Assessing the Utility of MMPI-2-RF-EX in Detecting Simulated Underreporting of Current Suicide Risk in Military Veterans

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Study Protocol and Statistical Analysis Plan

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1. **Objectives**

The aims of the current project are: 1) to examine the incremental predictive utility of the MMPI-2-RF-EX validity scales (L and K) in detecting simulated underreporting of suicide risk on the SUI scale and extratest measures of suicide risk (Suicide Cognitions Sale, Beck Scale for Suicide Ideation – Current) and 2) compare the use and preliminary effectiveness of a self-administered version of the Crisis Response Plan (CRP) in decreasing suicidal/death ideation and distress and increasing positive affect when compared to a clinician-administered version of the protocol in a sample of 150 military Veterans experiencing current death or suicidal ideation. Hypotheses include: **(H1)** Veterans following instructions to underreport suicide risk (Simulated Underreporting) would endorse significantly higher MMPI-2-RF-EX L and K scale scores than those administered the MMPI-2-RF-EX and extra test measures under standard conditions (Standard Instructions); **(H2)** Veterans randomized to the Simulated Underreporting group will produce significantly lower scores on MMPI-2-RF-EX (SUI) and extra test self-report measures of suicide risk (Suicide Cognitions Scale, Beck Scale for Suicide Ideation – Current) than the Standard Instructions group; **(H3)** lastly, L and K would contribute incremental predictive validity over one another in differentiating between veterans in the Standard Instructions and Simulated Underreporting group. Exploratory analyses will be conducted to examine whether those randomized to Simulated Underreporting endorse lower mean scores on extratest measures that do not assess suicide risk.

2. **Background and Rationale**

Military veterans comprise 7.9% of the US population but account for 13.5% of adult deaths by suicide; additionally, the Veteran suicide rate is 1.5 greater than that of the general population (US Department of Veterans Affairs, 2019). A disproportionate number of suicides are attributed to Veterans who have not recently received healthcare within the Veterans Affairs (VA) Healthcare System. Indeed, the age- and sex-adjusted suicide rates among these Veterans increased by 11.8% between 2016 and 2017, compared to an increase of 1.3% among Veterans recently utilizing VA health care services, highlighting the increasing pace of suicide rates among Veterans not receiving health care within VA, a group which constitutes the majority of Veterans (US Department of Veterans Affairs, 2019). Given the heightened suicide rate among this group of Veterans, implementation of empirically-based suicide assessment procedures would be well-served in other Veteran-serving community settings**.** However, research and clinical efforts to identify Veterans at highest risk of suicide have been met with limited success (Nelson et al., 2017). Further complicating suicide risk assessment in the Veteran population is the tendency for high risk populations to not disclose current levels of suicide risk (Anestis & Green, 2015). **Therefore, it is critical that empirically-derived methods of assessing suicide risk accurately identify Veterans outside the VA setting who are at risk of suicide, but do not accurately report their current experiences of suicidal ideation or intent.** However, current measures of suicide risk commonly administered in research and clinical settings are not well-suited to accomplish this task. **The proposed study is well-suited to address these limitations and expand upon preliminary findings in Veteran samples through two of its aims: 1) examine whether simulated underreporting on the MMPI-2-RF-EX (indexed by K and L scores) impacts SUI scores and generalizes to underreporting on extratest self-report measures of suicide risk and 2) assess the incremental predictive utility of MMPI-2-RF-EX L and K scales in differentiating between these groups.**

In response to enhanced detection of suicide risk, there is a need to identify psychotherapeutic interventions targeting suicide risk among military veterans who may be unable or unwilling to seek

follow-up mental health services. Indeed, reasons for refusal to seek mental health services among veterans include public and self-stigma (Held & Owens, 2013), adherence to masculine norms (Burns & Mahalik, 2011). However, Wilson et al. (2008) observed that the majority of Army soliders who were unwilling to speak to a clinician about mental health care have were willing to utilize technology-based approaches to mental health care.

2.1.1 False negatives and the current state of suicide risk assessment. The issue of false negatives in suicide risk assessment has been well-documented. In the VA setting, half of suicides occur in the group classified by physicians as being at low risk of suicide, calling the utility of suicide risk screening instruments into question (Pokorny, 1983). In accordance with Pokorny's (1983) findings, Denneson et al. (2010) observed that 72% of Veterans who died by suicide denied experiencing suicide ideation during their last suicide risk assessment by a VA provider. These findings are also consistent with those observed when suicide risk assessment is more proximal to death by suicide: Roughly 80% of suicide decedents whose death occurred in the hospital or shortly after discharge denied experiencing suicide ideation during their last suicide risk assessment (Bush, Fawcett, & Jacobs, 2003). The heightened rate of false negatives in suicide risk assessment are partly attributed to responders' concealment of suicidal intent (Nielssen, Wallace, & Large, 2017).

Suicide risk assessment is one instance in which individuals are motivated to underreport or minimize distress in order to avoid hospitalization or decrease time hospitalized (Oquendo & Bernanke, 2017; Petrik, Gutierrez, Berlin, & Saunders, 2015). Additionally, stigma related to receiving metal health care for suicide ideation (Hom, Stanley, Podlogar, & Joiner, 2016), past negative experiences related to disclosing suicide ideation (Fulginiti, Pahwa, Frey, Rice, & Brekke, 2016), negative repercussions during military service (Ganzini et al., 2013), and ambivalence about these thoughts (Harris, McLean, Sheffield, & Jobes, 2010) are other reasons for underreporting or nondisclosure of suicide ideation. Additionally, underreporting has been observed in instances when individuals are forced to select item responses (Podlogar et al., 2016; Podlogar & Joiner, 2019), which is common in clinical settings that administer self-report measures of suicide risk. Despite the documented prevalence of false negatives in suicide risk assessment and the tendency of respondents to underreport on these measures for a variety of reasons, the majority of measures and interviews assessing suicide risk are not equipped to assess underreporting. Additionally, limitations regarding the administration and interpretation of commonly administered measures of suicide risk have been noted.

While recent research has sought to identify better indicators of suicide risk using objective measures commonly administered in clinical practice (Levy et al., 2019), the design of commonly administered standardized interviews assessing suicide risk hinders the ability to accurately identify those at various levels of suicide risk (Tabares, Butner, Bryan, & Harris, In Press). Additionally, interview-based methods of suicide risk assessment rely on clinical judgment to determine an individual's current level of suicide risk and the corresponding course of intervention; however, clinicians' reliance on clinical judgment in suicide risk assessment results in heterogeneous determinations of suicide risk (Berman, Stark, Cooperman, Wilhelm, & Cohen, 2015). Further, suicide risk assessment methods that rely on clinical judgment do not add predictive validity above validated self-report measures of suicide risk (Lindh et al., 2020). In addition to the respective limitations of these methods of suicide risk assessment, each relies on patient self-report, but is not designed to accurately identify those who fail to disclose current suicide ideation or plans, preparations, or intent to attempt suicide. **This proposed research aims to address these limitations through 1) incorporating MMPI-2-RF-EX validity scales to detecting underreporting of suicide risk on the MMPI-2-RF-EX SUI scale and 2) assessing whether underreporting identified on the MMPI-2-RF-EX generalizes to extratest measures of suicide risk**.

2.1.2 The MMPI in detecting underreporting and its extension to extratest measures

A growing body of evidence indicates that underreporting on the MMPI instruments generalizes to conjointly administered self-report measures. Forbey and Lee (2011) observed that individuals who produced significantly elevated MMPI-2 K and L scale scores endorsed significantly lower mean scores on several conjointly administered self-report measures assessing various symptoms of psychopathology with roughly medium to large sized effects. Additionally, Forbey and colleagues (2013) observed that scores on internalizing self-report measures, namely the Beck Depression Inventory (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961), were also significantly lower for the content-based underreporting group with medium to large effects. Indeed, individuals indicated as underreporting on the MMPI-2 and MMPI-2-RF respond in a similar manner to extratest measures of psychopathology in university, VA psychiatric inpatient, and correctional settings (Forbey & Lee, 2011; Forbey et al., 2013).

Underreporting may result in false negative findings, particularly in high-stakes assessments (Crighton, Marek, Dragon, & Ben-Porath, 2017). However, limited quantitative research has focused on identifying underreporting in suicide risk assessment, a limitation noted in the current research base (Burchett and Ben-Porath, 2019). Indeed, preliminary evidence indicates that underreporting on the MMPI-2 may have implications for suicide risk assessment. During clinic intake procedures, individuals who denied current suicide ideation/behavior on both a clinician-administered phone interview and the MMPI-2 produced higher K, S, and ODep scores than those who responded affirmatively to only MMPI-2 questions or both the interview and MMPI-2 items (Glassmire, Stolberg ,Greene, & Bongrar, 2001). However, no research has extended this research to Veterans outside of the VA setting or examined whether the MMPI-2-RF-EX possesses similar clinical utility of previous iterations of the MMPI to accurately identify Veterans who underreport current suicide risk.

Divergent findings regarding differences in SUI scores between those classified as underreporting and those producing scores within normal limits on content-based validity scale scores support the further clinical need for examining the impact of MMPI-indexed underreporting on suicide-related criterion, including those embedded into the MMPI. While no significant mean differences in MMPI-2-RF SUI scores between these two groups have been observed (Crighton et al., 2017), including in Veteran samples (Forbey et al., 2013; Khazem et al., In Press), significant differences with small-sized effects have also been observed in other samples (Brown & Sellbom, 2020; Khazem et al., In Preparation). Further, as these studies were not aimed at identifying patterns of responding for individuals attempting to conceal suicidal ideation or intent, it is unclear how these individuals, particularly within the Veteran population, would respond to SUI items - and extratest measures of suicide risk and psychopathology. Research employing a simulated groups design in Veteran-serving clinics unaffiliated with VA is well-suited to address these limitations and expand upon previous findings.

MMPI-based research involving simulation designs have indicated the need for including indicators of underreporting when administering extratest self-report measures. Such research designs allow examination of the construct validity of the MMPI across response-style groups while maintaining experimental control over study conditions (Burchett & Ben-Porath, 2019; Dhillon, Bagby, Kushner, & Burchett, 2016). Sellbom and Bagby (2008) examined the impact of simulated underreporting on MMPI-2-RF substantive scales in undergraduate students and individuals with schizophrenia and observed that K-r and L-r added incrementally to each other in predicting underreporting in both groups, with greater effects in those diagnosed with schizophrenia. These findings were replicated in undergraduate students (Creighton et al., 2017). Other research utilizing simulation designs have noted differences in extratest measures of trait negative affectivity (Dhillon, Bagby, Kushner, & Burchett, 2016). Despite the need for research assessing whether underreporting negatively impacts the sensitivity of suicide risk assessment through simulation research designs (Burchett & Ben-Porath, 2019; Rogers, 2018), such research has not been conducted. **This research is particularly timely for populations at heightened risk of suicide - including Veterans. The proposed study addresses this absence in the research base by employing a simulation design centered on explicit underreporting of suicide risk to identify how Veterans respond to SUI and other MMPI-2-RF-EX scales when intending to conceal suicidal ideation or intent.**

Additionally, this study design affords the additional advantage of comparing SUI scores and scores of extratest measures of suicide risk between those attempting to underreport suicide risk and those testing under standard instructions.

2.3 Anticipated Results and Potential Pitfalls It is anticipated that this research will advance the detection and treatment of suicide risk among military veterans who seek clinical services outside the Veterans Affairs setting. More specifically, based on the aforementioned findings regarding the MMPI, we anticipate that the MMPI-2-RF-EX will demonstrate clinical utility in detecting simulated underreporting of suicide risk among individuals with current distress or suicidal ideation.

Participants could develop mild to moderate emotional discomfort or frustration associated with completing questionnaires or answering interview questions assessing thoughts about suicide. This potential risk is expected to be comparable to the discomfort experienced when talking with a friend or acquaintance about these same topics. If discomfort is experienced, it is not expected to be severe or to last for more than a few minutes. Participants' *confidentiality could be breached* if their identifiers are inadvertently released or accessed by a third party. This risk is expected to be low because the data are not stored or analyzed in ways that are likely to reveal a subject's identity. Breach of confidentiality could also occur if an external party or individual hacks into the Zoom interface during a participant's session. Safeguards will be implemented to mitigate this risk, including using password-protected Zoom sessions.

2.3. Benefits of the Proposed Research Results of this proposed research will have implications for future suicide risk assessment and suicide prevention efforts in Veterans through enhancing methods of identifying and responding to those at risk of suicide that would otherwise be missed by traditional methods of suicide risk assessment (i.e. false negatives).

Procedures

3.1. Research Design. A two-arm randomized controlled simulation design will be employed in this proposed research. For both components of the study, participants will be randomized using stratified blocks of 6 or 8 participants, per recommendations by Krenan et al. (1999), based on gender and suicide attempt history (no history of suicide attempts, history of one suicide attempt, or history of multiple suicide attempts).

3.2. Sample. A sample of 150 Veterans will be included in the study and randomized to study conditions (75 in the Simulation condition and 75 in the Standard condition). Results of a priori power analyses conducted using G*Power software (Faul et al., 2007) indicate that a total sample of 150 will results in a highly-powered study (β =.98-.99) to detect medium-sized effects in all regression-based analyses. Therefore, although we anticipate low attrition from this study, the proposed sample size is sufficiently powered for the proposed analyses. Additionally, this sample size accounts for a roughly 15% rate of Non-Content-Based Invalid Responding observed in other simulation-based MMPI research (Crighton et al., 2017).

Online recruitment methods for the study are include wed-based survey and research recruitment systems (e.g., SurveyMonkey), listservs and forums, and social media sites (e.g., Facebook, Twitter, Reddit). Additionally, we are requesting use of ResearchMatch (RM), which is an NIH sponsored national registry for research volunteers. ResearchMatch (RM) and OSU have had a fully executed agreement since August 2009. The IRB of record for ResearchMatch is Vanderbilt University. The Principal Investigator will be authorized to recruit study participants.

We will enroll any prospective Veteran meeting inclusion criteria (18 years of age or older, US military veteran, death or suicidal ideation/suicide attempt within the past month) in the proposed study. Exclusion criteria include: non-Veteran status, acute intoxication or active psychosis precluding

provision of informed consent, an inability to communicate and comprehend English, residence outside the United States, and lack of past-month death/suicide ideation or attempt. Participants recruited through web-based survey and research and recruitment systems will provide consent for study personnel to initiate contact through email or phone call, while those recruited through other online methods (e.g., listservs, forums) will be provided contact information for study personnel in order to inquire about the study or schedule participation.

3.3 Measurement/Instrumentation. The following self-report measures will be administered through Qualtrics online survey software during baseline procedures as part of the proposed research:

MMPI-2-RF-EX. The MMPI-2-RF-EX The MMPI-2-RF-EX was developed for research purposes in order to develop the MMPI-3 (Ben-Porath & Tellegen, 2020), which is comprised of a subset of MMPI-2-RF-EX items. While completing the MMPI-2-RF-EX. all participants will be monitored remotely by study personnel using a web camera and OSU CarmenZoom to ensure test integrity, as required by the study funding agency. While competing the MMPI-2-RF-EX, participants will simultaneously select the MMPI-2-RF-EX item numbers corresponding to those they believe are assessing current suicide risk through a separate internet browser or tab opened to a link in Qualtrics provided by study personnel.

Suicide Cognitions Scale (SCS; Bryan et al. 2014). The SCS is an 18-item survey measuring suicide-related thoughts and beliefs, unclouding hopelessness, perceived burdensomeness, entrapment, and unbearability. Respondents rate their agreement with each statement on a 5-point Likert scale. Item responses are summed, with higher scores indicating more severe suicide risk.

Beck Scale for Suicide Ideation-Current (BSS; Beck & Steer, 1991). The BSS is a 21-item measure of past-week suicide ideation and desire for death. Responses to items are scored on a 3-point Likert scale (range of 0- 2), with higher scores indicating greater suicide risk.

Short Grit Scale (Duckworth & Quinn, 2009). The Short Grit Scale is being administered to examine whether those randomized to the Simulated Underreporting condition endorse lower mean scores when compared to those randomized to the Standard Instructions condition (e.g., whether simulated underreporting of suicide risk extends to extratest measures that do not explicitly measure suicide risk).

PTSD Checklist for DSM-5 (PCL-5; Weathers et al., 2013). The PCL-5 is a self-report measure assessing the severity of 20 PTSD symptoms. Respondents rate the severity of each symptom during the past week on a 5-point Likert Scale ranging from 0 (*Not at all*) to 4 (*Extremely).* Similar to the Short Grit Scale, the PCL-5 is being administered to examine whether Veterans in the Simulated Underreporting groups endorse lower mean scores than those in randomized to the Standard instructions group.

Posttest Inquiry. All participants will be administered the MMPI-2-RF-EX Posttest Inquiry (PTI) that has been administered in previous MMPI simulation studies (Creighton et al., 2017), based on recommendations by Rogers (2008). The PTI assesses participants' compliance with condition-specific instructions for completing the MMPI and was adapted for the proposed research. Responses to three questions from this survey ("What instructions did you receive for completing the research study"; "I tried to answer the questions so I would look like I am not suicidal?"; "I tried to appear as suicidal as I could when I took the test") will be examined to assess compliance with instructions. Simulators answering "To fake not having thoughts of suicide" to the first question will be classified as Simulation- Compliant. Alternatively, Simulators answering at least "most of the time" to the second item and "not at all" to the third item will be classified as Simulation-Noncompliant and excluded from analyses. Veterans in the Standard Instructions condition who comply with instructions (e.g., do not produce profiles indicative of content-based invalid responding) are classified as Standard - Compliant while those who do not will be classified as Standard - Noncompliant and excluded from analyses.

3.4. Informed Consent and Confirmation of Eligibility

Informed consent will be obtained through Qualtrics survey software from each participant prior to initiation of study tasks. Study personnel will obtain informed consent from participants and answer questions about the study or informed consent process prior to beginning study activities. Following informed consent, participants will complete a demographics questionnaire through Qualtrics that also includes items assessing history of suicide attempts from the Self-Injurious Thoughts and behaviors Interview (Nock, Holmberg, Photos, & Michel, 2007) for study eligibility determination and randomization purposes as well as the Suicide Visual Analog Scale (Bryan, 2019). Regardless of eligibility, all participants will be provided with contact information for crisis resources including the National Suicide Prevention Lifeline and Veterans Crisis Line.

3.5. Randomization to Study Conditions.

REDCap, a secure online survey and data management system maintained by The Ohio State University, will be utilized to randomize participants to study conditions immediately after obtaining demographic information (man, woman, other) and information about suicide attempt history (no suicide attempts, one suicide attempt, more than one suicide attempt) obtained from the SITBI). Participants will be randomized using stratified blocks of 6 or 8 participants, per recommendations by Krenan et al. (1999). After randomization, each participant will complete the remainder of the research study, but will be presented with one of the following pages containing instructions for completing the MMPI-2-RF-EX.

MMPI Condition 1 (Standard Instructions): "We want you to imagine that you are undergoing psychological testing as part of standard intake procedures for receiving services in a mental health clinic, which involves completing some questionnaires and a personality test before the first session. Please answer the questionnaires as honestly as you can, as your mental health care provider will use the results of your testing to develop your treatment plan. Please note, the questionnaire has some "lie" scales built into it that detect false responding. Additionally, as part of the intake process, you agreed to identify questions that you think are assessing your current risk of suicide. You will open the link to this portion of the study that was sent to you by study personnel to complete this."

MMPI Condition 2 (Simulated Underreporting): "We want you to imagine that you are undergoing testing as part of standard intake procedures for receiving services in a mental health clinic, which involves completing some questionnaires and a personality test before the first session. You have recently had recurring thoughts of suicide and have thought of ways to attempt suicide. However, you are concerned that you will be hospitalized if you disclose this during testing and do not want to be hospitalized. Please answer the questionnaires as though you are trying to hide or downplay any thoughts of suicide or intent to make a suicide attempt. The questionnaire has some "lie" scales built into it, so try to avoid being detected. If you are able to avoid detection, you will receive an additional $20 gift card. Additionally, as part of the intake process, you agreed to identify questions that you think are assessing your current risk of suicide. You will use a computer to mark these while taking the questionnaires."

3.6. Additional incentives following completion of the first portion of the study.

Following the study session, all participants will receive payment in the form of $50 for participation. Additional incentives are condition-dependent, will be described to participants at the beginning of the study as part of the informed consent process, and administered no later than two weeks following completion of the study protocol:

Simulated Underreporting: Additional payment for undetected underreporting on MMPI-2-RF-EX. Individuals in the Simulated Underreporting condition who do not produce clinically significant MMPI-2-RF-EX K or L scale elevations and are classified as Simulation Compliant based on Posttest Inquiry responses will receive an additional electronic $20 gift card through email, following recommendations and procedures outlined in previous research (Brown & Sellbom, 2020; Crighton et al., 2017).

3.4. Detailed Study Procedures. One hundred and fifty adult military Veteran participants residing in the United States will complete eight study components during the baseline study session:

consenting, demographics survey and self-reported history of suicide attempts, randomization to study conditions, the MMPI-2-RF-EX, self-report measures, and the post-test survey to assess compliance with study instructions. Consenting procedures will always be completed first, and demographic and suicide attempt history data will always be collected second for randomization to conditions in both components of the study through REDCap online software. We estimate that the total participation time will be approximately 2.5 hours (2 hours to complete the MMPI-2-RF-EX and extra-test self-report measures. In order to protect participant confidentiality, password-protected Zoom or phone-based sessions will be conducted during the baseline session, in order to ensure security of MMPI-2-RF-EX items. All data will be collected through the Qualtrics, and non-PHI demographic information will be entered into REDCap system for randomization purposes. ID numbers will be linked to all data collected in the study, including identifying information collected in a separate data set as part of safety procedures (See Section 3.7), which will be deleted at the conclusion of the study. All deidentified data will be downloaded and deleted from Qualtrics servers at the conclusion of the study and stored on the password protected OneDrive server hosted by OSU indefinitely for the proposed analyses and secondary analysis. Additionally, in order to protect participant privacy during the study, all study personnel will conduct study procedures from a private location, using a secure Internet connection and instruct all participants to do the same, if possible, and outline the risks of loss of privacy or confidentiality if the participant is unable to so.

3.7. Internal Validity. A number of measures will be implemented to mitigate threats to internal and external validity. Specifically, the randomization procedures employed in the proposed research study (See Section 4.1.2) were selected to account for the potential influences of gender and suicide attempt status on study findings.

3.8 Data Analysis.

3.8.1.MMPI-2-RF-EX scale scores and extra test measures. Following methods employed in prior simulation research designs (Sellbom & Bagby, 2008), mean differences in scores on MMPI-2-RF-EX L, K, and SUI scales, and extratest measures of suicide risk (BSS), suicide-related cognition intensity (SCS), and measures of other psychopathology (PCL-5, Short Grit Scale) will be compared between Standard and Simulated Underreporting groups through a one-way Multivariate Analysis of Variance (MANOVA). Additionally, two stepwise hierarchical regression analyses will be conducted in order to assess the incremental predictive utility of MMPI-2-RF-EX K and L scales in identifying individuals classified in the Simulated Underreporting condition, consistent with previous literature (Sellbom & Bagby, 2008). The first model will contain the K scale in the first step and the L scale in the second step. The analysis will be repeated with the K and L scales entered into the opposite step.

3.9. Safety Procedures. During enrollment in the study, all participants, regardless of agreement to participate in both portions of the study, will provide their contact information (home address, telephone number, email address) and a telephone number for an alternate person that study personnel may contact in case of imminent suicide risk. Home addresses may be used to contact the participant's local emergency services in case of imminent suicide risk. If a subject reports suicidal ideation, or a research staff member becomes aware that the subject is at imminent risk to harm himself/herself, the following questions will be asked to clarify the nature of risk (and to identify those at imminent risk requiring consideration for hospitalization): (1) Do you have a plan for killing yourself and do you intend to act on the plan?; (2) Do you have a desire to kill yourself that you believe you might act on?; (3) Have you already taken steps to act on your plan? If so, what steps have you taken? Both iterations of the CRP, which is a recommended and empirically-supported strategy for reducing suicide risk, will include contact information for professional resources and crisis services, the National Suicide Prevention Lifeline phone number, and other local behavioral health clinics and emergency departments. These procedures have been used successfully by our research team in dozens of studies with acutely suicidal individuals, to include multiple clinical trials. All participants will be provided with contact information to use in case of crisis (National Suicide Prevention Lifeline, emergency services).

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