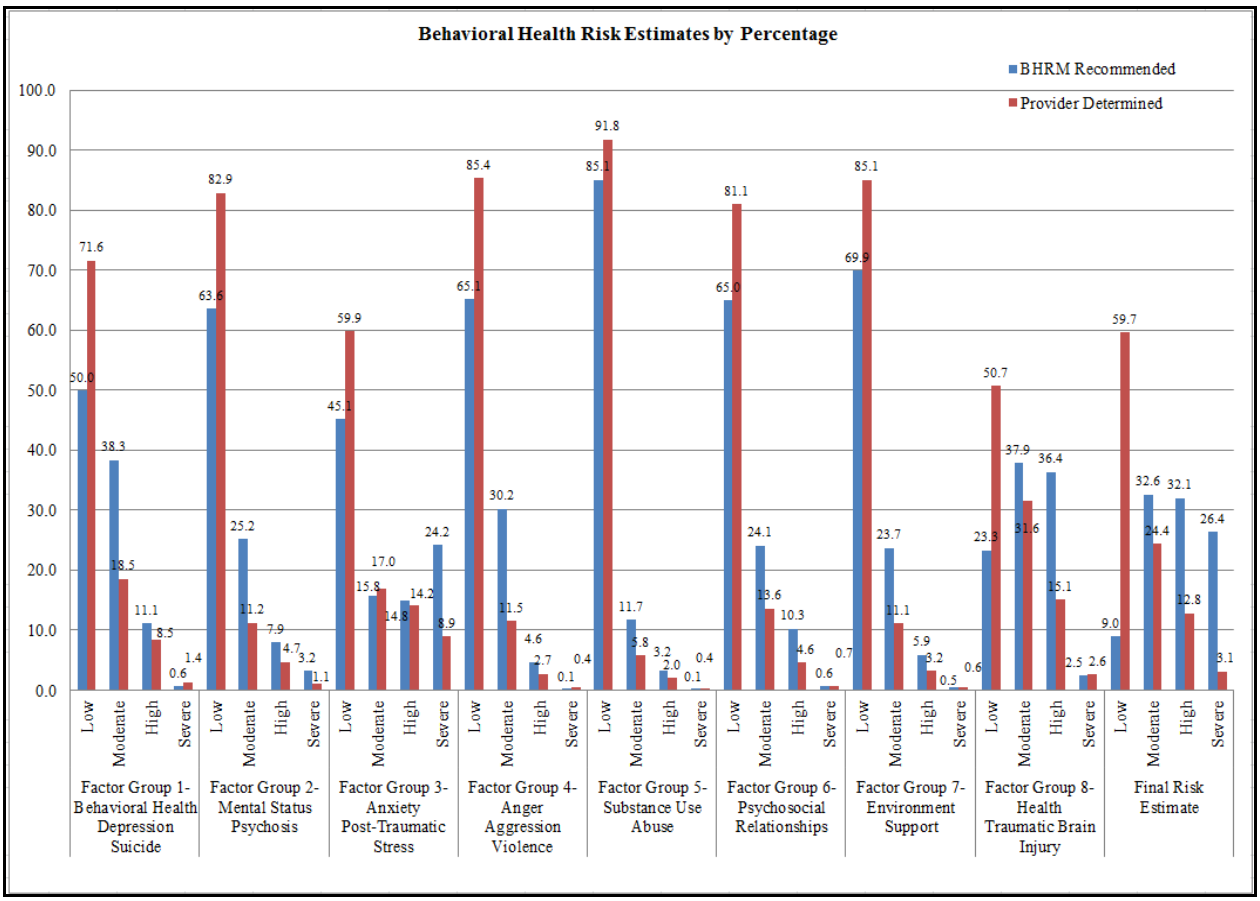

Figure 9. Behavioral Health Risk Estimates by Percentage – Behavioral Health Risk Management (BHRM) Recommended and Provider Determined. Factor Groups 1 through 8 and the Final risk estimate are displayed by the percentage of risk level estimates by BHRM and the provider (low, moderate, high, and severe). (N = 30,263)

Tables

Table 1

Demographic Characteristics of Subjects (N = 30,265-650; n = 29,615*)

Variables	Category	Frequency	Percent
Gender	Male	25,440	85.9
	Female	4,175	14.1
Age at Risk Estimate	18-24 years	6,217	21.0
	25-34 years	11,134	37.6
	35-44 years	7,292	24.6
	> 44 years	4,884	16.5
	Unknown	88	0.0
Race	White	21,183	71.5
	Black	5,983	20.2
	Asian	722	2.4
	Other	456	1.5
	Unknown	1,271	4.3
Ethnicity: Hispanic		3,113	10.5
Religion	Christian	20,058	67.7
	Other Religion	693	2.3
	No Preference / None	7,098	24.0
	Unknown	1,766	6.0
Education	Less than High School	2,954	10.0
	Graduate Equivalent Diploma	3,423	11.6
	High School	16,729	56.5
	Some College	290	1.0
	College Graduate	5,882	19.9
Marital Status at Risk Estimate	Married	18,677	63.1
	Never Married	8,108	27.4
	Previously Married	2,821	9.5
	Unknown	9	0.0
Military Service Component	Regular	14,990	50.6
	Guard or Reserve	14,625	49.4
Age at Military Entry	17-20 years	16,636	56.2
	21-24 years	7,566	25.5
	25-29 years	3,191	10.8
	30-44 years	2,161	7.3
	45 and above years	61	0.2

Table 1 cont'd. Demographic Characteristics of Subjects (*N* = 30,265-650; *n* = 29,615)

Variables	Category	Frequency	Percent
Rank at Risk Estimate	Enlisted, E1-2	650	2.2
	Enlisted, E3	2,257	7.6
	Enlisted, E4	9,199	31.1
	Enlisted, E5	6,197	20.9
	Enlisted, E6	4,251	14.4
	Enlisted, E7-9	3,702	12.5
	Warrant Officers	542	1.8
	Officers, O1-3	1,457	4.9
	Officers, O4 and above	1,360	4.6
Active Duty Service Length at Risk Estimate	Less than 1 year	4,263	14.4
	1 year	2,950	10.0
	2 years	2,752	9.3
	3 years	2,841	9.6
	4 years	2,600	8.8
	5 years	1,999	6.7
	6-10 years	6,361	21.5
	11-15 years	2,642	8.9
	16-19 years	1,182	4.0
	20+ years	660	2.2
	Unknown	1,365	4.6
Military Service Length at Risk Estimate	Less than 1 year	317	1.1
	1 year	1,884	6.4
	2 years	2,441	8.2
	3 years	2,399	8.1
	4 years	2,220	7.5
	5 years	1,802	6.1
	6-10 years	6,270	21.2
	11-15 years	4,288	14.5
	16-19 years	2,419	8.2
	20+ years	5,575	18.8
Deployments before Risk Estimate	0	6,106	20.6
	1	11,491	38.8
	2	7,311	24.7
	> 2	4,707	15.9
Unknown		650	2.0
Valid Demographics		29,615	98%
Total		30,265	100%

*Of the original 30, 265 subjects, 650 are not included in this table due to non-response to the questionnaire or non-availability of demographic information.

Table 2

Research Question 1. Endorsement of Behavioral Health Risk Assessment-Questionnaire – Frequencies and Percentages *(N* = 30,263)

N =30,263 Risk Factor / Variables (55)	Select 0, No, Never-Rarely, Poor-Fair	% Select 0, No, Never-Rarely, Poor-Fair	Select 1-10, Yes, +, Occassionally-Frequently, Good-Excellent	% Select 1-10, Yes, +, Occassionally-Frequently, Good-Excellent	Select Unknown	% Select Unknown
Factor Group 1 Behavioral Health (Depression/Suicide)						
Question 1 Emotional Pain (*n* =29,861)	9,824	32.90%	20,037	67.10%	402	1.35%
Question 2 Suicide Thoughts	29,689	98.10%	502	1.66%	72	0.24%
Question 3 Suicide Plan	30,050	99.30%	143	0.47%	70	0.23%
Question 4 Suicide Means (Not applicable=30,082,99%)	89	0.29%	71	0.23%	21	0.07%
Question 5 History of Self-Harm	27,180	89.81%	2,965	9.80%	118	0.39%
Question 6 Hopefulness (*Yes* = +)	1,846	6.10%	26,901	88.89%	1516	5.01%
Question 7 Failure Perception	19,377	64.03%	10,382	34.31%	504	1.67%
Question 8 Behavioral Health Diagnosis-History of	18,405	60.82%	11,393	37.65%	465	1.54%
Factor Group 2 Mental Status/Psychosis						
Question 1 Racing Thoughts	19,665	64.98%	10,392	34.34%	206	0.68%
Question 2 Special Powers	29,888	98.76%	257	0.85%	118	0.39%
Question 3 Hallucinations	28,427	93.93%	1,670	5.52%	166	0.55%
Question 4 Paranoia	26,538	87.69%	3,448	11.39%	277	0.92%
Factor Group 3 Anxiety/Post-Traumatic Stress						
Question 1 General Anxiety-History of	17,030	56.27%	12,934	42.74%	299	0.99%
Question 2 Panic Attacks	18,980	62.72%	11,015	36.40%	268	0.89%
Question 3 Avoidance	18,053	59.65%	11,958	39.51%	252	0.83%
Question 4 Post-Traumatic Stress-Nightmares	18,793	62.10%	11,285	37.29%	185	0.61%
Question 5 Post-Traumatic Stress-Avoidance	19,728	65.19%	10,364	34.25%	171	0.57%
Question 6 Post-Traumatic Stress-Hypervigilance	18,172	60.05%	11,911	39.36%	180	0.59%
Question 7 Post-Traumatic Stress-Emotional Detachment	19,964	65.97%	10,047	33.20%	252	0.83%
Factor Group 4 Anger/Aggression/Domestic						
Question 1 Anger	22,999	76.00%	6,963	23.01%	301	0.99%
Question 2 Homicidal Thoughts	29,572	97.72%	514	1.70%	177	0.58%
Question 3 Abuse-Self or Others-History of	28,368	93.74%	1,777	5.87%	118	0.39%
Question 4 Abuse-Current_of Others	29,977	99.05%	189	0.62%	97	0.32%
Question 5 Protective Order	29,985	99.08%	186	0.61%	92	0.30%
Question 6 Charged/Convicted Abuse	29,372	97.06%	776	2.56%	115	0.38%
Question 7 Weapons Possession	22,767	75.23%	7092	23.43%	404	1.33%
Question 8 Relationship Breakup-Domestic Violence	28,593	94.48%	1,486	4.91%	184	0.61%
Question 9 Agreement w/Breakup (*Yes* = +) (Not applicable=28,788/95%)	322	1.06%	1,000	3.30%	153	0.51%

Table 2 cont'd. Research Question 1. Endorsement of Behavioral Health Risk Assessment-Questionnaire – Frequencies and Percentages (N = 30,263)

N =30,263 Risk Factor / Variables (55)	Select 0, No, Never-Rarely, Poor-Fair	% Select 0, No, Never-Rarely, Poor-Fair	Select 1-10, Yes, +, Occassionally-Frequently, Good-Excellent	% Select 1-10, Yes, +, Occassionally-Frequently, Good-Excellent	Select Unknown	% Select Unknown
Factor Group 5 Substance Abuse/Use						
Question 1 Cut Down on Alcohol Use	27,261	90.08%	2,809	9.28%	193	0.64%
Question 2 Annoyed by Others	28,393	93.82%	1,710	5.65%	160	0.53%
Question 3 Guilty for Use	28,145	93.00%	1,959	6.47%	159	0.53%
Question 4 Eye Opener Required	28,808	95.19%	1,319	4.36%	136	0.45%
Question 5 Use Alcohol-Cope with Stress	28,138	92.98%	1,945	6.43%	180	0.59%
Question 6 Use Illegal Substances	28,225	93.27%	1,944	6.42%	94	0.31%
Question 7 Misuse Prescription Medications	30,064	99.34%	131	0.43%	68	0.22%
Question 8 SubstanceTreatment_Drop-Fail	29,977	99.05%	204	0.67%	82	0.27%
Factor Group 6 Psychosocial History/Relationships						
Question 1 Abused as Child	24,146	79.79%	5,663	18.71%	454	1.50%
Question 2 Relationship Satisfaction (n =26,648)	12,118	45.30%	14,630	54.70%	3,515	13.14%
Question 3 Relationship Problem-Intimate Partner	22,420	74.08%	5,451	18.01%	2,392	7.90%
Question 4 Safe from Abuse (*Yes* = +)	376	1.24%	28,315	93.56%	1,572	5.19%
Question 5 Problems-Children (Not applicable=9,430/31%)	18,487	61.09%	2,089	6.90%	257	0.85%
Question 6 History_Protective Services Involvement	27,875	92.11%	1,759	5.81%	629	2.08%
Factor Group 7 Environment/Support System						
Question 1 Learning Disability	27,299	90.21%	2,741	9.06%	223	0.74%
Question 2 Problems-Financial	26,781	88.49%	3,205	10.59%	277	0.92%
Question 3 Support Systems (*Yes* = +)	2,115	6.99%	27,779	91.79%	369	1.22%
Question 4 Problems-Family/Friends	26,365	87.12%	3,591	11.87%	307	1.01%
Question 5 Problems-Job or Military	24,996	82.60%	4,741	15.67%	526	1.74%
Question 6 Problems-Legal	28,603	94.51%	1,484	4.90%	176	0.58%
Factor Group 8 Health History/Traumatic Brain Injury						
Question 1 Physical Health	16,241	53.67%	13,712	45.31%	310	1.02%
Question 2 Rx Medications-Taking as Prescribed (*Yes* = +) (Not applicable=2,937/10%)	1,511	4.99%	25,616	84.64%	199	0.66%
Question 3 Concussion/Head Injury	21,634	71.49%	7,751	25.61%	878	2.90%
Question 4 Pain-Current	8,251	27.26%	21,841	72.17%	171	0.57%
Question 5 Pain Level (n=29,950)	5,776	19.29%	24,174	80.71%	313	1.05%
Question 6 Pain-Treatment (*Yes* = +) (Not applicable=6,519/22%)	3,977	13.14%	19,353	63.95%	414	1.37%
Question 7 Problems-Sleep	11,163	36.89%	18,855	62.30%	245	0.81%

Table 2 cont'd. Research Question 1. Endorsement of Behavioral Health Risk Assessment-Questionnaire – Frequencies and Percentages (*N* = 30,263)

N =30,263	Risk Factor / Variables (55)	Select 0, No, Never-Rarely, Poor-Fair	% Select 0, No, Never-Rarely, Poor-Fair	Select 1-10, Yes, +, Occassionally-Frequently, Good-Excellent	% Select 1-10, Yes, +, Occassionally-Frequently, Good-Excellent	Select Unknown	% Select Unknown
Factor Group 1	**Behavioral Health (Depression/Suicide)**						
Question 1	Emotional Pain (*n* =29,861)	9,824	32.90%	20,037	67.10%	402	1.35%
Question 2	Suicide Thoughts	29,689	98.10%	502	1.66%	72	0.24%
Question 3	Suicide Plan	30,050	99.30%	143	0.47%	70	0.23%
Question 4	Suicide Means (Not applicable=30,082/99%)	89	0.29%	71	0.23%	21	0.07%
Question 5	History of Self-Harm	27,180	89.81%	2,965	9.80%	118	0.39%
Question 6	Hopefulness *(Yes = +)*	1,846	6.10%	26,901	88.89%	1516	5.01%
Question 7	Failure Perception	19,377	64.03%	10,382	34.31%	504	1.67%
Question 8	Behavioral Health Diagnosis-History of	18,405	60.82%	11,393	37.65%	465	1.54%
Factor Group 2	**Mental Status/Psychosis**						
Question 1	Racing Thoughts	19,665	64.98%	10,392	34.34%	206	0.68%
Question 2	Special Powers	29,888	98.76%	257	0.85%	118	0.39%
Question 3	Hallucinations	28,427	93.93%	1,670	5.52%	166	0.55%
Question 4	Paranoia	26,538	87.69%	3,448	11.39%	277	0.92%
Factor Group 3	**Anxiety/Post-Traumatic Stress**						
Question 1	General Anxiety-History of	17,030	56.27%	12,934	42.74%	299	0.99%
Question 2	Panic Attacks	18,980	62.72%	11,015	36.40%	268	0.89%
Question 3	Avoidance	18,053	59.65%	11,958	39.51%	252	0.83%
Question 4	Post-Traumatic Stress-Nightmares	18,793	62.10%	11,285	37.29%	185	0.61%
Question 5	Post-Traumatic Stress-Avoidance	19,728	65.19%	10,364	34.25%	171	0.57%
Question 6	Post-Traumatic Stress-Hypervigilance	18,172	60.05%	11,911	39.36%	180	0.59%
Question 7	Post-Traumatic Stress-Emotional Detachment	19,964	65.97%	10,047	33.20%	252	0.83%
Factor Group 4	**Anger/Aggression/Domestic**						
Question 1	Anger	22,999	76.00%	6,963	23.01%	301	0.99%
Question 2	Homicidal Thoughts	29,572	97.72%	514	1.70%	177	0.58%
Question 3	Abuse-Self or Others-History of	28,368	93.74%	1,777	5.87%	118	0.39%
Question 4	Abuse-Current_of Others	29,977	99.05%	189	0.62%	97	0.32%
Question 5	Protective Order	29,985	99.08%	186	0.61%	92	0.30%
Question 6	Charged/Convicted Abuse	29,372	97.06%	776	2.56%	115	0.38%
Question 7	Weapons Possession	22,767	75.23%	7092	23.43%	404	1.33%
Question 8	Relationship Breakup-Domestic Violence	28,593	94.48%	1,486	4.91%	184	0.61%
Question 9	Agreement w/Breakup *(Yes = +)* (Not applicable=28,788/95%)	322	1.06%	1,000	3.30%	153	0.51%
Factor Group 5	**Substance Abuse/Use**						
Question 1	Cut Down on Alcohol Use	27,261	90.08%	2,809	9.28%	193	0.64%
Question 2	Annoyed by Others	28,393	93.82%	1,710	5.65%	160	0.53%
Question 3	Guilty for Use	28,145	93.00%	1,959	6.47%	159	0.53%
Question 4	Eye Opener Required	28,808	95.19%	1,319	4.36%	136	0.45%
Question 5	Use Alcohol-Cope with Stress	28,138	92.98%	1,945	6.43%	180	0.59%
Question 6	Use Illegal Substances	28,225	93.27%	1,944	6.42%	94	0.31%
Question 7	Misuse Prescription Medications	30,064	99.34%	131	0.43%	68	0.22%
Question 8	SubstanceTreatment_Drop-Fail	29,977	99.05%	204	0.67%	82	0.27%
Factor Group 6	**Psychosocial History/Relationships**						
Question 1	Abused as Child	24,146	79.79%	5,663	18.71%	454	1.50%
Question 2	Relationship Satisfaction (*n* =26,648)	12,118	45.30%	14,630	54.70%	3,515	13.14%
Question 3	Relationship Problem-Intimate Partner	22,420	74.08%	5,451	18.01%	2,392	7.90%
Question 4	Safe from Abuse *(Yes = +)*	376	1.24%	28,315	93.56%	1,572	5.19%
Question 5	Problems-Children (Not applicable=9,430/31%)	18,487	61.09%	2,089	6.90%	257	0.85%
Question 6	History_Protective Services Involvement	27,875	92.11%	1,759	5.81%	629	2.08%
Factor Group 7	**Environment/Support System**						
Question 1	Learning Disability	27,299	90.21%	2,741	9.06%	223	0.74%
Question 2	Problems-Financial	26,781	88.49%	3,205	10.59%	277	0.92%
Question 3	Support Systems *(Yes = +)*	2,115	6.99%	27,779	91.79%	369	1.22%
Question 4	Problems-Family/Friends	26,365	87.12%	3,591	11.87%	307	1.01%
Question 5	Problems-Job or Military	24,996	82.60%	4,741	15.67%	526	1.74%
Question 6	Problems-Legal	28,603	94.51%	1,484	4.90%	176	0.58%
Factor Group 8	**Health History/Traumatic Brain Injury**						
Question 1	Physical Health	16,241	53.67%	13,712	45.31%	310	1.02%
Question 2	Rx Medications-Taking as Prescribed *(Yes = +)* (Not applicable=2,937/10%)	1,511	4.99%	25,616	84.64%	199	0.66%
Question 3	Concussion/Head Injury	21,634	71.49%	7,751	25.61%	878	2.90%
Question 4	Pain-Current	8,251	27.26%	21,841	72.17%	171	0.57%
Question 5	Pain Level (n=29,950)	5,776	19.29%	24,174	80.71%	313	1.05%
Question 6	Pain-Treatment *(Yes = +)* (Not applicable=6,519/22%)	3,977	13.14%	19,353	63.95%	414	1.37%
Question 7	Problems-Sleep	11,163	36.89%	18,855	62.30%	245	0.81%

Table 3

Research Question 2 / Hypothesis 1. Significant Relationships among Behavioral Health Risk Variables in the Behavioral Health Risk Assessment-Questionnaire, $r \geq .40$ (Pearson's Chi-Square) (N = 30,263)

				r			
Risk Factor (Indicator)	FG1Q1_ Emotional Pain	FG1Q3_ Suicide Plan	FG1Q7_ Failure Perception	FG1Q8_ History BH Diagnosis	FG2Q1_ Racing Thoughts	FG2Q3_ Hallucinations	FG2Q4_ Paranoia
FG1Q4_SuicideMeans		0.60					
FG1Q8_History BH Diagnosis			0.41				
FG2Q1_RacingThoughts			0.41	0.40			
FG2Q4_Paranoia						0.40	
FG3Q1_AnxietyGeneral	0.42		0.43	0.58	0.49		
FG3Q2_PanicAttacks			0.41	0.53	0.48		
FG3Q3_Avoidance	0.40		0.43	0.54	0.48		
FG3Q4_PTS_Nightmares				0.47	0.44		
FG3Q5_PTS_Avoidance			0.40	0.49	0.46		
FG3Q6_PTS_Hypervigilant				0.47	0.45		
FG3Q7_PTS_Emotion Detached	0.40		0.46	0.51	0.49		0.40
	FG3Q1_ Anxiety General	FG3Q2_ Panic Attacks	FG3Q3_ Avoidance	FG3Q4_ PTS_ Nightmares	FG3Q5_ PTS_ Avoidance	FG3Q6_ PTS_ Hypervigilant	FG4Q8_ Relationship Breakup
FG3Q2_PanicAttacks	0.70						
FG3Q3_Avoidance	0.68	0.66					
FG3Q4_PTS_Nightmares	0.55	0.53	0.59				
FG3Q5_PTS_Avoidance	0.57	0.56	0.65	0.74			
FG3Q6_PTS_Hypervigilant	0.57	0.55	0.61	0.65	0.66		
FG3Q7_PTS_Detached	0.58	0.59	0.64	0.61	0.67	0.65	
FG4Q9_AgreementBreakup_Rev							0.44
FG8Q7_ProblemsSleep	0.40		0.40	0.40			
	FG5Q1_ Substance Use _CutDown	FG5Q2_ Substance Use _Annoyed	FG5Q3_ Substance Use _Guilty	FG6Q2_ Relationship Satisfaction	FG8Q4_ Pain Physical		
FG5Q2_SubstanceUse_Annoyed	0.55						
FG5Q3_SubstanceUse_Guilty	0.67	0.55					
FG5Q4_SubstanceUse_EyeOpener	0.42	0.42	0.41				
FG5Q5_SubstanceUse_Coping	0.43	0.40	0.40				
FG6Q3_ProblemsPartner				0.40			
FG8Q5_PainLevel					0.78		

Pearson's Correlation significant for all variables (2-tailed) at .01

r = association; FG = Factor Group; Q = Question; PTS = Post-Traumatic Stress; Rev = Reversed

Table 4

Research Question 2 / Hypothesis 1. Relationships among Behavioral Health Risk Variables *in* the Behavioral Health Risk Assessment-Questionnaire by Significance (Pearson's Chi-Square) (*N* = 30,263)

#	***r* = ≥ .70**	***r* = ≥ .60**	***r* = ≥ .50**	***r* = ≥ .40**
1	Pain and pain level	Suicide plan and means	Prior behavioral health diagnosis and general anxiety, panic attacks, avoidance, and PTS-emotional detachment	Emotional pain and anxiety-general, avoidance, and PTS-emotional detachment
2	Anxiety-general and panic attacks	Anxiety-general and avoidance	Anxiety-general and PTS-nightmares, PTS-avoidance, PTS-hypervigilant, and PTS-emotional detachment	Perceptions of failure and prior behavioral health diagnosis, racing thoughts, anxiety-general, panic attacks, avoidance, PTS-avoidance, PTS-emotional detachment
3	PTS-nightmares and avoidance	Panic attacks and avoidance	Panic attacks and prior behavioral health diagnosis, PTS-nightmares, PTS-avoidance, PTS-hypervigilant, and PTS-emotional detachment	Prior behavioral health diagnosis and failure perceptions, racing thoughts, PTS-nightmares, PTS-avoidance, PTS-hypervigilant
4	-	Avoidance and PTS-avoidance, PTS-hypervigilant, and PTS-emotional detachment	Avoidance and PTS-nightmares	Racing thoughts and failure perceptions, prior behavioral health diagnosis, general anxiety, panic attacks, avoidance, PTS-nightmares, PTS-avoidance, PTS-hypervigilant, and PTS-emotional detachment

PTS = Post Traumatic Stress; # = number; *r* = association

Table 4 cont'd. Relationships among Behavioral Health Risk Variables in the Behavioral Health Risk Assessment-Questionnaire by Significance (Pearson's Chi-Square) (N = 30,263)

#	***r* = ≥ .70**	***r* = ≥ .60**	***r* = ≥ .50**	***r* = ≥ .40**
5	-	PTS-nightmares and PTS-hypervigilant and PTS-emotional detachment	Substance use-need to cut down on alcohol use and feeling annoyed by others criticism about use	Hallucinations and paranoia
6	-	PTS-avoidance and PTS-hypervigilant and PTS-emotional detachment	Substance use-feeling annoyed by others criticism about alcohol use and feeling guilty about use	Paranoia and PTS-emotional detachment
7	-	PTS-hypervigilant and PTS emotional detachment	-	Problems sleeping and anxiety, avoidance, PTS-nightmares
8	-	Substance use - need to cut down on alcohol use and feeling guilty about use	-	Relationship break-up and disagreement with breakup
9	-	-	-	Substance use-need to cut down on alcohol use and being annoyed by criticism of use, feeling guilty about use, and need for eye-opener
10	-	-	-	Substance use-alcohol use to cope with stress and need to cut down, annoyed by criticism, feeling guilty about use
11	-	-	-	Relationship satisfaction and problems with partner

PTS = Post Traumatic Stress; # = number; *r* = association

Table 5

Research Question 3. Internal Reliability of Behavioral Health Risk Assessment-Questionnaire (Cronbach's Alpha and Spearman-Brown Coefficient [Split-Half]) (*N* = 30,263)

Test	***α / r***	**Items**	**Mean**	**Variance**	**SD**
Cronbach Alpha	.897				
Cronbach Alpha, Split Half					
Part 1	.886	28	5.41	23.489	4.847
Part 2	.772	27	5.22	9.163	3.027
Both		55	10.63	51.923	7.206
Between Forms	.657				
Spearman-Brown, Split Half	.793 (equal and unequal length)				
Part 1, 28 Items: FG1Q1-FG1Q8, FG2Q-FG2Q4, FG3Q1-FG3Q7, FG4Q1-FG4Q9					
Part 2, 27 Items: FG4Q9, FG5Q1-FG5Q8, FG6Q1-FG6Q6, FG7Q1-FG7Q6, FG8Q1-FG8Q7					
α = Alpha; *r* = association; SD = Standard Deviation; FG = Factor Group; Q = Question					

Table 6

Behavioral Health Risk Assessment-Questionnaire, Item-Total Statistics and Cronbach's Alpha, if Deleted (N = 30,263)

#	Factor Group / Question	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
1	FG1Q1	9.96	48.359	0.512	0.893
2	FG1Q2	10.61	51.568	0.184	0.897
3	FG1Q3	10.62	51.814	0.106	0.897
4	FG1Q4	10.62	51.851	0.094	0.897
5	FG1Q5	10.53	50.468	0.323	0.895
6	FG1Q6R	10.56	50.752	0.315	0.895
7	FG1Q7	10.28	48.013	0.558	0.892
8	FG1Q8	10.25	47.606	0.608	0.891
9	FG2Q1	10.28	47.806	0.592	0.891
10	FG2Q2	10.62	51.773	0.107	0.897
11	FG2Q3	10.57	50.814	0.324	0.895
12	FG2Q4	10.51	49.714	0.468	0.894
13	FG3Q1	10.20	46.979	0.692	0.890
14	FG3Q2	10.26	47.273	0.667	0.890
15	FG3Q3	10.23	46.940	0.707	0.889
16	FG3Q4	10.25	47.328	0.655	0.890
17	FG3Q5	10.28	47.188	0.691	0.890
18	FG3Q6	10.23	47.227	0.663	0.890
19	FG3Q7	10.29	47.072	0.715	0.889
20	FG4Q1	10.40	48.916	0.479	0.893
21	FG4Q2	10.61	51.526	0.204	0.896
22	FG4Q3	10.57	50.713	0.344	0.895
23	FG4Q4	10.62	51.766	0.132	0.897
24	FG4Q5	10.62	51.810	0.095	0.897
25	FG4Q6	10.60	51.544	0.156	0.897
26	FG4Q7	10.39	51.373	0.061	0.899
27	FG4Q8	10.58	51.110	0.247	0.896
28	FG4Q9R	10.62	51.707	0.139	0.897
29	FG5Q1	10.53	50.525	0.317	0.895
30	FG5Q2	10.57	50.873	0.302	0.896
31	FG5Q3	10.56	50.779	0.308	0.896
32	FG5Q4	10.58	51.125	0.258	0.896

= Question Number; FG = Factor Group; Q = Question; R = Reversed

Table 6 cont'd. Behavioral Health Risk Assessment-Questionnaire, Item-Total Statistics and Cronbach's Alpha, if Deleted (N = 30,263)

#	Factor Group / Question	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
33	FG5Q5	10.56	50.699	0.332	0.895
34	FG5Q6	10.56	51.527	0.095	0.897
35	FG5Q7	10.62	51.837	0.086	0.897
36	FG5Q8	10.62	51.785	0.111	0.897
37	FG6Q1	10.44	49.906	0.336	0.895
38	FG6Q2	10.09	49.633	0.291	0.897
39	FG6Q3	10.43	49.637	0.379	0.895
40	FG6Q4R	10.61	51.748	0.094	0.897
41	FG6Q5	10.56	51.051	0.217	0.896
42	FG6Q6	10.57	51.234	0.187	0.897
43	FG7Q1	10.54	51.244	0.145	0.897
44	FG7Q2	10.52	50.568	0.287	0.896
45	FG7Q3R	10.56	50.713	0.313	0.895
46	FG7Q4	10.51	49.824	0.435	0.894
47	FG7Q5	10.47	49.896	0.366	0.895
48	FG7Q6	10.58	51.258	0.199	0.896
49	FG8Q1	10.09	49.294	0.340	0.896
50	FG8Q2R	10.58	51.854	0.007	0.898
51	FG8Q3	10.36	49.663	0.333	0.895
52	FG8Q4	9.90	50.258	0.232	0.897
53	FG8Q5	9.82	50.658	0.198	0.897
54	FG8Q6R	10.49	51.122	0.141	0.897
55	FG8Q7	10.00	48.410	0.488	0.893

= Question Number; FG = Factor Group; Q = Question; R = Reversed

Table 7

Internal Reliability of Behavioral Health Risk Assessment-Questionnaire – Factor Groups tested Separately (Cronbach's alpha) (N = 30,263)

Factor Group, Latent Construct	α / r
All Factor Groups	.897
FG1, Behavioral Health / Depression / Suicide	.614
FG2, Mental Status / Psychosis	.514
FG3, Anxiety / Post-Traumatic Stress	.919
FG4, Anger / Aggression / Domestic Violence	.362
FG5, Substance Use / Abuse	.714
FG6, Psychosocial History / Relationships	.475
FG7, Environment / Support Systems	.520
FG8, Health History / Traumatic Brain Injury	.587

α = Alpha; r = Correlation; FG = Factor Group

Table 8

Research Question 4 / Hypothesis 2. Output for Hypothesized Behavioral Health Risk Assessment-Questionnaire Model: Selection Summary of Variable Information and Estimator from Structural Equation Modeling, Confirmatory Factor Analysis using M*plus* 8 (*N* = 30,263)

Number of groups	1
Number of observations	30,263
Number of dependent variables	55
Number of independent variables	0
Number of continuous variables	8

Observed Dependent Variables

Continuous (3)

FG1Q1	FG6Q2	FG8Q5

Binary and Ordered Categorical (52)

-------	FG1Q2	FG1Q3	FG1Q4	FG1Q5	FG1Q6R	FG1Q7	FG1Q8
FG2Q1	FG2Q2	FG2Q3	FG2Q4				
FG3Q1	FG3Q2	FG3Q3	FG3Q4	FG3Q5	FG3Q6	FG3Q7	
FG4Q1	FG4Q2	FG4Q3	FG4Q4	FG4Q5	FG4Q6	FG4Q7	FG4Q8
	FG4Q9R						
FG5Q1	FG5Q2	FG5Q3	FG5Q4	FG5Q5	FG5Q6	FG5Q7	FG5Q8
FG6Q1	-------	FG6Q3	FG6Q4R	FG6Q5	FG6Q6		
FG7Q1	FG7Q2	FG7Q3R	FG7Q4	FG7Q5	FG7Q6		
FG8Q1	FG8Q2R	FG8Q3	FG8Q4	-------	FG8Q6R	FG8Q7	

FG1	FG2	FG3	FG4	FG5	FG6	FG7	FG8

Estimator	WLSMV

FG = Factor Group; Q = Question; R = Reversed; WLSMV = Weighted Least Squares, Means and Variances

Table 9

Research Question 4. Output for Hypothesized Behavioral Health Risk Assessment-Questionnaire Model: Summary of Categorical Proportions from Structural Equation Modeling, Confirmatory Factor Analysis (M*plus* 8) (*N* = 30,263)

Summary of Categorical Proportions					
Question		**Question**		**Question**	
Category	**%**	Category	**%**	Category	**%**
FG1Q2		**FG4Q1**		**FG6Q1**	
No	.983	No	.768	No	.081
Yes	.017	Yes	.232	Yes	.019
FG1Q3		**FG4Q2**		**FG6Q3**	
No	.995	No	.983	No	.803
Yes	.005	Yes	.017	Yes	.197
FG1Q4		**FG4Q3**		**FG6Q4R**	
No	.997	No	.941	No	.986
Yes	.003	Yes	.059	Yes	.014
FG1Q5		**FG4Q4**		**FG6Q5**	
No	.902	No	.994	No	.928
Yes	.098	Yes	.006	Yes	.072
FG1Q6R		**FG4Q5**		**FG6Q6**	
No	.935	No	.994	No	.940
Yes	.065	Yes	.006	Yes	.060
FG1Q7		**FG4Q6**		**FG7Q1**	
No	.651	No	.974	No	.909
Yes	.349	Yes	.026	Yes	.091
FG1Q8		**FG4Q7**		**FG7Q2**	
No	.618	No	.762	No	.893
Yes	.382	Yes	.238	Yes	.107
FG2Q1		**FG4Q8**		**FG7Q3R**	
No	.654	No	.951	No	.929
Yes	.346	Yes	.049	Yes	.071
FG2Q2		**FG4Q9R**		**FG7Q4**	
No	.991	No	.989	No	.880
Yes	.009	Yes	.011	Yes	.120
FG2Q3		**FG5Q1**		**FG7Q5**	
No	.944	No	.907	No	.840
Yes	.056	Yes	.093	Yes	.160
FG2Q4		**FG5Q2**		**FG7Q6**	
No	.885	No	.943	No	.951
Yes	.115	Yes	.057	Yes	.049
FG3Q1		**FG5Q3**		**FG8Q1**	
No	.568	No	.935	No	.459
Yes	.432	Yes	.065	Yes	.541

FG = Factor Group; Q = Question; R = Reversed; % = Percentage

Table 9 cont'd. Research Question 4. Output for Hypothesized Behavioral Health Risk Assessment-Questionnaire: Summary of Categorical Proportions from Structural Equation Modeling, Confirmatory Factor Analysis (M*plus* 8) (*N* = 30,263)

Question Category	**%**	**Question** Category	**%**	**Question** Category	**%**
FG3Q2		**FG5Q4**		**FG8Q2R**	
No	.663	No	.956	No	.050
Yes	.367	Yes	.044	Yes	.950
FG3Q3		**FG5Q5**		**FG8Q3**	
No	.602	No	.935	No	.736
Yes	.398	Yes	.065	Yes	.264
FG3Q4		**FG5Q6**		**FG8Q4**	
No	.625	No	.936	No	.274
Yes	.375	Yes	.064	Yes	.726
FG3Q5		**FG5Q7**		**FG8Q6R**	
No	.656	No	.996	No	.867
Yes	.344	Yes	.004	Yes	.133
FG3Q6		**FG5Q8**		**FG8Q7**	
No	.604	No	.993	No	.372
Yes	.396	Yes	.007	Yes	.628
FG3Q7					
No	.665				
Yes	.335				

FG = Factor Group; Q = Question; R = Reversed; % = Percentage

Table 10

Research Question 4 / Hypothesis 2. Output for Hypothesized Behavioral Health Risk Assessment-Questionnaire Model: Selected Goodness-of-Fit Statistics from Structural Equation Modeling, Confirmatory Factor Analysis (M*plus* 8) (*N* = 30,263)

Tests of Model Fit	
Chi-Square Test of Model Fit*	
Value	38146.408*
Degrees of freedom	1402**
p-value	0.0000
Comparative Fit Index (CFI) / Tucker-Lewis Index (TLI)	
CFI	0.969
TLI	0.967
Number of free parameters	141
Root Mean Square Error of Approximation (RMSEA)	
Estimate (90% Confidence Interval)	0.029 (0.029-0.030)
Probability RMSEA ≤ .05	1.000
Weighted Root Mean Square Residual (WRMR)	
Value	5.139

*For Chi-Square difference tests using Weighted Least Squares, Means and Variance (WLSMV), Chi-Square value cannot be used.

**When using WLSMV, degrees of freedom are calculated differently than Confirmatory Factor Analysis procedures using normally distributed data (Muthén and Muthén, 2007-2017; Byrne, 2012).

Table 11

Research Question 4. Output for Hypothesized Behavioral Health Risk Assessment-Questionnaire Model: Parameter Estimates (Unstandardized) from Structural Equation Modeling, Confirmatory Factor Analysis (M*plus* 8) (*N* = 30,263)

Model Results – Unstandardized Parameter Estimates				
	Estimate	Standard Error (*SE*)	Estimate / *SE* Critical Ratio	Two-Tailed *p*-Value
FACTOR1 BY				
FG1Q1	1.000	0.000	999.000	999.000
FG1Q2	0.312	0.007	45.517	0.000
FG1Q3	0.382	0.009	41.121	0.000
FG1Q4	0.425	0.011	37.888	0.000
FG1Q5	0.305	0.005	62.974	0.000
FG1Q6R	0.325	0.005	61.223	0.000
FG1Q7	0.393	0.004	88.119	0.000
FG1Q8	0.439	0.005	88.270	0.000
FACTOR2 BY				
FG2Q1	1.000	0.000	999.000	999.000
FG2Q2	0.547	0.025	22.293	0.000
FG2Q3	0.860	0.010	83.718	0.000
FG2Q4	0.991	0.008	125.046	0.000
FACTOR3 BY				
FG3Q1	1.000	0.000	999.000	999.000
FG3Q2	0.971	0.003	285.541	0.000
FG3Q3	0.998	0.003	330.207	0.000
FG3Q4	0.972	0.003	293.036	0.000
FG3Q5	1.009	0.003	336.900	0.000
FG3Q6	0.961	0.003	286.175	0.000
FG3Q7	0.997	0.003	321.510	0.000
FACTOR4 BY				
FG4Q1	1.000	0.000	999.000	999.000
FG4Q2	0.859	0.018	46.444	0.000
FG4Q3	0.969	0.014	71.592	0.000
FG4Q4	0.793	0.028	28.406	0.000
FG4Q5	0.597	0.032	18.938	0.000
FG4Q6	0.570	0.021	27.014	0.000
FG4Q7	0.101	0.013	7.994	0.000
FG4Q8	0.847	0.015	57.712	0.000
FG4Q9R	0.932	0.020	46.699	0.000

*References variables assigned to each of the eight factor groups have a set value of 1.0.
p = Significance value; FG = Factor Group; Q = Question; R = Reversed

Table 11 cont'd. Research Question 4. Output for Hypothesized Behavioral Health Risk Assessment-Questionnaire Model: Parameter Estimates (Unstandardized) from Structural Equation Modeling, Confirmatory Factor Analysis (M*plus* 8) (*N* = 30,263)

Model Results – Unstandardized Parameter Estimates				
	Estimate	Standard Error (*SE*)	Estimate / *SE* Critical Ratio	Two-Tailed *p*-Value
FACTOR5 BY				
FG5Q1	1.000	0.000	999.000	999.000
FG5Q2	0.968	0.008	122.224	0.000
FG5Q3	1.022	0.008	125.386	0.000
FG5Q4	0.879	0.011	81.641	0.000
FG5Q5	0.958	0.010	99.151	0.000
FG5Q6	0.289	0.018	15.861	0.000
FG5Q7	0.636	0.035	18.015	0.000
FG5Q8	0.696	0.027	26.086	0.000
FACTOR6 BY				
FG6Q1	1.000	0.000	999.000	999.000
FG6Q2	2.112	0.047	44.885	0.000
FG6Q3	1.115	0.020	54.885	0.000
FG6Q4R	0.600	0.035	17.156	0.000
FG6Q5	0.792	0.022	36.155	0.000
FG6Q6	0.733	0.022	33.392	0.000
FACTOR7 BY				
FG7Q1	1.000	0.000	999.000	999.000
FG7Q2	1.897	0.080	23.806	0.000
FG7Q3R	2.349	0.098	23.977	0.000
FG7Q4	2.773	0.111	25.037	0.000
FG7Q5	2.206	0.090	24.450	0.000
FG7Q6	1.671	0.076	21.982	0.000
FACTOR8 BY				
FG8Q1	1.000	0.000	999.000	999.000
FG8Q2R	0.010	0.028	0.350	0.726
FG8Q3	1.040	0.020	52.098	0.000
FG8Q4	0.737	0.017	44.325	0.000
FG8Q5	1.889	0.038	50.302	0.000
FG8Q6R	0.448	0.021	21.464	0.000
FG8Q7	1.532	0.024	63.474	0.000

*References variables assigned to each of the eight factor groups have a set value of 1.0.
p = Significance value; FG = Factor Group; Q = Question; R = Reversed

Table 11 cont'd. Research Question 4. Output for Hypothesized Behavioral Health Risk Assessment-Questionnaire Model: Parameter Estimates (Unstandardized) from Structural Equation Modeling, Confirmatory Factor Analysis (M*plus* 8) (*N* = 30,263)

Model Results – Unstandardized Parameter Estimates				
	Estimate	Standard Error (*SE*)	Estimate / *SE* Critical Ratio	Two-Tailed *p*-Value
FACTOR2 WITH				
FACTOR1	1.447	0.019	75.037	0.000
FACTOR3 WITH				
FACTOR1	1.628	0.019	84.872	0.000
FACTOR2	0.699	0.005	146.843	0.000
FACTOR4 WITH				
FACTOR1	1.174	0.019	61.568	0.000
FACTOR2	0.497	0.007	74.201	0.000
FACTOR3	0.533	0.006	89.955	0.000
FACTOR5 WITH				
FACTOR1	0.958	0.019	50.173	0.000
FACTOR2	0.375	0.008	44.290	0.000
FACTOR3	0.441	0.007	59.556	0.000
FACTOR4	0.352	0.009	39.783	0.000
FACTOR6 WITH				
FACTOR1	0.928	0.018	52.729	0.000
FACTOR2	0.310	0.006	47.791	0.000
FACTOR3	0.369	0.006	59.018	0.000
FACTOR4	0.385	0.007	53.496	0.000
FACTOR5	0.241	0.008	31.800	0.000
FACTOR7 WITH				
FACTOR1	0.464	0.019	24.455	0.000
FACTOR2	0.173	0.007	24.265	0.000
FACTOR3	0.188	0.008	24.907	0.000
FACTOR4	0.187	0.008	24.451	0.000
FACTOR5	0.130	0.006	21.929	0.000
FACTOR6	0.166	0.007	23.149	0.000
FACTOR8 WITH				
FACTOR1	0.715	0.015	46.614	0.000
FACTOR2	0.324	0.006	54.041	0.000
FACTOR3	0.405	0.006	64.864	0.000
FACTOR4	0.258	0.006	44.582	0.000
FACTOR5	0.174	0.006	26.979	0.000
FACTOR6	0.178	0.005	37.304	0.000
FACTOR7	0.095	0.004	22.423	0.000

*References variables assigned to each of the eight factor groups have a set value of 1.0.
p = Significance value; FG = Factor Group; Q = Question; R = Reversed

Table 11 cont'd. Research Question 4. Output for Hypothesized Behavioral Health Risk Assessment-Questionnaire Model: Parameter Estimates (Unstandardized) from Structural Equation Modeling, Confirmatory Factor Analysis (M*plus* 8) (*N* = 30,263)

Model Results – Unstandardized Parameter Estimates				
	Estimate	Standard Error (*SE*)	Estimate / *SE* Critical Ratio	Two-Tailed *p*-Value
Intercepts				
FG1Q1	2.679	0.019	141.044	0.000
FG6Q2	2.205	0.029	75.983	0.000
FG8Q5	3.682	0.015	250.584	0.000
Thresholds				
FG1Q2$1	2.129	0.018	119.811	0.000
FG1Q3$1	2.595	0.029	90.520	0.000
FG1Q4$1	2.785	0.036	77.404	0.000
FG1Q5$1	1.291	0.010	130.754	0.000
FG1Q6R$1	1.512	0.011	135.456	0.000
FG1Q7$1	0.388	0.007	52.431	0.000
FG1Q8$1	0.299	0.007	40.874	0.000
FG2Q1$1	0.397	0.007	53.525	0.000
FG2Q2$1	2.386	0.023	104.629	0.000
FG2Q3$1	1.594	0.012	135.673	0.000
FG2Q4$1	1.200	0.009	127.045	0.000
FG3Q1$1	0.172	0.007	23.770	0.000
FG3Q2$1	0.339	0.007	46.099	0.000
FG3Q3$1	0.257	0.007	35.286	0.000
FG3Q4$1	0.318	0.007	43.344	0.000
FG3Q5$1	0.400	0.007	53.980	0.000
FG3Q6$1	0.264	0.007	36.168	0.000
FG3Q7$1	0.427	0.007	57.302	0.000
FG4Q1$1	0.731	0.008	91.941	0.000
FG4Q2$1	2.117	0.018	120.425	0.000
FG4Q3$1	1.564	0.012	135.685	0.000
FG4Q4$1	2.496	0.026	97.304	0.000
FG4Q5$1	2.504	0.026	96.794	0.000
FG4Q6$1	1.947	0.015	128.128	0.000
FG4Q7$1	0.714	0.008	90.227	0.000
FG4Q8$1	1.650	0.012	135.362	0.000
FG4Q9R$1	2.301	0.021	110.000	0.000
FG5Q1$1	1.320	0.010	131.718	0.000
FG5Q2$1	1.582	0.012	135.690	0.000
FG5Q3$1	1.513	0.011	135.466	0.000
FG5Q4$1	1.708	0.013	134.667	0.000

*References variables assigned to each of the eight factor groups have a set value of 1.0.
p = Significance value; FG = Factor Group; Q = Question; R = Reversed

Table 11 cont'd. Research Question 4. Output for Hypothesized Behavioral Health Risk Assessment-Questionnaire Model: Parameter Estimates (Unstandardized) from Structural Equation Modeling, Confirmatory Factor Analysis (M*plus* 8) (*N* = 30,263)

Model Results – Unstandardized Parameter Estimates				
	Estimate	Standard Error (*SE*)	Estimate / *SE* Critical Ratio	Two-Tailed *p*-Value
Thresholds (continued)				
FG5Q5$1	1.517	0.011	135.490	0.000
FG5Q6$1	1.519	0.011	135.503	0.000
FG5Q7$1	2.625	0.030	88.449	0.000
FG5Q8$1	2.469	0.025	99.127	0.000
FG6Q1$1	0.878	0.008	105.631	0.000
FG6Q3$1	0.851	0.008	103.290	0.000
FG6Q4R$1	2.186	0.019	116.736	0.000
FG6Q5$1	1.459	0.011	134.882	0.000
FG6Q6$1	1.559	0.011	135.677	0.000
FG7Q1$1	1.333	0.010	132.122	0.000
FG7Q2$1	1.243	0.010	128.925	0.000
FG7Q3R$1	1.470	0.011	135.028	0.000
FG7Q4$1	1.175	0.009	125.848	0.000
FG7Q5$1	0.996	0.009	114.954	0.000
FG7Q6$1	1.651	0.012	135.353	0.000
FG8Q1$1	-0.104	0.007	-14.386	0.000
FG8Q2R$1	-1.642	0.012	-135.431	0.000
FG8Q3$1	0.631	0.008	81.423	0.000
FG8Q4$1	-0.600	0.008	-77.980	0.000
FG8Q6R$1	1.111	0.009	122.380	0.000
FG8Q7$1	-0.326	0.007	-44.396	0.000
Variances				
FACTOR1	3.918	0.082	47.952	0.000
FACTOR2	0.739	0.010	76.910	0.000
FACTOR3	0.870	0.004	210.626	0.000
FACTOR4	0.695	0.013	51.859	0.000
FACTOR5	0.863	0.008	104.769	0.000
FACTOR6	0.415	0.012	35.655	0.000
FACTOR7	0.088	0.007	12.742	0.000
FACTOR8	0.370	0.009	39.936	0.000
Residual Variances				
FG1Q1	3.163	0.035	89.687	0.000
FG6Q2	6.756	0.077	87.833	0.000
FG8Q5	5.202	0.058	90.349	0.000

*References variables assigned to each of the eight factor groups have a set value of 1.0.
p = Significance value; FG = Factor Group; Q = Question; R = Reversed

Table 12

Research Question 4. Output for Hypothesized Behavioral Health Risk Assessment-Questionnaire Parameter Estimates (Standardized) from Structural Equation Modeling, Confirmatory Factor Analysis (M*plus* 8) (*N* = 30,263)

Standardized Model Results: STDYX Standardization				
	Estimate (Factor Loading)	Standard Error (*SE*)	Estimate / *SE* Critical Ratio	Two-Tailed *p*-Value
FACTOR1 BY				
FG1Q1	0.744	0.000	184.312	0.000
FG1Q2	0.618	0.012	50.627	0.000
FG1Q3	0.756	0.016	46.001	0.000
FG1Q4	0.841	0.020	41.710	0.000
FG1Q5	0.605	0.007	81.186	0.000
FG1Q6R	0.644	0.009	73.329	0.000
FG1Q7	0.778	0.005	155.854	0.000
FG1Q8	0.870	0.004	195.872	0.000
FACTOR2 BY				
FG2Q1	0.860	0.006	153.820	0.000
FG2Q2	0.471	0.021	22.545	0.000
FG2Q3	0.740	0.007	98.830	0.000
FG2Q4	0.852	0.005	160.831	0.000
FACTOR3 BY				
FG3Q1	0.933	0.002	421.251	0.000
FG3Q2	0.905	0.002	362.341	0.000
FG3Q3	0.931	0.002	444.742	0.000
FG3Q4	0.907	0.002	375.366	0.000
FG3Q5	0.941	0.002	500.275	0.000
FG3Q6	0.897	0.003	344.962	0.000
FG3Q7	0.930	0.002	436.113	0.000
FACTOR4 BY				
FG4Q1	0.834	0.008	103.718	0.000
FG4Q2	0.716	0.014	49.644	0.000
FG4Q3	0.808	0.009	85.199	0.000
FG4Q4	0.661	0.022	29.564	0.000
FG4Q5	0.498	0.026	19.393	0.000
FG4Q6	0.476	0.017	27.958	0.000
FG4Q7	0.084	0.011	8.000	0.000
FG4Q8	0.706	0.010	73.903	0.000
FG4Q9R	0.777	0.014	56.657	0.000

STDYX = Standardized Parameter Estimate (Y = Factor Group by X = Risk Variable; *p* = Significance value; FG = Factor Group; Q = Question; R = Reversed

Table 12 cont'd. Research Question 4. Output for Hypothesized Behavioral Health Risk Assessment-Questionnaire Model: Parameter Estimates (Standardized) from Structural Equation Modeling, Confirmatory Factor Analysis (M*plus* 8) (*N* = 30,263)

Standardized Model Results: STDYX Standardization				
	Estimate (Factor Loading)	Standard Error (*SE*)	Estimate / *SE* Critical Ratio	Two-Tailed *p*-Value
FACTOR5 BY				
FG5Q1	0.929	0.004	209.538	0.000
FG5Q2	0.900	0.006	155.141	0.000
FG5Q3	0.949	0.005	210.476	0.000
FG5Q4	0.816	0.009	89.176	0.000
FG5Q5	0.890	0.008	115.998	0.000
FG5Q6	0.269	0.017	15.902	0.000
FG5Q7	0.590	0.033	18.110	0.000
FG5Q8	0.646	0.025	26.292	0.000
FACTOR6 BY				
FG6Q1	0.644	0.009	71.309	0.000
FG6Q2	0.464	0.006	72.577	0.000
FG6Q3	0.718	0.008	91.676	0.000
FG6Q4R	0.386	0.022	17.789	0.000
FG6Q5	0.510	0.012	42.338	0.000
FG6Q6	0.472	0.013	37.000	0.000
FACTOR7 BY				
FG7Q1	0.297	0.012	25.484	0.000
FG7Q2	0.563	0.010	58.717	0.000
FG7Q3R	0.697	0.009	75.911	0.000
FG7Q4	0.823	0.007	114.891	0.000
FG7Q5	0.655	0.008	79.420	0.000
FG7Q6	0.496	0.012	41.051	0.000
FACTOR8 BY				
FG8Q1	0.609	0.008	79.873	0.000
FG8Q2R	0.060	0.017	0.350	0.726
FG8Q3	0.633	0.009	73.927	0.000
FG8Q4	0.449	0.009	52.215	0.000
FG8Q5	0.450	0.006	72.275	0.000
FG8Q6R	0.273	0.012	22.735	0.000
FG8Q7	0.932	0.007	126.550	0.000

STDYX = Standardized Parameter Estimate (Y = Factor Group by X = Risk Variable; *p* = Significance value; FG = Factor Group; Q = Question; R = Reversed

Table 12 cont'd. Research Question 4. Output for Hypothesized Behavioral Health Risk Assessment-Questionnaire Model: Parameter Estimates (Standardized) from Structural Equation Modeling, Confirmatory Factor Analysis (M*plus* 8) (*N* = 30,263)

Standardized Model Results: STDYX Standardization				
	Estimate (Factor Loading)	Standard Error (*SE*)	Estimate / *SE* Critical Ratio	Two-Tailed *p*-Value
FACTOR2 WITH				
FACTOR1	0.851	0.006	153.146	0.000
FACTOR3 WITH				
FACTOR1	0.881	0.003	267.637	0.000
FACTOR2	0.872	0.005	181.008	0.000
FACTOR4 WITH				
FACTOR1	0.712	0.007	98.848	0.000
FACTOR2	0.693	0.008	81.974	0.000
FACTOR3	0.685	0.007	98.316	0.000
FACTOR5 WITH				
FACTOR1	0.521	0.008	63.356	0.000
FACTOR2	0.470	0.010	45.945	0.000
FACTOR3	0.509	0.008	64.538	0.000
FACTOR4	0.454	0.011	41.425	0.000
FACTOR6 WITH				
FACTOR1	0.728	0.007	100.281	0.000
FACTOR2	0.559	0.010	57.761	0.000
FACTOR3	0.614	0.008	80.913	0.000
FACTOR4	0.718	0.009	80.796	0.000
FACTOR5	0.402	0.012	34.569	0.000
FACTOR7 WITH				
FACTOR1	0.790	0.007	115.866	0.000
FACTOR2	0.677	0.009	74.206	0.000
FACTOR3	0.678	0.007	93.351	0.000
FACTOR4	0.755	0.009	86.113	0.000
FACTOR5	0.471	0.011	41.126	0.000
FACTOR6	0.866	0.008	102.831	0.000

STDYX = Standardized Parameter Estimate (Y = Factor Group by X = Risk Variable; *p* = Significance value; FG = Factor Group; Q = Question; R = Reversed

Table 12 cont'd. Research Question 4. Output for Hypothesized Behavioral Health Risk Assessment-Questionnaire Model: Parameter Estimates (Standardized) from Structural Equation Modeling, Confirmatory Factor Analysis (M*plus* 8) (*N*=30,263)

Standardized Model Results: STDYX Standardization				
	Estimate (Factor Loading)	Standard Error (*SE*)	Estimate / *SE* Critical Ratio	Two-Tailed *p*-Value
FACTOR8 WITH				
FACTOR1	0.594	0.007	91.148	0.000
FACTOR2	0.620	0.008	77.557	0.000
FACTOR3	0.713	0.005	137.411	0.000
FACTOR4	0.508	0.009	56.473	0.000
FACTOR5	0.308	0.011	29.282	0.000
FACTOR6	0.454	0.009	48.551	0.000
FACTOR7	0.523	0.009	56.105	0.000
Intercepts				
FG1Q1	1.007	0.012	84.704	0.000
FG6Q2	0.752	0.014	54.408	0.000
FG8Q5	1.442	0.010	140.314	0.000
Thresholds				
FG1Q2$1	2.129	0.018	119.811	0.000
FG1Q3$1	2.595	0.029	90.520	0.000
FG1Q4$1	2.785	0.036	77.404	0.000
FG1Q5$1	1.291	0.010	130.754	0.000
FG1Q6R$1	1.512	0.011	135.456	0.000
FG1Q7$1	0.388	0.007	52.431	0.000
FG1Q8$1	0.299	0.007	40.874	0.000
FG2Q1$1	0.397	0.007	53.525	0.000
FG2Q2$1	2.386	0.023	104.629	0.000
FG2Q3$1	1.594	0.012	135.673	0.000
FG2Q4$1	1.200	0.009	127.045	0.000
FG3Q1$1	0.172	0.007	23.770	0.000
FG3Q2$1	0.339	0.007	46.099	0.000
FG3Q3$1	0.257	0.007	35.286	0.000
FG3Q4$1	0.318	0.007	43.344	0.000
FG3Q5$1	0.400	0.007	53.980	0.000
FG3Q6$1	0.264	0.007	36.168	0.000
FG3Q7$1	0.427	0.007	57.302	0.000
FG4Q1$1	0.731	0.008	91.941	0.000
FG4Q2$1	2.117	0.018	120.425	0.000
FG4Q3$1	1.564	0.012	135.685	0.000
FG4Q4$1	2.496	0.026	97.304	0.000
FG4Q5$1	2.504	0.026	96.794	0.000
FG4Q6$1	1.947	0.015	128.128	0.000

STDYX = Standardized Parameter Estimate (Y = Factor Group by X = Risk Variable; *p* = Significance value; FG = Factor Group; Q = Question; R = Reversed

Table 12 cont'd. Research Question 4. Output for Hypothesized Behavioral Health Risk Assessment-Questionnaire Model: Parameter Estimates (Standardized) from Structural Equation Modeling, Confirmatory Factor Analysis (M*plus* 8) (*N* = 30,263)

Standardized Model Results: STDYX Standardization				
	Estimate (Factor Loading)	Standard Error (*SE*)	Estimate / *SE* Critical Ratio	Two-Tailed *p*-Value
Thresholds (continued)				
FG4Q7$1	0.714	0.008	90.227	0.000
FG4Q8$1	1.650	0.012	135.362	0.000
FG4Q9R$1	2.301	0.021	110.000	0.000
FG5Q1$1	1.320	0.010	131.718	0.000
FG5Q2$1	1.582	0.012	135.690	0.000
FG5Q3$1	1.513	0.011	135.466	0.000
FG5Q4$1	1.708	0.013	134.667	0.000
FG5Q5$1	1.517	0.011	135.490	0.000
FG5Q6$1	1.519	0.011	135.503	0.000
FG5Q7$1	2.625	0.030	88.449	0.000
FG5Q8$1	2.469	0.025	99.127	0.000
FG6Q1$1	0.878	0.008	105.631	0.000
FG6Q3$1	0.851	0.008	103.290	0.000
FG6Q4R$1	2.186	0.019	116.736	0.000
FG6Q5$1	1.459	0.011	134.882	0.000
FG6Q6$1	1.559	0.011	135.677	0.000
FG7Q1$1	1.333	0.010	132.122	0.000
FG7Q2$1	1.243	0.010	128.925	0.000
FG7Q3R$1	1.470	0.011	135.028	0.000
FG7Q4$1	1.175	0.009	125.848	0.000
FG7Q5$1	0.996	0.009	114.954	0.000
FG7Q6$1	1.651	0.012	135.353	0.000
FG8Q1$1	-0.104	0.007	-14.386	0.000
FG8Q2R$1	-1.642	0.012	-135.431	0.000
FG8Q3$1	0.631	0.008	81.423	0.000
FG8Q4$1	-0.600	0.008	-77.980	0.000
FG8Q6R$1	1.111	0.009	122.380	0.000
FG8Q7$1	-0.326	0.007	-44.396	0.000
Residual Variances				
FG1Q1	0.447	0.006	74.386	0.000
FG6Q2	0.785	0.006	132.469	0.000
FG8Q5	0.797	0.006	142.189	0.000

STDYX = Standardized Parameter Estimate (Y = Factor Group by X = Risk Variable; *p* = Significance value; FG = Factor Group; Q = Question; R = Reversed

Table 13

Research Question 4. Output for Hypothesized Behavioral Health Risk Assessment-Questionnaire Model: Reliability Estimates and Modification Indices from Structural Equation Modeling, Confirmatory Factor Analysis (M*plus* 8) (*N* = 30,263)

			***R*²**		
Observed Variable	Estimate R^2	Standard Error (*SE*)	Estimate / *SE*	Two-Tailed *p*-Value	Residual Variance
FG1Q1	0.553	0.006	92.156	0.000	0.447
FG1Q2	0.381	0.015	25.314	0.000	0.619
FG1Q3	0.572	0.025	23.000	0.000	0.428
FG1Q4	0.707	0.034	20.855	0.000	0.293
FG1Q5	0.366	0.009	40.593	0.000	0.634
FG1Q6R	0.415	0.011	36.664	0.000	0.585
FG1Q7	0.606	0.008	77.927	0.000	0.394
FG1Q8	0.757	0.008	97.936	0.000	0.243
FG2Q1	0.739	0.010	76.910	0.000	0.261
FG2Q2	0.221	0.020	11.272	0.000	0.779
FG2Q3	0.547	0.011	49.415	0.000	0.453
FG2Q4	0.726	0.009	80.416	0.000	0.274
FG3Q1	0.870	0.004	210.626	0.000	0.130
FG3Q2	0.820	0.005	181.171	0.000	0.180
FG3Q3	0.866	0.004	222.371	0.000	0.134
FG3Q4	0.823	0.004	187.683	0.000	0.177
FG3Q5	0.885	0.004	250.137	0.000	0.115
FG3Q6	0.804	0.005	172.481	0.000	0.196
FG3Q7	0.865	0.004	218.056	0.000	0.135
FG4Q1	0.695	0.013	51.859	0.000	0.305
FG4Q2	0.513	0.021	24.822	0.000	0.487
FG4Q3	0.653	0.015	42.599	0.000	0.347
FG4Q4	0.438	0.030	14.782	0.000	0.562
FG4Q5	0.248	0.026	9.697	0.000	0.752
FG4Q6	0.226	0.016	13.979	0.000	0.774
FG4Q7	0.007	0.002	4.000	0.000	0.993
FG4Q8	0.499	0.013	36.951	0.000	0.501
FG4Q9R	0.604	0.021	28.328	0.000	0.396
FG5Q1	0.863	0.008	104.769	0.000	0.137
FG5Q2	0.809	0.010	77.571	0.000	0.191
FG5Q3	0.901	0.009	105.238	0.000	0.099
FG5Q4	0.666	0.015	44.588	0.000	0.334
FG5Q5	0.792	0.014	57.999	0.000	0.208
FG5Q6	0.072	0.009	7.951	0.000	0.928

R^2 = *r* Squared / Correlation Squared; *p* = Significance value; FG = Factor Group; Q = Question; R = Reversed

Table 13 cont'd. Research Question 4. Output for Hypothesized Behavioral Health Risk Assessment-Questionnaire Model: Reliability Estimates and Modification Indices from Structural Equation Modeling, Confirmatory Factor Analysis (M*plus* 8) (*N* = 30,263)

			***R*²**		
Observed Variable	Estimate R^2	Standard Error (*SE*)	Estimate / *SE*	Two-Tailed *p*-Value	Residual Variance
FG5Q7	0.349	0.039	9.055	0.000	0.651
FG5Q8	0.418	0.032	13.146	0.000	0.582
FG6Q1	0.415	0.012	35.655	0.000	0.585
FG6Q2	0.215	0.006	36.288	0.000	0.785
FG6Q3	0.516	0.011	45.838	0.000	0.484
FG6Q4R	0.149	0.017	8.895	0.000	0.851
FG6Q5	0.260	0.012	21.169	0.000	0.740
FG6Q6	0.223	0.012	18.500	0.000	0.777
FG7Q1	0.088	0.007	12.742	0.000	0.912
FG7Q2	0.317	0.011	29.358	0.000	0.683
FG7Q3R	0.486	0.013	37.956	0.000	0.514
FG7Q4	0.678	0.012	57.446	0.000	0.322
FG7Q5	0.429	0.011	39.710	0.000	0.571
FG7Q6	0.246	0.012	20.525	0.000	0.754
FG8Q1	0.370	0.009	39.936	0.000	0.630
FG8Q2R	0.000	0.000	0.175	0.861	1.000
FG8Q3	0.401	0.011	36.964	0.000	0.599
FG8Q4	0.201	0.008	26.108	0.000	0.799
FG8Q5	0.203	0.006	36.137	0.000	0.797
FG8Q6R	0.074	0.007	11.367	0.000	0.926
FG8Q7	0.869	0.014	63.275	0.000	0.131

R^2 = *r* Squared / Correlation Squared; *p* = Significance value; FG = Factor Group; Q = Question; R = Reversed

Table 14

Research Question 4. Summary of Behavioral Health Risk Assessment-Questionnaire Model: Reliability Estimates from Structural Equation Modeling, Confirmatory Factor Analysis – Variance Contributions (M*plus* 8)

Behavioral Health Risk Variables – Variance					
Significant (35 items)		$R^2 \geq .40$	Non-Significant (20 items)		$R^2 < .40$
FG1Q1	Emotional pain	.553	FG1Q2	Suicide Thoughts	.381
FG1Q3	Suicide Plan	.572	FG1Q5	Self-Harm History	.366
FG1Q4	Suicide Means	.707	FG2Q2	Special Powers	.221
FG1Q6R	Hopeless	.415	FG4Q5	Protective Order	.248
FG1Q7	Feelings of Failure	.606	FG4Q6	Charge_Assault-Abuse	.266
FG1Q8	Prior BH Diagnosis	.757	FG4Q7	Weapons Access	.007
FG2Q1	Racing Thoughts	.739	FG5Q6	SubstanceUse_Illegal	.072
FG2Q3	Hallucinations	.547	FG5Q7	Misuse Prescriptions	.349
FG2Q4	Paranoia	.726	FG6Q2	Relationship Satisfaction	.215
FG3Q1	Anxiety-General	.870	FG6Q4R	Safe from Abuse	.149
FG3Q1	Panic Attacks	.820	FG6Q5	Problems_Children	.260
FG3Q1	Avoidance	.866	FG6Q6	ProtectiveServices_Prior	.223
FG3Q1	PTS-Nightmares	.823	FG7Q1	Learning Disability	.088
FG3Q1	PTS-Avoidance	.885	FG7Q2	Problems_Finances	.317
FG3Q1	PTS-Hypervigilant	.804	FG7Q6	Problems_Legal	.246
FG3Q1	PTS-Emotional Detached	.865	FG8Q1	Problems_Health	.370
FG4Q1	Anger	.695	FG8Q2R	Taking Meds_Prescribed	.000
FG4Q2	Homicide Thoughts	.513	FG8Q4	Pain_Current	.201
FG4Q3	Abuse_Self or Others	.653	FG8Q5	Pain_Level	.203
FG4Q4	Abuse Others_Current	.438	FG8Q6R	Pain_Treated	.074
FG4Q8	Breakup_Violence	.499			
FG4Q9R	Agreement_Breakup	.604			
FG5Q1	Substance Use_CutDown	.863			
FG5Q1	SubstanceUse_Agitated	.809			
FG5Q1	SubstanceUse_Guilty	.901			
FG5Q1	SubstanceUse_EyeOpener	.666			
FG5Q1	SubstanceUse_Cope	.792			
FG5Q8	Substance_TreatmentFail	.418			
FG6Q1	Abused as Child	.415			
FG6Q3	Problems_Partner	.516			
FG7Q3R	Support Systems	.486			
FG7Q4	Problems_Family-Friends	.678			
FG7Q5	Problems_Job	.429			
FG8Q3	Traumatic Brain Injury	.401			
FG8Q7	Problems_Sleeping	.869			

R^2 = variance; FG = Factor Group; Q = Question; R = Reversed; BH = Behavioral Health; PTS = Post Traumatic Stress

Table 15

Research Questions 5 and 6. Behavioral Health Risk Estimates by Behavioral Health Risk Management and Provider – Frequencies and Descriptives (*N*=30,263)

	BHRM Recommended				**Provider Determined**			
	Frequency	%	M	SD	Frequency	%	M	SD
Factor Group 1 - Behavioral Health / Depression / Suicide								
			1.62	0.702			1.4	0.701
Low	15,117	50.0			21,668	71.6		
Moderate	11,602	38.3			5,607	18.5		
High	3,361	11.1			2,572	8.5		
Severe	183	0.6			416	1.4		
Factor Group 2 - Mental Status / Psychosis								
			1.51	0.776			1.24	0.587
Low	19,256	63.6			25,096	82.9		
Moderate	7,624	25.2			3,397	11.2		
High	2,405	7.9			1,432	4.7		
Severe	978	3.2			338	1.1		
Factor Group 3 – Anxiety / Post Traumatic Stress								
			2.18	1.239			1.72	1.01
Low	13,663	45.1			18,126	59.9		
Moderate	4,778	15.8			5,139	17.0		
High	4,492	14.8			4,300	14.2		
Severe	7,330	24.2			2,698	8.9		
Factor Group 4 – Anger / Aggression / Violence								
			1.4	0.579			1.18	0.479
Low	19,710	65.1			25,831	85.4		
Moderate	9,148	30.2			3,473	11.5		
High	1,383	4.6			829	2.7		
Severe	22	0.1			130	0.4		
Factor Group 5 – Substance Use / Abuse								
			1.18	0.468			1.11	0.401
Low	25,741	85.1			27,776	91.8		
Moderate	3,535	11.7			1,758	5.8		
High	956	3.2			617	2.0		
Severe	31	0.1			112	0.4		

BHRM = Behavioral Health Risk Management; % = Percentage; M = Mean;
SD = Standard Deviation

Table 15 cont'd. Research Questions 5 and 6. Behavioral Health Risk Estimates by Behavioral Health Risk Management and Provider – Frequencies and Descriptives (*N*=30,263)

	BHRM Recommended				**Provider Determined**			
	Frequency	%	M	SD	Frequency	%	M	SD
Factor Group 6 – Psychosocial History / Relationships								
			1.47	0.701			1.25	0.567
Low	19,662	65.0			24,534	81.1		
Moderate	7,306	24.1			4,124	13.6		
High	3,103	10.3			1,393	4.6		
Severe	192	0.6			212	0.7		
Factor Group 7 – Environment / Support System								
			1.37	0.616			1.19	0.506
Low	21,163	69.9			25,740	85.1		
Moderate	7,171	23.7			3,365	11.1		
High	1,783	5.9			983	3.2		
Severe	146	0.5			175	0.6		
Factor Group 8 – Health History / Traumatic Brain Injury								
			2.18	0.814			1.7	0.819
Low	7,064	23.3			15,358	50.7		
Moderate	11,455	37.9			9,551	31.6		
High	11,002	36.4			4,561	15.1		
Severe	742	2.5			793	2.6		
Final Risk Estimate								
			2.76	0.943			1.59	0.827
Low	2,711	9.0			18,062	59.7		
Moderate	9,869	32.6			7,388	24.4		
High	9,700	32.1			3,870	12.8		
Severe	7,983	26.4			943	3.1		

BHRM = Behavioral Health Risk Management; % = Percentage; M = Mean;
SD = Standard Deviation

Table 16. Summary of Behavioral Health Risk Estimates by Behavioral Health Risk Management and Provider

	Risk Estimate	
Factor Group	BHRM	Provider
1	Low or Moderate	Low*
2	Low or Moderate	Low
3	Low or Severe	Low
4	Low or Moderate	Low
5	Low	Low
6	Low or Moderate	Low
7	Low or Moderate	Low
8	Moderate or High	Low or Moderate
Final	Moderate, High or Severe	Low or Moderate

*Providers tended to estimate more as severe than BHRM

BHRM – Behavioral Health Risk Management

Table 17

Research Question 7. Relationships of Behavioral Health Risk Management and Provider Risk Estimates (Pearson's Chi-Square) (N = 30,263; df = 9)

Factor Group – BHRM by Provider	**Estimate**				X^2	p
	Low	Mod	High	Severe		
Factor Group 1 – Behavioral Health / Depression / Suicide					16995.62[a]	.001
Low	14,695	341	76	5		
Moderate	6,411	4,136	940	115		
High	555	1,117	1,466	223		
Severe	7	13	90	73		
Factor Group 2 – Mental Health / Psychosis					19195.43	.001
Low	19,060	138	53	5		
Moderate	5,163	2,223	215	23		
High	749	773	799	84		
Severe	124	263	365	226		
Factor Group 3 – Anxiety / Post-Traumatic Stress					24058.62	.001
Low	13,476	159	24	4		
Moderate	2,966	1,597	186	29		
High	1,165	1,648	1,468	211		
Severe	519	1,735	2,622	2,454		
Factor Group 4 – Anger / Aggression / Violence					12221.22[b]	.001
Low	19,103	526	72	9		
Moderate	6,391	2,453	265	39		
High	336	490	482	75		
Severe	1	4	10	7		
Factor Group 5 – Substance Use / Abuse					16199.37[c]	.001
Low	25,320	325	90	6		
Moderate	2,228	1,144	138	25		
High	226	282	374	74		
Severe	2	7	15	7		
Factor Group 6 – Psychosocial History / Relationships					15120.40[d]	.001
Low	19,104	470	75	13		
Moderate	4,455	2,510	303	38		
High	960	1,091	939	113		
Severe	15	53	76	48		

a. 1 cell (6.3%) have expected count < 5; minimum expected is 2.52.
b. 3 cells (18.8%) have expected count < 5; minimum expected is 0.09.
c. 4 cells (25%) have expected count < 5; minimum expected is 0.11.
d. 1 cell (6.3%) have expected count < 5; minimum expected is 2.52.

BHRM = Behavioral Health Risk Management module; df = degrees of freedom; X^2 =Chi-Square; p = asymptotic significance (2-sided); Mod = Moderate

Table 17 cont'd. Research Question 7. Relationships of Behavioral Health Risk Management and Provider Risk Estimates (Pearson's Chi-Square) (N = 30,263; df = 9)

Factor Group – BHRM by Provider	**Estimate**				X^2	p
	Low	Mod	High	Severe		
Factor Group 7 – Environment / Support System					17592.66[e]	.001
Low	20,859	278	24	2		
Moderate	4,438	2,428	250	55		
High	429	627	649	78		
Severe	14	32	60	40		
Factor Group 8 – Health History / Traumatic Brain Injury					10238.71	.001
Low	6,368	629	61	6		
Moderate	5,911	4,639	814	91		
High	2,977	4,062	3,432	531		
Severe	102	221	254	165		
Final Estimate – Overall Risk					8167.023	.001
Low	2,559	133	17	2		
Moderate	7,827	1,761	265	16		
High	5,658	2,497	1,453	92		
Severe	2,018	2,997	2,135	833		

e. 2 cells (12.5%) have expected count < 5; minimum expected count is .84.

BHRM = Behavioral Health Risk Management module; df = degrees of freedom; X^2 =Chi-Square; p = asymptotic significance (2-sided); Mod = Moderate

Table 18

Research Question 7 / Hypothesis 3. Correlation of Behavioral Health Risk Management and Provider Risk Estimates (Spearman's Rho) (N = 30,263)

Factor Group – Latent Construct	**Correlation Coefficient (*r*)***	**Effect Size****
Factor Group 1 - Behavioral Health / Depression / Suicide	0.630	r >.50=large
Factor Group 2 - Mental Status / Psychosis	0.624	r >.50=large
Factor Group 3 – Anxiety / Post-Traumatic Stress	0.807	r >.50=large
Factor Group 4 – Anger / Aggression / Violence	0.484	.50 > r > .30=medium
Factor Group 5 - Substance Use / Abuse	0.588	r >.50=large
Factor Group 6 - Psychosocial History / Relationships	0.598	r >.50=large
Factor Group 7 – Environmental / Support Systems	0.611	r >.50=large
Factor Group 8 - Health / Traumatic Brain Injury	0.521	r >.50=large
FINAL Risk Estimate	0.494	.50 > r > .30=medium

*All are significant at .001 ($p < .01$) and exhibit positive relationships.
**Cohen's criteria for effect size.

r = correlation; BHRM = Behavioral Health Risk Management

Table 19

Research Questions 8 and 9. Demographic Characteristics of Subjects (Grouped) (*n* = 27,675)

Variables (Grouped)	Category	Frequency	%
Gender	Male	23,754	85.8
	Female	3,921	14.2
Age at Risk Estimate	18-24 years	5,908	21.3
	25-34 years	10,469	37.8
	35-44 years	6,751	24.4
	> 44 years	4,547	16.4
	Unknown (Removed)	88	
Marital Status at Risk Estimate	Married	17,529	63.3
	Not Married	10,146	36.7
	Unknown (Removed)	9	
Race (Dummy coded)	White	19,792	71.5
	Other	6,718	24.3
	Unknown	1,165	4.2
Religion (Dummy coded)	Christian	18,881	68.2
	Other	7,107	25.7
	Unknown	1,687	6.1
Education	< High School or Graduate Equivalency	3,870	14.0
	High School or Some College	19,533	70.6
	College Graduate	4,272	15.4
	Unknown (Removed)	333	
Age at Military Entry	18-24 years	22,651	81.8
	> 24 years	5,024	18.2
	Unknown (Removed)	185	
Rank at Risk Estimate	Enlisted, E1-4	11,317	40.9
	Enlisted, E5-7	12,214	44.1
	Enlisted_E8-9 and Officers	4,144	15.0
Military Service Component at Risk Estimate	Regular (Active Duty)	14,646	52.9
	Guard or Reserve	13,029	47.1
Active Duty Service Length at Risk Estimate	0-4 years	15,153	54.8
	5-10 years	8,226	29.7
	> 10 years	4,296	15.5
	Unknown (Removed)	1,365	

% = Percentage

Table 19 cont'd. Research Questions 8 and 9. Demographic Characteristics of Subjects (Grouped) (*n* = 27,675)

Variables (Grouped)	Category	Frequency	%
Military Service Length at Risk Estimate	0-4 years	6,952	25.1
	5-10 years	7,487	27.1
	11-16 years	4,516	16.3
	> 16 years	6,952	25.1
	Unknown (Removed)	2	
Deployments before Risk Estimate	0	5,650	20.4
	1	10,744	38.8
	2	6,852	24.8
	> 2	4,429	16.0
Unknown		650	2.0
Valid (InStudy)		27,675	93.4
Missing (Unknown = 650+1940 Removed)		2,590	8.6
Total		30,265	100.0

% = Percentage

Table 20

Research Questions 8 and 9. Behavioral Health Risk Estimates by Behavioral Health Risk Management and Provider (Low, Moderate, High) – Frequencies and Percentages (*n* = 27,675)

	BHRM			Provider		
Factor Group	Risk Estimate	#	%	Risk Estimate	#	%
FG1_Behavioral Health / Depression / Suicide	Low	13,788	49.8	Low	19,761	71.4
	Mod	10,600	38.3	Mod	5,162	18.7
	High	3,287	11.9	High	2,752	9.9
FG2_Mental Status / Psychosis	Low	17,590	63.6	Low	22,921	82.8
	Mod	6,965	25.2	Mod	3,116	11.3
	High	3,120	11.3	High	1,638	5.9
FG3_Anxiety / Post-Traumatic Stress	Low	12,478	45.1	Low	16,546	59.8
	Mod	4,352	15.7	Mod	4,704	17.0
	High	10,845	39.2	High	6,425	23.2
FG4_Anger / Aggression / Violence	Low	18,060	65.3	Low	23,633	85.4
	Mod	8,335	30.1	Mod	3,162	11.4
	High	1,280	4.6	High	880	3.2
FG5_Substance Use / Abuse	Low	23,556	85.1	Low	25,401	91.8
	Mod	3,219	11.6	Mod	1,608	5.8
	High	900	3.3	High	666	2.4
FG6_ Psychosocial History / Relationships	Low	17,956	64.9	Low	22,421	81.0
	Mod	6,694	24.2	Mod	3,784	13.7
	High	3,025	10.9	High	1,470	5.3
FG7_ Environment / Support Systems	Low	19,364	70.0	Low	23,535	85.0
	Mod	6,543	23.6	Mod	3,077	11.1
	High	1,768	6.4	High	1,063	3.8
FG8_ Health / Traumatic Brain Injury	Low	6,475	23.4	Low	14,036	50.7
	Mod	10,448	37.8	Mod	8,714	31.5
	High	10,752	38.9	High	4,925	17.8
FINAL Risk Estimate	Low	2,464	8.9	Low	16,476	59.5
	Mod	9,034	32.6	Mod	6,766	24.4
	High	16,177	58.5	High	4,433	16.0

BHRM = Behavioral Health Risk Management; # = Number of Estimates; % = Percentage; FG = Factor Group; Mod = Moderate

Table 21a through r. Research Questions 8 and 9. Demographic Variables (12) and Behavioral Health Risk Estimates by Behavioral Health Risk Management and Provider (Pearson's Chi-Square) (*n* = 27,615)

Table 21a. Demographic Variables and BHRM Final Risk Estimate (X^2) (*n* = 27,675)

	BHRM - Final Risk Estimate							
	Low		Moderate		High		X^2(df)	*Sig.*
Variable	#	%	#	%	#	%		
Gender							.952(2)	.621
Male	2,099	8.8	7,764	32.7	13,891	58.5		
Female	365	9.3	1,270	32.4	2,286	58.3		
Race							10.994(4)	.027
White	1,772	9	6,562	33.2	11,458	57.9		
Non-White	600	8.9	2,097	31.2	4,021	59.9		
Unknown	92	7.9	375	32.2	698	59.9		
Education							3.754(4)	.440
< High School/GED	342	8.8	1,288	33.3	2,240	57.9		
High School	1,769	9.1	6,358	32.6	11,406	58.4		
College Graduate	353	8.3	1,388	32.5	2,531	59.2		
Religion							9.677(4)	.046
Christian	1,739	9.2	6,194	32.8	10,948	58.0		
Other	589	8.3	2,307	32.5	4,211	59.3		
Unknown	136	8.1	533	31.6	1,018	60.3		
Age Entered Military							1.319(2)	.517
17-24 years	2,035	9	7,371	32.5	13,245	58.5		
25+ years	429	8.5	1,663	33.1	2,932	58.4		
Age at Risk Estimate							5.568(6)	.473
17-24 years	534	9.0	1,946	32.9	3,428	58.0		
25-34 years	941	9.0	3,390	32.4	6,138	58.6		
35-44 years	611	9.1	2,241	33.2	3,899	57.8		
45+ years	378	8.3	1,457	32.0	2,712	59.6		
Marital Status at Risk Estimate							.801(2)	.670
Married	1,571	9.0	5,690	32.5	10,268	58.6		
Unmarried	893	8.8	3,344	33.0	5,909	58.2		
Rank at Risk Estimate							2.418(4)	.659
Enlisted 1-4	1,011	8.9	3,708	32.8	6,598	58.3		
Enlisted 5-7	1,108	9.1	3,977	32.6	7,129	58.4		
Enlisted 8-9 or Officer	345	8.3	1,349	32.6	2,450	59.1		

BHRM = Behavioral Health Risk Management module; X^2(df) = Chi-Square (degrees of freedom); *Sig.* = Significance; # = Number of Estimates; % = Percentage;
GED = Graduate Equivalency Degree

Table 21a. cont'd. Demographic Variables and BHRM Final Risk Estimate (X^2) (n = 27,675)

	BHRM - Final Risk Estimate							
	Low		Moderate		High		X^2(df)	*Sig.*
Variable	#	%	#	%	#	%		
Military Service Component							2.248(2)	.325
Regular	1,316	9.0	4,723	32.2	8,607	58.8		
Guard or Reserve	1,148	8.8	4,311	33.1	7,570	58.1		
Active Duty Service Length at Risk Estimate							.414(4)	.981
0-4 years	1,340	8.8	4,944	32.6	8,869	58.5		
5-10 years	731	8.9	2,688	32.7	4,807	58.4		
11+ years	393	9.1	1,402	32.6	2501	58.2		
Military Service Length at Risk Estimate							3.906(6)	.689
0-4 years	766	8.8	2839	32.6	5,115	58.7		
5-10 years	695	9.3	2460	32.9	4,332	57.9		
11-16 years	399	8.8	1441	31.9	2,676	59.3		
17+ years	604	8.7	2294	33.0	4,054	58.3		
Deployments before Risk Estimate							2.134(6)	.907
None	518	9.2	1861	32.9	3,271	57.9		
1	963	9.0	3493	32.5	6,288	58.5		
2	604	8.8	2247	32.8	4,001	58.4		
3+	379	8.6	1433	32.4	2,617	59.1		

BHRM = Behavioral Health Risk Management module; X^2(df) = Chi-Square (degrees of freedom); *Sig.* = Significance; # = Number of Estimates; % = Percentage;
GED = Graduate Equivalency Degree

Table 21b. Demographic Variables and BHRM Factor Group 1 Risk Estimate (X^2) (n = 27,675)

BHRM - Factor Group 1_Risk Estimate								
	Low		Moderate		High		X^2(df)	*Sig.*
Variable	#	%	#	%	#	%		
Gender							.996(2)	.608
Male	11,861	49.9	9,085	38.2	2,808	11.8		
Female	1,927	49.1	1,515	38.6	479	12.2		
Race							2.373(4)	.668
White	9,982	49.9	7,538	38.1	2,372	12.0		
Non-White	3,316	49.4	2,621	39.0	781	11.6		
Unknown	590	50.6	441	37.9	134	11.5		
Education							6.269(4)	.180
< High School/GED	1,919	49.6	1,520	39.3	431	11.1		
High School	9,704	49.7	7,500	38.4	2,329	11.9		
College Graduate	2,165	50.7	1,580	37.0	527	12.3		
Religion							1.742(4)	.783
Christian	9,427	49.9	7,196	38.1	2,258	12.0		
Other	3,532	49.7	2,737	38.5	838	11.8		
Unknown	829	49.1	667	39.5	191	11.3		
Age Entered Military							.089(2)	.956
17-24 years	11,277	49.8	8,685	38.3	2,689	11.9		
25+ years	2,511	50.0	1,915	38.1	598	11.9		
Age at Risk Estimate							11.587(6)	.072
17-24 years	2,872	48.6	2,356	39.9	680	11.5		
25-34 years	5,231	50.0	3,984	38.1	1,254	12.0		
35-44 years	3,396	50.3	2,575	38.1	780	11.6		
45+ years	2,289	50.3	1,685	37.1	573	12.6		
Marital Status at Risk Estimate							2.197(2)	.333
Married	8,683	49.5	6,733	38.4	2,113	12.1		
Unmarried	5,105	50.3	3,867	38.1	1,174	11.6		
Rank at Risk Estimate							3.337(4)	.503
Enlisted 1-4	5,645	49.9	4,366	38.6	1,306	11.5		
Enlisted 5-7	6,070	49.7	4,679	38.3	1,465	12.0		
Enlisted 8-9 or Officer	2,073	50.0	1,555	37.15	516	12.5		
Military Service Component							6.934(2)	.031
Regular	7,189	49.1	5,681	38.8	1,776	12.1		
Guard or Reserve	6,599	50.6	4,919	37.8	1,511	11.6		

BHRM = Behavioral Health Risk Management module; X^2(df) = Chi-Square (degrees of freedom); *Sig.* = Significance; # = Number of Estimates; % = Percentage;
GED = Graduate Equivalency Degree

Table 21b. cont'd. Demographic Variables and BHRM Factor Group 1 Risk Estimate (X^2) (n = 27,675)

	BHRM - Factor Group 1_Risk Estimate							
	Low		Moderate		High		X^2(df)	*Sig.*
Variable	#	%	#	%	#	%		
Active Duty Service Length at Risk Estimate								
0-4 years	7,471	49.3	5,896	38.9	1,786	11.8	7.756(4)	.101
5-10 years	4,162	50.6	3,105	37.7	959	11.7		
11+ years	2,155	50.2	1,599	37.2	542	12.6		
Military Service Length at Risk Estimate							10.899(6)	.092
0-4 years	4,286	49.2	3,406	39.1	1,028	11.8		
5-10 years	3,752	50.1	2,889	38.6	846	11.3		
11-16 years	2,239	49.6	1,695	37.5	582	12.9		
17+ years	3,511	50.5	2,610	37.5	831	12.0		
Deployments before Risk Estimate							2.957(6)	.814
None	2,818	49.9	2,173	38.5	659	11.7		
1	5,338	49.7	4,130	38.4	1,276	11.9		
2	3,412	49.8	2,640	38.5	800	11.7		
3+	2,220	50.1	1,657	37.4	552	12.5		

BHRM = Behavioral Health Risk Management module; X^2(df) = Chi-Square (degrees of freedom); *Sig.* = Significance; # = Number of Estimates; % = Percentage;
GED = Graduate Equivalency Degree

Table 21c. Demographic Variables and BHRM Factor Group 2 Risk Estimate (X^2) (n = 27,675)

BHRM - Factor Group 2_Risk Estimate								
	Low		Moderate		High		X^2(df)	*Sig.*
Variable	#	%	#	%	#	%		
Gender							4.781(2)	.092
Male	15,055	63.4	6,033	25.4	2,666	11.2		
Female	2,535	64.7	932	23.8	454	11.6		
Race							.585(4)	.965
White	12,565	63.5	4,978	25.2	2,249	11.4		
Non-White	4,282	63.7	1,695	25.2	741	11.0		
Unknown	743	63.8	292	25.1	130	11.2		
Education							2.048(4)	.727
< High School/GED	2,430	62.8	995	25.7	445	11.5		
High School	12,419	63.6	4,923	25.2	2,191	11.2		
College Graduate	2,741	64.2	1,047	24.5	484	11.3		
Religion							9.429(4)	.051
Christian	12,096	64.1	4,682	24.8	2,103	11.1		
Other	4,463	62.8	1,818	25.6	826	11.6		
Unknown	1,031	61.1	465	27.6	191	11.3		
Age Entered Military							2.534(2)	.282
17-24 years	14,349	63.3	5,727	25.3	2,575	11.4		
25+ years	3,241	64.5	1,238	24.6	545	10.8		
Age at Risk Estimate							6.206(6)	.401
17-24 years	3,710	62.8	1,543	26.1	655	11.1		
25-34 years	6,659	63.6	2,632	25.1	1,178	11.3		
35-44 years	4,350	64.4	1,645	24.4	756	11.2		
45+ years	2,871	63.1	1,145	25.2	531	11.7		
Marital Status at Risk Estimate							2.594(2)	.273
Married	11,112	63.4	4,400	25.1	2,017	11.5		
Unmarried	6,478	63.8	2,565	25.3	1,103	10.9		
Rank at Risk Estimate							1.280(4)	.865
Enlisted 1-4	7,160	63.3	2,872	25.4	1,285	11.4		
Enlisted 5-7	7,768	63.6	3,067	25.1	1,379	11.3		
Enlisted 8-9 or Officer	2,662	64.2	1,026	24.8	456	11.0		
Military Service Component							1.214(2)	.545
Regular	9,267	63.3	3,707	25.3	1,672	11.4		
Guard or Reserve	8,323	63.9	3,258	25.0	1,448	11.1		

BHRM = Behavioral Health Risk Management module; X^2(df) = Chi-Square (degrees of freedom); *Sig.* = Significance; # = Number of Estimates; % = Percentage; GED = Graduate Equivalency Degree

Table 21c. cont'd. Demographic Variables and BHRM Factor Group 2 Risk Estimate (X^2) (n = 27,675)

BHRM - Factor Group 2_Risk Estimate								
	Low		Moderate		High		X^2(df)	*Sig.*
Variable	#	%	#	%	#	%		
Active Duty Service Length at Risk Estimate							1.914(4)	.752
0-4 years	9,579	63.2	3,859	25.5	1,715	11.3		
5-10 years	5,266	64.0	2,036	24.8	924	11.2		
11+ years	2,745	63.9	1,070	24.9	481	11.2		
Military Service Length at Risk Estimate							5.267(6)	.510
0-4 years	5,471	62.7	2,257	25.9	992	11.4		
5-10 years	4,820	64.4	1,840	24.6	827	11.0		
11-16 years	2,874	63.6	1,135	25.1	507	11.2		
17+ years	4,425	63.7	1,733	24.9	794	11.4		
Deployments before Risk Estimate							2.903(6)	.821
None	3,560	63.0	1,420	25.1	670	11.9		
1	6,858	63.8	2,705	25.2	1,181	11.0		
2	4,359	63.6	1,725	25.2	768	11.2		
3+	2,813	63.5	1,115	25.2	501	11.3		

BHRM = Behavioral Health Risk Management module; X^2(df) = Chi-Square (degrees of freedom); *Sig.* = Significance; # = Number of Estimates; % = Percentage; GED = Graduate Equivalency Degree

Table 21d. Demographic Variables and BHRM Factor Group 3 Risk Estimate (X^2) (n = 27,675)

BHRM - Factor Group 3_Risk Estimate								
	Low		Moderate		High		X^2(df)	*Sig.*
Variable	#	%	#	%	#	%		
Gender							.010(2)	.995
Male	10,711	45.1	3,737	15.7	9,306	39.2		
Female	1,767	45.1	615	15.7	1,539	39.3		
Race								
White	8,904	45.0	3,176	16.0	7,712	39.0	5.993(4)	.200
Non-White	3,036	45.2	1,006	15.0	2,676	39.8		
Unknown	538	46.2	170	14.6	457	39.2		
Education							2.791(4)	.593
< High School/GED	1,703	44.0	635	16.4	1,532	39.6		
High School	8,835	45.2	3,047	15.6	7,651	39.2		
College Graduate	1,940	45.4	670	15.7	1,662	38.9		
Religion							3.381(4)	.496
Christian	8,574	45.4	2,968	15.7	7,339	38.9		
Other	3,165	44.5	1,121	15.8	2,821	39.7		
Unknown	739	43.8	263	15.6	685	40.6		
Age Entered Military							.768(2)	.681
17-24 years	10,212	45.1	3,581	15.8	8,858	39.1		
25+ years	2,266	45.1	771	15.3	1,987	39.6		
Age at Risk Estimate							17.611(6)	.007
17-24 years	2,625	44.4	997	16.9	2,286	38.7		
25-34 years	4,679	44.7	1,680	16.0	441	39.3		
35-44 years	3,116	46.2	1,022	15.1	2,613	38.7		
45+ years	2,058	45.3	653	14.4	1,836	40.4		
Marital Status at Risk Estimate							5.365(2)	.068
Married	7,935	45.3	2,689	15.3	6,905	39.4		
Unmarried	4,543	44.8	1,663	16.4	3,940	38.8		
Rank at Risk Estimate							7.295(4)	.121
Enlisted 1-4	5,033	44.5	1,854	16.4	4,430	39.1		
Enlisted 5-7	5,565	45.6	1,852	15.2	4,797	39.3		
Enlisted 8-9 or Officer	1,880	45.4	646	15.6	1,618	39.0		
Military Service Component							4.985(2)	.083
Regular	6,539	44.6	2,366	16.2	5,741	39.2		
Guard or Reserve	5,939	45.6	1,986	15.2	5,104	39.2		

BHRM = Behavioral Health Risk Management module; X^2(df) = Chi-Square (degrees of freedom); *Sig.* = Significance; # = Number of Estimates; % = Percentage; GED = Graduate Equivalency Degree

Table 21d. cont'd. Demographic Variables and BHRM Factor Group 3 Risk Estimate (X^2) (n = 27,675)

BHRM - Factor Group 3_Risk Estimate								
	Low		Moderate		High		X^2(df)	*Sig.*
Variable	#	%	#	%	#	%		
Active Duty Service Length at Risk Estimate							8.493(4)	.075
0-4 years	6,713	44.3	2,415	15.9	6,025	39.8		
5-10 years	3,779	45.9	1,278	15.5	3,169	38.5		
11+ years	1,986	46.2	659	15.3	1,651	38.4		
Military Service Length at Risk Estimate							19.039(6)	.004
0-4 years	3,814	43.7	1,470	16.9	3,436	39.4		
5-10 years	3,420	45.7	1,169	15.6	2,898	38.7		
11-16 years	2,046	45.3	698	15.5	1,772	39.2		
17+ years	3,198	46.0	1,015	14.6	2,739	39.4		
Deployments before Risk Estimate							5.088(6)	.533
None	2,527	44.7	919	16.3	2,204	39.0		
1	4,836	45.0	1,724	16.0	4,184	38.9		
2	3,103	45.3	1,034	15.1	2,715	39.6		
3+	2,012	45.4	675	15.2	1,742	39.3		

BHRM = Behavioral Health Risk Management module; X^2(df) = Chi-Square (degrees of freedom); *Sig.* = Significance; # = Number of Estimates; % = Percentage; GED = Graduate Equivalency Degree

Table 21e. Demographic Variables and BHRM Factor Group 4 Risk Estimate (X^2) (n = 27,675)

	BHRM - Factor Group 4_Risk Estimate							
	Low		Moderate		High		X^2(df)	*Sig.*
Variable	#	%	#	%	#	%		
Gender							1.976(2)	.372
Male	15,464	65.1	7,191	30.3	1,099	4.6		
Female	2,596	66.2	1,144	29.2	181	4.6		
Race							2.428(4)	.658
White	12,873	65.0	6,011	30.4	908	4.6		
Non-White	4,420	65.8	1,984	29.5	314	4.7		
Unknown	767	65.8	340	29.2	58	5.0		
Education							6.661(4)	.155
< High School/GED	2,559	66.1	1,114	28.8	197	5.1		
High School	12,708	65.1	5,948	30.5	877	4.5		
College Graduate	2,793	65.4	1,273	29.8	206	4.8		
Religion							10.364(4)	.035
Christian	12,356	65.4	5,632	29.8	893	4.7		
Other	4,632	65.2	2,148	30.2	327	4.6		
Unknown	1,072	63.5	555	32.9	60	3.6		
Age Entered Military							.163(2)	.922
17-24 years	14,773	65.2	6,833	30.2	1,045	4.6		
25+ years	3,287	65.4	1,502	29.9	235	4.7		
Age at Risk Estimate							8.835(6)	.183
17-24 years	3,898	66.0	1,760	29.8	250	4.2		
25-34 years	6,797	64.9	3,195	30.5	477	4.6		
35-44 years	4,439	65.8	1,976	29.3	336	5.0		
45+ years	2,926	64.4	1,404	30.9	217	4.8		
Marital Status at Risk Estimate							5.244(2)	.073
Married	11,360	64.8	5,332	30.4	837	4.8		
Unmarried	6,700	66.0	3,003	29.6	443	4.4		
Rank at Risk Estimate							4.731(4)	.316
Enlisted 1-4	7,406	65.4	3,408	30.1	503	4.4		
Enlisted 5-7	8,002	65.5	3,634	29.8	578	4.7		
Enlisted 8-9 or Officer	2,652	64.0	1,293	31.2	199	4.8		
Military Service Component							3.549(2)	.170
Regular	9,546	65.2	4,452	30.4	648	4.4		
Guard or Reserve	8,514	65.3	3,883	29.8	632	4.9		

BHRM = Behavioral Health Risk Management module; X^2(df) = Chi-Square (degrees of freedom); *Sig.* = Significance; # = Number of Estimates; % = Percentage;
GED = Graduate Equivalency Degree

Table 21e. cont'd. Demographic Variables and BHRM Factor Group 4 Risk Estimate (X^2) (n = 27,675)

BHRM - Factor Group 4_Risk Estimate								
	Low		Moderate		High		X^2(df)	*Sig.*
Variable	#	%	#	%	#	%		
Active Duty Service Length at Risk Estimate							2.334(4)	.675
0-4 years	9,925	65.5	4,526	29.9	702	4.6		
5-10 years	5,358	65.1	2,501	30.4	367	4.5		
11+ years	2,777	64.6	1,308	30.4	211	4.9		
Military Service Length at Risk Estimate							14.212(6)	.027
0-4 years	5,701	65.4	2,623	30.1	396	4.5		
5-10 years	4,918	65.7	2,269	30.3	300	4.0		
11-16 years	2,922	64.7	1,349	29.9	245	5.4		
17+ years	4,519	65.0	2,094	30.1	339	4.9		
Deployments before Risk Estimate							11.251(6)	.081
None	3,622	64.1	1,734	30.7	294	5.2		
1	7,058	65.7	3,230	30.1	456	4.2		
2	4,509	65.8	2,029	29.6	314	4.6		
3+	2,871	64.8	1,342	30.3	216	4.9		

BHRM = Behavioral Health Risk Management module; X^2(df) = Chi-Square (degrees of freedom); *Sig.* = Significance; # = Number of Estimates; % = Percentage; GED = Graduate Equivalency Degree

Table 21f. Demographic Variables and BHRM Factor Group 5 Risk Estimate (X^2) (n = 27,675)

	BHRM - Factor Group 5_Risk Estimate							
	Low		Moderate		High		X^2(df)	*Sig.*
Variable	#	%	#	%	#	%		
Gender							3.875(2)	.144
Male	20,179	84.9	2,798	11.8	777	3.3		
Female	3,377	86.1	421	10.7	123	3.1		
Race (26,510, missing 1,165)							.906(4)	.924
White	16,854	85.2	2,287	11.6	651	3.3		
Non-White	5,706	84.9	799	11.9	213	3.2		
Unknown	996	85.5	133	11.4	36	3.1		
Education							2.016(4)	.733
< High School/GED	3,267	84.4	470	12.1	133	3.4		
High School	16,651	85.2	2,258	11.6	624	3.2		
College Graduate	3,638	85.2	491	11.5	143	3.3		
Religion							2.315(4)	.678
Christian	16,082	85.2	2,189	11.6	610	3.2		
Other	6,052	85.2	830	11.7	225	3.2		
Unknown	1,422	84.3	200	11.9	65	3.9		
Age Entered Military							1.011(2)	.603
17-24 years	19,299	85.2	2,614	11.5	738	3.3		
25+ years	4,257	84.7	605	12.0	162	3.2		
Age at Risk Estimate							8.847(6)	.182
17-24 years	5,047	85.4	665	11.3	196	3.3		
25-34 years	8,895	85.0	1,215	11.6	359	3.4		
35-44 years	5,784	85.7	776	11.5	191	2.8		
45+ years	3,830	84.2	563	12.4	154	3.4		
Marital Status at Risk Estimate							1.779(2)	.411
Married	14,883	84.9	2,064	11.8	582	3.3		
Unmarried	8,673	85.5	1,155	11.4	318	3.1		
Rank at Risk Estimate							3.083(4)	.544
Enlisted 1-4	9,618	85.0	1,314	11.6	385	3.4		
Enlisted 5-7	10,425	85.4	1,400	11.5	389	3.2		
Enlisted 8-9 or Officer	3,513	84.8	505	12.2	126	3.0		
Military Service Component							5.034(2)	.081
Regular	12,481	85.2	1,663	11.4	502	3.4		
Guard or Reserve	11,075	85.0	1,556	11.9	398	3.1		

BHRM = Behavioral Health Risk Management module; X^2(df) = Chi-Square (degrees of freedom); *Sig.* = Significance; # = Number of Estimates; % = Percentage;
GED = Graduate Equivalency Degree

Table 21f. cont'd. Demographic Variables and BHRM Factor Group 5 Risk Estimate (X^2) (n = 27,675)

BHRM - Factor Group 5_Risk Estimate								
	Low		Moderate		High		X^2(df)	*Sig.*
Variable	#	%	#	%	#	%		
Active Duty Service Length at Risk Estimate							2.816(4)	.589
0-4 years	12,869	84.9	1,773	11.7	511	3.4		
5-10 years	7,006	85.2	967	11.8	253	3.1		
11+ years	3,681	85.7	479	11.1	136	3.2		
Military Service Length at Risk Estimate							6.213(6)	.400
0-4 years	7,423	85.1	1,004	11.5	293	3.4		
5-10 years	6,400	85.5	850	11.4	237	3.2		
11-16 years	3,848	85.2	510	11.3	158	3.5		
17+ years	5,885	84.7	855	12.3	212	3.0		
Deployments before Risk Estimate							2.115(6)	.090
None	4,810	85.1	660	11.7	180	3.2		
1	9,154	85.2	1,230	11.4	360	3.4		
2	5,818	84.9	806	11.8	228	3.3		
3+	3,774	85.2	523	11.8	132	3.0		

BHRM = Behavioral Health Risk Management module; X^2(df) = Chi-Square (degrees of freedom); *Sig.* = Significance; # = Number of Estimates; % = Percentage; GED = Graduate Equivalency Degree

Table 21g. Demographic Variables and BHRM Factor Group 6 Risk Estimate (X^2) (n = 27,675)

BHRM - Factor Group 6_Risk Estimate								
	Low		Moderate		High		X^2(df)	*Sig.*
Variable	#	%	#	%	#	%		
Gender							2.213(2)	.331
Male	15,447	65.0	5,709	24.0	2,598	10.9		
Female	2,509	64.0	985	25.1	427	10.9		
Race							2.229(4)	.694
White	12,876	65.1	4,750	24.0	2,166	10.9		
Non-White	4,320	64.3	1,657	24.7	741	11.0		
Unknown	760	65.2	287	24.6	118	10.1		
Education							1.463(4)	.833
< High School/GED	2,494	64.4	958	24.8	418	10.8		
High School	12,673	64.9	4,706	24.1	2,154	11.0		
College Graduate	2,789	65.3	1,030	24.1	453	10.6		
Religion							2.841(4)	.585
Christian	12,264	65.0	4,575	24.2	2,042	10.8		
Other	4,611	64.9	1,692	23.8	804	11.3		
Unknown	1,081	64.1	427	25.3	179	10.6		
Age Entered Military							.043(2)	.979
17-24 years	14,690	64.9	5,483	24.2	2,478	10.9		
25+ years	3,266	65.0	1,211	24.1	547	10.9		
Age at Risk Estimate							2.655(6)	.851
17-24 years	3,862	65.4	1,416	24.0	630	10.7		
25-34 years	6,790	64.9	2,513	24.0	1,166	11.1		
35-44 years	4,378	64.8	1,632	24.2	741	11.0		
45+ years	2,926	64.4	1,133	24.9	488	10.7		
Marital Status at Risk Estimate							.319(2)	.853
Married	11,377	64.9	4,225	24.1	1,927	11.0		
Unmarried	6,579	64.8	2,469	24.3	1,098	10.8		
Rank at Risk Estimate							1.860(4)	.761
Enlisted 1-4	7,362	65.1	2,696	23.8	1,259	11.1		
Enlisted 5-7	7,904	64.7	2,989	24.5	1,321	10.8		
Enlisted 8-9 or Officer	2,690	64.9	1,009	24.3	445	10.7		
Military Service Component							3.351(2)	.187
Regular	9,454	64.6	3,607	24.6	1,585	10.8		
Guard or Reserve	8,502	65.3	3,087	23.7	1,440	11.1		

BHRM = Behavioral Health Risk Management module; X^2(df) = Chi-Square (degrees of freedom); *Sig.* = Significance; # = Number of Estimates; % = Percentage;
GED = Graduate Equivalency Degree

Table 21g. cont'd. Demographic Variables and BHRM Factor Group 6 Risk Estimate (X^2) (n = 27,675)

BHRM - Factor Group 6_Risk Estimate								
	Low		Moderate		High		X^2(df)	*Sig.*
Variable	#	%	#	%	#	%		
Active Duty Service Length at Risk Estimate							.890(4)	.926
0-4 years	9,832	64.9	3,649	24.1	1,672	11.0		
5-10 years	5,333	64.8	1,994	24.2	899	10.9		
11+ years	2,791	65.0	1,051	24.5	454	10.6		
Military Service Length at Risk Estimate							2.550(6)	.863
0-4 years	5,643	64.7	2,118	24.3	959	11.0		
5-10 years	4,891	65.3	1,769	23.6	827	11.0		
11-16 years	2,940	65.1	1,090	24.1	486	10.8		
17+ years	4,482	64.5	1,717	24.7	753	10.8		
Deployments before Risk Estimate							5.633(6)	.466
None	3,632	64.3	1,388	24.6	630	11.2		
1	7,046	65.6	2,554	23.8	1,143	10.6		
2	4,446	64.9	1,644	24.0	762	11.1		
3+	2,831	63.9	1,108	25.0	490	11.1		

BHRM = Behavioral Health Risk Management module; X^2(df) = Chi-Square (degrees of freedom); *Sig.* = Significance; # = Number of Estimates; % = Percentage;
GED = Graduate Equivalency Degree

Table 21h. Demographic Variables and BHRM Factor Group 7 Risk Estimate (X^2) (n = 27,675)

BHRM - Factor Group 7_Risk Estimate								
	Low		Moderate		High		X^2(df)	*Sig.*
Variable	#	%	#	%	#	%		
Gender							.187(2)	.911
Male	16,632	70.0	5,607	23.6	1,515	6.4		
Female	2732	69.7	936	23.9	253	6.5		
Race							.586(4)	.965
White	13,829	69.9	4,701	23.8	1,262	6.4		
Non-White	4,712	70.1	1,574	23.4	432	6.4		
Unknown	832	70.6	268	23.0	74	6.4		
Education							2.800(4)	.592
< High School/GED	2,706	69.9	905	23.4	259	6.7		
High School	13,694	70.1	4,592	23.5	1,247	6.4		
College Graduate	2,964	69.4	1,046	24.5	262	6.1		
Religion							8.731(4)	.068
Christian	13,253	70.2	4,436	23.5	1,192	6.3		
Other	4,957	69.7	1,668	23.5	482	6.8		
Unknown	1,154	68.4	439	26.0	94	5.6		
Age Entered Military							.665(2)	.717
17-24 years	15,860	70.0	5,336	23.6	1,455	6.4		
25+ years	3,504	69.7	1,207	24.0	313	6.2		
Age at Risk Estimate							4.158(6)	.655
17-24 years	4,140	70.1	1,384	23.4	384	6.5		
25-34 years	7,319	69.9	2,460	23.5	690	6.6		
35-44 years	4,742	70.2	1,611	23.9	398	5.9		
45+ years	3,163	69.6	1,088	23.9	296	6.5		
Marital Status at Risk Estimate							1.891(2)	.388
Married	12,218	69.7	4,172	23.8	1,139	6.5		
Unmarried	7,146	70.4	2,371	23.4	629	6.2		
Rank at Risk Estimate							4.137(4)	.388
Enlisted 1-4	7,965	70.4	2,624	23.2	728	6.4		
Enlisted 5-7	8,534	69.9	2,895	23.7	785	6.4		
Enlisted 8-9 or Officer	2,865	69.1	1,024	24.7	255	6.2		
Military Service Component							.738(2)	.691
Regular	10,225	69.8	3,469	23.7	952	6.5		
Guard or Reserve	9,139	70.1	3,074	23.6	816	6.3		

BHRM = Behavioral Health Risk Management module; X^2(df) = Chi-Square (degrees of freedom); *Sig.* = Significance; # = Number of Estimates; % = Percentage;
GED = Graduate Equivalency Degree

Table 21h. cont'd. Demographic Variables and BHRM Factor Group 7 Risk Estimate (X^2) (n = 27,675)

BHRM - Factor Group 7_Risk Estimate								
	Low		Moderate		High		X^2(df)	*Sig.*
Variable	#	%	#	%	#	%		
Active Duty Service Length at Risk Estimate							1.854(4)	.763
0-4 years	10,572	69.8	3,613	23.8	968	6.4		
5-10 years	5,763	70.1	1,924	23.4	539	6.6		
11+ years	3,029	70.5	1,006	23.4	261	6.1		
Military Service Length at Risk Estimate							3.257(6)	.776
0-4 years	6,072	69.6	2,082	23.9	566	6.5		
5-10 years	5,258	70.2	1,747	23.3	482	6.4		
11-16 years	3,130	69.3	1,100	24.4	286	6.3		
17+ years	4,904	70.5	1,614	23.2	434	6.2		
Deployments before Risk Estimate							1.547(6)	.956
None	3,954	70.0	1,338	23.7	358	6.3		
1	7,524	70.0	2,516	23.4	704	6.6		
2	4,788	69.9	1,628	23.8	436	6.4		
3+	3,098	69.9	1,061	24.0	270	6.1		

BHRM = Behavioral Health Risk Management module; X^2(df) = Chi-Square (degrees of freedom); *Sig.* = Significance; # = Number of Estimates; % = Percentage;
GED = Graduate Equivalency Degree

Table 21i. Demographic Variables and BHRM Factor Group 8 Risk Estimate (X^2) (n = 27,675)

	BHRM - Factor Group 8_Risk Estimate							
	Low		Moderate		High		X^2(df)	*Sig.*
Variable	#	%	#	%	#	%		
Gender							1.214(2)	.545
Male	5,566	23.4	8,937	37.6	9,251	38.9		
Female	909	23.2	1,511	38.5	1,501	38.3		
Race							7.116(4)	.130
White	4,660	23.5	7,535	38.1	7,597	38.4		
Non-White	1,553	23.1	2,489	37.0	2,676	39.8		
Unknown	262	22.5	424	36.4	479	41.1		
Education							9.273(4)	.055
< High School/GED	895	23.1	1,478	38.2	1,497	38.7		
High School	4,653	23.8	7,317	37.5	7,563	38.7		
College Graduate	927	21.7	1,653	38.7	1,692	39.6		
Religion							6.138(4)	.189
Christian	4,459	23.6	7,170	38.0	7,252	38.4		
Other	1,625	22.9	2,668	37.5	2,814	39.6		
Unknown	391	23.2	610	36.2	686	40.7		
Age Entered Military							1.710(2)	.425
17-24 years	5,335	23.6	8,536	37.7	8,780	38.8		
25+ years	1,140	22.7	1,912	38.1	1,972	39.3		
Age at Risk Estimate							5.842(6)	.441
17-24 years	1,405	23.8	2,230	37.7	2,273	38.5		
25-34 years	2,480	23.7	3,935	37.6	4,054	38.7		
35-44 years	1,585	23.5	2,556	37.9	2,610	38.7		
45+ years	1,005	22.1	1,727	38.0	1,815	39.9		
Marital Status at Risk Estimate							.977(2)	.614
Married	4,078	23.3	6,604	37.7	6,847	39.1		
Unmarried	2,397	23.6	3,844	37.9	3,905	38.5		
Rank at Risk Estimate							8.072(4)	.089
Enlisted 1-4	2,666	23.6	4,265	37.7	4,386	38.8		
Enlisted 5-7	2,907	23.8	4,566	37.4	4,741	38.8		
Enlisted 8-9 or Officer	902	21.8	1,617	39.0	1,625	39.2		
Military Service Component							5.868(2)	.053
Regular	3,469	23.7	5,432	37.1	5,745	39.2		
Guard or Reserve	3,006	23.1	5,016	38.5	5,007	38.4		

BHRM = Behavioral Health Risk Management module; X^2(df) = Chi-Square (degrees of freedom); *Sig.* = Significance; # = Number of Estimates; % = Percentage;
GED = Graduate Equivalency Degree

Table 21i. cont'd. Demographic Variables and BHRM Factor Group 8 Risk Estimate (X^2) (n = 27,675)

BHRM - Factor Group 8_Risk Estimate								
	Low		Moderate		High		X^2(df)	*Sig.*
Variable	#	%	#	%	#	%		
Active Duty Service Length at Risk Estimate							1.136(4)	.889
0-4 years	3,538	23.3	5,753	38.0	5,862	38.7		
5-10 years	1,915	23.3	3,086	37.5	3,225	39.2		
11+ years	1,022	23.8	1,609	37.5	1,665	38.8		
Military Service Length at Risk Estimate							2.478(6)	.871
0-4 years	2,049	23.5	3,277	37.6	3,394	38.9		
5-10 years	1,790	23.9	2,809	37.5	2,888	38.6		
11-16 years	1,044	23.1	1,721	38.1	1,751	38.8		
17+ years	1,592	22.9	2,641	38.0	2,719	39.1		
Deployments before Risk Estimate							3.761(6)	.709
None	1,358	24.0	2,120	37.5	2,172	38.4		
1	2,474	23.0	4,103	38.2	4,167	38.8		
2	1,613	23.5	2,581	37.7	2,658	38.8		
3+	1,030	23.3	1,644	37.1	1,755	39.6		

BHRM = Behavioral Health Risk Management module; X^2(df) = Chi-Square (degrees of freedom); *Sig.* = Significance; # = Number of Estimates; % = Percentage;
GED = Graduate Equivalency Degree

Table 21j. Demographic Variables and Provider Final Risk Estimate (X^2) (n = 27,675)

	Provider - Final Risk Estimate							
	Low		Moderate		High		X^2(df)	*Sig.*
Variable	#	%	#	%	#	%		
Gender							1.380(2)	.502
Male	14,170	59.7	5,779	24.3	3,805	16.0		
Female	2,306	58.8	987	25.2	628	16.0		
Race							2.674(4)	.614
White	11,476	59.3	4,853	24.5	3,193	16.1		
Non-White	4,016	59.8	1,647	24.5	1,055	15.7		
Unknown	714	61.3	266	22.8	185	15.9		
Education							8.346(4)	.080
< High School/GED	2,251	58.2	1,007	26.0	612	15.8		
High School	11,649	59.6	4,763	24.4	3,121	16.0		
College Graduate	2,576	60.3	996	23.3	700	16.4		
Religion							11.122(4)	.025
Christian	11,282	59.8	4,549	24.1	3,050	16.2		
Other	4,181	58.8	1,830	25.7	1,096	15.4		
Unknown	1,013	60.0	387	22.9	287	17.0		
Age Entered Military							.086(2)	.958
17-24 years	13,494	59.6	5,531	24.4	3,626	16.0		
25+ years	2,982	59.4	1,235	24.8	807	16.1		
Age at Risk Estimate							6.575(6)	.362
17-24 years	3,523	59.6	1,450	24.5	935	15.8		
25-34 years	6,178	59.0	2,549	24.3	1,742	16.6		
35-44 years	4,042	59.9	1,676	24.8	1,033	15.3		
45+ years	2,733	60.1	1,091	24.0	723	15.9		
Marital Status at Risk Estimate							.835(2)	.659
Married	10,465	59.7	4,281	24.4	2,783	15.9		
Unmarried	6,011	59.2	2,485	24.5	1,650	16.3		
Rank at Risk Estimate							3.441(4)	.487
Enlisted 1-4	6,678	59.0	2,824	25.0	1,815	16.0		
Enlisted 5-7	7,296	59.7	2,953	24.2	1,965	16.1		
Enlisted 8-9 or Officer	2,502	60.4	989	23.9	653	15.8		
Military Service Component							3.892(2)	.143
Regular	8,639	59.0	3,627	24.8	2,380	16.3		
Guard or Reserve	7,837	60.2	3,139	24.1	2,053	15.8		

BHRM = Behavioral Health Risk Management module; X^2(df) = Chi-Square (degrees of freedom); *Sig.* = Significance; # = Number of Estimates; % = Percentage;
GED = Graduate Equivalency Degree

Table 21j. cont'd. Demographic Variables and Provider Final Risk Estimate (X^2) (n = 27,675)

	Provider - Final Risk Estimate							
	Low		Moderate		High		X^2(df)	*Sig.*
Variable	#	%	#	%	#	%		
Active Duty Service Length at Risk Estimate							2.084(4)	.720
0-4 years	8,974	59.2	3,720	24.5	2,459	16.2		
5-10 years	4,916	59.8	2,000	24.3	1,310	15.9		
11+ years	2,586	60.2	1,046	24.3	664	15.5		
Military Service Length at Risk Estimate							5.269(6)	.510
0-4 years	5,142	59.0	2,166	24.8	1,412	16.2		
5-10 years	4,420	59.0	1,845	24.6	1,222	16.3		
11-16 years	2,705	59.9	1,093	24.2	718	15.9		
17+ years	4,209	60.5	1,662	23.9	1,081	15.5		
Deployments before Risk Estimate							3.123(6)	.793
None	3,330	58.9	1,386	24.5	934	16.5		
1	6,417	59.7	2,640	24.6	1,687	15.7		
2	4,064	59.3	1,682	24.5	1,106	16.1		
3+	2,665	60.2	1,058	23.9	706	15.9		

BHRM = Behavioral Health Risk Management module; X^2(df) = Chi-Square (degrees of freedom); *Sig.* = Significance; # = Number of Estimates; % = Percentage;
GED = Graduate Equivalency Degree

Table 21k. Demographic Variables and Provider Factor Group 1 Risk Estimate (X^2) (n = 27,675)

Provider - Factor Group 1_Risk Estimate								
	Low		Moderate		High		X^2(df)	*Sig.*
Variable	#	%	#	%	#	%		
Gender							1.657(2)	.437
Male	16,995	71.5	4,409	18.6	2,350	9.9		
Female	2,766	70.5	753	19.2	402	10.3		
Race							5.394(4)	.249
White	14,129	71.4	3,675	18.6	1,988	10.0		
Non-White	4,777	71.1	1,271	18.9	670	10.0		
Unknown	855	73.4	216	18.5	94	8.1		
Education							1.359(4)	.851
< High School/GED	2,776	71.7	708	18.3	386	10.0		
High School	13,912	71.2	3,676	18.8	1,945	10.0		
College Graduate	3,073	71.9	778	18.2	421	9.9		
Religion							5.953(4)	.203
Christian	13,529	71.7	3,464	18.3	1,888	10.0		
Other	5,040	70.9	1,384	19.5	683	9.6		
Unknown	1,192	70.7	314	18.6	181	10.7		
Age Entered Military							1.753(2)	.416
17-24 years	16,184	71.4	4,239	18.7	2,228	9.8		
25+ years	3,577	71.2	923	18.4	524	10.4		
Age at Risk Estimate							8.718(6)	.190
17-24 years	4,232	71.6	1,118	18.9	558	9.4		
25-34 years	7,438	71.0	1,932	18.5	1,099	10.5		
35-44 years	4,852	71.9	1,232	18.2	667	9.9		
45+ years	3,239	71.2	880	19.4	428	9.4		
Marital Status at Risk Estimate							.436(2)	.804
Married	12,533	71.5	3,249	18.5	1,747	10.0		
Unmarried	7,228	71.2	1,913	18.9	1,005	9.9		
Rank at Risk Estimate							3.116(4)	.539
Enlisted 1-4	8,112	71.7	2,072	18.3	1,133	10.0		
Enlisted 5-7	8,681	71.1	2,303	18.9	1,230	10.1		
Enlisted 8-9 or Officer	2,968	71.6	787	19.0	389	9.4		
Military Service Component							5.107(2)	.078
Regular	10,377	70.9	2,799	19.1	1,470	10.0		
Guard or Reserve	9,384	72.0	2,363	18.1	1,282	9.8		

BHRM = Behavioral Health Risk Management module; X^2(df) = Chi-Square (degrees of freedom); *Sig.* = Significance; # = Number of Estimates; % = Percentage;
GED = Graduate Equivalency Degree

Table 21k. Demographic Variables and Provider Factor Group 1 Risk Estimate (X^2) (n = 27,675)

Provider - Factor Group 1_Risk Estimate								
	Low		Moderate		High		X^2(df)	*Sig.*
Variable	#	%	#	%	#	%		
Active Duty Service Length at Risk Estimate							3.597(4)	.463
0-4 years	10,819	71.4	2,804	18.5	1,530	10.1		
5-10 years	5,900	71.7	1,517	18.4	809	9.8		
11+ years	3,042	70.8	841	19.6	413	9.6		
Military Service Length at Risk Estimate							8.683(6)	.192
0-4 years	6,210	71.2	1,629	18.7	881	10.1		
5-10 years	5,370	71.7	1,359	18.2	758	10.1		
11-16 years	3,189	70.6	851	18.8	476	10.5		
17+ years	4,992	71.8	1,323	19.0	637	9.2		
Deployments before Risk Estimate							3.185(6)	.785
None	4,015	71.1	1,048	18.5	587	10.4		
1	7,702	71.7	1,973	18.4	1,069	9.9		
2	4,887	71.3	1,296	18.9	669	9.8		
3+	3,157	71.3	845	19.1	427	9.6		

BHRM = Behavioral Health Risk Management module; X^2(df) = Chi-Square (degrees of freedom); *Sig.* = Significance; # = Number of Estimates; % = Percentage;
GED = Graduate Equivalency Degree

Table 21l. Demographic Variables and Provider Factor Group 2 Risk Estimate (X^2) (n = 27,675)

Provider - Factor Group 2_Risk Estimate								
	Low		Moderate		High		X^2(df)	*Sig.*
Variable	#	%	#	%	#	%		
Gender							.597(2)	.742
Male	19,669	82.8	2,669	11.2	1,416	6.0		
Female	3,252	82.9	447	11.4	222	5.7		
Race							1.744(4)	.783
White	16,379	82.8	2,224	11.2	1,189	6.0		
Non-White	5,571	82.9	758	11.3	389	5.8		
Unknown	971	83.3	134	11.5	60	5.2		
Education							1.673(4)	.796
< High School/GED	3,203	82.8	444	11.5	223	5.8		
High School	16,154	82.7	2,210	11.3	1,169	6.0		
College Graduate	3,564	83.4	462	10.8	246	5.8		
Religion							3.439(4)	.487
Christian	15,667	83.0	2,111	11.2	1,103	5.8		
Other	5,880	82.7	807	11.4	420	5.9		
Unknown	1,374	81.4	198	11.7	115	6.8		
Age Entered Military							.338(2)	.844
17-24 years	18,773	82.9	2,539	11.2	1,339	5.9		
25+ years	4,148	82.6	577	11.5	299	6.0		
Age at Risk Estimate							6.543(6)	.365
17-24 years	4,901	83.0	648	11.0	359	6.1		
25-34 years	8,629	82.4	1,230	11.7	610	5.8		
35-44 years	5,629	83.4	716	10.6	406	6.0		
45+ years	3,762	82.7	522	11.5	263	5.8		
Marital Status at Risk Estimate							1.432(2)	.489
Married	14,524	82.9	1,951	11.1	1054	6.0		
Unmarried	8,397	82.8	1,165	11.5	584	5.8		
Rank at Risk Estimate							5.053(4)	.282
Enlisted 1-4	9,354	82.7	1,289	11.4	674	6.0		
Enlisted 5-7	10,102	82.7	1,364	11.2	748	6.1		
Enlisted 8-9 or Officer	3,465	83.6	463	11.2	216	5.2		
Military Service Component							7.292(2)	.026
Regular	12,067	82.4	1,661	11.3	918	6.3		
Guard or Reserve	10,854	83.3	1,455	11.2	720	5.5		

BHRM = Behavioral Health Risk Management module; X^2(df) = Chi-Square (degrees of freedom); *Sig.* = Significance; # = Number of Estimates; % = Percentage;
GED = Graduate Equivalency Degree

Table 21l. cont'd. Demographic Variables and Provider Factor Group 2 Risk Estimate (X^2) (n = 27,675)

Provider - Factor Group 2_Risk Estimate								
	Low		Moderate		High		X^2(df)	*Sig.*
Variable	#	%	#	%	#	%		
Active Duty Service Length at Risk Estimate							3.946(4)	.413
0-4 years	12,522	82.6	1,709	11.3	922	6.1		
5-10 years	6,858	83.4	914	11.1	454	5.5		
11+ years	3,541	82.4	493	11.5	262	6.1		
Military Service Length at Risk Estimate							3.828(6)	.700
0-4 years	7,187	82.4	1,002	11.5	531	6.1		
5-10 years	6,225	83.1	825	11.0	437	5.8		
11-16 years	3,716	82.3	528	11.7	272	6.0		
17+ years	5,793	83.3	761	10.9	398	5.7		
Deployments before Risk Estimate							3.002(6)	.809
None	4,652	82.3	639	11.3	359	6.4		
1	8,922	83.0	1,198	11.2	624	5.8		
2	5,676	82.8	772	11.3	404	5.9		
3+	3,671	82.9	507	11.4	251	5.7		

BHRM = Behavioral Health Risk Management module; X^2(df) = Chi-Square (degrees of freedom); *Sig.* = Significance; # = Number of Estimates; % = Percentage;
GED = Graduate Equivalency Degree

Table 21m. Demographic Variables and Provider Factor Group 3 Risk Estimate (X^2) (n = 27,675)

Provider - Factor Group 3_Risk Estimate								
	Low		Moderate		High		X^2(df)	Sig.
Variable	#	%	#	%	#	%		
Gender							.782(2)	.676
Male	14,226	59.9	4,023	16.9	5,505	23.2		
Female	2,320	59.2	681	17.4	920	23.5		
Race							2.225(4)	.694
White	11,838	59.8	3,333	16.8	4,621	23.3		
Non-White	4,000	59.5	1,176	17.5	1,542	23.0		
Unknown	708	60.8	195	16.7	262	22.5		
Education							1.847(4)	.764
< High School/GED	2,296	59.3	660	17.1	914	23.6		
High School	11,684	59.8	3,301	16.9	4,548	23.3		
College Graduate	2,566	60.1	743	17.4	963	22.5		
Religion							2.784(4)	.595
Christian	11,313	59.9	3,233	17.1	4,335	23.0		
Other	4,229	59.5	1,196	16.8	1,682	23.7		
Unknown	1,004	59.5	275	16.3	408	24.2		
Age Entered Military							.639(2)	.726
17-24 years	13,553	59.8	3,831	16.9	5,267	23.3		
25+ years	2,993	59.6	873	17.4	1,158	23.0		
Age at Risk Estimate							6.209(6)	.400
17-24 years	3,534	59.8	1,015	17.2	1,359	23.0		
25-34 years	6,250	59.7	1,733	16.6	2,486	23.7		
35-44 years	4,054	60.1	1,141	16.9	1,556	23.0		
45+ years	2,708	59.6	815	17.9	1,024	22.5		
Marital Status at Risk Estimate							.063(2)	.969
Married	10,487	59.8	2,981	17.0	4,061	23.2		
Unmarried	6,059	59.7	1,723	17.0	2,364	23.3		
Rank at Risk Estimate							5.512(4)	.239
Enlisted 1-4	6,761	59.7	191	17.0	2,637	23.3		
Enlisted 5-7	7,320	59.9	2,034	16.7	2,860	23.4		
Enlisted 8-9 or Officer	2,465	59.5	751	18.1	928	22.4		
Military Service Component							3.574(2)	.167
Regular	8,712	59.5	2,468	16.9	3,466	23.7		
Guard or Reserve	7,834	60.1	2,236	17.2	2,959	22.7		

BHRM = Behavioral Health Risk Management module; X^2(df) = Chi-Square (degrees of freedom); *Sig.* = Significance; # = Number of Estimates; % = Percentage;
GED = Graduate Equivalency Degree

Table 21m. cont'd. Demographic Variables and Provider Factor Group 3 Risk Estimate (X^2) (n = 27,675)

Provider - Factor Group 3_Risk Estimate								
	Low		Moderate		High		X^2(df)	*Sig.*
Variable	#	%	#	%	#	%		
Active Duty Service Length at Risk Estimate							4.573(4)	.334
0-4 years	8,979	59.3	2,617	17.3	3,557	23.5		
5-10 years	4,952	60.2	1,376	16.7	1,898	23.1		
11+ years	2,615	60.9	711	16.6	970	22.6		
Military Service Length at Risk Estimate							10.556(6)	.103
0-4 years	5,180	59.4	1,499	17.2	2,041	23.4		
5-10 years	4,472	59.7	1,228	16.4	1,787	23.9		
11-16 years	2,707	59.9	746	16.5	1,063	23.5		
17+ years	4,187	60.2	1,231	17.7	1,534	22.1		
Deployments before Risk Estimate							7.152(6)	.307
None	3,417	60.5	908	16.1	1,325	23.5		
1	6,402	59.6	1,887	17.6	2,455	22.8		
2	4,075	59.5	1,153	16.8	1,624	23.7		
3+	2,652	59.9	756	17.1	1,021	23.1		

BHRM = Behavioral Health Risk Management module; X^2(df) = Chi-Square (degrees of freedom); *Sig.* = Significance; # = Number of Estimates; % = Percentage;
GED = Graduate Equivalency Degree

Table 21n. Demographic Variables and Provider Factor Group 4 Risk Estimate (X^2) (n = 27,675)

Provider - Factor Group 4_Risk Estimate								
	Low		Moderate		High		X^2(df)	*Sig.*
Variable	#	%	#	%	#	%		
Gender							.338(2)	.845
Male	20,274	85.3	2,720	11.5	760	3.2		
Female	3,359	85.7	442	11.3	120	3.1		
Race							5.833(4)	.212
White	16,855	85.2	2,299	11.6	638	3.2		
Non-White	5,758	85.7	751	11.2	209	3.1		
Unknown	1,020	87.6	112	9.6	33	2.8		
Education							2.812(4)	.590
< High School/GED	3,303	85.3	441	11.4	126	3.3		
High School	16,675	85.4	2,253	11.5	605	3.1		
College Graduate	3,655	85.6	468	11.0	149	3.5		
Religion							4.051(4)	.399
Christian	16,145	85.5	2,140	11.3	596	3.2		
Other	6,066	85.4	806	11.3	235	3.3		
Unknown	1,422	84.3	216	12.8	49	2.9		
Age Entered Military							1.008(2)	.604
17-24 years	19,364	85.5	2,575	11.4	712	3.1		
25+ years	4,269	85.0	587	11.7	168	3.3		
Age at Risk Estimate							7.977(6)	.240
17-24 years	5,092	86.2	656	11.1	160	2.7		
25-34 years	8,893	84.9	1,225	11.7	351	3.4		
35-44 years	5,779	85.6	756	11.2	216	3.2		
45+ years	3,869	85.1	525	11.5	153	3.4		
Marital Status at Risk Estimate							.113(2)	.945
Married	14,963	85.4	2,004	11.4	562	3.2		
Unmarried	8,670	85.5	1,158	11.4	318	3.1		
Rank at Risk Estimate							1.6833(4)	.794
Enlisted 1-4	9,656	85.3	1,308	11.6	353	3.1		
Enlisted 5-7	10,445	85.5	1,386	11.3	383	3.1		
Enlisted 8-9 or Officer	3,532	85.2	468	11.3	144	3.5		
Military Service Component							2.167(2)	.338
Regular	12,509	85.4	1,691	11.5	446	3.0		
Guard or Reserve	11,124	85.4	1,471	11.3	434	3.3		

BHRM = Behavioral Health Risk Management module; X^2(df) = Chi-Square (degrees of freedom); *Sig.* = Significance; # = Number of Estimates; % = Percentage;
GED = Graduate Equivalency Degree

Table 21n. cont'd. Demographic Variables and Provider Factor Group 4 Risk Estimate (X^2) (n = 27,675)

	Provider - Factor Group 4_Risk Estimate							
	Low		Moderate		High		X^2(df)	*Sig.*
Variable	#	%	#	%	#	%		
Active Duty Service Length at Risk Estimate							.270(4)	.992
0-4 years	12,930	85.3	1,744	11.5	479	3.2		
5-10 years	7,032	85.5	930	11.3	264	3.2		
11+ years	3,671	85.5	488	11.4	137	3.2		
Military Service Length at Risk Estimate							6.654(6)	.354
0-4 years	7,445	85.4	1,008	11.6	267	3.1		
5-10 years	6,412	85.6	854	11.4	221	3.0		
11-16 years	3,821	84.6	530	11.7	165	3.7		
17+ years	5,955	85.7	770	11.1	227	3.3		
			Deployments before Risk Estimate				5.968(6)	.427
None	4,792	84.8	661	11.7	197	3.5		
1	9,222	85.8	1,207	11.2	315	2.9		
2	5,845	85.3	777	11.3	230	3.4		
3+	3,774	85.2	517	11.7	138	3.1		

BHRM = Behavioral Health Risk Management module; X^2(df) = Chi-Square (degrees of freedom); *Sig.* = Significance; # = Number of Estimates; % = Percentage; GED = Graduate Equivalency Degree

Table 21o. Demographic Variables and Provider Factor Group 5 Risk Estimate (X^2) (n = 27,675)

Provider - Factor Group 5_Risk Estimate								
	Low		Moderate		High		X^2(df)	*Sig.*
Variable	#	%	#	%	#	%		
Gender							.496(2)	.780
Male	21,796	91.8	1,389	5.8	569	2.4		
Female	3,605	91.9	219	5.6	97	2.5		
Race							4.045(4)	.400
White	18,141	91.7	1,171	5.9	480	2.4		
Non-White	6,187	92.1	366	5.4	165	2.5		
Unknown	1,073	92.1	71	6.1	21	1.8		
Education							1.942(4)	.746
< High School/GED	3,545	91.6	234	6.0	91	2.4		
High School	17,934	91.8	1,118	5.7	481	2.5		
College Graduate	3,922	91.8	256	6.0	94	2.2		
Religion							5.168(4)	.271
Christian	17,290	91.6	1,115	5.9	476	2.5		
Other	6,557	92.3	401	5.6	149	2.1		
Unknown	1,554	92.1	92	5.5	41	2.4		
Age Entered Military							2.804(2)	.246
17-24 years	20,814	91.9	1,307	5.8	530	2.3		
25+ years	4,587	91.3	301	6.0	136	2.7		
Age at Risk Estimate							8.767(6)	.187
17-24 years	5,430	91.9	334	5.7	144	2.4		
25-34 years	9,568	91.4	630	6.0	271	2.6		
35-44 years	6,240	92.4	360	5.3	151	2.2		
45+ years	4,163	91.6	284	6.2	100	2.2		
Marital Status at Risk Estimate							1.046(2)	.593
Married	16,086	91.8	1,031	5.9	412	2.4		
Unmarried	9,315	91.8	577	5.7	254	2.5		
Rank at Risk Estimate							6.091(4)	.192
Enlisted 1-4	10,384	91.8	645	5.7	288	2.5		
Enlisted 5-7	11,216	91.8	702	5.7	296	2.4		
Enlisted 8-9 or Officer	3,801	91.7	261	6.3	82	2.0		
Military Service Component							.590(2)	.745
Regular	13,426	91.7	860	5.9	360	2.5		
Guard or Reserve	11,975	91.9	748	5.7	306	2.3		

BHRM = Behavioral Health Risk Management module; X^2(df) = Chi-Square (degrees of freedom); *Sig.* = Significance; # = Number of Estimates; % = Percentage;
GED = Graduate Equivalency Degree

Table 21o. cont'd. Demographic Variables and Provider Factor Group 5 Risk Estimate (X^2) (n = 27,675)

Provider - Factor Group 5_Risk Estimate								
	Low		Moderate		High		X^2(df)	*Sig.*
Variable	#	%	#	%	#	%		
Active Duty Service Length at Risk Estimate							2.147(4)	.709
0-4 years	13,900	91.7	872	5.8	381	2.5		
5-10 years	7,553	91.8	489	5.9	184	2.2		
11+ years	3,948	91.9	247	5.7	101	2.4		
Military Service Length at Risk Estimate							6.668(6)	.353
0-4 years	7,998	91.7	495	5.7	227	2.6		
5-10 years	6,867	91.7	454	6.1	166	2.2		
11-16 years	4,140	91.7	255	5.6	121	2.7		
17+ years	6,396	92.0	404	5.8	152	2.2		
Deployments before Risk Estimate							8.966(6)	.176
None	5,185	91.8	313	5.5	152	2.4		
1	9,868	91.8	606	5.6	270	2.5		
2	6,273	91.5	429	6.3	150	2.2		
3+	4,075	92.0	260	5.9	94	2.1		

BHRM = Behavioral Health Risk Management module; X^2(df) = Chi-Square (degrees of freedom); *Sig.* = Significance; # = Number of Estimates; % = Percentage;
GED = Graduate Equivalency Degree

Table 21p. Demographic Variables and Provider Factor Group 6 Risk Estimate (X^2) (n = 27,675)

Provider - Factor Group 6_Risk Estimate								
	Low		Moderate		High		X^2(df)	*Sig.*
Variable	#	%	#	%	#	%		
Gender							4.972(2)	.083
Male	19,281	81.2	3,204	13.5	1,269	5.3		
Female	3,140	80.1	580	14.8	201	5.1		
Race							3.844(4)	.428
White	16,013	80.9	2,742	13.9	1,037	5.2		
Non-White	5,447	81.1	896	13.3	375	5.6		
Unknown	961	82.5	146	12.5	58	5.0		
Education							4.340(4)	.362
< High School/GED	3,122	80.7	549	14.2	199	5.1		
High School	15,797	80.9	2,675	13.7	1,061	5.4		
College Graduate	3,502	82.0	560	13.1	210	4.9		
Religion							6.141(4)	.189
Christian	15,337	81.2	2,535	13.4	1,009	5.3		
Other	5,713	80.4	1,007	14.2	387	5.4		
Unknown	1,371	81.3	242	14.3	74	4.4		
Age Entered Military							.184(2)	.912
17-24 years	18,361	81.1	3,088	13.6	1,202	5.3		
25+ years	4,060	80.8	696	13.9	268	5.3		
Age at Risk Estimate							7.873(6)	.248
17-24 years	4,789	81.1	833	14.1	286	4.8		
25-34 years	8,439	80.6	1,435	13.7	595	5.7		
35-44 years	5,505	81.5	904	13.4	342	5.1		
45+ years	3,688	81.1	6,121	13.5	247	5.4		
Marital Status at Risk Estimate							.422(2)	.810
Married	14,221	81.1	2,380	13.6	928	5.3		
Unmarried	8,200	80.8	1,404	13.8	542	5.3		
Rank at Risk Estimate							1.097(4)	.895
Enlisted 1-4	9,164	81.0	1,537	13.6	616	5.4		
Enlisted 5-7	9,887	80.9	1,689	13.8	638	5.2		
Enlisted 8-9 or Officer	3,370	81.3	558	13.5	216	5.2		
Military Service Component							2.220(2)	.330
Regular	11,827	80.8	2,045	14.0	774	5.3		
Guard or Reserve	10,594	81.3	1,739	13.3	696	5.3		

BHRM = Behavioral Health Risk Management module; X^2(df) = Chi-Square (degrees of freedom); *Sig.* = Significance; # = Number of Estimates; % = Percentage;
GED = Graduate Equivalency Degree

Table 21p. cont'd. Demographic Variables and Provider Factor Group 6 Risk Estimate (X^2) (n = 27,675)

Provider - Factor Group 6_Risk Estimate								
	Low		Moderate		High		X^2(df)	*Sig.*
Variable	#	%	#	%	#	%		
Active Duty Service Length at Risk Estimate							3.023(4)	.554
0-4 years	12,240	80.8	2,112	13.9	801	5.3		
5-10 years	6,704	81.5	1,080	13.1	442	5.4		
11+ years	3,477	80.9	592	13.8	227	5.3		
Military Service Length at Risk Estimate							3.234(6)	.779
0-4 years	7,038	80.7	1,226	14.1	456	5.2		
5-10 years	6,057	80.9	1,022	13.7	408	5.4		
11-16 years	3,653	80.9	616	13.6	247	5.5		
17+ years	5,673	81.6	920	13.2	359	5.2		
Deployments before Risk Estimate							7.675(6)	.263
None	4,528	80.1	811	14.4	311	5.5		
1	8,747	81.4	1,448	13.5	549	5.1		
2	5,554	81.1	945	13.8	353	5.2		
3+	3,592	81.1	580	13.1	257	5.8		

BHRM = Behavioral Health Risk Management module; X^2(df) = Chi-Square (degrees of freedom); *Sig.* = Significance; # = Number of Estimates; % = Percentage;
GED = Graduate Equivalency Degree

Table 21q. Demographic Variables and Provider Factor Group 7 Risk Estimate (X^2) (n = 27,675)

Provider - Factor Group 7_Risk Estimate								
	Low		Moderate		High		X^2(df)	*Sig.*
Variable	#	%	#	%	#	%		
Gender							1.887(2)	.389
Male	20,200	85.0	2,628	11.1	926	3.9		
Female	335	85.1	449	11.5	137	3.5		
Race							2.069(4)	.723
White	16,806	84.9	2,210	11.2	776	3.9		
Non-White	5,736	85.4	742	11.0	240	3.6		
Unknown	993	85.2	125	10.7	47	4.0		
Education							.954(4)	.917
< High School/GED	3,292	85.1	424	11.0	154	4.0		
High School	16,595	85.0	2,185	11.2	753	3.9		
College Graduate	3,648	85.4	468	11.0	156	3.7		
Religion							6.046(4)	.196
Christian	16,107	85.3	2,058	10.9	716	3.8		
Other	6,005	84.5	812	11.4	290	4.1		
Unknown	1,423	84.4	207	12.3	57	3.4		
Age Entered Military							.456(2)	.796
17-24 years	19,278	85.1	2,507	11.1	866	3.8		
25+ years	4,257	84.7	570	11.3	197	3.9		
Age at Risk Estimate							6.800(6)	.340
17-24 years	5,056	85.6	633	10.7	219	3.7		
25-34 years	8,882	84.8	1,152	11.0	435	4.2		
35-44 years	5,739	85.0	771	11.4	241	3.6		
45+ years	3,858	84.8	521	11.5	168	3.7		
Marital Status at Risk Estimate							3.722(2)	.156
Married	14,879	84.9	1,947	11.1	703	4.0		
Unmarried	8,656	85.3	1,130	11.1	360	3.5		
Rank at Risk Estimate							1.379(4)	.848
Enlisted 1-4	9,640	85.2	1,240	11.0	437	3.9		
Enlisted 5-7	10,357	84.8	1,387	11.4	470	3.8		
Enlisted 8-9 or Officer	3,538	85.4	450	10.9	156	3.8		
Military Service Component							1.291(2)	.524
Regular	12,470	85.1	1,603	10.9	573	3.9		
Guard or Reserve	11,065	84.9	1,474	11.3	490	3.8		

BHRM = Behavioral Health Risk Management module; X^2(df) = Chi-Square (degrees of freedom); *Sig.* = Significance; # = Number of Estimates; % = Percentage;
GED = Graduate Equivalency Degree

Table 21q. Demographic Variables and Provider Factor Group 7 Risk Estimate (X^2) (n = 27,675)

Provider - Factor Group 7_Risk Estimate								
	Low		Moderate		High		X^2(df)	*Sig.*
Variable	#	%	#	%	#	%		
Active Duty Service Length at Risk Estimate							1.898(4)	.754
0-4 years	12,855	84.8	1,705	11.3	593	3.9		
5-10 years	7,029	85.4	887	10.8	310	3.8		
11+ years	3,651	85.0	485	11.3	160	3.7		
Military Service Length at Risk Estimate							7.518(6)	.276
0-4 years	7,434	85.3	958	11.0	328	3.8		
5-10 years	6,364	85.0	819	10.9	304	4.1		
11-16 years	3,793	84.0	537	11.9	186	4.1		
17+ years	5,944	85.5	763	11.0	245	3.5		
Deployments before Risk Estimate							1.397(6)	.966
None	4,802	85.0	636	11.3	212	3.8		
1	9,131	85.0	1,205	11.2	408	3.8		
2	5,828	85.1	760	11.1	264	3.9		
3+	3,774	85.2	476	10.7	179	4.0		

BHRM = Behavioral Health Risk Management module; X^2(df) = Chi-Square (degrees of freedom); *Sig.* = Significance; # = Number of Estimates; % = Percentage;
GED = Graduate Equivalency Degree

Table 21r. Demographic Variables and Provider Factor Group 8 Risk Estimate (X^2) (n = 27,675)

Provider - Factor Group 8_Risk Estimate								
	Low		Moderate		High		X^2(df)	*Sig.*
Variable	#	%	#	%	#	%		
Gender							.050(2)	.975
Male	12,053	50.7	7,478	31.5	4,223	17.8		
Female	1,983	50.6	1,236	31.5	702	17.9		
Race							4.530(4)	.339
White	10,024	50.6	6,271	31.7	3,497	17.7		
Non-White	3,392	50.5	2,098	31.2	1,228	18.3		
Unknown	620	53.2	345	29.6	200	17.2		
Education							2.698(4)	.610
< High School/GED	1,926	49.8	1,250	32.3	694	17.9		
High School	9,964	51.0	6,112	31.3	3,457	17.7		
College Graduate	2,146	50.2	1,352	31.6	774	18.1		
Religion							10.043(4)	.040
Christian	9,657	51.1	5,886	31.2	3,338	17.7		
Other	3,530	49.7	2,320	32.6	1,257	17.7		
Unknown	849	50.3	508	30.1	330	19.6		
Age Entered Military							.268(2)	.875
17-24 years	11,480	50.7	7,147	31.6	4,024	17.8		
25+ years	2,556	50.9	1,567	31.2	901	17.9		
Age at Risk Estimate							3.891(6)	.691
17-24 years	3,001	50.8	1,890	32.0	1,017	17.2		
25-34 years	5,298	50.6	3,261	31.1	1,910	18.2		
35-44 years	3,442	51.0	2,130	31.6	1,179	17.5		
45+ years	2,295	50.5	1,433	31.5	819	18.0		
Marital Status at Risk Estimate							3.129(2)	.209
Married	8,923	50.9	5,456	31.1	3,150	18.0		
Unmarried	5,113	50.4	3,258	32.1	1,775	17.5		
Rank at Risk Estimate							1.750(4)	.782
Enlisted 1-4	5,703	50.4	3,606	31.9	2,008	17.7		
Enlisted 5-7	6,238	51.1	3,797	31.1	2,179	17.8		
Enlisted 8-9 or Officer	2,095	50.6	1,311	31.6	738	17.8		
Military Service Component							3.512(2)	.173
Regular	7,380	50.4	4,601	31.4	2,665	18.2		
Guard or Reserve	6,656	51.1	4,113	31.6	2,260	17.3		
Active Duty Service Length at Risk Estimate							1.926(4)	.749
0-4 years	7,645	50.5	4,811	31.7	2,697	17.8		
5-10 years	4176	50.8	2576	31.3	1,474	17.9		
11+ years	2215	51.6	1327	30.9	754	17.6		

BHRM = Behavioral Health Risk Management module; X^2(df) = Chi-Square (degrees of freedom); *Sig.* = Significance; # = Number of Estimates; % = Percentage;
GED = Graduate Equivalency Degree

Table 21r. cont'd. Demographic Variables and Provider Factor Group 8 Risk Estimate (X^2) (n = 27,675)

Provider - Factor Group 8_Risk Estimate								
	Low		Moderate		High		X^2(df)	*Sig.*
Variable	#	%	#	%	#	%		
Active Duty Service Length at Risk Estimate							1.926(4)	.749
0-4 years	7,645	50.5	4,811	31.7	2,697	17.8		
5-10 years	4176	50.8	2576	31.3	1,474	17.9		
11+ years	2215	51.6	1327	30.9	754	17.6		
Military Service Length at Risk Estimate							2.761(6)	.838
0-4 years	4,378	50.2	2,777	31.8	1,565	17.9		
5-10 years	3,798	50.7	2,338	31.2	1,351	18.0		
11-16 years	2,300	50.9	1,410	31.2	806	17.8		
17+ years	3,560	51.2	2,189	31.5	1,203	17.3		
Deployments before Risk Estimate							1.834(6)	.934
None	2,849	50.4	1,804	31.9	997	17.6		
1	5,444	50.7	3,403	31.7	1,897	17.7		
2	3,486	50.9	2,125	31.0	1,241	18.1		
3+	2,257	51.0	1,382	31.2	790	17.8		

BHRM = Behavioral Health Risk Management module; X^2(df) = Chi-Square (degrees of freedom); *Sig.* = Significance; # = Number of Estimates; % = Percentage;
GED = Graduate Equivalency Degree

Table 22

Research Questions 8 and 9. Demographic Variables and Behavioral Health Risk Estimates by Behavioral Health Risk Management and Provider by Significance (Pearson's Chi-Square) (*n* = 27,675)

Risk Estimate – Chi-Square Significance								
#	Variable	BHRM *Sig.*	Provider *Sig.*	Factor Group	#	Variable	BHRM *Sig.*	Provider *Sig.*
1	Gender	0.62	0.50	Final	4	Religion	*0.05*	*0.03*
		0.61	0.44	FG1			0.78	0.20
		0.09	0.74	FG2			*0.05*	0.49
		1.00	0.68	FG3			0.50	0.60
		0.37	0.85	FG4			*0.04*	0.40
		0.14	0.78	FG5			0.69	0.27
		0.33	0.08	FG6			0.59	0.19
		0.91	0.39	FG7			0.07	0.20
		0.55	0.98	FG8			0.19	*0.04*
2	Race	*0.03*	0.61	Final	5	Age-Enter Military	0.52	0.96
		0.67	0.25	FG1			0.96	0.42
		0.97	0.78	FG2			0.28	0.84
		0.20	0.69	FG3			0.68	0.73
		0.66	0.21	FG4			0.92	0.60
		0.92	0.40	FG5			0.60	0.25
		0.69	0.43	FG6			0.98	0.91
		0.97	0.72	FG7			0.72	0.80
		0.13	0.34	FG8			0.43	0.88
3	Education	0.44	0.08	Final	6	Age at RE	0.47	0.36
		0.18	0.85	FG1			0.07	0.19
		0.73	0.80	FG2			0.40	0.37
		0.59	0.76	FG3			*0.01*	0.40
		0.16	0.59	FG4			0.18	0.24
		0.73	0.75	FG5			0.18	0.19
		0.83	0.36	FG6			0.85	0.25
		0.59	0.92	FG7			0.66	0.34
		0.05	0.61	FG8			0.44	0.69

= Variable Number; *Sig.* = Significance; BHRM = Behavioral Health Risk Management; FG = Factor Group; RE = Risk Estimate

Table 22 cont'd. Research Questions 8 and 9. Demographic Variables and Risk Estimates by Behavioral Health Risk Management and Provider by Significance (Pearson's Chi-Square) (n = 27,675)

Risk Estimate – Chi-Square Significance								
#	Variable	BHRM *Sig.*	Provider *Sig.*	Factor Group	#	Variable	BHRM *Sig.*	Provider *Sig.*
7	Marital Status at RE	0.67	0.66	Final	10	Active Duty Service Length	0.98	0.72
		0.33	0.80	FG1			0.10	0.46
		0.27	0.49	FG2			0.75	0.41
		0.07	0.97	FG3			0.08	0.33
		0.07	0.95	FG4			0.68	0.99
		0.41	0.59	FG5			0.59	0.71
		0.85	0.81	FG6			0.93	0.55
		0.39	0.16	FG7			0.76	0.75
		0.61	0.21	FG8			0.89	0.75
8	Rank at RE	0.66	0.49	Final	11	Military Service Length at RE	0.69	0.51
		0.50	0.54	FG1			0.09	0.19
		0.87	0.28	FG2			0.51	0.70
		0.12	0.24	FG3			*0.00*	0.10
		0.32	0.79	FG4			*0.03*	0.35
		0.54	0.19	FG5			0.40	0.35
		0.76	0.90	FG6			0.86	0.78
		0.39	0.85	FG7			0.78	0.28
		0.09	0.78	FG8			0.87	0.84
9	Military Service Component	0.33	0.14	Final	12	Deployment before RE	0.91	0.79
		0.03	0.08	FG1			0.81	0.79
		0.55	*0.03*	FG2			0.82	0.81
		0.08	0.17	FG3			0.53	0.31
		0.17	0.34	FG4			0.08	0.43
		0.08	0.75	FG5			0.91	0.18
		0.19	0.33	FG6			0.47	0.26
		0.69	0.52	FG7			0.96	0.97
		0.05	0.17	FG8			0.71	0.93

= Variable Number; *Sig.* = Significance; BHRM = Behavioral Health Risk Management; FG = Factor Group; RE = Risk Estimate

Table 23

Research Questions 8 and 9. Demographic Variables and Behavioral Health Risk Estimates by Behavioral Health Risk Management and Provider with Significant Relationships (Pearson's Chi-Square) (n = 27,675; $p \leq .05$)

Variable	**Low**		**Moderate**		**High**		X^2**(df)**	***Sig.***
	#	%	#	%	#	%		
BHRM - Final Risk Estimate								
Race							10.994(4)	.027
White	1,772	9	6,562	33.2	11,458	57.9		
Non-White	600	8.9	2,097	31.2	4,021	59.9		
Unknown	92	7.9	375	32.2	698	59.9		
Religion							9.677(4)	.046
Christian	1,739	9.2	6,194	32.8	10,948	58.0		
Other	589	8.3	2,307	32.5	4,211	59.3		
Unknown	136	8.1	533	31.6	1,018	60.3		
Provider - Final Risk Estimate								
Religion							11.122(4)	.025
Christian	11,282	59.8	4,549	24.1	3,050	16.2		
Other	4,181	58.8	1,830	25.7	1,096	15.4		
Unknown	1,013	60.0	387	22.9	287	17.0		
BHRM - Factor Group 1_Risk Estimate								
Military Service Component							6.934(2)	.031
Regular	7,189	49.1	5,681	38.8	1,776	12.1		
Guard or Reserve	6,599	50.6	4,919	37.8	1,511	11.6		
BHRM - Factor Group 2_Risk Estimate								
Religion							9.429(4)	.051
Christian	12,096	64.1	4,682	24.8	2,103	11.1		
Other	4,463	62.8	1,818	25.6	826	11.6		
Unknown	1,031	61.1	465	27.6	191	11.3		
Provider - Factor Group 2_Risk Estimate								
Military Service Component							7.292(2)	.026
Regular	12,067	82.4	1,661	11.3	918	6.3		
Guard or Reserve	10,854	83.3	1,455	11.2	720	5.5		
BHRM - Factor Group 3_Risk Estimate								
Age at Risk Estimate							17.611(6)	.007
18-24 years	2,625	44.4	997	16.9	2,286	38.7		
25-34 years	4,679	44.7	1,680	16.0	441	39.3		
35-44 years	3,116	46.2	1,022	15.1	2,613	38.7		
45+ years	2,058	45.3	653	14.4	1,836	40.4		

BHRM = Behavioral Health Risk Management; X^2(df) = Chi-Square (degrees of freedom); *Sig.* = Significance; # = Number of Estimates;
% = percentage; GED = Graduate Equivalency Degree

Table 23 cont'd. Demographic Variables and Behavioral Health Risk Estimates by Behavioral Health Risk Management and Provider with Significant Relationships (Pearson's Chi-Square) (n = 27,675; $p \leq .05$)

Variable	**Low**		**Moderate**		**High**		***X*²(df)**	***Sig.***
	#	%	#	%	#	%		
BHRM - Factor Group 3_Risk Estimate								
Military Service Length at Risk Estimate							19.039(6)	.004
0-4 years	3,814	43.7	1,470	16.9	3,436	39.4		
5-10 years	3,420	45.7	1,169	15.6	2,898	38.7		
11-16 years	2,046	45.3	698	15.5	1,772	39.2		
17+ years	3,198	46.0	1,015	14.6	2,739	39.4		
BHRM - Factor Group 4_Risk Estimate								
Religion							10.364(4)	.035
Christian	12,356	65.4	5,632	29.8	893	4.7		
Other	4,632	65.2	2,148	30.2	327	4.6		
Unknown	1,072	63.5	555	32.9	60	3.6		
Military Service Length at Risk Estimate							14.212(6)	.027
0-4 years	5,701	65.4	2,623	30.1	396	4.5		
5-10 years	4,918	65.7	2,269	30.3	300	4.0		
11-16 years	2,922	64.7	1,349	29.9	245	5.4		
17+ years	4,519	65.0	2,094	30.1	339	4.9		
BHRM - Factor Group 8_Risk Estimate								
Education							9.273(4)	.055
< High School/GED	895	23.1	1,478	38.2	1,497	38.7		
High School	4,653	23.8	7,317	37.5	7,563	38.7		
College Graduate	927	21.7	1,653	38.7	1,692	39.6		
Military Service Component							5.868(2)	.053
Regular	3,469	23.7	5,432	37.1	5,745	39.2		
Guard or Reserve	3,006	23.1	5,016	38.5	5,007	38.4		
Provider - Factor Group 8_Risk Estimate								
Religion							10.043(4)	.040
Christian	9,657	51.1	5,886	31.2	3,338	17.7		
Other	3,530	49.7	2,320	32.6	1,257	17.7		
Unknown	849	50.3	508	30.1	330	19.6		

BHRM = Behavioral Health Risk Management; X^2(df) = Chi-Square (degrees of freedom); *Sig.* = Significance; # = Number of Estimates; % = percentage; GED = Graduate Equivalency Degree

Table 24

Research Questions 8 and 9. Results of Ordinal Logistic Regression – Demographic Variables and Behavioral Health Risk Estimates by Behavioral Health Risk Management and Provider with Significant Relationships (Pearson's Chi-Square) violating Proportional Odds
(n = 27,675, $p \leq .05$)

Table 24a. Results of Ordinal Logistic Regression – Demographic Variables predicting Behavioral Health Risk Management-Factor Group 3 Risk Estimate
(n = 27,675; $p \leq .05$)

BHRM – Factor Group 3_Risk Estimate				
Variable	B(SE)	Wald (X^2)	*Sig.*	OR (95% CI)
FG3_RiskEstimate_BHRM, Low	-.213 (.025)	70.373	.001	.808 (.769-.849)
FG3_RiskEstimate_BHRM, Mod	.424 (.025)	276.861	.001	1.528 (1.453-1.606)
FG3_RiskEstimate_BHRM, High	0			1.0
Age at Risk Estimate, 18-24 years	.089 (.056)	2.485	.115	1.093 (.979-1.220)
Age at Risk Estimate, 25-34 years	.022 (.046)	.223	.637	1.022 (.934-1.118)
Age at Risk Estimate, 35-44 years	.044 (.036)	1.552	.213	1.045 (.975-.1.121)
Age at Risk Estimate, 45+ years	0			1.0
Military Service Length, 0-4 years	-.090 (.049)	3.345	.067	.914 (.831-1.006)
Military Service Length, 5-10 years	-.059 (.042)	1.998	.157	.942 (.868-1.023)
Military Service Length, 11-16 years	-.075 (.034)	4.906	.027	.928 (.868-.991)
Military Service Length, 17+ years	0			1.0
*Test of parallel lines: X^2 = .002				

BHRM = Behavioral Health Risk Management; B(SE) = Beta (Standard Error);
Wald X^2 = Chi-Square; *Sig.* = Significance; OR = Odds Ratio (Beta exponent);
CI = Confidence Interval; Mod = Moderate

Table 24 cont'd. Results of Ordinal Logistic Regression – Demographic Variables and Behavioral Health Risk Estimates by Behavioral Health Risk Management and Provider with Significant Relationships (Pearson's Chi-Square) violating Proportional Odds
(n = 27,675, $p \leq .05$)

Table 24b. Results of Ordinal Logistic Regression – Demographic Variables predicting Behavioral Health Risk Management-Factor Group 4 Risk Estimate
(n = 27,675; $p \leq .05$)

BHRM – Factor Group 4_Risk Estimate*				
Variable	B(SE)	Wald (X^2)	*Sig.*	OR (95% CI)
FG4_RiskEstimate_BHRM, Low	.569 (.060)	89.071	.001	1.767 (1.570- 1.988)
FG4_RiskEstimate_BHRM, Mod	2.965 (.065)	2050.369	.001	19.400 (17.063-22.057)
FG4_RiskEstimate_BHRM, High	0			1.0
Religion, Unknown	-.064 (.053)	1.501	.220	.938 (.846-1.039)
Religion, Non-Christian	-.011 (.029)	.135	.713	.989 (.935-1.047)
Religion, Christian	0			1.0
Military Service Length, 0-4 years	.024 (.034)	.492	.483	1.024 (.959-1.093)
Military Service Length, 5-10 years	.042 (.038)	1.219	.269	1.043 (.968-1.123)
Military Service Length, 11-16 years	-.021 (.033)	.411	.522	.979 (.918-1.044)
Military Service Length, 17+ years	0			1.0
*Test of parallel lines: X^2 = .001				

BHRM = Behavioral Health Risk Management; B(SE) = Beta (Standard Error);
Wald X^2 = Chi-Square; *Sig.* = Significance; OR = Odds Ratio (Beta exponent);
CI = Confidence Interval; Mod = Moderate

Table 24 cont'd. Results of Ordinal Logistic Regression – Demographic Variables and Behavioral Health Risk Estimates by Behavioral Health Risk Management and Provider with Significant Relationships (Pearson's Chi-Square) violating Proportional Odds
(n = 27,675, $p \leq .05$)

Table 24c. Results of Ordinal Logistic Regression – Demographic Variables predicting Behavioral Health Risk Management-Factor Group 8 Risk Estimate
(n = 27,675, $p \leq .05$)

BHRM – Factor Group 8_Risk Estimate*				
Variable	B(SE)	Wald (X^2)	*Sig.*	OR (95% CI)
FG8_RiskEstimate_BHRM, Low	-1.194 (.032)	1366.811	.001	.303 (.284-.323)
FG8_RiskEstimate_BHRM, Mod	.446 (.032)	200.197	.001	1.562 (1.468-1.661)
FG8_RiskEstimate_BHRM, High	0			1.0
Education, < High School/GED	.059 (.042)	1.989	.158	1.061 (.977-1.151)
Education, High School	-.013 (.033)	.154	.695	.987 (.926-1.052)
Education, College Graduate	0			1.0
MilSrvCompo, Guard or Reserve	-.017 (.023)	.557	.455	.983 (.940-1.028)
MilSrvCompo, Regular (Active)	0			1.0
*Test of parallel lines: X^2 = .027				

BHRM = Behavioral Health Risk Management; B(SE) = Beta (Standard Error); Wald X^2 = Chi-Square; *Sig.* = Significance; OR = Odds Ratio (Beta exponent); CI = Confidence Interval; Mod = Moderate; MilSrvCompo = Military Service Component

Table 24 cont'd. Results of Ordinal Logistic Regression – Demographic Variables and Behavioral Health Risk Estimates by Behavioral Health Risk Management and Provider with Significant Relationships (Pearson's Chi-Square) violating Proportional Odds (n = 27,675, $p \leq .05$)

Table 24d. Results of Ordinal Logistic Regression – Demographic Variables predicting Provider-Final Risk Estimate (n = 27,675; $p \leq .05$)

Provider - Final Risk Estimate*				
Variable	B(SE)	Wald (X^2)	*Sig.*	OR (95% CI)
Final_RiskEstimate_Provider, Low	.369(.055)	44.253	.001	1.446 (1.297-1.612)
Final_RiskEstimate_Provider, Mod	1.639(.056)	842.990	.001	5.153(4.613-5.756)
Final_RiskEstimate_Provider, High	0			1.0
Religion, Unknown	-.004(.050)	.006	.938	.996 (.903-1.099)
Religion, Non-Christian	-.019(.027)	.457	.499	.982 (.930-1.036)
Religion, Christian	0			1.0
*Test of parallel lines: X^2 = .005				

B(SE) = Beta (Standard Error); Wald X^2 = Chi-Square; *Sig.* = Significance; OR = Odds Ratio (Beta exponent); CI = Confidence Interval; Mod = Moderate

Table 24 cont'd. Results of Ordinal Logistic Regression – Demographic Variables and Bheavioral health Risk Estimates by Behavioral Health Risk Management and Provider with Significant Relationships (Pearson's Chi-Square) violating Proportional Odds (n = 27,675, $p \leq .05$)

Table 24e. Results of Ordinal Logistic Regression – Demographic Variables predicting Provider Factor Group 8 Risk Estimate (n = 27,675, $p \leq .05$)

Provider – Factor Group 8_Risk Estimate*				
Variable	B(SE)	Wald (X^2)	Sig.	OR (95% CI)
FG8_RiskEstimate_Provider, Low	-.058 (.053)	1.204	.273	.943 (.850-1.047)
FG8_RiskEstimate_Provider, Mod	1.443 (.054)	712.088	.001	4.235 (3.809-4.708)
FG8_RiskEstimate_Provider, High	0			1.0
Religion, Unknown	-.058 (.048)	1.466	.226	.943 (.859-1.037)
Religion, Non-Christian	-.044 (.026)	2.741	.098	.957 (.909-1.108)
Religion, Christian	0			1.0
*Test of parallel lines: X^2 = .044				
B(SE) = Beta (Standard Error); Wald X^2 = Chi-Square; *Sig.* = Significance; OR = Odds Ratio (Beta exponent); CI = Confidence Interval; Mod = Moderate				

Table 25

Research Questions 8 and 9 / Hypothesis 4 and 5. Results of Ordinal Logistic Regression – Demographic Variables and Behavioral Health Risk Estimates with Significant Relationships not violating Proportional Odds (Pearson's Chi-Square)
(n = 27,675, $p \leq .05$)

Table 25a. Results of Ordinal Logistic Regression – Demographic Variables predicting Behavioral Health Risk Management-Final Risk Estimate (n = 27,675, $p \leq .05$)

BHRM - Final Risk Estimate*				
Variable	B(SE)	Wald (X^2)	*Sig.*	OR (95% CI)
Final_RiskEstimate_BHRM, Low	-2.626 (.089)	880.354	.001	.072 (.061-.086)
Final_RiskEstimate_BHRM, Mod	-.641 (.087)	54.843	.001	.527 (.444-.624)
Final_RiskEstimate_BHRM, High	0			1.0
Race, Unknown	-.096 (.060)	2.546	.111	.908 (.807-1.022)
Race, Non-White	-.076 (.028)	7.279	.007	. 927 (.877-.979)
Race, White	0			1.0
Religion, Unknown	-.107 (.051)	4.457	.035	.898 (.813-.992)
Religion, Non-Christian	-.066 (.028)	5.736	.017	.936 (.886-.988)
Religion, Christian	0			1.0
Bivariate association: race – p =.027, X^2 = 10.994(4) and religion – p = .046, X^2 = 9.677(4); *Test of parallel lines: X^2 = .285				
BHRM = Behavioral Health Risk Management; B(SE) = Beta (Standard Error); Wald X^2 = Chi-Square; *Sig.* = Significance; OR = Odds Ratio (Beta exponent); CI = Confidence Interval; Mod = Moderate				

Table 25b. Results of Ordinal Logistic Regression – Demographic Variables predicting Behavioral Health Risk Management-Factor Group 1 Risk Estimate
(n = 27,675, $p \leq .05$)

BHRM – Factor Group 1_Risk Estimate*				
Variable	B(SE)	Wald (X^2)	*Sig.*	OR (95% CI)
FG1_RiskEstimate_BHRM, Low	-.036 (.016)	4.809	.028	.965 (.935-.996)
FG1_RiskEstimate_BHRM, Mod	1.976 (.021)	8509.168	.001	7.215 (6.918-7.524)
FG1_RiskEstimate_BHRM, High	0			1.0
MilSrvCompo, Guard or Reserve	-.060 (.023)	6.825	.009	.942(.900-.985)
MilSrvCompo, Regular (Active)	0			1.0
Bivariate association: p = .026, X^2 = 6.934(2); *Test of parallel lines: X^2 = .742				
BHRM = Behavioral Health Risk Management; B(SE) = Beta (Standard Error); Wald X^2 = Chi-Square; *Sig.* = Significance; OR = Odds Ratio (Beta exponent); CI = Confidence Interval; Mod = Moderate; MilSrvCompo = Military Service Component				

Table 25 cont'd. Research Questions 8 and 9 / Hypothesis 4 and 5. Results of Ordinal Logistic Regression – Demographic Variables and Behavioral Health Risk Estimates with Significant Relationships (Chi-Square) not violating Proportional Odds (n=27,675, $p \leq .05$)

Table 25c. Results of Ordinal Logistic Regression – Demographic Variables predicting Behavioral Health Risk Management-Factor Group 2 Risk Estimates (n = 27,675; $p \leq .05$)

BHRM – Factor Group 2_Risk Estimate*				
Variable	B(SE)	Wald (X^2)	*Sig.*	OR (95% CI)
FG2_RiskEstimate_BHRM, Low	.414 (.056)	53.937	.001	1.513 (1.355- 1.690)
FG2_RiskEstimate_BHRM, Mod	1.921 (.058)	1093.861	.001	6.831 (6.096-7.655)
FG2_RiskEstimate_BHRM, High	0			1.0
Religion, Unknown	-.109 (.051)	4.557	.033	.897 (.812-.991)
Religion, Non-Christian	-.054 (.028)	3.621	.057	.948 (.897-1.002)
Religion, Christian	0			1.0
Bivariate association: p = .051, X^2 = 9.429(4); *Test of parallel lines: X^2 = .327				

BHRM = Behavioral Health Risk Management; B(SE) = Beta (Standard Error); Wald X^2 = Chi-Square; *Sig.* = Significance; OR = Odds Ratio (Beta exponent); CI = Confidence Interval; Mod = Moderate

Table 25d. Results of Ordinal Logistic Regression – Demographic Variables predicting Provider-Factor Group 2 Risk Estimates (n = 27,675; $p \leq .05$)

Provider – Factor Group 2_Risk Estimate*				
Variable	B(SE)	Wald (X^2)	*Sig.*	OR (95% CI)
FG2_RiskEstimate_Provider, Low	1.541 (.022)	5071.909	.001	4.669 (4.475-4.871)
FG2_RiskEstimate_Provider, Mod	2.734 (.029)	8681.027	.001	15.394 (14.534-16.306)
FG2_RiskEstimate_Provider, High	0			1.0
MilSrvCompo, Guard or Reserve	-.069 (.032)	4.696	.030	.933 (.877-.993)
MilSrvCompo, Regular (Active)	0			1.0
Bivariate association: p = .033, X^2 = 7.292(2); *Test of parallel lines: X^2 = .106				

B(SE) = Beta (Standard Error); Wald X^2 = Chi-Square; *Sig.* = Significance; OR = Odds Ratio (Beta exponent); CI = Confidence Interval; Mod = Moderate; MilSrvCompo = Military Service Component

Table 26. Demographic Variables predicting Behavioral Health Risk Estimates by Behavioral Health Risk Management and Provider - Significant Predictors (7)

Demographic	**#**	**Comparison**
Race	1	Non-whites service members are 8% less likely than whites to self-assess using ***BHRM*** as high in the final risk estimate.
Religion	2	Service members with "unknown" religion are 11% less likely than Christians to self-assess using ***BHRM*** as high in the final risk estimate.
	3	Service members with "unknown" religion are 12% less likely than Christians to self-assess using ***BHRM*** as high risk for mental status / psychosis risk factors (Factor Group 2).
	4	Service members with non-Christian religions are 7% less likely than Christians to self-assess using ***BHRM*** as high in the final risk estimate.
	5	Service members with non-Christian religions are 5% less likely than Christians to self-assess using ***BHRM*** as high risk for mental status / psychosis risk factors (Factor Group 2).
Military Service Component	6	Guard and Reserve are 6% less likely than active duty (regular) Army to self-assess using ***BHRM*** as high risk for behavioral health / depression / suicide risk factors (Factor Group 1).
	7	Guard and Reserve are 6% less likely than active duty (regular) Army to be estimated by a ***Provider*** as high risk for mental status / psychosis risk factors (Factor Group 2).

BHRM = Behavioral Health Risk Management

Table 27. Demographic Comparison of Warrior Transition Unit Service Members with Army Active Duty and Guard / Reserve Populations*

Variable	WTU %	Active Duty (AD) %	Guard/Reserve %	WTU Population
White	72	70	76	
Male	86	86	82	
Ages – 17-34	59	78	80	Older
Married	63	57	48	More likely married
High School Diploma +	76	94	88	Less education
Enlisted (E4-6)	66	52	66	> # of E4-6

*Office of the Deputy Under Secretary of Defense (ODUSD) 2011 population data is compared to Warrior Transition Unit (WTU) 2009-2013. *Ages in ODUSD = 17 to 34; WTU = 18 to 34.*

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Curriculum Vita

Kathleen D. Putnam, MSW, LCSW

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EDUCATION

PhD	Graduation Date: Dec 2017	Social Work University of Houston
Master's Degree	1992	Social Work University of Alabama
Bachelor's Degree	1986	Psychology University of Houston

PROFESSIONAL WORK

May 2015 – Present U.S. Army Medical Command, Behavioral Health Service Line, 615 East Houston St., Garcia Federal Building, San Antonio, Texas 78205/210-295-7370

Deputy Family Advocacy Programs (FAP) Manager for Research and Information Technology (GS-13), Behavioral Health Service Line (BHSL): Plan, develop, train, contract, budget, resource, research, write publications, and provide program management of two behavioral health information technology systems. Manage governance (Military Health System Defense Business Certification, Business Process Review, Information Management Investment Review Board, Business Capability Life Cycle, etc.) and cybersecurity processes for Family Advocacy System of Records (FASOR) and Psychological and Behavioral Health-Tools for Evaluation, Risk and Management (PBH-TERM). Act as expert in the areas of domestic violence, child abuse and BH risk assessment to the BHSL regarding these IT systems which are required to support the health readiness mission. Provide research and quality management support to FAP Manager.

Aug 2013 – Oct 2017 U.S. Army Reserve, Drilling Individual Mobilization Augmentee, 2748 Worth Road, Fort Sam Houston, Texas 78234-6019/210-221-8455

U.S. Army Reserve Social Work Consultant to the U.S. Army Medical Command Surgeon General: Provide guidance to U.S. Army Medical Command and reserve social work officers. Assist with behavioral health program coordination and integration between U.S. Army Reserve and Medical Command. (U.S. Army Reserve officer since June, 1994; serving at the rank of Colonel)

Nov 2014 – May 2015 Georgia Tech Research Institute (GTRI), 430 10th St. NE, Atlanta, GA 30332/404-407-7554

Military Advisor for Family Programs: Advise and facilitate open communication and information exchange between GTRI and military Family Programs regarding program regulatory requirements, policies, information technology, defense business certification and governance processes. Develop, design, publish tangibles, research, educate, train, and provide quality management related to military family support programs.

Nov 2014 – May 2014 U.S. Army Medical Command, Brooke Army Medical Center, 3851 Roger Brooke Drive, Fort Sam Houston, Texas 78234

Clinical Social Worker (GS-11), Behavioral Medicine, Warrior Clinic: Provision of clinical social work and behavioral health services to military families.

Dec 2006 – Nov 2013 U.S. Army Medical Command, Behavioral Health Service Line 2748 Worth Road, Fort Sam Houston, Texas 78234-6019

Deputy Social Work Programs Manager, Behavioral Health Service Line (Family Advocacy Program (FAP), Warrior Transition Unit (WTU) Behavioral Health Program and Marriage & Family Therapy Program): Developed, trained, contracted, budgeted, resourced, wrote publications, and supported management of the programs listed above. Managed governance (Military Health System Defense Business Certification, Business Process Review, Information Management Investment Review Board, Business Capability Life Cycle, Anti-Deficiency Act issues, etc.) and information assurance processes (Defense Accreditation and Information Certification Program / DIACAP) for two BH IT systems including Family Advocacy System of Records (FASOR) and Psychological and Behavioral Health-Tools for Evaluation, Risk and Management (PBH-TERM). Applied expert knowledge and experience in the areas of domestic violence, child abuse and BH risk assessment to the program management and IT applications required to support the mission. Trained staff on FAP and WTU policies as well as on the two BH IT products listed above. Developed publications in military format for behavioral health system of care requirements including regulations, policies, concept of operations, business case analysis documents, and user manuals for complex BH IT systems. Prepared and staffed documents and responses (policies, information papers, executive summaries, white papers, articles, etc.) to Congress, legislative bodies, investigating agencies, Department of Defense and its Service components, and US Army Medical Command. Assisted in management and analysis of multi-million dollar budget for the FAP. (Activated U.S. Army Reserve, Medical Service Officer, Colonel)

Jan 2005 – Nov 2006 U.S. Army Medical Command, Carl R. Darnall Army Medical Center, 36000 Darnall Loop, Fort Hood, Texas 76544

Chief, Department of Social Work (Outpatient Social Work, Family Advocacy Program, and Care Manager Program): Managed and supervised 65+ personnel including military personnel, supervisors, social work clinicians, social service assistants, and administrative staff; oversight of 2 million dollar budget. (Activated US Army Reserve, Medical Service Officer, Major)

Mar 1998 – Jan 2005 U.S. Army Medical Command, Brooke Army Medical Center, 3851 Roger Brooke Drive, Fort Sam Houston, Texas 78234

Clinical Social Worker (GS-11), Department of Social Work/Family Advocacy Program: Provided clinical social work services for military families involved in crisis (primarily child and spouse abuse and sexual assault); conducted treatment and clinical supervision. (Mobilized by US Army Reserve 5 Jan 2005)

TEACHING EXPERIENCE [Dec 2006 – Nov 2013]

Training 1 – Title: **Family Advocacy System of Records (FASOR)**, an automated information system for child abuse and neglect (FASOR); Participants (100+): Chiefs of Social Work and Family Advocacy Program System Administrators/Medical Support Assistants; Frequency: 4 to 8 hours / annually via secure web-conferencing technologies.

Training 2 – Title: **Psychological and Behavioral Health-Tools for Evaluation, Risk and Management (PBH-TERM)**, an automated behavioral health risk assessment system; Participants (15+): Licensed Clinical Social Workers working in the Warrior Transition Command; Frequency: 4 hours / bi-monthly via secure web-conferencing technologies.

Training 3 – Title: **Warrior Transition Unit Social Work Newcomer's Standard Operating Procedure Training**; Participants (15+): Licensed Clinical Social Workers, Bachelor Level Social Workers and Social Service Assistants; Frequency: 3 hours / bi-monthly via secure web-conferencing technologies.

Guest Instructor/Trainer at U.S. Army Medical Department Center and School, Family Advocacy Staff Training (FAST), Fort Sam Houston, TX and Germany; Students (60+): MSWs (active duty military and civilian staff); Frequency: 4 hours / quarterly.

Course 1 – Title: **Decision Tree Algorithm and Definitions**; Content: Department of Defense definitions of abuse and use of the algorithm to make determinations.

Course 2 – Title: **Family Advocacy Program Case Review Committee**; Content: Military's committee process for determining whether incidents of alleged abuse and/or neglect meet criteria (definitions of abuse) and require management and treatment (practical exercise).

CONFERENCE PRESENTATIONS

Foreman, K. P. U.S. Army Medical Command, Behavioral Health Division, Social Work Programs: Standardize to Optimize (Update). Warrior Transition Command (Social Work Conference), Orlando, Florida, August 6, 2011. Conference Moderator / Co-Organizer, August 6-7, 2011.

Foreman, K. P. U.S. Army Medical Command, Behavioral Health Division, Social Work Programs: Standardize to Optimize. Force Health Protection Conference (Social Work Conference), Phoenix, Arizona, August 7, 2010.

Foreman, K. P. U.S. Army Medical Command, Behavioral Health Division Update. U.S. Army Family Advocacy Program – 2009 Biennial Worldwide Training, Louisville, Kentucky, August 10, 2009.

Foreman, K. P. U.S. Army Medical Command, Behavioral Health Division, Social Work Programs: Assessing Behavioral Health Risk for Warriors in Transition. Force Health Protection Conference (Social Work Conference), Albuquerque, New Mexico, August 15, 2009.

REFEREED PUBLICATIONS

First submission pending Spring 2018. Authored numerous non-refereed publications / policies approved by the U.S. Army for use within behavioral health programs. Available for review, upon request.

AWARDS

2014 Order of Military Merit induction from the U.S. Army Medical Command for performance of duties from 1995 to 2013 as a military civilian social worker and medical service officer.

2011 & 2014 Meritorious Service Medals from the U.S. Army for performance of duties while serving on active duty as the Medical Command, Behavioral Health Division, Deputy Social Work Programs Manager.

2006 Meritorious Service Medal from the U.S. Army for performance of duties while serving on active duty as the Chief, Social Work at Fort Hood, Texas (the largest social work department in the Army).

2004 Army Commendation Medal from the U.S. Army for performance of duties while serving as a Reserve Social Work Officer for the 5501st U.S. Army Hospital, San Antonio, Texas.

1998 Commander's Award for Civilian Service from the U.S. Army Womack Army Medical Center commander for performance of duties while serving as a civilian clinical social worker in the Family Advocacy Program in the areas of domestic violence and child abuse.

COMMUNITY SERVICE

2010 – Present Haven for Hope, San Antonio, TX; support coordinator and volunteer on behalf of for group of volunteers serving meals at this local homeless shelter.

2010 – Present Saint Vincent dePaul Society, San Antonio, TX; active member; making decisions by consensus about working with the poor in the local community.

HONOR SOCIETIES AND PROFESSIONAL MEMBERSHIPS

National Association of Social Workers (1992) – Member
Humane Society (2006) – Member
St. Vincent dePaul Society (2010) – Member
Paralyzed Veteran's Association (2003) - Member