January 2013

Examination of Racial Bias on the MMPI-2 Restructured Form among African Americans and Caucasians

Willie Floyd McBride III
Eastern Kentucky University

Follow this and additional works at: https://encompass.eku.edu/etd

Part of the Psychology Commons

EXAMINATION OF RACIAL BIAS ON THE MMPI-2 RESTRUCTURED FORM

AMONG AFRICAN AMERICANS AND CAUCASIANS

By
Willie Floyd McBride III, B.S.

Thesis Approved.
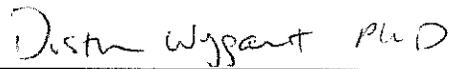
_____
Chair, Advisory Committee

_____
Member, Advisory Committee

_____
Member, Advisory Committee
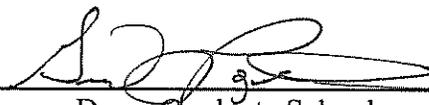
_____
Dean, Graduate School

STATEMENT OF PERMISSION TO USE

In presenting this thesis in partial fulfillment of the requirements for a Master's of Science degree at Eastern Kentucky University, I agree that the Library shall make it available to borrowers under rules of the Library. Brief quotations from this thesis are allowable without special permission, provided that accurate acknowledgment of the source is made. Permission for extensive quotation from or reproduction of this thesis may be granted by my major professor, or in [his/her] absence, by the Head of Interlibrary Services when, in the opinion of either, the proposed use of the material is for scholarly purposes. Any copying or use of the material in this thesis for financial gain shall not be allowed without my written permission.

Signature _____

Date _____7/16/13_____

EXAMINATION OF RACIAL BIAS ON THE MMPI-2 RESTRUCTURED FORM

AMONG AFRICAN AMERICANS AND CAUCASIANS

By

Willie Floyd McBride III

Bachelor of Arts
The University of Louisville
Louisville, Kentucky
2011

Submitted to the Faculty of the Graduate School of
Eastern Kentucky University
in partial fulfillment of the requirements
for the degree of
MASTER OF SCIENCE
August, 2013

ACKNOWLEDGMENTS

ABSTRACT

Although it is widely known that the link between ethnicity and psychopathology is undeniable, there still remains ambiguity concerning the possibility of racial bias on measures assessing psychopathology. The current study examined the extent to which the MMPI-2-RF is affected by racial bias. Using a sample of 1017 college students, the current study examined whether ethnicity acted as a moderating variable in the MMPI-2-RF's ability to predict conceptually relevant criteria for African Americans as it does for Caucasians. Step-down hierarchical linear regression test were implemented to determine the presence of prediction bias and whether there were indications of slope and intercept bias. Overall, the results suggest minimal presence of predication bias on the MMPI-2-RF and when it was present, the effect sizes were minimal and not clinically significant. This study provides preliminary evidence that the MMPI-2-RF can effectively capture personality and psychopathology traits in African Americans as well as Caucasians.

TABLE OF CONTENTS

LIST OF FIGURES

I. Introduction

Self-report measures play an important role in the assessment and diagnosis of psychopathology. One of the most widely used measures of personality and psychopathology is the Minnesota Multiphasic Personality Inventory (MMPI; Hathaway & McKinley, 1943) and its revisions, the MMPI-2 (Butcher et al., 1989; Butcher et al., 2001) and more recently, MMPI-2 Restructured Form (MMPI-2-RF; Ben-Porath & Tellegen, 2008). These MMPI family of instruments remain popular in clinical assessment due to their extensive research base and breadth of coverage of important clinical constructs pertaining to personality and psychopathology. An essential requirement for using these measures in diverse settings is a determination that the scales predict relevant criteria in a similar manner for various ethnic groups. The current study will examine the most recent version of the MMPI family, the MMPI-2-RF, in a college undergraduate sample to determine whether the clinically-substantive scales of the measure accurately predict relevant criteria equally well for African American and Caucasian individuals. Chapter one (Introduction) will provide a review of several topics that include cross-cultural issues relevant to psychopathology, followed by a review of psychological assessment procedures, focused on self-report methodologies. This will involve a discussion of the MMPI and its revisions, highlighting the instrument that will be examined in the current study, the MMPI-2-RF. A discussion of test bias will follow and explain two important psychometric concepts: slope and intercept bias. Following this, the introduction will review previous research on the MMPI-2 and MMPI-2-RF that has examined potential test bias between African Americans and Caucasians. The introduction will conclude with specific hypotheses relevant to the current study.

Cross-cultural Issues and Psychopathology

Race and ethnicity have been documented as being factors that impact the diagnoses and treatment of psychopathology. The implications for the use of race and ethnicity have both positive and negative effects on the assessment of psychopathology. On one hand, the knowledge of this association benefits our theoretical understanding of the way culture influences personality and psychopathology (Sue & Sue, 2008), as well as the practical values of knowing that accurate assessment is necessary for appropriate diagnosis, and that misdiagnosis leads to disparate treatment and poorer outcomes for minority group members (Gray-Little, 2009). In addition, since stigma is associated with severe mental disorders, findings of more severe or frequent psychopathology in minority groups can foster negative stereotypes that may become the basis for further discrimination (Gray-Little, 2009). This is complicated further by the fact that in psychiatric literature and diagnostic manuals, there exist ethnic variations in the expression of disorders, as well as an occurrence of culture-specific syndromes (American Psychiatric Association, 2000; Westermeyer, 1987). According to The Oxford Handbook of Personality Assessment (2009), the influence of race and ethnicity on psychopathology, involves two focuses; the first dilemma includes attempts to negate or affirm the presence of bias in the assessment of psychopathology, while the second dilemma, involves developing modifications that eliminate presumed bias.

Several studies during the past few decades have shown a clear association between race and psychopathology. For example, numerous studies have shown that clinical interviews often result in over-diagnosis of severe psychopathology or recommendations of more restrictive treatment for African Americans, Hispanic

Americans, and Native American patients than for Caucasians (Blake, 1973; Flaherty & Meagher, 1980; Lawson, Yesavage, & Werner, 1984; Lu, 2004; Soloff & Turner, 1981; Mukherjee, Shukla, Woodle, Rosen, & Olarte, 1983; Neighbors, Trierweiler, Ford, & Muroff, 2003; Pavkov, Lewis, & Lyons, 1989; Raskin, Crook, & Herman, 1975; Simon, Fleiss, Gurland, Stiller, & Sharpe, 1973; Strawkowski et al., 1995). The reverse has also been demonstrated as studies have shown an under-diagnosis of psychosis in African Americans (Kunen et al., 2005) as well as both an over-diagnosis (Aldwin & Greenberger, 1987) and an under-diagnosis of psychopathology (Lu, 2004) in Asian Americans relative to Caucasians.

The assessment of psychopathology continues to be plagued by the ambiguity concerning the relationship between race and psychopathology. Gray-Little (2009) defines several attributable factors which may determine ethnic differences in diagnosis: true variances in the rate of psychopathology, the presence of culturally meaningful differences that are misinterpreted as psychopathology, or bias in the clinician. The determination of true differences requires prior elimination of the latter two explanations.

The influence of majority group against minority group membership should be considered in terms of its potential to bias clinicians in assessing psychopathology. Several studies have shown that actor-observer attribution bias occurs when clinicians assume similarities between themselves and the patient, and are more prone to emphasize situational factors rather than internal causes, resulting in less severe diagnosis (Poland & Caplan, 2004; Trierweiler, Muroff, Jackson, Neighbors, & Munday 2005). A large body of research over the past 40 years suggest greater congruence between symptoms and diagnostic categories for Caucasian patients than for ethnic minority patients, which

further demonstrates that diagnostic criteria may not be an equally "good fit" for all groups (Gray-Little, 2009).

In particular, Loring and Powell (1988) found that male and female, white and non-white psychiatrists were more accurate in diagnosing a case of their own gender and race rather than when either gender or race was different. Seeing as the majority ethnic group in the United States is Caucasian, the possibility of racial bias in the assessment of psychopathology has more harmful implications for ethnic minorities. Several studies have highlighted these issues, particularly in the form of the "over-diagnosis" of psychopathology, especially for schizophrenia in African-American patients (Simon et al., 1973; Trierweiler et al., 2000; Fernando, 2003; Neighbors et al., 2003; Schwartz and Feisthamel, 2009). Disparities were also discovered in studies reporting that African American clients are significantly more likely to be hospitalized in psychiatric facilities and were more likely to be involuntarily committed than other ethnic groups (Lawson, Helper, Holladay, & Cuffel, 1994; Snowden & Cheung, 1990; Whaley, 2004b).

In order to further understand the relationship between race and psychopathology, the socio-economic factors must be acknowledged as having potential to impact the relationship. Individuals considered to be African American make up approximately 12 percent of the U.S. population, with an additional 1.9 million people reported being African American and one or more other races (Sue & Sue, 2008). However, in spite of the diversity the African American population has managed, disparities still remain in terms of the utilization of healthcare services, and opportunities available to them. These disparities may be due in part to several socio-cultural factors that diminish the availability of psychological resources.

Socioeconomic status (SES) seems to set in motion some of the same features as ethnicity and race (Gray-Little, 2009). Research suggests that SES is reliably related to psychopathology (Bruce & Phelan, 2006; Johnson, Cohen, Dohrenwend, Link, & Brook, 1999) and may have a more pronounced effect than ethnicity in many cultural areas. Compared to Caucasians, African Americans are more likely to experience greater early life poverty (MacArthur Foundation Research Network on Socioeconomic Status & Health, 2010). One in five children in the U.S. will grow up in poverty, and the rates are considerably higher for African Americans children (Mather & Rivers, 2006). In addition, according to Sue and Sue (2008), African Americans have a poverty rate that is twice that of Caucasians (25% vs. 12%).

Furthermore, family structure seems to play a significant role in the relationship between race and psychopathology. A disproportionately large percentage of African American families are headed by a single parent (Sue & Sue, 2008), while the percentage of African American households headed by married couples is well below the national average (U.S. Census Bureau, 2005). In addition, among lower class African American families, over 70 percent are ran by women, while the increasing number of births are comprised of unmarried African American females, where the majority of them are teenagers (Sue & Sue, 2008).

The cumulative effect of these socio-economic and cultural factors increase the probability that African Americans have a much higher need for mental health services. In turn this combination of SES and culture affects the ability of African Americans to receive mental health services. According to the Surgeon General (DHHS, 1999), the link between socioeconomic status and mental health is undeniable: poor mental health is

more common among those who are impoverished than among those who are more affluent. Compared to other ethnic groups, African Americans are more likely to have larger disparities between the mental health services available and the quality of care (DHHS, 1999; Brown & Keith, 2003; Lawson & Kim, 2005; Chow, Jaffee, & Snowden, 2003). In addition, these differences may be due to the poorer insurance coverage, a shortage of culturally sound providers, as well as socioeconomic differences among African American clients (Chow, Jaffee, & Snowden, 2003). Furthermore, due to fear, skepticism and mistrust of mental health care (Dixon & Vaz, 2005; Nickerson, Helms, & Terrell, 1994; Whitaker, 2000; Sussman, Robins, & Earls, 1987) African Americans seek out and use mental health services at a disproportionately lower rate than those of European Americans (Mindel & Wright, 1982; Snowden, 1999).

Research in the realm of minority youths, demonstrates troubling results that further validate the notion of racial bias. Children from ethnic minorities have higher rates of emotional disorders, such as substance abuse and teenage suicide, than non-ethnic minorities (McLoyd, 1998; Sattler & Hoge, 2006). Similarly, African American youth are over-diagnosed much more with externalizing problems (Costello et al., 1988; Nguyen, Huang, Arganza, Liao, 2007; Yeh et al., 2002) and psychotic disorders than Caucasian counterparts (Canino & Spurlock, 2000; Epstein, March, Conners, & Jackson, 1998; Gibbs, 1988; Reynolds, Plake, Harding, 1983). Moreover, disparities appear in the higher teacher ratings of symptoms of externalizing disorders (ADHD and OCD) for African American adolescents than Caucasian adolescents (Evans et al., 2013). Barksdale, Azur, & Leaf (2009), noted that African American youth are less likely to use mental

health services, more likely to suffer from untreated mental health problems, and are more likely to have unmet needs compared to Caucasian youth.

The under utilization of mental health services by African Americans is not a recently occurring trend. Rather it is the progression of events in history, such as slavery in the United States, segregation and discrimination, and Jim Crow laws that have contributed to the disparity in the utilization of mental health services currently. Chou and colleagues (2012) have demonstrated a link between perceived racial discrimination with higher rates of the endorsement of various types of psychopathology in ethnic minorities. A Euro-Centric perspective predicated the education and training of professional psychologists that was designed to embody the interests of that population (Dana, 1998; Dana & May, 1987). As services started to become available to African Americans they were still inadequate and underutilized because of financial, institutional, and cultural barriers (Leong, Wagner, & Tata, 1995).

Assessment of Psychopathology

The purpose for assessing psychopathology varies across many different settings (Meyer et al., 2001). Since the introduction of personality assessment tools, psychologists have utilized psychological tests and measures to help in the prediction of psychopathology through a standardized and normative manner in order to make predictions about a differential diagnosis. In addition, psychological measures describe and predict everyday behaviors such as interpersonal qualities, daily functioning, stress coping abilities, and personal attributes (Rorer, 1990). Furthermore, a psychological assessment aids a clinicians in their ability to determine mental health treatment. Indeed, a myriad of reasons can be specified for psychological assessments, however the focus

remains unchanged. Handler and Meyer (1998) describes the focus of psychological assessment as gathering data from various methods of assessment and encoding that information in the context of historical information, referral information, and behavioral observations in order to create a cohesive and representative depiction of the person being evaluated.

However, according to Groth-Marnat (2003), the most important means of data collection for the purposes of psychological assessment remains the clinical interview. Through the clinical interview, a vast amount of information can be gained, such as behavioral observations, personality characteristics, and the symptom presentation of the client. In addition the clinical interview is an opportunity to build rapport and a means to substantiating the meaning and validity of test results and records (Groth-Marnat, 2003).

The clinical interview is often the first assessment procedure administered (Mohr & Beutler, 2003), as the information gathered here does not travel through second and third sources that can often filter out the most vital pieces of information. The interview allows the clinician the opportunity to gather valuable information that creates a portrait detailing the patient's current and past issues, level of functioning, mental status, family history, and personality characteristics. Central to forming a diagnostic impression is the mental status examination (MSE). This information comes from clinician observations of the individual and impressions formed about the patient during the course of the clinical interview. It is further corroborated by observations from other assessment procedures, such as psychological testing (Archer & Smith 2008). Although the style and approach of questions asked vary by clinician the content of information gathered remains the same.

These areas cover the patient's appearance and behavior, mood and affect, perception, thought processes, orientation, memory judgment, and insight (Archer & Smith, 2008).

Often the clinical interview provides a hypothesis concerning a diagnostic impression based on the patients current presentation, history, and issues. However, as strong as a clinician's hypothesis may be, supporting evidence must be available to substantiate the diagnostic impression. Collateral information, such as medical records, legal documents, relative interviews, often provide information that the patient may be unable to substantiate. In addition, psychological testing serves as an invaluable source of information that combined with the clinical interview assist in understanding the individual, personality characteristics, and presenting issues. Psychological testing also serves as a way to validate information obtained from other sources and possibly support or reject a hypothesis (Archer & Smith, 2008).

There are a number of different forms of psychological testing that fall traditionally under two categories: projective and objective tests. However, with steadfast innovations and developments in testing, more accurate labels are being used, performance-based and self-report, respectively. Performance-based (projective) test, usually have an unstructured response format, that allows for the patient to respond in a manner that reveals important individual characteristics about the person that can be coded and interpreted (Archer & Smith, 2008). Self-report (objective) measures offer standardized series of questions that assess multiple domains of personality, psychopathology, or functioning (omnibus; Archer & Smith, 2008), as well as narrow-band measures that capture only a few characteristics in greater detail.

Self-report measures increase the clinician's ability to form diagnostic impressions with greater accuracy. Depending on the purpose of the test and constructs to be measured (Archer & Smith, 2008) predictions and descriptions of the patient's current symptoms and presentation can be made. Self-report measures, such as the Personality Assessment Inventory (PAI; Morey, 1991), Revised NEO Personality Inventory (NEO-PI-R; Costa & McCrae, 1992), and Minnesota Multiphasic Personality Inventory (MMPI; Hathaway & McKinley, 1943) assess general areas of psychological functioning such as emotion and anxiety dysfunction, interpersonal functioning, thought dysfunction, and behavioral dysfunction.

Self-Report Measures (MMPI & MMPI-2)

The Minnesota Multiphasic Personality Inventory (MMPI; Hathaway & McKinley, 1943) and its subsequent revision, the MMPI-2 (Butcher et al., 2001), have a long history of use in various clinical, medical, pre-employment, correctional, and forensic settings (Graham, 2012). The original MMPI (Hathaway & McKinley, 1943) was designed to be a self-report inventory that would provide more efficient and reliable ways of reaching a psychiatric diagnosis. The MMPI utilized 8 Clinical Scales to assess symptoms derived from specific diagnostic criterion groups. However, due to many Clinical scales of the MMPI producing high inter-correlations (Graham, 2012) the test was revised and reintroduced as the MMPI-2 (Butcher et al., 1989). These changes resulted in a more representative standardization sample, updated and improved items, deletion of objectionable items, as well as new scales (Graham, 2012). Currently the MMPI-2 remains the most widely used and researched objective measure of personality and psychopathology, both in clinical (Camara, Nathan, & Puente, 2000) and forensic

settings (Archer, Buffington-Vollum, Stredny, & Handel, 2006; Borum & Grisso, 1995; Greenburg, Otto, & Long, 2003; Lees-Haley, 1992).

Introducing the MMPI-2 Restructured Form

The most recent development in the long history of the MMPI is the introduction of the alternate form of the MMPI-2, the MMPI-2 Restructured Form (MMPI-2-RF; Ben-Porath & Tellegen, 2008/2011). The MMPI-2-RF contains fewer items (338 items of the 567 MMPI-2 item pool) and includes 9 Restructured Clinical (RC) scales, identical to those of the MMPI-2, in order to reduce inter-correlations, revised versions of the 7 MMPI-2 Validity scales, and two additional Validity scales, the Infrequency Somatic (F_s) scale and the Response Bias (RBS) scale. The MMPI-2-RF replaced the Clinical, Content, and Supplementary scales with a set of Higher Order (HO) scales as well as a large number of Specific Problems (SP) scales. Furthermore, the MMPI-2-RF contains a revised version of the Personality Psychopathology Five (PSY-5) scales and 2 new interest scales. Table[1] 1 lists all 51 of the MMPI-2-RF scales and a brief description of what each scale measures.

Test Bias

Measures of psychopathology, such as the MMPI-2 and MMPI-2-RF were designed and developed to provide objective and standardized judgments to support interpretations about behavioral and psychological functioning. The basis for such test rely on the distinct notion that these measures are capable of capturing psychological disorders in the same manner for each population and that these measures adequately represent these various symptoms. In addition, scores obtained on these measures must

---

[1] All tables and figures are located in the Appendix.

represent true scores, whereas, each score accurately measures the target construct with a certain level of error, with the variance in error differing from one group to another (Choca, Shanley, & Van Denburg, 1983).

A multitude of factors can significantly affect a measures ability to predict well for one group as it does another. The term, moderator variable, describes any characteristic of a sub group of persons in a sample that influences the degree of correlation between two other variables (Urbina, 2004). Demographic characteristics such as gender, ethnicity, education level, and socioeconomic status are capable of acting as moderator variables that either lower or raise the predictive-criterion correlation (Urbina, 2004).

These innumerable variables are what create the bias that affects a measures ability to have comparable validity for different groups. The term that best describes any systematic difference in the relationship between predictors and criteria for people belonging to different groups is test bias (Urbina, 2004). However, there have been recent changes in the methods of determining test bias.

Test bias research in the realm of intellectual assessments is an area with extensive research. Sattler and Hoge (2006) acknowledge the extensive research that has investigated test bias in intellectual assessment measures, however they call attention to the even less research conducted on the effects of culture, ethnicity, and language as forms of bias in personality and clinical assessment. Numerous studies have explored such issues, in particular, looking at the differences of average scores on IQ test for ethnic minority groups as compared to Caucasians (Kamin, 1974; Nisbett, 2005; Rosenthal & Jacobson, 1968; Turkheimer, 1991; Wiggan, 2007; Zuckerman, 1990; Tong,

Bagurst, Vimpani, & McMichael, 2007). It is widely known that on average African American individuals score approximately 1 standard deviation lower than Caucasian individuals on standardized IQ tests (Kaplan & Saccuzzo, 2009). Many of these authors argued whether these differences resulted from environmental factors, whereas, others have suggested the differences are biological (Eysenck, 1991; Hoekstra, Bartels, Hudziak, Van Beijsterveldt, & Boomsma, 2007; Jensen, 1969, 1972; Munsinger, 1975; Rushton, 1991;van Leeuwen, van den Berg, & Boomsma, 2008). In particular for African Americans, Steele and Aronson (2004) believe these students perform more poorly on test when they reveal their race. Furthermore, several studies have demonstrated clear ethnic group response bias in youths on the Revised Children's Manifest Anxiety Scale (Reynolds et al., 1983). However these differences were minor and had no significant effect on the total scores. Even more so, mixed results are presented in the report of varied factor structures for African American and European American youth for the Children's Depression Inventory (Politano, Nelson, Evans, Sorenson, & Zeman, 1986), while similar factor structures have been reported for African American and European American children on the Revised Children's Manifest Anxiety Scale (Reynolds & Paget, 1981).

Research concerning psychological test and its use with ethnic minorities has produced ambiguous results (Dahlstrom & Gynther, 1986; Pritchard & Rosenblatt, 1980; Green, 1987; Graham, 1990; Gynther & Green, 1980; Frueh, Smith, & Libet, 1996). Mean differences between two groups, such as African Americans and Caucasians, were reported as demonstrating that any mean difference on a measure could be interpreted as showing that a particular measure was biased towards a certain group (Timbrook &

Graham, 1994). However, most of these studies did not examine extra-test criteria to determine whether these measures were biased in their predictive abilities (Timbrook & Graham, 1994). Timbrook & Graham (1994) explained the utility of criterion-related validity, which is defined as the degree to which test scores are related to relevant extra-test measures. Criterion related validity could be utilized to explore ethnic differences in the accuracy with which the measure predicts extra-test characteristics (Timbrook & Graham, 1994). In this framework, the accuracy of prediction between the minority and majority groups can be determined by measuring the difference between the predicted and actual extra-test scores (Timbrook & Graham, 1994). Timbrook and Graham (1994) describe a methodology that produces an error score that can be used to discern whether a measure is biased by determining whether the error in predicting extra-test characteristics for the minority groups is different for the majority group.

To further understand test bias, in terms of criterion-related validity, several key terms must be defined. Test bias can manifest itself in two ways, specifically, differential validity and differential prediction. Differential validity refers to differences in the size of the correlations obtained between predictors and criteria for members of different groups (Urbina, 2004). Detecting bias involves analyzing prediction errors in two specific ways. Systematic differences are observed through graphic evidence from the differences in the slope of the regression line between the predictor and criterion variable, often referred to as slope bias (Anastasi & Urbina, 1997; Nunnally & Bernstein, 1994). For instance, a significant difference between two groups in the magnitude of the correlation coefficients between a particular measure and conceptually relevant criterion variable would indicate a bias in the accuracy of prediction across the range of predictor scores (Arbisi, McNulty,

& Ben-Porath, 2002). Additionally, bias can be observed when the predictor variable either systematically under or over predicts the criterion variable for a particular variable, which describes intercept bias (Arbisi, Ben-Porath, McNulty, 2002).

The most consistent method for investigating possible prediction bias and identifying slope and intercept differences is through a step-down hierarchical multiple regression procedure, as described by Lautenschlager and Mendoza (1986). This method is a modified version of the moderated multiple regression (Nunnally & Bernstein, 1994). Differential validity (slope bias) and differential prediction (intercept bias) can be observed through graphic means as well. Graphic evidence of differential validity is observed when the slopes of the regression lines for the two groups in question are different; the slope of the regression line is steeper for the group with the higher validity coefficient (Urbina, 2004). Urbina (2004) also illustrates that differential prediction occurs when the Y intercept or point of origin for that group's regression line on the Y-axis, is different than for the other groups.

Test Bias Research with the MMPI-2 and MMPI-2-RF

The MMPI-2 is one of the most frequently used objective measures of personality and psychopathology, both in clinical (Camara, Nathan, & Puente, 2000) and forensic settings (Archer, Buffington-Vollum, Stredny, & Handel, 2006; Borum & Grisso, 1995; Greenburg, Otto, & Long, 2003; Lees-Haley, 1992). However, issues remain concerning the test's ability to accurately predict psychiatric status of racial minorities as earlier versions of the test have been criticized for introducing potential racial bias (Gynther, 1972; Hall, Bansal, & Lopez, 1999). Early research efforts explored racial bias on the MMPI-2 by examining group differences in mean scale score elevations (Gynther, 1972).

15

However, results from studies capturing only the mean scale differences often yielded ambiguous results and later confirmed that the presence of mean scale differences between groups is not sufficient for confirming test bias. Specifically, these differences may account for genuine differences between groups or settings but not necessarily biases in clinical conclusions or behavioral predictions (Archer, Griffin, & Aiduk, 1995).

With regards to research on the MMPI-2 and its use with ethnic minorities, such as African Americans, the results have been inconclusive (Graham, 1990; Gynther, 1972, 1987; Greene, 1987, 1991; Pritchard & Rosenblatt, 1980; Hall, Bansal, & Lopez, 1999). As referenced by Timbrook & Graham (1994) a general approach was taken to studying possible bias against African Americans on the MMPI-2. Most studies examined mean score differences between minority and majority groups, concluding that higher scores for minority groups indicated that test bias was present (e.g., Gynther & Green, 1980). This method to determining test bias, however, did not address directly the issue of test bias, as referenced by Pritchard and Rosenblatt (1980).

Many studies addressed key issues concerning the use of mean score differences as the sole basis for determining test bias. Using the normative sample for the MMPI-2, Timbrook and Graham (1994) matched African Americans and Caucasians for age, education, and family income in order to compare mean score differences on the MMPI-2 clinical scales. They found that for Scale 8 (Schizophrenia), African American men scored significantly higher than Caucasian men. African American women scored significantly higher than Caucasian women on Scales 4 (Psychopathic Deviate), 5 (Masculinity-Femininity), and 9 (Hypomania), with all differences being relatively small (less than 5 T-score points). Additionally, Timbrook and Graham (1994) examined the

16

accuracy with which MMPI-2 scores differentially predicted conceptually relevant extra-test characteristics of African Americans and Caucasians. Results demonstrated that the accuracy of prediction did not differ for any scale between African American and Caucasian men, while, Scale 7 (Psychiathesenia) slightly under predicted anxiety ratings of African American woman.

McNulty, Graham, Ben-Porath, and Stein (1997) explored ethnic differences in MMPI-2 performance in an outpatient setting in relation to conceptually related therapist-rating scales for the two groups. They found no significant differences between MMPI-2 scores and therapist ratings of conceptually relevant client characteristics. Arbisi and colleagues (2002) examined the MMPI-2 for racial bias by utilizing a group of African American and Caucasian psychiatric inpatients. They reported significant elevations on several Clinical scales (Scales 4, 6, 9), though regression analyses (step-down hierarchical multiple regression) indicated that differences in predictive accuracy were small and not clinically significant.

Most recently, in relation to this study, two studies in particular have examined the use of the Restructure Clinical scales (RC; Tellegen et al., 2003) as a means to evaluate the predictive accuracy of the MMPI-2 with minority groups (Castro et al., 2008; Monot, Quirk, Hoerger, & Brewer, 2009). Prior to these studies, no published study had examined differential elevations by race on the RC scales of the MMPI-2. Of importance to the current study, the RC scales of the MMPI-2 are identical (Tellegen et al., 2003) to the RC scales of the MMPI-2-RF. Therefore, results concluded from research with the RC scales of the MMPI-2 can be applied to our understanding of how the MMPI-2-RF RC scales may function.

Using a group of African American and Caucasians clients from a outpatient mental health center, Castro and colleagues (2008) examined selected MMPI-2 scales, including the RC scales for the presence of predictive bias. Hierarchical regression and hierarchical logistic regression analyses were utilized to determine if bias was present. Results of mean scale score comparisons demonstrated clinically significant higher elevations for African American clients than Caucasian clients. However, the results of the Castro et al. (2008) study failed to find evidence that supported the notion that the MMPI-2 differentially predicted the self-report of conceptually relevant symptomatology by race. The authors concluded that their study was consistent with earlier studies that failed to find racial bias in the MMPI-2 using multiple sample populations (community, outpatient, and inpatient psychiatric). These findings were significant for several reasons. The use of a homogeneous sample, unlike past studies, allowed for the increased control over extraneous variable and allowed for more confident interpretations as applied to this sample. In addition, the conceptually relevant criterion variables utilized were based on the clients' self-report of symptoms using non MMPI-2 indices. This limited clinician bias, unlike the studies of Arbisi et al. (2002), and expanded the various methodologies used to examine racial bias in the MMPI-2.

Monot, Quirk, Hoerger, and Brewer (2009) examined various scales on the MMPI-2, including the RC scales, in the prediction of clinical diagnostic status in an inpatient substance abuse treatment setting with a large sample of African American and Caucasian male veterans. Conceptually relevant criterion were developed using the diagnostic classifications of the Structured Clinical Interview for DSM-III-R (SCID; Spitzer, Williams, Gibbon, & First, 1992). Due to the large sample size, many significant

18

differences in the MMPI-2 scores were found. Of these significant differences, only a few

differences were clinically meaningful, with African American patients scoring higher

than Caucasian patients on clinical Scale 9 and RC scales (RC2 and RC6). Step-down

hierarchical regression analyses revealed slope and prediction bias for several scales.

These findings suggest differential accuracy for the MMPI-2 in predicting diagnostic

status between subgroups of male veteran inpatients seeking substance abuse treatment

(Monot et al., 2009).

II. The Current Study

As suggested earlier, results concerning the predictive accuracy of the MMPI-2 with minority population have been varied and inconclusive. Past studies have encountered generalizing limitations due to the use of specific populations, such as substance abuse psychiatric inpatient, community health outpatient, and the general population. If not for these limitations, limitations present in the form of the methodologies chosen by the authors to create conceptually relevant criterion. Currently these same questions are being asked of the MMPI-2-RF as its use has increased since its introduction in 2008. Prior to this study, no published study had examined differential elevations by race on the RC scales, as well as the Specific Problem (SP) and Personality Psychopathology Five (PSY-5) scales, of the MMPI-2-RF. To investigate the ability of the MMPI-2-RF to predict conceptually relevant criteria, the current study will examine a sample of college undergraduates to determine if predictive bias in the MMPI-2-RF exist on a broad level. Here, mean elevations between African American and Caucasians in the samples will be examined, specifically looking at the Restructured Clinical (RC), Specific Problem (SP) and Personality Psychopathology Five (PSY-5) scales of the MMPI-2-RF. The current study will also utilize a series of hierarchical linear regressions (as described earlier) to examine predictive test bias. Specifically, the current study will examine whether particular RC, SP, and PSY-5 scales of the MMPI-2-RF predict relevant criteria equally well for African Americans and Caucasians.

III. Method

Participants

College Student Sample (Forbey & Ben-Porath, 2008). Participants consisted of 1159 (Men, $n = 473$; Women, $n = 687$) undergraduate students from a college in the Midwest region. Participants were primarily Caucasian (90.6%, $n = 1051$); a smaller proportion were African American (9.3%; $n = 108$). The age range of the participants was 18 to 48 years ($M = 19.6$, $SD = 3.2$).

Participants were excluded from this study if they produced an invalid MMPI-2 profile. To be considered invalid, an individual profile must have a Cannot Say (CNS) raw > 30; a T score > 80 on True Response Inconsistency (TRIN), Variable Response Inconsistency (VRIN), or Correction (K); and/or a T Score > 100 on Infrequency (F), Infrequency-Back (FB), or Infrequency-Psychopathology (Fp). Based on these criteria, a total of 143 individuals produced an invalid MMPI-2 profile.

The final group of participants consisted of 1016 individuals (Men, $n = 389$; Women, $n = 628$). Of those participants, 930 (91.4%) were White, and 86 (8.5%) were African Americans. The mean age of the final group was 19.6 ($SD = 3.24$; range = 18-46).

Instruments and Measures

MMPI-2. The Minnesota Multiphasic Personality Inventory-2 (MMPI-2; Butcher et al., 2001) is a self-report personality inventory, comprised of 567 items, which assess individual personality characteristics across several broad domains (i.e. emotional disturbances, somatic complaints, thought dysfunction, social and behavioral factors, and personality traits). The MMPI-2-Restructured Form (MMPI-2-RF) scales can all be scored directly from the MMPI-2. The Restructured Clinical (RC) scales (Tellegen et al.,

2003), developed to preserve the essential properties and uniqueness of the Clinical

Scales, will be examined. Tellegen el al. (2003) provides extensive data regarding the

psychometric properties of the nine RC scales in a variety of samples. In the normative

sample, internal consistencies range from .34 to .85 for men and .37 to .87 for women,

while test-retest coefficients after a one-week interval range from .62 to .88 for men and

women combined ($N = 193$), from .63 to .87 for men and .62 to .89 for women.

In a similar manner as Forbey & Ben-Porath (2008), 15 criterion(13 individual

measures, 2 being two subscales), were selected to reflect the constructs and content of

the MMPI-2-RF RC, SP, and PSY-5 scales. Table 2 includes information regarding these

criterion measures and their corresponding MMPI-2-RF scale.

Beck Depression Inventory(BDI). The BDI (Beck, Ward, Mendelson, Mock, &

Erbaugh, 1961) is a 21 item self-report inventory utilized to measure levels of depression.

The BDI test utilizes a four-point scale ranging from 0 (no symptoms present) to 3

(symptom very intense) capturing both psychological and physical symptoms of

depression on two separate portions of the test. The individual must rate their level of

depression across 21 distinct symptoms of depression. Higher scores signify increased

levels of depressive symptomology.

Drug Abuse Screening Test (DAST). The DAST (Skinner, 1982) is 28 item

standardized self-report screening instrument utilized to capture problems associated to

drug abuse. The DAST uses a dichotomous yes or no response to capture the

endorsement of positive drug use. The DAST total score is calculated by summing all

items endorsed in the direction of increased drug use problems, with the total score

ranging from 0 to 28. Higher score indicate a pronounced use of drugs.

*Michigan Alcoholism Screening Test (MAST).*The MAST (Selzer, 1971) is a 25 item structured self-report inventory utilized to detect alcoholism. The MAST uses a dichotomous yes or no response to focus on an individuals consequences of problem drinking and their perceptions of their alcoholic problems. A scoring algorithm was formulated that yielded a minimum number of false positives (controls who scored above the criterion levels) and a minimum number of false negatives (hospitalized alcoholics who scored below the criterion levels). A score of three points or less was considered nonalcoholic, a score of four points was suggestive of alcoholism, and a score of five points or more indicated alcoholism (Selzer, 1971).

Internal State Scale (ISS; Hypomanic Activation). The ISS (Bauer, Crits-Cristoph, Ball, Dewees, McAlister, Alahi, et al., 1991) is a 15-item self-report measure designed to capture depressive and manic symptoms simultaneously. Four empirically validated subscales (Activation, Well-Being, Perceived Conflict, and the Passion Index) comprise the ISS. The patient responds to each query about depression and manic symptoms over the last 24 hours. Based on the scoring algorithm, individuals are classified in one of three mood states: euthymic, depressed, or manic/hypomanic. Individuals who considered depressed obtain a score < 125 on the Well-Being subscale, where as non-depressed individuals (WB score ≥ 125) are classified as manic/hypomanic (ACT score ≥ 200) or euthymic (ACT score < 200). In this analysis, the Hypomanic Activation subscale score was utilized.

*Screener for Somatoform Disorders (SDS).*The Somatoform Disorders Schedule (SDS; Janca, Burke, Issac, Burke, Costa E Silva, Acuda, et al., 1995) is a highly standardized diagnostic measure designed for the assessment of somatoform disorders

according to ICD-10 (WHO, 1992) and DSM-IV (American Psychiatric Association, 1994) criteria. The SDS encompasses numerous ICD-10 and DSM-IV diagnostic categories, including somatization disorders, dissociative disorders, somatoform autonomic dysfunction, undifferentiated somatoform disorder, persistent somatoform pain disorder, hypochondriasis and neurasthenia. Symptom questions are arranged according to three sections, somatization, hypochondriasis, and neurasthenia. The symptom questions are fully structured and are answered by a choice between fixed alternatives or a number.

Obsessive Compulsive Scale (OCS). The Obsessive Compulsive Scale (Gibb, Bailey, Best, & Lambirth, 1983) is a 22 item true or false questionnaire developed to measure an individuals compulsive behaviors. Ten of the items are scored positively if endorsed, while another set of ten items are reverse scored if answered negatively. The last 2 items are utilized for the validity of responding. Scores range from 0 to 20 where higher scores reflect greater levels of compulsivity.

Barratt Impulsivity Scale (BIS – General, Motor). The Barratt Impulsivity Scale (Barratt, 1985) is a 34-item self-report questionnaire designed to measure impulsive behaviors. Each question is answered on a 4-point scale (Rarely/Never, Occasionally, Often, Almost Always/Always), while selected questions are worded to indicate non-impulsive responses and are scored accordingly. Three subscales (Attentional Impulsiveness, Motor Impulsiveness, and Non Planning Impulsiveness) encompass the measure. Summing the scores for all items create a total score, where the greater the score the greater the level of impulsivity. For the purposes of this study, general impulsivity was calculated as well as the Motor Impulsivity subscale.

*State Trait Personality Inventory (STPI-Anxiety, Anger).*The State Trait

Personality Inventory (Spielberger, 1979) is a 60 item self-administered questionnaire

designed to measure transitory and dispositional anger, anxiety, curiosity, and depression

in adults. It consist of eight 10-item subscales, measuring current emotions and intrinsic

emotional dispositions, in the form of state and trait anxiety, state and trait anger, state

and trait curiosity, and state and trait depression. Items capturing "state" characteristics

are rated on a four-point intensity scale, while "trait" items are rated on a four-point

frequency scale. Items on the "State" subscales are rated on a 4-point scale ranging from

1 (not at all) to 4 (very much so), while the "Trait" scale items are rated on a 4-point scale

ranging from 1 (almost never) to 4 (almost always). For the purposes of this study only

the Trait Anxiety and Anger subscales will be utilized.

Machiavellianism-IV. The Machiavellianism-IV (Christie & Gies, 1970) is 20-

item self-report questionnaire designed to capture traits of cynicism and beliefs about

people and things. Ten items capture high Machiavellianism while ten indicate low

Machiavellianism. Each question is rated on a 6-point Likert scale: 1 = *Strongly Disagree,*

2 = *Disagree,* 3 = *Slightly Disagree,* 4 = *Slightly Agree*, 5 = *Agree,* 6 = *Strongly Agree.*

For this study the subscale capturing cynical beliefs about other's intentions was used.

Magical Ideation Scale (MIS). The Magical Ideation Scale (Eckblad & Chapman,

1983) is a self-report questionnaire designed to assess the prevalence of magical beliefs

and thoughts as well as the capability of thought broadcasting. Thirty items comprise the

questionnaire in a dichotomous True/False format. Higher scores reflect higher levels of

abnormal thinking.

Perceptual Aberration Scale (PAS). The Perceptual Aberration Scale (Chapman, Chapman, & Raulin, 1978) is a self-report questionnaire designed to assess perceptual distortions commonly associated with body image and unusual sensory perceptions. The PAS is composed of 35 items in a dichotomous True/False format. Higher scores on the PAS reflect higher levels of schizophrenic traits.

Fear Questionnaire (FQ; Social Phobia). The Fear Questionnaire (Marks & Matthews, 1979) is a self-report questionnaire designed to capture common fears and phobias individuals may have. The FQ is comprised of three subscales: agoraphobia, social phobia, and anxiety depression. It contains 15 items that measure Total phobia and items are rated on a 9-point scale from 0 (would not avoid it) to 8 (always avoid it) indicating how much a situation is avoided because of fear or other unpleasant feelings. For this study the Social Phobia (5 items) subscale is utilized to capture fears of social situations.

Procedure

All participants were tested during two testing sessions 7 days apart. Each participant completed a computer-administrated version of the MMPI-2 during either the first or second testing session and one of the two sets of criterion measures during each of the two testing sessions. To ensure randomization, the measures in each criterion were counterbalanced as was the administration order of the criterion measure sets. By the end of the second testing session, all criterion measures were completed. For their participation, each subject received credit in an Introduction to Psychology course.

Data Analyses

All scales on the MMPI-2-RF were scored directly from the MMPI-2 item responses, utilizing syntax in SPSS. The mean scores for the MMPI-2-RF Restructured Clinical, Specific Problems, and PSY-5 scales were calculated by race. Both statistically significant and clinically significant differences were identified (Greene, 1987).

In order to determine the presence of bias, the analysis of the prediction errors associated with the criterion variables was conducted. As mentioned earlier, test bias can manifest itself as slope bias and intercept bias. Slope bias refers to differences in the slope of the regression line between the predictor and criterion variable (Anastasi & Urbina, 1997; Nunnally & Bernstein, 1994). For this study, a significant difference between African Americans and Caucasians in the degree of correlation coefficients between a particular scale and the conceptually relevant criterion variable may indicate a bias in the accuracy of prediction across the range of predictor scores, indicates slope bias. The second form of bias, intercept bias, occurs when the predictor variable (MMPI-2-RF scale) under or over predicts the criterion variable for a particular variable, i.e. ethnic group (Arbisi, Ben-Porath, McNulty, 2002).

The standard method for investigating the occurrence of prediction bias and identifying slope and intercept bias is through moderated multiple regression (Nunnally & Berstein, 1994). As referenced earlier, the current study will use a step-down hierarchical multiple regression procedure as described by Lautenschlager and Mendoza (1986). To determine the presence of racial bias, a comparison between a regression model that includes on the predictor variable (MMPI-2-RF scale) and one that includes the predictor variable (MMPI-2-RF scale), suspected moderator variable (ethnicity), and

the cross product of the predictor variable and the moderator variable (full model). A

significant change in R^2 determined through the use of the full model rather than the

model containing the predictor only denotes the presence of bias. In order to determine if

the prediction bias is the result of variances in slope, intercept, or both, a series of

analysis were calculated for slope or intercept bias. Analysis for slope bias was conducted

by comparison of the full model to a model containing only the MMPI-2-RF scale and

ethnicity. A significant change in R^2 indicates the presence of slope bias and a further test

is executed to detect intercept bias. To determine intercept bias, a comparison between

the full model and a model containing the MMPI-2-RF scale and the cross product of

ethnicity and the MMPI-2-RF scale is calculated. A significant increase in R^2

demonstrates the presence of intercept bias, though, if there is no significant increase in

R^2, then the bias identified is solely due to differences in the slope. Conversely, if the full

test for bias is significant, though no slope bias is indicated, a separate test for intercept

bias is performed containing the MMPI-2-RF scale to a model containing the predictor

variable and ethnicity variable. Again, if a significant increase in R^2 is identified, the

presence of intercept bias is signified.

Regression analyses were conducted between an MMPI-2-RF scale and the

criterion measures if the scale and the criterion measure reflect the constructs and content

of the MMPI-2-RF scales and were conceptually related.

Mean Comparisons

 T tests comparing African American and Caucasian participants on the MMPI-2-RF Higher Order (H-O), Restructured Clinical (RC), Specific Problems (SP), and Personality Psychopathology Five (PSY-5) indicated several statistically significant mean score differences, and are located in Table 3. For the Higher Order (H-O) scales, African American individuals scored significantly higher than Caucasian individuals on THD (Thought Dysfunction) scale, $t(1014) = -2.89$, $p = .004$. For the RC scales, African American Individuals scored significantly higher than Caucasian individuals on the RC3 (Cynicism), $t(1014) = -3.95$, $p < .001$, and RC6 (Ideas of Persecution) scale, $t(1014) = -4.72$, $p < .001$. For the Specific Problem (SP) and PSY-5 scales, African American individuals scored significantly higher than Caucasian individuals on the MSF (Multiple Specific Fears), $t(1014) = -6.04$, $p < .001$, and the DSF (Disaffiliativeness) scales, $t(1014) = -3.89$, $p < .001$, while Caucasian individuals scored significantly higher than African American individuals on the SUB (Substance Abuse), $t(1014) = 4.78$, $p < .001$, MEC (Mechanical-Physical Interest), $t(1014) = 5.64$, $p < .001$, and DISC-r (Disconstraint-revised) scales, $t(1014) = 4.16$, $p < .001$.

Prediction Bias

 Results of the hierarchical multiple regression analyses between the MMPI-2-RF Restructured Clinical, the Specific Problem, and PSY-5 scales for African Americans and Caucasians can be found in Table 4. The significance level for both African American and Caucasian individuals was maintained at the $p < .01$ level for the regression analyses to reduce the risk of a Type I error given the number of regressions that were calculated.

No conceptually relevant criterion variables were identified for Specific Problem scales Gastrointestinal Complaints (GIC), Head Pain Complaints (HPC), Neurological Complaints (NUC), Cognitive Complaints (COG), Suicidal/Death Ideation (SUI), Self-Doubt (SFD), Inefficacy (NFC), Juvenile Conduct Problems (JCP), Aggression (AGG), Family Problems (FML), Interpersonal Passivity (IPP), Shyness (SHY), Aesthetic-Literary Interest (AES), Mechanical-Physical Interest (MEC), Disaffiliativeness (DSF), Aggressiveness-revised (AGGR-r), Introversion-revised (INTR-r), and Disconstraint-revised (DISC-r). Therefore these scales were omitted from the regression analyses. For the remaining Restructured Clinical (RC), Specific Problem Scales, and Personality Psychopathology Five (PSY-5) scales, criterion variables were identified as conceptually relevant and can be found in Table 2. The magnitude of the overall prediction bias effect sizes (R^2) ranged from .000 to .019. Of the 39 analyses for African American and Caucasian individuals, none obtained at least a small effect size (R^2 = .02; Cohen, 1988).

Evidence of statistically significant prediction bias for a subtest of criterion variables was found for the State Trait Personality Inventory (Anxiety), Magical Ideation Scale, Drug Abuse Screening Test (DAST), Internal State Scale (Hypomanic Activation), and Barratt Impulsivity Scale (General & Motor; BIS). Consequently, additional analyses were conducted to determine whether the prediction bias impacted slope or intercept. Evidence of slope and intercept bias were found on several scales between ethnicities. RC8 and ACT evidenced intercept bias, where as scales RC4, RC7, and RC9 evidenced slope and intercept bias on several criterion measures. Additionally, BXD evidenced slope bias. Results of intercept bias depicting the over and under prediction of criteria scores can be found in Figures 1-7. Subsequently, RC8 under predicted criteria scores for

African American individuals on the MIS. For the State Trait Personality Inventory (Anxiety), RC7 over predicted criteria scores for African American individuals. The RC4 scale over predicted criteria scores for African Americans on the Drug Abuse Screening Test, while RC9 and ACT over predicted criteria scores for African Americans on the Motor subscale of the Barratt Impulsivity Scale. Furthermore, the RC9 scale over predicted criteria scores for the Barratt Impulsivity Scale (General). Lastly, the ACT scale over predicted criteria scores for the Internal State Scale (Hypomanic Activation).

For ethnicity, the Dysfunctional Negative Emotions (RC7) scale demonstrated slope and intercept bias for the criterion variable, State Trait Personality Inventory (Anxiety), though the magnitude of the impact of that bias fell far below what is considered clinically meaningful (Cohen, 1988). The Aberrant Experiences (RC8) scale demonstrated intercept bias for the Magical Ideation Scale. However, again the effect size of this bias fell below what is considered statistically small. For the Antisocial Behavior (RC4) scale, both intercept and slope bias were found for the criterion variable Drug Abuse Screening Test (DAST), while the Behavioral/Externalizing Dysfunction (BXD) scale demonstrated slope bias, though the impact of that bias was slight. For the Activation (ACT) scale, intercept bias was evidenced for the Internal State Scale (Hypomanic Activation). Finally, the scale Hypomanic Activation (RC9), demonstrated statistically significant slope bias and intercept bias for the General and Motor subscales of the Barratt Impulsivity Scale, where as the Activation (ACT) scale demonstrated only intercept bias for the BIS (Motor), however once again the impact of that bias was below what is considered statistically small.

In sum, of the 39 measure-criterion comparisons in African American and Caucasian individuals, 7 comparisons evidenced statistically significant intercept bias. The RC4, RC7, RC8, RC9, and ACT scales demonstrated intercept bias. Of those 7 instances of bias, none exceeded what is considered a small effect size. There was evidence for over-prediction of psychopathology for African American individuals with only 7 scale-criterion predictions: RC4 (Antisocial Behavior) with the Drug Abuse Screening Test (DAST); RC7 (Dysfunctional Negative Emotions) and the State Trait Personality Inventory (STPI; Anxiety subscale); RC8 (Aberrant Experiences) and the Magical Ideation Scale (MIS); RC9 (Hypomanic Activation) and the Barratt Impulsivity Scale (BIS; General); RC9 and ACT (Activation) and the Barratt Impulsivity Scale (BIS; Motor); ACT (Activation) and the Internal State Scale (Hypomanic Activation).

V. Discussion

Summary of Results

The current study is the first to examine the clinically substantive scales of the MMPI-2-RF, specifically examining its application with ethnic minorities and the possibility for test bias in the MMPI-2-RF scores of African American and Caucasian college students. Previous studies have not found consistent evidence for test bias with the MMPI-2 (Arbisi et al., 2002; Castro et al., 2008; McNulty et al., 1997; Timbrook & Graham, 1994). Mean differences were observed across ethnicity on several MMPI-2-RF scales. With the exception of the SUB (Substance Abuse), MEC (Mechanical-Physical Interest), and DISC-r (Disconstraint-revised) scales, African American individuals scored significantly higher than Caucasian individuals.

Comparison across ethnicity, using a step-down hierarchical multiple regression procedure, demonstrated the presence of prediction bias in only 8 of the 39 analyses, with the majority of the bias occurring due to differences in the intercepts between ethnicity. Additionally, when the incremental change in R^2 was examined, the effect sizes were well below what is considered small (Cohen, 1988). Although there was slight evidence of prediction bias, the effect was minimal and would not significantly influence the clinical interpretation of the MMPI-2-RF. Furthermore, when bias was present, it trended toward the direction of the overprediction of psychopathology in African Americans.

Implications

The results of this study lend several implications concerning the MMPI-2-RF as a predictor of psychopathology for different ethnicities. Past researchers have advocated for the investigation of prediction bias on the MMPI measures in diverse settings (Arbisi

33

et al., 2002; Castro et al., 2008; McNulty et al., 1997; Timbrook & Graham, 1994) and whether predictive accuracy differs depending on the population (Hall, Bansal, & Lopez, 1999). The current study's use of a college university sample demonstrates the predictive accuracy of the MMPI-2-RF in this setting for African Americans as well as Caucasian individuals.

Due to results demonstrating minimal evidence for bias, the current study was unable to find results to support the notion that the MMPI-2-RF differentially predicts relevant criteria by ethnicity. Additionally, African American individuals scored significantly higher on certain MMPI-2-RF scales, which may be due to ethnic variations in item response style This can be seen in the higher elevations on THD, RC3, and RC6 scales, which may represent innate suspicions due to cultural factors such as cultural upbringing, racism, and discrimination which may be apart of everyday living. This suggest that the MMPI-2-RF scales can be interpreted in the same way for African Americans and Caucasians and that the relationship between MMPI-2-RF scores and criteria measure scores is not statistically moderated by ethnicity in the college sample. In light of these small differences, along with past research results, it may be unnecessary to consider separate interpretive guidelines for the assessments of African American and Caucasian individuals (Castro et al., 2008; Gynther, 1972). Furthermore, these results may help answer questions about the predictive abilities of the MMPI-2-RF for other ethnic minorities. The results of this study and past research have demonstrated higher mean score differences for African Americans on certain scales and minimal evidence of prediction bias. This suggests that although there may be little evidence of prediction bias

for minority populations on the MMPI-2 and MMPI-2-RF, there may exist differences in the pattern of scale scores depending on the minority group.

Limitations and Future Directions

Several limitations must be acknowledged when examining the results of this study. The nonclinical sample of college students utilized in this study was collected from an archival data set and was not originally intended for this type of study. The small number of African American individuals in this study warrants further investigation within a larger sample size. This limitation further denied the ability to examine differences by gender. As such, it is possible that group differences in MMPI-2-RF scale scores exist in this sample by gender. Additionally, the use of college students as a nonclinical sample limits the ability to generalize results to other nonclinical populations. Further research needs to be conducted in other clinical populations in which the MMPI-2-RF is administered (i.e., forensic populations, military and police assessments, and employment settings).

As with the nonclinical populations, the examination of prediction bias in the MMPI-2-RF needs to be undertaken with clinical populations (mental health hospitals, psychiatric outpatient, correctional settings) where there is more diversity in the severity and type of psychopathology (i.e. depression, bipolar disorder, schizophrenia) and demographics.

Another limitation may be found in the design of this study as prediction bias was examined in only 23 substantive MMPI-2-RF scales, due to the absence of conceptually relevant extratest criterion for the remaining 18 scales. Therefore, conclusions could only be made about bias in this sample for those scales. The possibility remains that the 18

clinically relevant MMPI-2-RF scales not included may demonstrate prediction bias in this sample. Future studies should address this limitations by developing additional relevant extratest criterion for those scales.

Conclusion

Assessments measures of psychopathology, such as the MMPI-2-RF, are the standard to which clinical diagnoses are validated and upheld. In diverse settings (i.e., forensic settings, corrections, mental health treatment), these measures impact decisions made about differential diagnosis concerning individuals. Therefore, concerns about whether a test such as the MMPI-2-RF predicts as well for African Americans as it does for Caucasians must be determined. The current study provides evidence indicating that although African American individuals scored higher on several MMPI-2-RF scales, no evidence supports the notion that the MMPI-2-RF demonstrates racial bias of these scales. These results add to the literature enhancing the MMPI-2-RF profile as a universal measure of personality and psychopatholgy for diverse populations. However, further research needs to be conducted with Asian, Hispanic, and other minorities, in order to fully evaluate whether these conclusions are generalizable.

List of References

Aldwin, C., & Greenberger, E. (1987). Cultural differences in the predictors of

depression. *American Journal of Community Psychology, 15*, 789-813.

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental

disorders* (4th Rev. ed.). Washington, DC: Author.

Anastasi, A., & Urbina, S. (1997). *Psychological testing* (7th ed.). Upper Saddle River,

NJ: Prentice Hall.

Arbisi, P. A, Ben-Porath, Y. S., & McNulty, J. (2002). A Comparison of MMPI-2

Validity in African American and Caucasian Psychiatric Inpatients. *Psychological

Assessment, 14,* 3-15.

Arbisi, P. A., Sellbom, M., & Ben-Porath, Y. S. (2008). Empirical Correlates of the

MMPI-2 Restructured Clinical (RC) Scales in Psychiatric Inpatients. *Journal of

Personality Assessment, 90,* 122-128.

Archer, R. P., Griffin, R., & Aiduk, R. (1995). MMPI-2 clinical correlates for ten

common codes. *Journal of Personality Assessment, 65,* 391-407.

Archer, R. P., Buffington-Vollum, J. K., Stredny, R. V., Handel, R. W. (2006). A survey

of psychological test use patterns among forensic psychologists. *Journal of

Personality Assessment, 87,* 84-94.

Archer, R. P., & Smith, S. R. (2008). *Personality assessment*. New York, NY US:

Routledge/Taylor & Francis Group.

Barksdale, C. L., Azur, M., & Leaf, P. J. (2009). Differences in Mental Health Service

Sector Utilization among African American and Caucasian Youth Entering

Systems of Care Programs. *Journal of Behavioral Health Services & Research, 37,* 363-373.

Barratt, E. S. (1985). Impulsiveness sub traits: Arousal and information processing. In J. T. Spence and C. E. Izard (Eds.), *Motivation, emotion, and personality* (Vol. 5, pp. 137-146). New York: North-Holland.

Bauer, M. S., Crits-Christoph, P., Ball, W. A., Dewees, E., McAllister, T., Alahi, P., et al. (1991). Independent assessment of manic and depressive symptoms by self-rating. *Archives of General Psychiatry, 48*, 807-812.

Beck, A. T., Ward, C. H., Mendelson, M., Mock, J., & Erbaugh, J. (1961). An inventory for measuring depression. *Archives of General Psychiatry, 12,* 57-62.

Ben-Porath, Y. S., & Tellegen, A. (2008). *MMPI-2-RF (Minnesota Multiphasic Personality Inventory-2-Restructured Form): Manual for administration, scoring, and interpretation.* Minneapolis, MN: University of Minnesota Press.

Blake, W. (1973). The influence of race on diagnosis. *Studies in Social Work, 43,* 184-192.

Borum, R., & Grisso, T. (1995). Psychological test use in criminal forensic evaluations. *Professional Psychology: Research & Practice, 26,* 465-473.

Brown, D. R., & Keith, V. M. (2003). *In and out of our right minds*. New York: Columbia University Press.

Bruce, B. G., & Phelan, J. C. (2006). Fundamental social causes: The ascendancy of social factors as determinants of distributions of mental illnesses in populations. In W. W. Eaton (Ed.), *Medical and psychiatric comorbidity over the course of life* (pp. 77-94). Washington, DC: American Psychiatric Publishing.

Butcher, J. N. (2009). *Oxford handbook of personality assessment*. New York, NY US: Oxford University Press.

Butcher, J. N., Dahlstrom, W. G., Graham, J. R., Tellegen, A., & Kaemer, B. (1989). *Minnesota Multiphasic Personality Inventory-2 (MMPI-2): Manual for administration and scoring.* Minneapolis: University of Minnesota.

Butcher, J. N., Graham, J. R., Ben-Porath, Y. S., Tellegen, A., Dahlstrom, W. G., & Kaemmer, B. (2001). *MMPI-2 (Minnesota Multiphasic Personality Inventory-2): Manual for administration and scoring* (rev. ed.). Minneapolis, MN: University of Minnesota Press.

Camara, W. J., Nathan, J. S., & Puente, A. E. (2000). Psychological test usage: Implications in professional psychology. *Professional Psychology: Research and Practice, 31,* 141-154.

Canino, I., & Spurlock, J. (2000). *Culturally diverse children and adolescents: Assessment, diagnosis, and treatment* (2nd ed.). New York: Guilford.

Castro, Y., Gordon, K. H., Brown, J. S., Anestis, J. C., & Joiner, Jr., T. E. (2008). Examination of Racial Differences on the MMPI-2 Clinical and Restructured Clinical in an Outpatient Sample. *Assessment, 15,* 277-286.

Chapman, L. J., Chapman, J. P., & Raulin, M. L. (1978). Body-image aberration in schizophrenia. *Journal of Abnormal Psychology, 87,* 399-407.

Choca, J. P., Shanley, L. A., & Van Denburg, E. (1992). *Interpretive guide to the Millon Clinical Multiaxial Inventory.* Washington, DC: American Psychological Association.

Chou, T., Asnaani, A., & Hofmann, S. G. (2012). Perception of racial discrimination and psychopathology across three U.S. ethnic minority groups. *Cultural Diversity and Ethnic Minority Psychology, 18,* 74-81.

Chow, J. C. C., Jaffee, K., & Snowden, L. (2003). Racial/ethnic disparities in the use of mental health services in poverty areas. *American Journal of Public Health, 93,* 792-797.

Christie, R., & Gies, F. L. (1970). *Studies in Machiavellianism.* New York: Academic.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.

Costa, P. T., Jr., & McCrae, R. R. (1992). *Revised NEO Personality Inventory (NEO-PI-R) and NEO Five-Factor Inventory (NEO-FFI) professional manual.* Odessa, FL: Psychological Assessment Resources.

Costello, E. J., Costello, A. J., Edelbrock, C., Burns, B. J., Dulcan, M. K., Brent, D., et al. (1988). Psychiatric disorders in primary care: Prevalence and risk factors. *Archives of General Psychiatry, 45*, 197–1116.

Dahlstrom, W. G., & Gynther, M. D. (1986). Previous MMPI research on Black Americans. In W. G. Dahlstrom, D. Lachar, & L. E. Dahlstrom (Eds.), *MMPI patterns of American minorities* (pp. 24-49). Minneapolis: University of Minnesota Press.

Dana, R. H. (1998). *Understanding cultural identity in intervention and assessment.* Thousand Oaks, CA: Sage.

Dana, R. H., & May, W. T. (Eds.). (1987). *Internship training in professional psychology.* New York: Hemisphere.

Dixon, C. G., & Vaz, K. (2005). Perceptions of African Americans regarding mental

    health counseling. In D. A. Harley & J. M. Dillard (Eds.), *Contemporary mental*

    health issues among African Americans (pp. 163-174). Alexandria, VA: American

    Counseling Association.

Eckblad, M. L., & Chapman, L. J. (1983). Magical ideation as an indicator of schizotypy.

    Journal of Consulting and Clinical Psychology 51, 215-225.

Epstein, J. N., March, J. S., Conners, C. K., & Jackson, D. L. (1998). Racial differences

    on the Conners Teacher Rating Scale. *Journal of Abnormal Child Psychology, 26,*

    109-118.

Evans, S. W., Brady, C. E., Harrison, J. R., Bunford, N., Kern, L., State, T., Andrews, C.

    (2013). Measuring ADHD and ODD symptoms and impairment using high school

    teacher's ratings. *Journal of Clinical Child and Adolescent Psychology, 42,* 197-

    207.

Eysenck, H. J. (1991). Raising IQ through vitamin and mineral supplementation: An

    introduction. *Personality and Individual Differences, 12,* 329-333.

Fernando, S. (2003). *Cultural diversity, mental health and psychiatry: The struggle*

    against racism. New York: Brunner-Routledge.

Flaherty, J. A., & Meagher, R. (1980). Measuring racial bias in inpatient treatment.

    American Journal of Psychiatry, 137, 679-682.

Forbey, J. D., & Ben-Porath, Y. S. (2007). A Comparison of the MMPI-2 Restructured

    Clinical (RC) and Clinical Scales in a Substance Abuse Treatment Sample.

    Psychological Services, 4, 46-58.

Forbey, J. D., & Ben-Porath, Y. S. (2008). Empirical Correlates of the MMPI-2

    Restructured Clinical (RC) Scales in a Nonclinical Setting. *Journal of Personality*

    *Assessment, 90,*136-141.

Frueh, C. B., Smith, D. W., & Libet, J. M. (1996). Racial differences on psychological

    measures in combat veterans seeking treatment for PTSD. *Journal of Personality*

    Assessment, 66, 41-53.

Gibb, G., Bailey, J., Best, R., & Lambirth, T. (1983). The measurement of obsessive-

    compulsive personality. *Educational and Psychological Measurement, 43,* 1233-

    1237.

Gibbs, J. T. (1988). Mental health issues of Black adolescents: Implications for policy

    and practice: In A. R. Stiffman & L. E. Davis (Eds.), *Ethnic issues in adolescent*

    mental health (pp. 21-52). Newbury Park, CA: Sage.

Graham, J. R. (1990). *MMPI-2: Assessing personality and psychopathology (*1st ed.).

    New York: Oxford University Press.

Graham, J. R. (2012). *MMPI-2: Assessing Personality and Psychopathology* (5th ed.).

    New York, NY: Oxford University Press, Inc.

Gray-Little, B. (2009). The assessment of psychopathology in racial and ethnic minorities.

    In J. N. Butcher (Ed.), Oxford *handbook of personality assessment* (pp. 396-414).

    New York, NY US: Oxford University Press.

Greene, R. L. (1987). Ethnicity and MMPI performance: A review. *Journal of Consulting*

    and Clinical Psychology, 55, 497-512.

Greene, R. L. (1991). *The MMPI-2/MMPI: An interpretive manual.* Boston: Allyn &

    Bacon.

Greenberg, S. A., Otto, R. K., Long, A. C. (2003). The utility of psychological testing in

    assessing emotional damages in personality injury litigation. *Assessment, 10,* 411-

    419.

Groth-Marnat, G. (1999). Financial efficacy of clinical assessment: Rational guidelines

    and issues for future research. *Journal of Clinical Psychology, 55,* 813-824.

Groth-Marnat, G. (2003). *Handbook of psychological assessment* (4th ed.). Hoboken, NJ:

    Wiley.

Gynther, M. D. (1972). White norms and Black MMPIs: A prescription for

    discrimination? *Psychological Bulletin, 78,* 386-402.

Gynther, M. D., & Green, S. B. (1980). Accuracy may make a difference, but does a

    difference make for accuracy? A response to Pritchard and Rosenblatt. *Journal of*

    Consulting & Clinical Psychology, 48, 268-272.

Hall, G. C. N., Bansal, A., & Lopez, I. R. (1999). Ethnicity and psychopathology: A

    meta-analytic review of 31 years of comparative MMPI/MMPI-2 research.

    Psychological Assessment, 11, 186-197.

Handler, L., & Meyer, G. J. (1998). The importance of teaching and learning personality

    assessment. In L. Handler & M. J. Hilsenroth (Eds.), *Teaching and learning*

    personality assessment (pp. 3-30). Mahwah, NJ: Erlbaum.

Hathaway, S., & McKinley, J. (1943). *The Minnesota Multiphasic Personality Inventory.*

    University of Minnesota Press, Minneapolis, MN.

Hoekstra, R. A., Bartels, M., Hudziak, J. J., Van Beijsterveldt, T. C., & Boomsma, D. I.

    (2007). Genetic and environmental covariation between autistic traits and

    behavioral problems. *Twins Research and Human Genetics, 10,* 853-860.

Janca, A., Burke, J. D., Isaac, M., Burke, K. C., Costa e Silva, J. A., Acuda, S. W., et al. (1995). The World Health Organization Somatoform Disorders Schedule: A preliminary report on design and reliability. *European Psychiatry, 10,* 373-378.

Jensen, A. R. (1969). How much can we boost IQ scholastic achievement? *Harvard Educational Review, 39,* 1-23.

Jensen, A. R. (1972). *Genetics and education.* New York: Harper & Row.

Johnson, J., Cohen, P., Dohrenwend, B., Link, B. G., & Brook, J. S. (1999). A longitudinal investigation of social causation and social selection processes involved in the association between SES status and psychiatric disorders. *Journal of Abnormal Psychology, 108,* 490-499.

Kamin, L. J. (1974). *The science and politics of IQ.* Hillsdale, NJ: Eribaum.

Kaplan, R. M., & Saccuzzo, D. P. (2009). *Psychological Testing, principles, applications, and issues* (7th ed.). Belmont: Wadsworth.

Kunen, S., Niederhauser, R., Smith, P., Morris, J., & Marx, B. (2005). Race disparities in psychiatric rates in emergency departments. *Journal of Consulting and Clinical Psychology, 73,* 116-126.

Lautenschlager, G. J., & Mendoza, J. L. (1986). A step-down hierarchical multiple regression analysis for examining hypotheses about test bias in prediction. *Applied Psychological Measurement, 10,* 133-139.

Lawson, W. B., Helper, N., Holiday, J., & Cuffel, B. (1994). Race as a factor in inpatient and outpatient admissions and diagnosis. *Hospital and Community Psychiatry, 45,* 72-74.

Lawson, E. J., & Kim, Y. J. (2005). Collaborators: Mental health and public health in the

    African American community. In D. A. Harley & J. M. Dillard (Eds.),

    Contemporary mental health issues among African Americans (pp. 205-222).

    Alexandria, VA: American Counseling Association.

Lawson, W. B., Yesavage, J. A., & Werner, P. D. (1984). Race, violence, and

    psychopathology. *Journal of Clinical Psychiatry, 45,* 294-297.

Lees-Haley, P. R. (1992). Psychodiagnostic test usage by forensic psychologists.

    American Journal of Forensic Psychology, 10, 25-30.

Leong, F. T. L., Wagner, N. S., & Tata, S. P. (1995). Racial and ethnic variations in help-

    seeking attitudes. In J. G. Ponterotto, J. M. Casas, L. A. Suzuki, & C. M.

    Alexander (Eds.), *Handbook of multicultural counseling* (pp. 415-438). Thousand

    Oaks, CA: Sage.

Loring, M., & Powell, B. (1988). Gender, race, and DSM-III: A study of the objectivity

    of psychiatric diagnostic behavior. *Journal of Health and Social Behavior, 29,* 1-

    22.

Lu, F. (2004). Culture and inpatient psychiatry. In W.-S. Tseng & J. Streltzer (Eds.),

    Cultural competence in clinical psychiatry (pp. 21-36). Washington, DC:

    American Psychiatric Publishing.

MacArthur Foundation Research Network on Socioeconomic Status and Health (2010).

    Retrieved December 20, 2012 from Reaching for a healthier life: Facts on

    socioeconomic status and health in the U.S.

    http://www.macses.ucsf.edu/Reaching_for_a_Healthier_Life.pdf

Marks, I. M., & Mathews, A. M. (1979). Brief standard self-rating for phobic patients. *Behavior Research and Therapy, 23,* 563-569

Mather, M., & Rivers, K. L. (2006). *City profiles of child well-being: Results from the American community survey.* Washington, DC: Annie E. Casey Foundation.

McLoyd, V. C. (1998). Socioeconomic disadvantage and child development. *American Psychologist, 53,* 185-204.

McNulty, J. L., Graham, J. R., Ben-Porath, Y. S., & Stein, L., A. R. (1997). Comparative Validity of MMPI-2 Scores of African American and Caucasian Mental Health Center Clients. *Psychological Assessment, 9,* 464-470.

Meyer, G. J., Finn, S. E., Eyde, L. D., Kay, G. G., Moreland, K. L., Dies, R. R., et al. (2001). Psychological testing and psychological assessment: A review of evidence and issues. *American Psychologist, 56,* 128-165.

Mindel, C. H., & Wright, R. (1982). The use of social services by Black and White elderly: The role of social support systems. *Journal of Gerontological Social Work, 4,* 107-125.

Mohr, D., & Beutler, L. E. (2003). The integrative clinical interview. In L. E. Beutler & G. Groth-Marnat (Eds.), *Integrative assessment of adult personality* (2nd ed., pp. 82-122). New York: Guilford.

Monot, M. J., Quirk, S. W., Hoerger, M., Brewer, L. (2009). Racial Bias in Personality Assessment: Using the MMPI-2 to Predict Psychiatric Diagnoses of African American and Caucasian Chemical Dependency Inpatients. *Psychological Assessment, 21,* 137-151.

Morey, L. C. (1991). *The Personality Assessment Inventory professional manual.* Odessa, FL: Psychological Assessment Resources.

Mukherjee, S., Shukla, S., Woodle, J., Rosen, A., & Olarte, S. (1983). Misdiagnosis of schizophrenia in bipolar patients: A multiethnic comparison. *American Journal of Psychiatry, 140,* 1571-1574.

Munsinger, H. (1975). The adopted child's I.Q.: A critical review. *Psychological Bulletin, 82,* 623-659.

Neighbors, H., Trierweiler, S., Ford, B., & Muroff, J. (2003). Racial differences in DSM diagnosis using a semi-structured instrument: The importance of clinical judgment in the diagnosis of African Americans. *Journal of Health and Social Behavior, 44*, 237-256.

Nguyen, L., Huang, L. N., Arganza, G. F., & Liao, Q. (2007). The influence of race and ethnicity on psychiatric diagnoses and characteristics of children and adolescents in Children's Services. *Cultural Diversity and Ethnic Minority Psychology, 13,* 18-25.

Nickerson, K. J., Helms, J. E., & Terrell, F. (1994). Cultural mistrust, opinions about mental illness, and Black students' attitudes toward seeking psychological help from White counselors. *Journal of Counseling Psychology, 41,* 378-386.

Nisbett, R. E. (2005). Heredity, environment, and race differences in IQ: A commentary on Rushton and Jensen (2005). *Psychology, Public Policy, and Law, 11,* 302-310.

Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory.* (3rd ed.). New York: McGraw-Hill.

Pavkov, T. W., Lewis, D. A., & Lyons, J. S. (1989). Psychiatric diagnoses and racial

    bias: An empirical investigation. *Professional Psychology: Research and Practice,*

    20, 364-368.

Poland, J., & Caplan, P. J. (2004). The deep structure of bias in psychiatric diagnosis. In

    P. J. Caplan & L. Cosgrove (Eds.), *Bias in psychiatric diagnosis* (pp. 9-23).

    Lanham, MD: Jason Aronson.

Politano, P. M., Nelson, W. M., Evans, H. E., Sorenson, S. B., & Zeman, D. J. (1986).

    Factor analytic evaluation of differences between Black and Caucasian

    emotionally disturbed children on the Children's Depression Inventory. *Journal of*

    Psychopathology and Behavioral Assessment, 8, 1-7.

Pritchard, D. A., & Rosenblatt, A. (1980). Racial bias in the MMPI: A methodological

    review. *Journal of Consulting and Clinical Psychology, 48,* 263-267.

Raskin, A., Crook, T. H., & Herman, K. D. (1975). Psychiatric history and symptom

    differences in Black and White depressed inpatients. *Journal of Consulting and*

    Clinical Psychology, 43, 73-80.

Reynolds, C. R., & Paget, K. (1981). Factor analysis of the Revised Manifest Anxiety

    Scale for blacks, whites, males, and females, with a national normative sample.

    Journal of Consulting and Clinical Psychology, 49, 349-352.

Reynolds, C. R., Plake, B. S., & Harding, R. E. (1983). Item bias in the assessment of

    children's anxiety: Race and sex interaction on items of the Revised Children's

    Manifest Anxiety Scale. *Journal of Psychological Assessment, 1,* 17-24.

Rorer, L. G. (1990). Personality assessment: A conceptual survey. In L. A. Pervin (Ed.),

 Handbook of personality: Theory and research (pp. 693-720). New York:

 Guilford.

Rosenthal, R., & Jacobson, L. (1968). *Pygmalion in the classroom.* New York: Holt,

 Rinehart & Winston.

Rushton, J. P. (1991). Do r-K strategies underlie human race differences? *Canadian*

 Psychology, 32, 29-42.

Sattler, J. M, & Hoge, R. D. (2006). *Assessment of children, behavioral, social, and*

 clinical foundations (5th ed.). San Diego: Jerome M. Sattler, Inc.

Schwartz, R. C., & Feisthamel, K. P. (2009). Disproportionate diagnosis of mental

 disorders among African American versus European American clients:

 Implications for counseling theory, research, and practice. *Journal of Counseling*

 & Development, 87, 295-301.

Selzer, M. (1971). The Michigan Alcoholism Screening Test: The quest for a new

 diagnostic instrument. *American Journal of Psychiatry, 127,* 1653-1658.

Simon, R. J., Fleiss, J. L., Gurland, B. J., Stiller, P. R., & Sharpe, L. (1973). Depression

 and schizophrenia in hospitalized Black and White mental patients. *Archives of*

 General Psychiatry, 28, 509-512.

Skinner, H. A. (1982). The drug abuse screening test. *Addictive Behaviors, 7,* 363-371.

Soloff, P. H., & Turner, S. M. (1981). Patterns of seclusion: A prospective study.

 Nervous and Mental Disease, 169, 37-44.

Snowden, L. R. (1999). African American folk idiom and mental health service use.

 Cultural Diversity and Ethnic Minority Psychology, 5, 364-369.

Snowden, L. R., & Cheung, F. K. (1990). Use of inpatient mental health services by

    members of ethnic minority groups. *American Psychologist, 45,* 347-355.

Spielberger, C. D. (1979). *Preliminary manual for the State-Trait Personality Inventory*

    (STPI). Tampa: University of South Florida.

Spitzer, R. L., Williams, J. B., Gibbon, M., & First, M. B. (1992). The structured clinical

    interview for DSM-III-R (SCID): I. history, rationale, and description. *Archives of*

    General Psychiatry, 49, 624-629.

Steele, C. M., & Aronson, J. A. (2004). Stereotype threat does not live by Steele and

    Aronson (1995) alone. *American Psychologist, 59,* 47-48.

Strawkowski, S. M., Lonczak, H. S., Sax, K., West, S. A., Crist, A., Mehta, R., et al.

    (1995). The effects of ethnicity on diagnosis and disposition from a psychiatric

    emergency service. *Journal of Clinical Psychiatry, 56,* 101-107.

Sussman, L., Robins, L., & Earls, F. (1987). Treatment-seeking for depression by Black

    and White Americans. *Social Science and Medicine, 24,* 187-196.

Tellegen, A., Ben-Porath, Y. S., McNulty, J. L., Arbisi, P. A., Graham, J. R., & Kaemmer,

    B. (2003). *MMPI-2 restructured clinical (RC) scales: Development, validation,*

    and interpretation. Minneapolis: University of Minnesota Press.

Trierweiler, S. J., Neighbors, H. W., Munday, C., Thompson, E. E., Binion, V. J., &

    Gomez, J. P. (2000). Clinician attributions associated with the diagnosis of

    schizophrenia in African American and non-African American patients. *Journal*

    of Consulting and Clinical Psychology, 68, 171-175.

Trierweiler, S., Muroff, J., Jackson, J., Neighbors, H., & Munday, C. (2005). Clinician race, situational attributions, and diagnoses of mood versus schizophrenia disorders. *Cultural Diversity and Ethnic Minority Psychology, 11,* 351-364.

Timbrook, R. E., & Graham, J. R. (1994). Ethnic Differences on the MMPI-2? *Psychological Assessment, 6,* 212-217.

Tong, S., Baghurst, P., Vimpani, G., & McMichael, A. (2007). Socioeconomic position, maternal IQ, home environment, and cognitive development. *Journal of Pediatrics, 151,* 284-288, 288 e281.

Turkheimer, E. (1991). Individual and group differences in adoption studies of IQ. *Psychological Bulletin, 110,* 392-405.

Urbina, S. (2004). *Essentials of psychological testing.* Hoboken, NJ: John Wiley & Sons.

U.S. Census Bureau (2005). *We the people: Blacks in the United States.* Washington DC: U.S. Government Printing Office.

U.S. Department of Health and Human Services. (1999). *Mental health: A report of the Surgeon General.* Rockville, MD: Author.

Van Leeuwen, M., Van den Berg, S., & Boomsma, D. (2008). A twin-family study of general IQ. *Learning and Individual Differences, 18,* 76-88.

Wiggan, G. (2007). Race, school achievement, and educational inequality: Toward a student-based inquiry perspective. *Review of Educational Research, 77,* 310.

Wing Sue, D., & Sue, D. (2008). *Counseling the culturally diverse: Theory and practice (5th ed.).* Hoboken, NJ US: John Wiley & Sons Inc.

Westermeyer, J. (1987). Cultural factors in clinical assessment. *Journal of Consulting and Clinical Psychology, 55,* 471-478.

Whaley, A. L. (2004a). A two-stage method for the study of cultural bias in the diagnosis

      of schizophrenia in African Americans. *Journal of Black Psychology, 30,* 167-186.

Whaley, A. L. (2004b). Ethnicity/race, paranoia, and hospitalization for mental health

      problems among men. *American Journal of Public Health, 94*, 78-81.

Whitaker, C. (2000, July). The mental health crisis in Black America. *Ebony, 55,* 74-78.

Yeh, M., McCabe, K., Hurlburt, M., Hough, R., Hazen, A., Culver, S., et al. (2002).

      Referral sources, diagnoses, and service types of youth in public outpatient mental

      health care: A focus on ethnic minorities. *Journal of Behavioral Health Services*

      & Research, 29, 45-60.

Zuckerman, M. (1990). Some dubious premises in research and theory on racial

      differences. *American Psychologist, 45,* 1297-1303.

APPENDIX A:

Tables

Table 1.

MMPI-2-RF Scales

Validity Scales		
VRIN-r	Variable Response Inconsistency	Random Responding – 53 item-response pairs
TRIN-r	True Response Inconsistency	Fixed Responding– 26 pairs negatively correlated items
F-r	Infrequent Responses	Responses infrequent in the General Population – 32 items
F$_P$-r	Infrequent Psychopathology Responses	Responses infrequent in psychiatric populations – 18 Items
F$_S$	Infrequent Somatic Responses	Somatic complaints infrequent in medical patient populations – 16 Items
FBS-r	Symptom Validity	Somatic and Cognitive complaints associated at high levels with over-reporting – 30 Items
RBS	Response Bias	Self-reported symptoms associated with failure on cognitive malingering measures
L-r	Uncommon Virtues	Rarely claimed moral attributes or activities – 14 Items
K-r	Adjustment Validity	Avowals of good psychological adjustment associated at high levels w/under reporting – 14 Items
Higher-Order (H-O) Scales		
EID	Emotional/Internalizing Dysfunction	Problems associated with mood and affect
THD	Thought Dysfunction	Problems associated with disorder thinking
BXD	Behavioral/Externalizing Dysfunction	Problems associated with under-controlled behavior
Restructured Clinical (RC) Scales		
RCd	Demoralization	General unhappiness and dissatisfaction – 24 Items
RC1	Somatic Complaints	Diffuse physical health complaints – 27 Items
RC2	Low Positive Emotions	Lack of positive emotional responsiveness – 17 Items
RC3	Cynicism	Non self-referential beliefs expressing distrust and a generally low opinion of others – 15 Items
RC4	Antisocial Behavior	Rule breaking and irresponsible behavior – 22 Items

Table 1 (continued)

RC6	Ideas of Persecution	Self-referential beliefs that others pose a threat – 17 Items
RC7	Dysfunctional Negative Emotions	Maladaptive anxiety, anger, irritability – 24 Items
RC8	Aberrant Experiences	Unusual perceptions or thoughts – 18 Items
RC9	Hypomanic Activation	Over-activation, aggression, impulsivity, and grandiosity – 28 Items

Specific Problems (SP) Scales

Somatic Scales

MLS	Malaise	Overall sense of physical debilitation, poor health
GIC	Gastrointestinal Complaints	Nausea, recurring upset stomach, and poor appetite
HPC	Head Pain Complaints	Head and neck pains
NUC	Neurological Complaints	Dizziness, weakness, paralysis, loss of balance, etc.
COG	Cognitive Complaints	Memory problems, difficulties concentrating

Internalizing Scales

SUI	Suicidal/Death Ideation	Direct reports of suicidal ideation and recent suicide attempts
HLP	Helplessness/Hopelessness	Belief that goals cannot be reached or problems solved
SFD	Self-Doubt	Lack of confidence, feelings of uselessness
NFC	Inefficacy	Belief that one is indecisive and inefficacious
STW	Stress/Worry	Preoccupation w/disappointments, difficulty w/time pressure
AXY	Anxiety	Pervasive anxiety, frights, nightmares
ANP	Anger Proneness	Easily angered, impatient with others
BRF	Behavior-Restricting Fears	Fears that significantly inhibit normal activities
MSF	Multiple Specific Fears	Fears of blood, fire, thunder, etc.

Table 1 (continued)

<div align="center">***Externalizing Scales***</div>

JCP	Juvenile Conduct Problems	Difficulties at school and at home
SUB	Substance Abuse	Current and past misuse of alcohol and drugs
AGG	Aggression	Physically aggressive, violent behavior
ACT	Activation	Heightened excitation and energy level

<div align="center">***Interpersonal Scales***</div>

FML	Family Problems	Conflictual family Relationships
IPP	Interpersonal Passivity	Being unassertive and submissive
SAV	Social Avoidance	Avoiding or not enjoying social events
SHY	Shyness	Bashful, prone to feel inhibited and anxious around others
DSF	Disaffiliativeness	Disliking people and being around them

<div align="center">***Interest Scales***</div>

AES	Aesthetic-Literary Interests	Literature, music, theatre
MEC	Mechanical-Physical Interest	Fixing and building things, outdoors, and sports

<div align="center">***Personality Psychopathology Five (PSY-5) Scales***</div>

AGGR-r	Aggressiveness-Revised	Instrumental, goal-directed aggression – 18 Items
PSYC-r	Psychoticism-Revised	Disconnection from reality – 25 Items
DISC-r	Disconstraint-Revised	Under-controlled behavior – 29 Items
NEGE-r	Negative Emotionality/Neuroticism-Revised	Anxiety, insecurity, worry, and fear – 33 Items
INTR-r	Introversion/Low Positive Emotionality-Revised	Social disengagement and anhedonia – 34 Items

Table 2

Criteria and associated MMPI-2-RF scales in undergraduate sample (n = 1017)

Criterion	Measures	Predicted RC Scale(s)
Screener for Somatoform Disorders	Somatic symptoms	RC1, MLS
Beck Depression Inventory	Depressive symptoms	EID, RCd, RC2, HLP
Internal State Scale	Depressive symptoms	RCd, RC2, HLP
State Trait Personality Inventory (STPI) - Anxiety	Trait Anxiety (subscale)	RC7, NEGE-r, STW, AXY
STPI – Anger	Trait Anger (subscale)	RC7, ANP, NEGE-r
Fear Questionnaire	Social Phobia	RC7, BRF, MSF, SAV
Obsessive Compulsive Scale	Obsessiveness	RC7
Magical Ideation Scale	Magical Thinking	THD, RC6, RC8, PSYC-r
Perceptual Aberration Scale	Perceptual abnormalities	THD, RC8, PSYCH-r
Machiavellianism-IV	Cynical beliefs about others	RC3
Drug Abuse Screening Test	Drug use and abuse	BXD, RC4, SUB
Michigan Alcohol Screening Test	Alcohol use and abuse	BXD, RC4 , SUB
Barratt Impulsivity Scale – General	General Impulsivity	BXD, RC4, RC9
Barratt Impulsivity Scale – Motor	Motor Impulsivity (subscale)	RC9, ACT
Internal State Scale	Hypomanic activation (subscale)	RC9, ACT

Table 3.

Comparison of Minnesota Multiphasic Personality Inventory-2-RF Scale Scores
Between African American and Caucasian Participants

	African American (n = 86)		Caucasian (n = 930)				
Scale	M	SD	M	SD	t(1014)	p	d
Higher Order							
EID	51.0	10.3	51.0	11.2	.03	.979	.00
BXD	53.4	9.0	54.2	10.1	.78	.435	-.08
THD	56.2	11.0	52.7	10.5	-2.89	.004*	.33
Restructured Clinical							
RCd	55.3	9.8	54.4	10.6	-.79	.433	.09
RC1	52.6	9.5	53.4	10.6	.70	.487	-.08
RC2	48.2	9.1	48.1	10.1	-.12	.906	.01
RC3	59.8	9.8	55.5	9.7	-3.95	< .001*	.44
RC4	52.2	7.3	53.0	9.7	.70	.484	-.09
RC6	60.8	11.9	55.1	10.6	-4.72	< .001*	.51
RC7	54.1	11.3	54.2	11.7	.04	.971	-.01
RC8	55.9	10.5	54.5	11.4	-1.04	.297	.12
RC9	56.7	11.7	57.2	11.3	.39	.700	-.04
Specific Problems							
Somatic/Cognitive							
MLS	52.4	9.1	51.2	9.8	-1.12	.262	.13
GIC	50.6	9.3	52.7	11.9	1.59	.113	-.20
HPC	51.8	10.4	52.3	10.7	.40	.691	-.05
NUC	55.0	9.8	54.5	11.4	-.42	.674	.05
COG	55.9	11.4	56.2	12.3	.23	.817	-.03

Table 3 (continued)

Scale	African American (n = 86)		Caucasian (n = 930)		t(1014)	p	d
	M	SD	M	SD			
Internalizing							
SUI	50.0	11.0	49.5	10.9	-.40	.688	.05
HLP	48.5	10.0	50.4	10.7	1.56	.120	-.18
SFD	51.6	11.1	53.0	11.8	1.08	.280	-.12
NFC	53.6	8.7	53.9	11.0	.19	.847	-.03
STW	49.8	9.3	53.2	11.2	2.77	.006	-.33
AXY	55.1	12.5	56.4	13.4	.81	.418	-.10
ANP	54.2	11.6	53.1	11.0	-.86	.390	.10
BRF	53.9	11.1	53.3	11.7	-.49	.624	.05
MSF	53.8	9.4	47.9	8.6	-6.04	< .001*	.65
Externalizing							
JCP	52.3	9.3	50.4	10.3	-1.62	.106	.19
SUB	47.4	7.7	53.6	11.9	4.78	< .001*	-.62
AGG	53.3	11.8	52.1	11.7	-.90	.366	.10
ACT	54.5	10.9	53.8	10.2	-.65	.515	.07
Interpersonal							
FML	53.9	9.6	51.3	10.4	-2.24	.025	.26
IPP	44.4	6.9	45.6	7.9	1.35	.177	-.16
SAV	47.0	9.2	45.3	9.9	-1.50	.135	.18
SHY	49.6	9.3	50.7	11.1	.85	.398	-.11
DSF	55.0	11.1	50.7	9.6	-3.89	< .001*	.41
Interest							
AES	45.2	8.8	44.8	9.6	-.42	.675	.04
MEC	43.5	5.6	49.7	10.0	5.64	< .001*	-.77

Table 3 (continued)

Scale	African American (n = 86)		Caucasian (n = 930)		t(1014)	p	d
	M	SD	M	SD			
PSY-5 Scales							
AGGR-r	53.6	9.7	51.1	10.0	-2.21	.028	.25
PSYC-r	56.4	10.8	53.2	10.5	-2.71	.007	.30
DISC-r	50.1	7.8	54.8	10.3	4.16	< .001*	-.51
NEGE-r	53.3	11.6	54.4	11.9	.80	.423	-.09.
INTR-r	45.6	9.3	44.2	9.6	-1.29	.198	.15

Note. EID = Emotional/Internalizing Dysfunction; THD = Thought Dysfunction; BXD =

Behavioral/Externalizing Dysfunction; RCd = Demoralization; RC1 = Somatic

Complaints; RC2 = Low Positive Emotion; RC3 = Cynicism; RC4 = Antisocial

Behavior; RC6 Ideas of Persecution; RC7 = Dysfunctional Negative Emotions; RC8 =

Aberrant Experiences; RC9 = Hypomanic Activation; MLS = Malaise; GIC =

Gastrointestinal Complaints; HPC = Head Pain Complaints; NUC = Neurological

Complaints; COG = Cognitive Complaints; SUI = Suicidal/Death Ideation; HLP =

Helplessness/Hopelessness; SFD = Self-Doubt; NFC = Inefficacy; STW = Stress/Worry;

ANX = Anxiety; ANP = Anger Proneness; BRF = Behavior-Restricting Fears; MSF =

Multiple Specific Fears; JCP = Juvenile Conduct Problems; SUB = Substance Abuse;

AGG = Aggression; ACT = Activation; FML = Family Problems; IPP = Interpersonal

Passivity; SAV = Social Avoidance; SHY = Shyness; DSF = Disaffiliativeness; AES =

Aesthetic-Literacy Interest; MEC = Mechanical-Physical Interest; AGGR-r =

Aggressiveness-Revised; PSYC-r = Psychoticism-Revised; DISC-r = Disconstraint-

Revised; NEGE-r = Negative Emotionality/Neuroticism-Revised; INTR-r =

Introversion/Low Positive Emotionality-Revised.

Table 4.

Hierarchical Regression Analyses to Examine Ethnicity as a Moderating Variable in the Prediction of Criterion Variables

	Full Model						
	β						
	IV	Ethnicity	IV x Ethnicity	R^2	Prediction Bias ΔR^2	Slope Bias ΔR^2	Intercept Bias ΔR^2
Beck Depression Inventory							
EID	.655	.004	.039	.477	.000		
RCd	.701	.006	-.011	.477	.000		
RC2	.355	-.028	.136	.230	.001		
HLP	.688	.086	-.260	.179	.005		
Screener for Somatoform Disorders							
RC1	.494	.022	.130	.383	.004		
MLS	.302	-.022	.155	.199	.002		
State Trait Personality Inventory (STPI) – Anxiety							
RC7	.816	.014	-.210	.398	.006**	.002*	.004*
STW	.720	.033	-.142	.346	.001		
AXY	.624	-.020	-.151	.235	.004		
	.776	.027	-.179	.384	.004		
STPI – Anger							
RC7	.553	-.032	.009	.315	.001		
ANP	.659	-.038	-.018	.413	.002		
	.568	-.008	-.012	.310	.000		
Fear Questionnaire							
RC7	.339	.049	.062	.162	.005		
BRF	.472	.094	-.130	.128	.005		

Table 4 (continued)

	Full Model β						
	IV	Ethnicity	IV * Ethnicity	R^2	Prediction Bias ΔR^2	Slope Bias ΔR^2	Intercept Bias ΔR^2
MSF	.580	.106	-.257	.139	.003		
SAV	.148	.076	-.037	.018	.005		
Obsessive Compulsive Scale							
RC7	.340	.034	.072	.168	.004		
Magical Ideation Scale							
THD	.775	.109	-.225	.338	.005		
RC6	.547	.087	-.182	.158	.003		
RC8	.690	.101	-.081	.387	.006**	.000	.006**
	.798	.118	-.235	.355	.005		
Perceptual Aberration Scale							
THD	.648	.106	-.233	.200	.005		
RC8	.486	.066	-.008	.235	.004		
	.646	.110	-.228	.202	.005		
Machiavellianism-IV							
RC3	.643	.049	-.178	.259	.004		
Drug Abuse Screening Test							
BXD	.935	.154	-.529	.233	.017**	.012**	.005
RC4	.888	.079	-.402	.280	.010**	.006**	.005**
SUB	.809	.031	-.234	.334	.002		
Michigan Alcohol Screening Test							
BXD	.565	.063	-.191	.158	.002		
RC4	.408	-.003	-.042	.138	.000		
SUB	.473	.038	-.110	.131	.001		

Table 4 (continued)

	Full Model β						
	IV	Ethnicity	IV x Ethnicity	R^2	Prediction Bias ΔR^2	Slope Bias ΔR^2	Intercept Bias ΔR^2
Barratt Impulsivity Scale (BIS) - General							
BXD	.608	.031	-.235	.168	.007		
RC4	.471	-.032	-.101	.150	.005		
RC9	.710	.145	-.370	.189	.011**	.006**	.006**
Barratt Impulsivity Scale - Motor							
RC9	.740	.110	-.373	.221	.019**	.006**	.013**
ACT	.496	-.033	-.195	.126	.018**	.002	.016**
Internal State Scale – Hypomanic Activation							
RC9	.203	-.186	.186	.129	.007		
ACT	.146	-.169	.174	.094	.009**	.002	.007**

Note. Values in boldface indicate at least a small effect size per Cohen (1988). IV =
Independent Variable, Ethnicity = Caucasian or Latino/a, IV x Ethnicity = Interaction
term. Ethnicity is coded 1 for Caucasian and 2 for African-American. R^2D = the change
in proportion of variance accounted for by the addition of the full model.

** $p \leq .01$.

APPENDIX B:

Figures
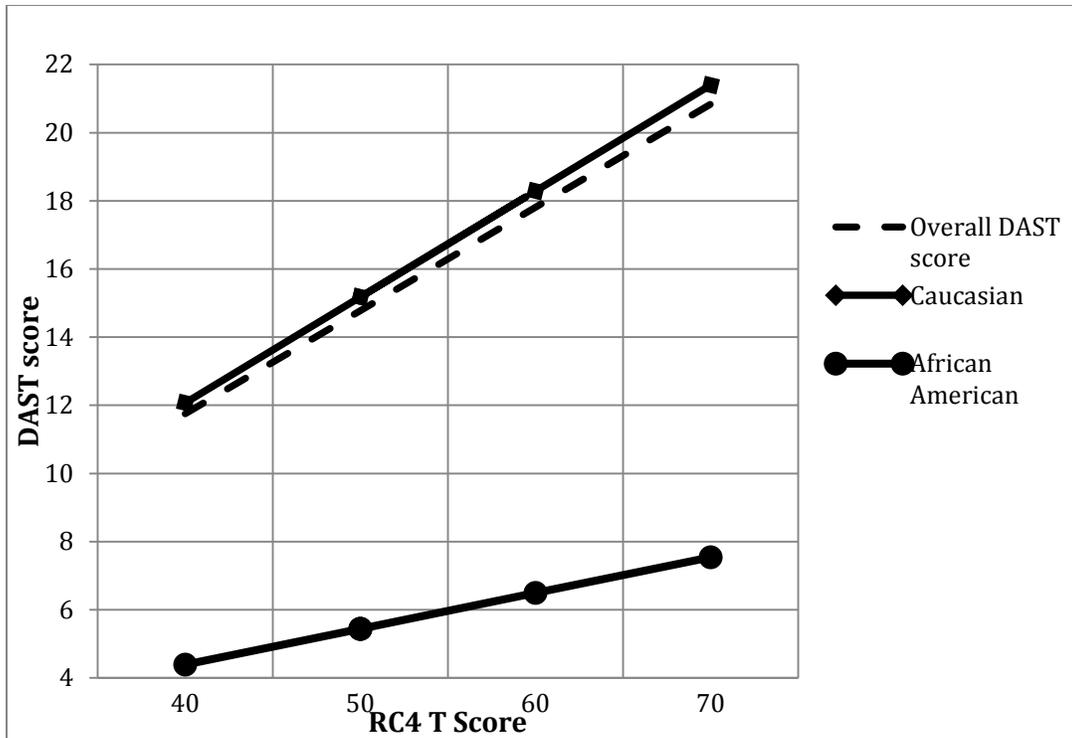
Figure 1. Over prediction of DAST criteria scores as evidenced by intercept bias on the

RC4 scale.
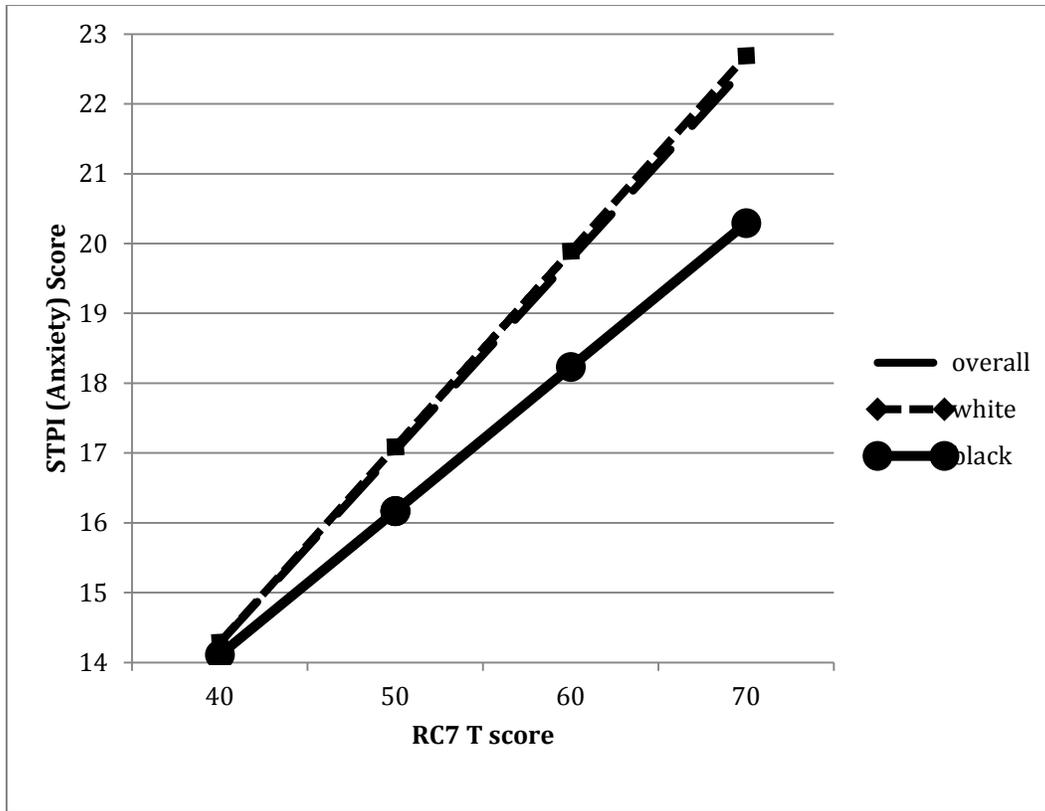
Figure 2. Over prediction of STPI (Anxiety) criteria scores as evidenced by intercept bias on the RC7 scale.
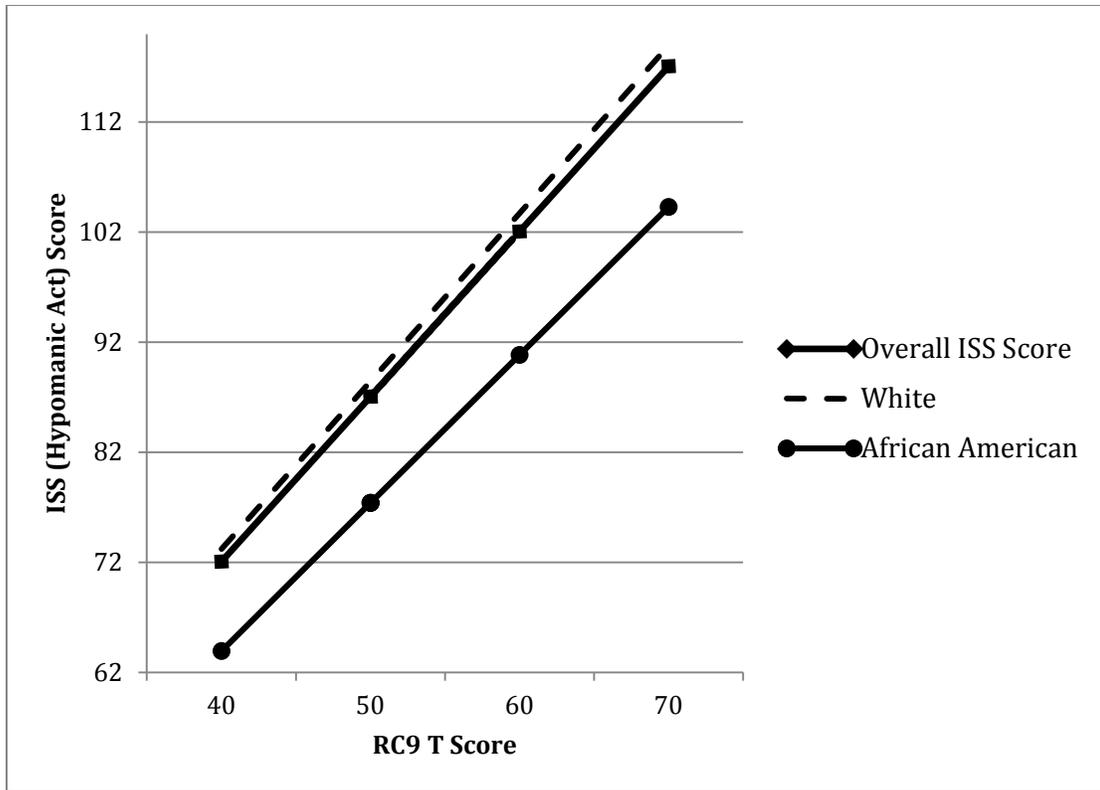
Figure 3. Over prediction of ISS (Hypomanic Activation) criteria scores as evidenced by intercept bias on the RC9 scale.
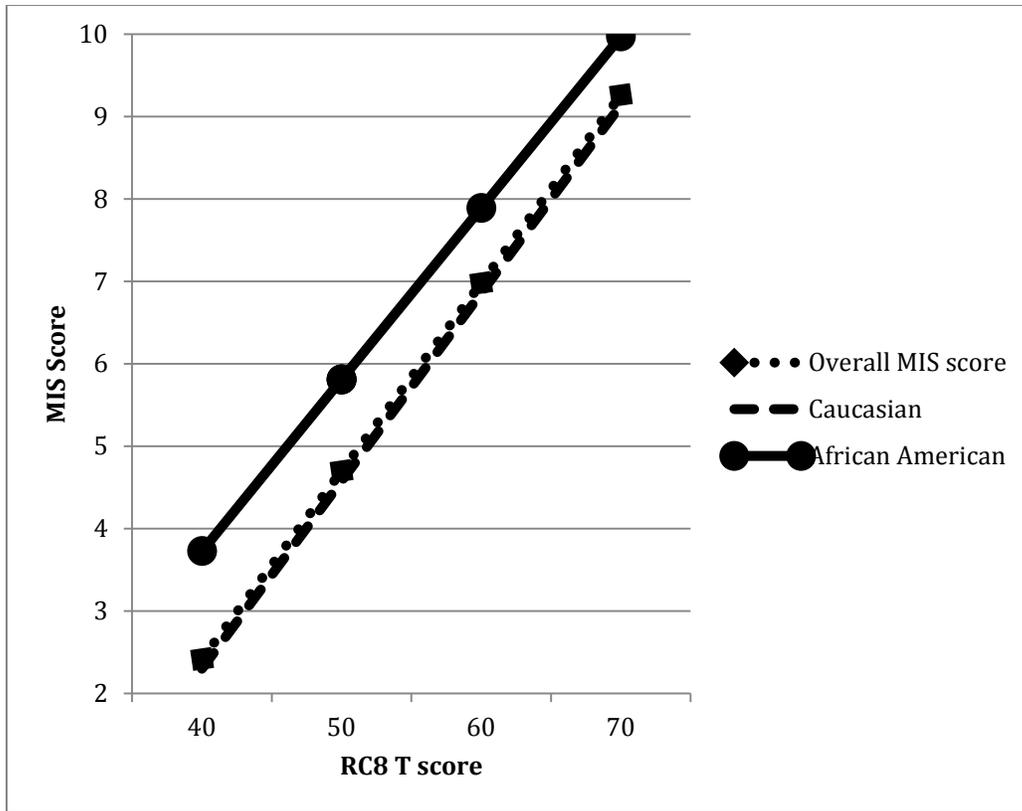
Figure 4. Under prediction of MIS criteria scores as evidenced by intercept bias on the RC8 scale.
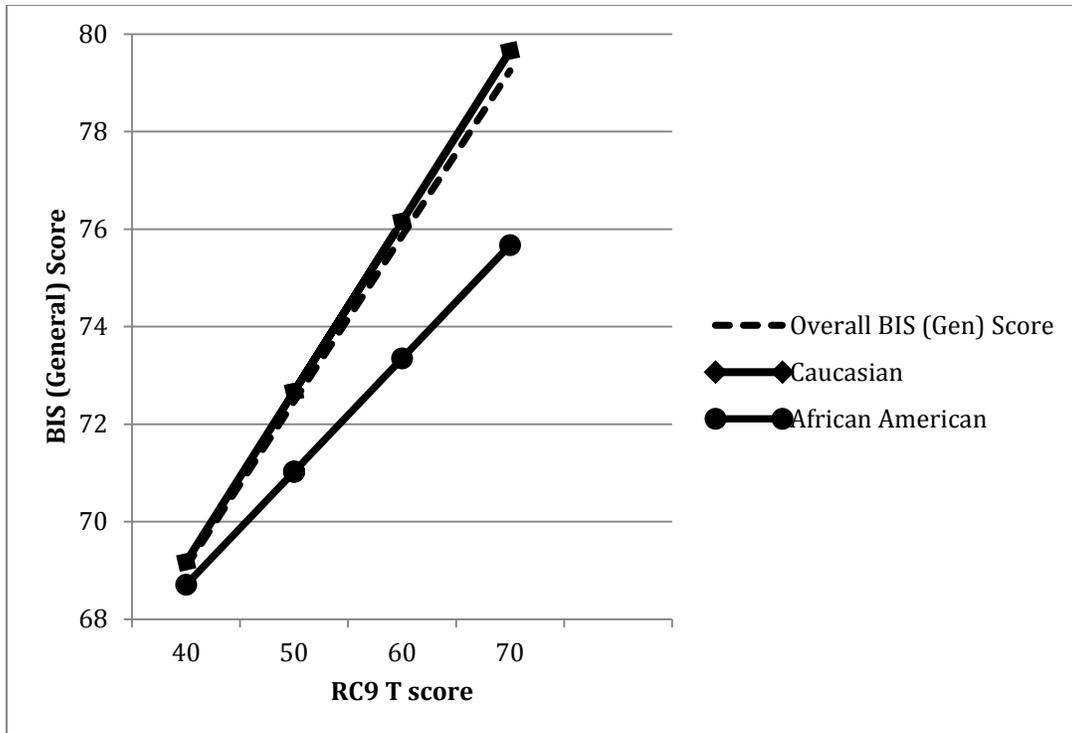
Figure 5. Over prediction of BIS (General) criteria scores as evidenced by intercept

bias on the RC9 scale
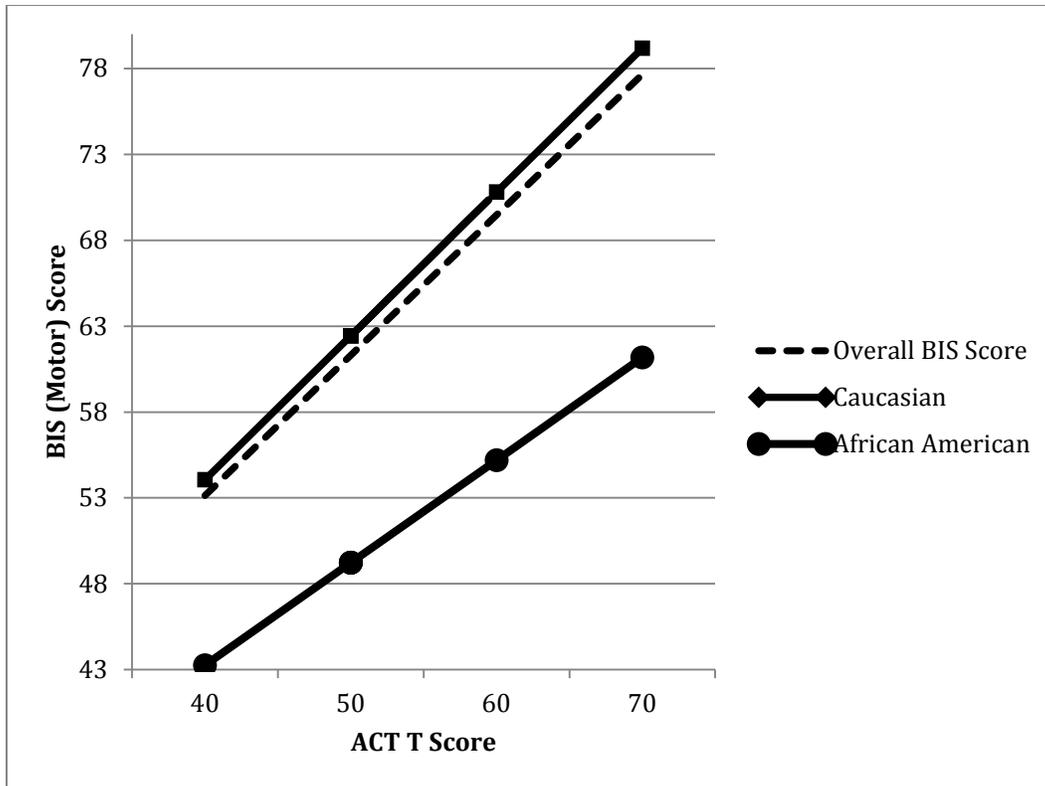
Figure 6. Over prediction of BIS (Motor) criteria scores as evidenced by intercept bias on the ACT scale.
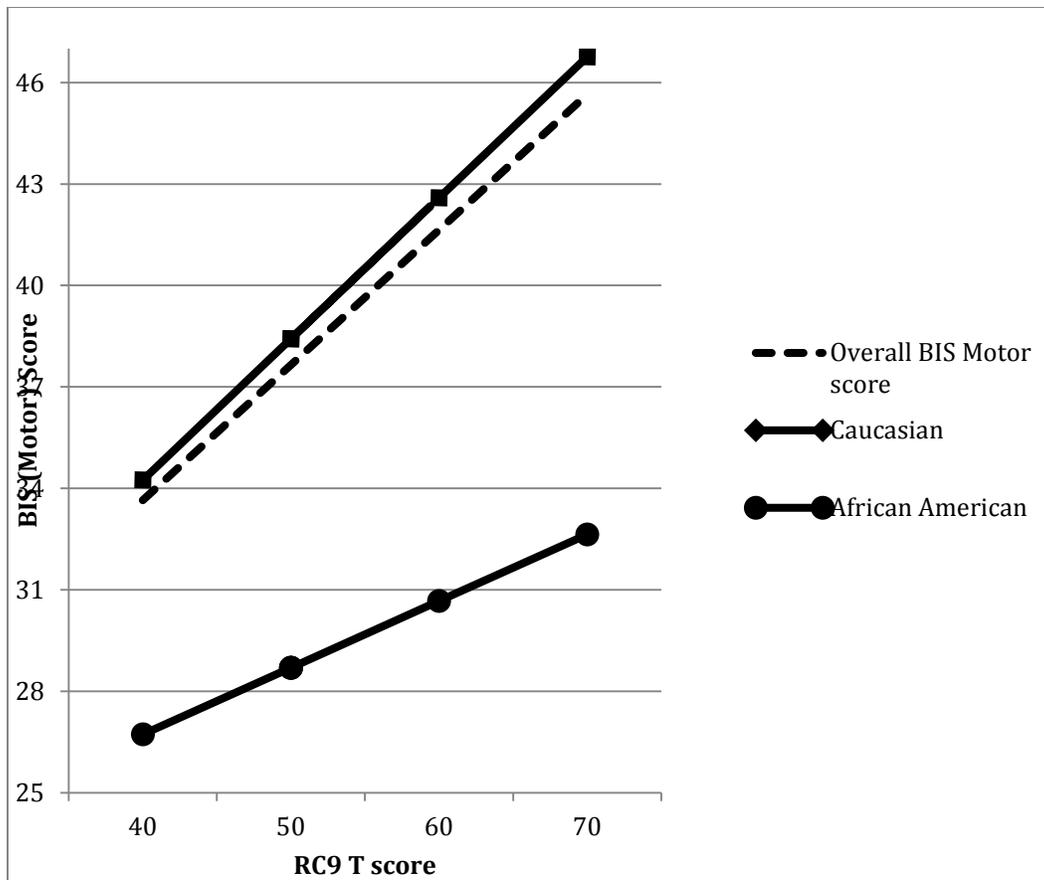
Figure 7. Over prediction of BIS (Motor) criteria scores as evidenced by intercept
bias on the RC9 scale.