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Examining Validity Characteristics Of The Mmpi-2 Psy-5 Psychoticism Scale

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EXAMINING VALIDITY CHARACTERISTICS OF THE MMPI-2 PSY-5 PSYCHOTICISM SCALE

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ABSTRACT

The purpose of this study is to firmly establish the facet scales of the Personality Psychopathology Five (PSY-5) Psychoticism scale of the Minnesota Multiphasic Personality Inventory-Second Edition (MMPI-2). Arnau, Handel, and Archer (2005) recently developed facet scales for the MMPI-2 PSY-5 scales using principal component analyses. The results of this study and the original published study were compared to determine if similar facet scales are found for the MMPI-2 PSY-5 Psychoticism scale. Participants were drawn from three different samples: the MMPI-2 normative sample, an inpatient sample from a mid-Atlantic region, and a college sample from a Midwestern university. Item-level principal component analyses and factor analyses were utilized to determine which scales yield better clinical utility. Although the results show some consistency in the MMPI-2 PSY-5 Psychoticism facet scales between the current and original study, differences were noted which indicate that the psychometric properties of the facet scales have yet to be empirically established. Clinical and research implications for the facet scales are discussed.

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The Minnesota Multiphasic Personality Inventory (MMPI) was originally developed to aid in diagnosing psychiatric disorders (Hathaway & McKinley, 1943). Before the MMPI, a reliable, valid, and practical measure of personality and psychopathology had not been developed (Kleinmuntz, 1967); previous measures of personality and psychopathology had failed to fulfill the anticipated goals of the MMPI (Greene, 1999). Ultimately, the MMPI and its revised edition, the MMPI-2, became the most widely researched measures in the field (Greene, Gwin, & Staal, 1997), providing empirical evidence of its practical and clinical use in assessing personality and psychopathology across settings and populations (Graham, 2006).

The MMPI-2 provides clinical descriptions of individuals to aid in diagnosing psychiatric disorders. To accomplish this objective, the components of the MMPI-2 include multiple validity scales (e.g., Infrequency Scale, Variable Response Inconsistency Scale, True Response Inconsistency Scale) and clinical scales (e.g., Depression, Paranoia, and Schizophrenia scales; Butcher et al., 2001). It also includes supplemental scales (e.g., Anxiety Scale, Repression Scale, Dominance Scale) and content scales (e.g., Harris-Lingoes Subscales, MMPI-2 Content Scales) to aid in the interpretation of a profile (Butcher et al., 2001). Recently, the Restructured Clinical scales (RC; Tellegen et al., 2003) and Personality Psychopathology Five scales (PSY-5; Harkness, McNulty, & Ben-Porath, 1995) were added to the standard MMPI-2 to provide more detailed and descriptive data that often are not measured or are overlooked by the clinical parent scales alone. Specifically, the PSY-5 scales were developed to measure both normal and

abnormal personality traits and psychopathology (Harkness et al., 1995). The development of the PSY-5 scales was necessary because previous personality measures such as the NEO Personality Inventory-Revised (NEO-PI-R; Costa & McCrae, 1992) and the California Personality Inventory (CPI; Gough & Bradley, 1996) have been primarily used to measure "normal" characteristics of personality.

Numerous constructs to measure normal personality characteristics have been identified, but as more advanced statistical techniques were utilized, five personality constructs surfaced consistently (Digman, 1990). These five constructs became known as the Five-Factor Model (FFM), and have historically been used to study personality and psychopathology (Digman, 1990). Although there are several five-factor models, such as the Big Five (Goldberg, 1993), Costa and McCrae's (1992) model has been established empirically and continues to be the most utilized model in assessing personality traits (Briggs, 1992; Digman, 1990; Piedmont, 1998). According to this model, the constructs of the FFM are Openness to Experience/Intelligence, Conscientiousness, Extraversion, Agreeableness, and Neuroticism (OCEAN; Briggs, 1992; Costa & McCrae, 1998). These five constructs are considered global and orthogonal and have been empirically supported (Costa & McCrae, 1992). Since the FFM has been empirically shown to measure normal traits, it is primarily practical in describing normal personality (Costa & McCrae, 1992; McCrae & John, 1992), but fails to measure abnormal personality or psychopathology (Harkness & McNulty, 1994; Harkness, et al., 1995).

The lack of ability to measure abnormal personality led Harkness and McNulty (1994) to develop a FFM that is applicable to a clinically disturbed population. As in Costa and McCrae's (1992) FFM, terms that described personality were used, but Harkness and McNulty also selected terms that described abnormal personality from the Diagnostic and Statistical Manual of

Mental Disorders, Third Edition, Revised (American Psychiatric Association, 1987) to address more pathological personality traits. The personality constructs to describe abnormal personality and psychopathology thus developed were named Aggressiveness, Psychoticism, Disconstraint, Negative Emotionality/Neuroticism, and Introversion/Low Positive Emotions, and became known as the Personality Psychopathology Five constructs (PSY-5; Harkness & McNulty., 1994).

Harkness, McNulty, Ben-Porath, and Graham (2002) defined the PSY-5 constructs as follows. The Aggressiveness construct focused on offensive aggression, intimidation, and violence-proneness behaviors. Psychoticism was reserved for individuals who experience a disconnection from reality, extraordinary beliefs and sensory processes, and isolation and idealistic anticipation of harm. Behavioral disinhibition and risk-taking behaviors were assessed in the Disconstraint construct. The Negative Emotionality/Neuroticism construct was reserved for those prone to increased worry, self-criticism, and shame. The Introversion/Low Positive Emotions construct was reserved for those who are incapable of experiencing any kind of joy and who feel interpersonal isolation and depression.

The PSY-5 scales (Harkness et al., 1995) were developed to measure the PSY-5 constructs. Although the scales describe personality for both normal and abnormal populations, they were specifically designed to measure abnormal personality and psychopathology (Harkness et al., 1995). The MMPI-2 was deemed appropriate to encompass the PSY-5 scales because of its extensive item set and its numerous validity scales that can identify the test-taker's attitude. These scales, along with other MMPI-2 scales (i.e., clinical, supplemental, and content scales) are used to aid in interpreting profiles. Therefore, the PSY-5 scales add further interpretive information that other scales may not be appropriate to measure (Graham, 2006).

Although the PSY-5 scales are useful in describing abnormal personality and psychopathology, they are considered too broad to provide detailed descriptions of personality (Arnau, Handel, & Archer, 2005). Eysenck (1967) asserted that broad constructs such as the MMPI-2 PSY-5 and clinical scales tend to be heterogeneous and that narrow constructs or facets can be used to obtain more constricted and detailed descriptions of personality than broad or parent constructs. Facet scales have been shown to predict normal personality more accurately than broad or parent constructs in the NEO PI-R (Reynolds & Clark, 2001) and abnormal personality and psychopathology in the Minnesota Multiphasic Personality Inventory-Adolescents (MMPI-A; Bolinskey, Arnau, Archer, & Handel, 2004).

Facet scales for the MMPI-2 PSY-5 scales were recently developed (see Arnau et al., 2005) to help identify which content areas are causing clinical elevations in the corresponding parent PSY-5 scale. Arnau et al. (2005) used MMPI-2 protocols drawn from three large heterogeneous samples which consisted of participants who completed the MMPI-2 in a variety of clinical settings (i.e., outpatient or inpatient mental health centers, general medical centers, chronic pain programs, correctional settings, or college counseling centers). Principal component analysis using a Promax rotation were utilized to develop and replicate the facet scales of the PSY-5 scales. The Aggressiveness scale had three facet scales: assertiveness, physical/instrumental aggression, and grandiosity. The facet scales for the Psychoticism scale were psychotic experiences, paranoia, and mistrust/withdrawal. In the Disconstraint scale, facets of antisocial history/norm violation and impulsivity/low harm avoidance were revealed. The facet scales for Negative Emotionality/Neuroticism were irritability/dysphoria and phobias. Lastly, the three facet scales for Introversion/Low Positive Emotions were disengagement/anhedonia, low sociability, and low diligence/hypomania. Arnau et al. indicated

that the PSY-5 facet scales could be used to further explain the significant clinical elevations of the corresponding PSY-5 parent scale once they have been empirically established.

Quilty and Bagby (2007) further examined the MMPI-2 PSY-5 facet scales and its psychometric properties. In contrast to Arnau et al. (2005), Quilty and Bagby utilized other extraction methods (i.e., exploratory factor analysis and confirmatory factor analysis) and a smaller sample that consisted exclusively of psychiatric patients to develop the MMPI-2 PSY-5 facet scales, but the facet scales they obtained were not consistent with what had been published (see Arnau et al., 2005). They noted significant differences in the item composition for each of the PSY-5 facet scales. For instance, upon further exploration of the PSY-5 Aggressiveness facet scales (Assertiveness, Physical/Instrumental Aggression, and Grandiosity), the items that composed the Assertiveness facet scale in the original study were observed across the first two factors in Quilty and Bagby's replication study. Items in the original Physical/Instrumental Aggression facet scale were similarly noted across Components I and II, and one of the items failed to load on any of the three factors. In addition, items that encompassed the original study's third facet scale, Grandiosity, loaded on the replication study's second factor.

Quilty and Bagby (2007) also found four components for the Disconstraint scale as opposed to Arnau et al.'s (2005) two facets (Antisocial History/Norm Violation and Impulsivity/Low Harm Avoidance). Furthermore, items that encompassed the original Antisocial History/Norm Violation facet scale were found across Components I and III in the replication study. Two additional items were noted across Component II, and four items failed to load as statistically significant across the replication study's four factors. Similar factor discrepancies were observed between the original and replication. Table 1 provides information about the facet scales found in each study and the number of items in each one. In light of these

discrepancies, the MMPI-2 PSY-5 facet scales and their psychometric properties have yet to be replicated. Therefore, the purpose of the current study is to further examine the PSY-5 facet scales, in particular the PSY-5 Psychoticism facet scale and its utility for clinical and research purposes.

Method

Participants

Archival data were used for the study. Participants were gathered from three different samples: an MMPI-2 normative sample, an inpatient sample from a mid-Atlantic region, and a college sample from a Midwestern university. The MMPI-2 normative sample included 2,600 participants (1138 men and 1462 women) with an age range from 18 to 85 years old (M = 41.04, SD = 15.29). Of this sample, 81% were White, 12% were African American, 3% were Hispanic, 3% were Native American, and 1% were Asian American. According to the 1980 Census, this sample was representative of the United States population at that time. This sample also represented different geographical areas: Minnesota, Ohio, North Carolina, Washington, Pennsylvania, Virginia, and California. Participants were randomly selected by using community or telephone directories and were given a monetary incentive for their participation, which was voluntary. The MMPI-2 normative sample was used to standardize the MMPI-2 and continues to inform the use of the instrument.

Data from participants from an inpatient mental health setting in a mid-Atlantic region were also utilized. This sample included a total of 487 adults (249 men and 238 women) with an age range of 18 to 63 years (M = 32.3, SD = 8.8 for men; M = 34.9, SD = 9.8 for women). Of this sample, 79% were White, 20.7% were African American, and 0.3% were classified as Other. Regarding psychiatric history, 37% reported no previous psychiatric admission, 20.8% had a

single psychiatric diagnosis and 42.2% had more than one psychiatric diagnosis. Participants were required to undergo testing as part of the admission process.

A college sample from a Midwestern university was also used. Participants included 284 undergraduate students (100 men and 184 women) with an age range of 18 to 24 (M = 19.98, SD = 3.92 for men; M = 18.9, SD = 1.31 for women). In this sample, there was a wide range of college majors, with the most popular being psychology (12%). Regarding ethnicity, 86.5% were Caucasian, 10.6% were African American, 1.4% were Asian, 0.7% were Hispanic, and 0.7% were classified as Other. Participants in this group were volunteers recruited in the fall semester of 2005. Participants received experimental psychology course credit for completing the study.

Several considerations were taken into account for the selection criteria of all participants. Participants must have been 18 years of age and above to be included in the sample since individuals must be at least 18 years old to take the MMPI-2. In addition, the MMPI-2 was completed and valid according to the varied T scores on the validity scales. Profiles with a Cannot Say Raw score < 30, Infrequency T score < 100, Back Infrequency T score < 100, Infrequency Psychopathology T score < 100, Variable Response Inconsistency T score < 80, and True Response Inconsistency T score < 80 were deemed appropriate for the study. Those who failed to meet these criteria were excluded.

Instrumentation

The Minnesota Multiphasic Personality Inventory -2 (MMPI-2) is a 567-item, true/false structured inventory designed to measure an individual's personality characteristics and emotional adjustment (Butcher et al., 2001). It is written at a sixth-grade reading level and designed to be administered to individuals who are 18 years old or older. It consists of validity

scales used to measure accuracy, response bias, and test-taker attitude as well as clinical scales which measure personality characteristics and emotional adjustment. Reliability analysis for the clinical scales for men and women in the normative sample determined that this inventory has an alpha coefficient between .34 and .87 and a test-retest reliability between .54 and .93 (Butcher et al., 2001). The validity of the MMPI-2 and its scales (i.e., validity scales, clinical scales, and content scales) has been empirically established (Butcher et al., 2001; Graham, 2006).

There are additional MMPI-2 supplemental and content scales, including the Restructured Clinical Scales (RC) and Personality Psychopathology Five Scales (PSY-5), to aid in the interpretation of the profile. The PSY-5 scales consist of five scales: Aggressiveness (AGGR), Disconstraint (DISC), Negative Emotionality/Neuroticism (NEGE), Introversion (INTR), and Psychoticism (PSYC). These scales provide a synopsis of individual differences in normal and abnormal personality traits and psychopathology (Harkness et al., 1995). Recently, Arnau et al. (2005) developed facet scales for the PSY-5 scales to provide more meaningful information about the elevated corresponding parent scale. In particular, the Psychoticism scale, which measures disconnection from reality (Harkness et al., 2002), is comprised of three facet scales: Psychotic Experiences (PSYC1), Paranoia (PSYC2), and Mistrust/Withdrawal (PSYC3). Although the psychometric properties of the PSY-5 scales have been empirically established (see Graham, 2006), the PSY-5 facet scales are new and have not yet been shown to be psychometrically sound. An extensive review of the MMPI-2's purpose, development, use, interpretation, and psychometric properties can be found in the test manual (Butcher et al., 2001).

Procedures

Permission to use participants' data has been granted to this researcher by the holders of the archival data. Participants in the three samples were informed that their data may be used for

research purposes in the future. Identifying information that could be used to link the data to the participant has been removed, so the participants' identities were not disclosed to the researcher. Instructions were given to participants verbally and in print to ensure that participants understood how to take the MMPI-2.

Data were collected from three different groups of participants: an MMPI-2 normative sample, an inpatient sample from a mid-Atlantic region, and a college sample from a Midwestern university. Participants in the MMPI-2 normative sample gave informed consent to use their data for potential MMPI-2 research in the future. Participants in the MMPI-2 normative sample were administered the MMPI-2 in one of seven testing sites located in different geographical locations. Necessary documents and measures were provided to participants. Adequate time was provided to complete the study. Participants from the mid-Atlantic region were admitted to an inpatient facility. Each participant in this sample was required to complete the MMPI-2 independently in an interviewing room as part of the admission process to the facility. Adequate time was provided to each participant to complete the MMPI-2. Participants from the college sample were required to complete the MMPI-2 independently in a private interview or conference room at the university. Adequate time was given to complete all the measures.

Once participants completed the MMPI-2, the primary holders of the data interpreted the MMPI-2 profiles. Profiles that were deemed valid given the selection criteria described above were entered into the Statistical Package for the Social Sciences (SPSS) version 15.0 software.

Data Analysis

The analyses built on a previous factor-analytic study of the PSY-5 facet scale items in the extant assessment literature (i.e., Arnau et al., 2005). In particular, Arnau et al. (2005) used principal components analyses to examine the dimensions of the PSY-5 facet scales across

multiple samples. The current study contributes to previous investigations by examining the PSY-5 Psychoticism (PSYC) facet scale items across three samples. In addition, using two extraction methods (i.e., principal components analysis [PCA] and the factor analysis [FA] using unweighted least squares [ULS] procedure), comparisons of the dimensions of the 25-item PSYC facet scale scores were made within each sample. As discussed below, the ULS method was chosen as a common factor analytic method because the PSYC items are dichotomous.

Examination of the promax rotated pattern matrix of the PSYC pattern matrix in Arnau et al. (2005) showed that the first component, composed of 11 items, was *Psychotic Experiences*. The second component, composed of 7 items, was referred to as *Paranoia.* The third component was composed of 7 items, and was referred to as *Mistrust/Withdrawal*. Together, the three components accounted for approximately 66.4% of the variance in the initial sample data, and 68.9% of the variance in their replication sample data. As expected of most MMPI-2 scale items, cross-loadings of four of the items were observed in the initial sample data. Of note is that only items with salient loadings of .40 or higher were interpreted as making substantive or unique contributions to a component in the analyses by Arnau et al.

In the current study, the decision to select an estimator in conducting the factor analyses was based on the scaling of the PSYC items. In particular, for self-report instruments that are scored on a continuous scale (i.e., Likert-type), the data can be either normal or non-normal. If the scaling is continuous, and the distributions of responses are normal, the recommended estimator when conducting factor analysis would be the maximum likelihood factoring extraction (ML) method. Unfortunately, given the non-normality of responses in self-report, the ML estimator is not used frequently in the extant factor analytic literature. However, as observed in responses to most self-report instruments, when the rating scale is continuous and

the distributions of responses to the items are non-normal, exploratory principal factoring extraction (PAF) method is considered appropriate for conducting the analyses (see Nunnally, 1970).

Unlike continuous scales, researchers also tend to use self-report instruments with limited range of response alternatives. As an example, the current study used data on a self-report scale with items that are rated as "true" or "false." Responses from these instruments are typically coded as "1" or "0" when conducting the related analyses. These types of scales tend to yield data that are usually referred to as categorical (e.g., dichotomous data). Additionally, unlike continuous scales, scores on non-continuous scales (i.e., categorical) tend to yield highly non-normal data; that is, the scores are not distributed across a range of response options. As noted previously, the use of estimators for continuous scaling such as ML is considered inappropriate. Following recommendations in the factor analytic literature, the appropriate estimator for dichotomously scored instruments should include the unweighted least squares (ULS) procedure (see, Brown, 2006; Floyd & Widaman, 1995; Nunnally, 1970).

In a series of preliminary analyses of the data in each of the samples in the current study, the PAF method with polychoric (tetrachoric) matrix in SYSTAT 11.0 (1994) resulted in warnings that a singular matrix was encountered in the interative process. A singular matrix indicates that the obtained matrix is poorly scaled and does not result in any meaningful set of solutions. There are several good indicators of a singular matrix each of which impact the results obtained in factor analysis. First, it is common for the intercorrelations of items to be high and linked to one another. In order to extract factors, low to moderate intercorrelations among the items in the matrix are needed. When the matrix does not have low to moderate interactions

among the items, the rotation does not allow for independent factors to be obtained. Therefore, it does not provide facet scales for a given parent scale.

A second indicator of a singular matrix is that the factors also are highly correlated. Highly correlated factors imply that the factors may not be as independent as they appear to be. This is often expected given that facet scales come from the same parent scale which was the case in this study. Therefore, it is important to determine the utility of the obtained facet scales if the factors are highly correlated. Third, complex loadings are common when a singular matrix is obtained. Complex loadings mean that items load highly on more than one factor which makes it challenging to assign the item to a given factor.

One potential solution to a singular matrix is for the researcher to force the factors by specifying an interpretable set of factors to extract (see Brown, 2006). In particular, the responses of most dichotomous data tend not to be sufficiently distributed (i.e., high frequency of zero scores tend to be obtained for nonclinical samples on clinically related scales) to allow for the exaction of interpretable set of factors.

Because of the limitations noted above, the analyses were conducted in both STATISTICA 9.0 (StatSoft, Inc., 2009) and FACTOR 7.02 (Lorenzo-Seva & Ferrando, 2006) with the ULS common factor analytic method. Unlike PCA, the ULS procedure can differentiate between the common and unique variance in the sample data (Fabrigar, Wegener, MacCallum, & Strahan, 1999). In addition, unlike PAF, ULS is a robust estimation procedure; thus questions about the distributions are not that important. The best way to work with a singular matrix is to choose a robust estimator that does not make strong assumptions about the distributions of scores. In both exploratory factor analysis and confirmatory factor analysis, robust estimators such as ULS are best for handling the singularity issue (see Brown, 2006). Furthermore, because

the PSYC is composed of dichotomous items, the analyses were conducted on the polychoric (tetrachoric) matrix. In addition, because the components/factors were expected to be correlated, the promax rotation method was used in all the analyses. Regarding missing data, participants with five or more missing responses to the items were removed from the data set before specifying the listwise deletion procedure.

The STATISTICA 9.0 and FACTOR 7.02 programs were used because they offer several advantages in determining the number of components/factors to extract. In particular, the scree plot and parallel analysis (Horn, 1965) procedures were used to determine the number of components/factors to extract. The FACTOR 7.02 program computes the mean of random eigenvalues, the 95th percentile eigenvalues, and the real-data eigenvalues. Because the program randomly draws from the real-data to compute the eigenvalues, the 95th percentile eigenvalues were examined in conjunction with the scree plot to determine the initial number of components/factors to extract. However, given the exploratory nature of the analyses, the final decision regarding the number of components/factors to retain was based on the comprehensibility of the item-factor composition.

Additionally, based on recommendations in the factor analytic literature, the polychoric (tetrachoric) matrix was estimated for use in the both the ULS and PCA procedures (see Gorsuch, 1983; Nunnally, 1970; Tabachnick & Fidell, 2001). Consistent with exploratory factor analytic procedures, the pattern matrix (i.e., loadings of items) provides standardized estimates that yield interpretable results. In particular, the pattern matrix provides reliable information (i.e., standardized coefficients) regarding the unique relation between each item and the related component/factor. Thus, the current study focused on examining the pattern matrix to interpret the study findings. Another matrix that is extracted is usually referred to as the structure matrix.

In contrast to pattern matrix, the structure matrix provides additional information regarding the components/factors that are extracted. Specifically, in addition to the unique item-factor relationships, the structure matrix provides additional information about the relationships among the components/factors. Because of this additional information, item-factor loadings included in the structure matrix tend to be much higher than those included in the pattern matrix. Thus, it is misleading to base interpretations of the unique item-factor relationships on the structure matrix. Therefore, structure matrices were not needed for the interpretation of findings in the current study. Taken together, using the pattern matrix in each analysis, only items that loaded ≥ .40 on a component/factor were interpreted as contributing meaningfully to the component/factor. Items that loaded highly on more than one component/factor (complex loadings) were assigned to a given component/factor based on the loadings and also the content of the item. The content of the item was of great interest as the goal was to place items in a component/factor that makes the most sense. Therefore, in these situations, the loading and content of the items were examined to determine which component/factor to place that item.

In the final phase of data analysis, the MPI-2 PSY-5 Psychoticism facet scales from each sample were compared to the existing facet scales reported by Arnau et al. (2005) to determine the level of incongruence. Finally, each of the current samples (i.e., an MMPI-2 normative sample, an inpatient sample from a mid-Atlantic region, and a college sample from a Midwestern university) was examined for significant between group variation. This allowed me to determine if the MMPI-2 PSY-5 Psychoticism facet scale differed across the three samples and provided information about which of the two extraction methods (i.e., principal component analysis or factor analysis) used in this study created the most parsimonious model and yield scales with better clinical utility. The most parsimonious model is the one that "makes sense" and explains

the most amount of variance with the smallest number of factors (Mertler & Vannatta, 2005; Tabachnick & Fidell, 2001).

Results

PSYC Factors for the MMPI-2 Normative Sample

Results of the PCA and the factor analysis utilizing ULS are presented in Table 2. For the PCA, the first six eigenvalues of the real-data were 7.80, 1.96, 1.77, 1.38, 1.23, and 1.15; the corresponding 95th percentile of random eigenvalues were 1.20, 1.17, 1.15, 1.13, 1.11, and 1.09. Pre-specified component extraction criteria indicated that six components could be extracted, yet only three of the components were comprehensible. Thus, three components were extracted and submitted to a promax rotation. The three components in combination explained approximately 46.10% of the variance in the item responses. The first component (Mistrust/Withdrawal) was composed of five items (Items 48, 184, 315, 448, and 466). The second component (Psychotic Experiences) was defined by nine items (Items 24, 72, 96, 198, 361, 427, 490, 508, and 551). The third component (Paranoia) was composed of six items (Items 42, 99, 138, 144, 259, and 355). Five items (Items 241, 319, 336, 374, and 549) failed to load on any of the components.

In the factor analysis involving the ULS procedure, similar eigenvalues and variance estimates from the PCA were obtained for the 25 PSYC items. As in the PCA, six factors could be extracted, but only three factors were comprehensible. The first factor (Psychotic Experiences) was defined by nine items (Items 24, 72, 96, 198, 355, 361, 427, 490, and 551). Factor 2 (Mistrust/Withdrawal) was composed of three items (Items 48, 184, and 448). The third factor (Paranoia) was defined by five items (Items 42, 99, 138, 144, and 259). Eight items (Items 241, 315, 319, 336, 374, 466, 508, and 549) failed to load on any of the factors.

PSYC Factors for the Inpatient Sample

Results of the PCA and the factor analysis utilizing ULS are presented in Table 3. The first six eigenvalues of PCA from the real-data were as follows: 12.21, 1.80, 1.45, 1.10, 1.04, and 0.82. The corresponding 95th percentile of random eigenvalues were 1.50, 1.41, 1.36, 1.31, 1.27, and 1.23. All the pre-specified component extraction criteria indicated that a three-component solution could be extracted. Thus, three components were extracted and submitted to promax rotation; the three components together explained approximately 61.85% of the variance in the item responses. For the PCA, Component 1 was composed of three items (Items 48, 184, and 448); the component was named Mistrust/Withdrawal. Component 2, Paranoia, was defined by six items (Items 42, 99, 241, 315, 374, and 549). One of these items (Item 99) had complex loading on Component 3. Component 3 (Psychotic Experiences) was composed of 16 items (Items 24, 72, 96, 138, 144, 198, 259, 319, 336, 355, 361, 427, 466, 490, 508, and 551). However, one of these items (Item 138) had a complex loading on Component 2.

In the factor analysis involving the ULS procedure, similar eigenvalues and variance estimates from the PCA were obtained. The first factor, Paranoia, included three items (Items 42, 99, and 138) that loaded. The second factor, Psychotic Experiences, was defined by 14 items (Items 24, 72, 96, 144, 198, 319, 336, 355, 361, 427, 466, 490, 508, and 551). The third factor, Mistrust/Withdrawal, included five items (Items 48, 184, 241, 374, and 448). Three items (Items 259, 315, and 549) failed to load on any of the factors.

PSYC Factors for the College Student Sample

Results of the PCA and the factor analysis utilizing ULS are presented in Table 4. For the PCA, the first six eigenvalues of the real-data were 8.49, 2.46, 2.07, 1.66, 1.42, and 1.32; the corresponding 95th percentile of random eigenvalues were 1.68, 1.56, 1.48, 1.41, 1.35, 1.30. Pre-

specified component extraction criteria indicated that five to six components could be extracted, but most of the components were defined by one or two items, and the related components were not comprehensible. Thus, a three-component solution was extracted; all three components explained approximately 52.08% of the variance in the item responses. The first component (Psychotic Experiences) was composed of seven items (Items 24, 72, 138, 144, 198, 336, and 355). One item (Item 138) had substantive cross-loading on Component 2. The second component (Paranoia) was defined by eight items (Items 42, 48, 99, 241, 259, 315, 374, and 448) that loaded on this component, with one item (Item 138) from Component 1 cross-loading on this component. The third component (Mistrust/Withdrawal) was composed of seven items (Items 319, 361, 427, 466, 490, 549, and 551) that loaded on this component. Items 96, 184, and 508 did not load on any of the components.

The eigenvalues for the factor analysis utilizing ULS were the same as in the PCA procedure. Similarly, although it was indicated that five to six factors could be extracted, only three of the factors were comprehensible. The first factor (Paranoia) was defined by five items (Items 42, 48, 99, 138, and 315) that loaded on this factor. The second factor (Psychotic Experiences) was defined by six items (Items 24, 72, 144, 198, 336, and 355). The third factor (Mistrust/Withdrawal) was defined by six items (Items 319, 361, 466, 508, 549, and 551). Items 96, 184, 241, 259, 374, 427, 448, 490 did not load on any of the factors.

PSYC Factor Differences across Samples

Exploratory factor analyses (i.e., PCA and factor analysis utilizing ULS) were used to examine the components/factors of the MMPI-2 PSY-5 Psychoticism scale items. The differences are being examined in the following three ways: the order in which

components/factors appeared, percentage of variance accounted for by each set of components/factors extracted, and the item composition of each component/factor.

The order in which components/factors appear is of great importance as it informs the amount of variance accounted for in the data. The position of the first component/factor signifies that it accounts for the most amount of variance in the data, while the last component/factor accounts for the least amount of variance in the data. Observed changes in the order of components/factors extracted would indicate that the components/factors are not stable across the samples. These changes were observed in the current study across multiple component/factor solutions.

Upon further examination of the MMPI-2 normative sample, the order of components using PCA showed that Component 1 was *Mistrust/Withdrawal*, Component 2 was *Psychotic Experiences,* and Component 3 was *Paranoia*. However, when using ULS, Factor 1 was *Psychotic Experiences*, Factor 2 was *Mistrust/Withdrawal*, and Factor 3 was *Paranoia*. Similar discrepancies in the order of components/factors were found in the inpatient sample. For instance, the first component using PCA was *Mistrust/Withdrawal*, followed by *Paranoia*, and *Psychotic Experiences*. Using ULS, the order of factors were as follows: *Paranoia*, *Psychotic Experiences*, and *Mistrust/Withdrawal*. The third sample (college students) also showed substantive differences in how the components/factors appeared. Using PCA, *Psychotic Experiences* was the first component, followed by *Paranoia* and *Mistrust/Withdrawal*. The ULS factor analytic method obtained the following order of factors: *Paranoia*, *Psychotic Experiences*, and *Mistrust/Withdrawal*.

The second method used to identify PSYC factor differences across the three samples is the percentage of total variance accounted for by each set of components/factors extracted. This

is important because the higher the amount of variance accounted for by the components/factors that are extracted, the more useful and meaningful the components/factors are for that sample. Recall that three components/factors were extracted for each sample. Similar variance estimates from the PCA and factor analysis utilizing ULS were obtained for the 25 PSYC items. The obtained components/factors had a percentage of total variance of 46.10% for the MMPI-2 normative sample, 52.08% for the college student sample, and 61.85% for the inpatient sample. These findings indicated that the inpatient sample contributed more meaningful responses to the MMPI-2 PSYC items than any of the other study samples.

Understanding the item composition of each facet scale is of great interest as it elucidates how items are contributing to each component/factor. Although there were similarities in the item composition of each component/factor across the three samples, several discrepancies were noted in the current study. For example, the results of the PCA indicated that the facet scale *Mistrust/Withdrawal* had relatively similar items (Items 48, 184, and 448) on the MMPI-2 normative sample and inpatient sample. However, the MMPI-2 normative sample's factors for this facet scale also consisted of items 315 and 466. The college student factors for this facet scale demonstrated great differences as it included Items 319, 361, 427, 466, 490, 549, and 551. Similar discrepancies were noted across the other components/factors (see Tables 2-4).

In addition, the item composition shows which items are making the least contribution to the derived facet scale scores. Specifically, items that fail to load on any of the components/factors should be excluded because the items may not be contributing substantially to the component/factor. Several of the obtained components/factors had items that failed to load on a component/factor. The components obtained using PCA for the MMPI-2 normative sample had five items (Items 241, 319, 336, 374, and 549) that failed to load on any components.

Similarly, using ULS for this sample, resulted in eight items (Items 241, 315, 319, 336, 374, 466, 508, and 549) that failed to load uniquely to any of the factors. In contrast, all items loaded on one of the three components when using PCA for the inpatient sample. However, using ULS for this sample, resulted in three items (Items 259, 315, and 549) that failed to load on any factor. Further examination of the components obtained using PCA for the college student sample had three items (Items 96, 184, and 508) that failed to load on any component. Using ULS for this sample resulted in eight items (Items 96, 184, 241, 259, 374, 427, 448, and 490) that failed to load on any of the factors.

PSYC Factor Consistency with the Original Study

Overall, the components/factors obtained in the current study were generally consistent with the components identified by Arnau et al. (2005). For example, three facet scales (i.e.., Psychotic Experiences, Paranoia, and Mistrust/Withdrawal) were identified in both the original and current studies for the MMPI-2 PSY-5 Psychoticism scale items. However, the order in which the components/factors appeared was different across most of the component/factor solutions. In addition, many of the items that composed each of the facet scales in the original study were also found in the current study's facet scales. However, several of the items that were found on any given facet scale in the original study were dispersed across different facet scales in the current study. Tables 5-7 show a comparison of the component/factor loadings of the facet scales between the original sample (see Arnau et. al., 2005) and the current study's sample.

Principal Component Analysis versus Factor Analysis

Finally, it is important to note that, unlike Arnau et al. (2005), I used two extraction methods to explore the component/factor solution of the PSYC items. Like Arnau et al., I used a

Principal Components Analytic (PCA) procedure. Typically, PCA is not considered a factor analytic procedure. The major purpose is for data reduction when constructing an instrument. Although this procedure requires eliminating items and re-running the analyses to obtain a stable solution, this was not done in the current study as an additional factor-analytical procedure was use to explore the component/factor solutions of the PSYC items. Unlike the Arnau et al., I also used a common factor-analytic procedure, unweighted least squares (ULS), to examine the factors of the PSYC items. One major advantage of a factor analytic procedure such as ULS is that the related solutions are more likely to be replicated across samples. This procedure is also more appropriate for dichotomous data such as is generated by the MMPI-2. Although the component loadings using PCA were generally higher than the factor loadings using factor analysis, the PCA yielded more complex loadings than the factor analysis. Therefore, the scales were not as clear for PCA as they were for the factor analysis. These factor loadings further confirm the factors that were identified. In addition, the factor solutions obtained were more replicable than the ones obtained using PCA.

Discussion

In the present study, I examined the MMPI-2 PSY-5 Psychoticism scale in order to further understand its components/factors and utility for clinical and research purposes. Three samples (i.e., an MMPI-2 normative sample, an inpatient sample from a mid-Atlantic region, and a college sample from a Midwestern university) were utilized to empirically establish the facet scales of the MMPI-2 PSY-5 Psychoticism scale which were originally developed by Arnau et al. (2005). Although the facet scales were developed, the findings of this study demonstrated that these facet scales have yet to be empirically established and may be more meaningful and useful for an inpatient population than for a non-clinical and college sample.

In the current study, several components/factors were established for the MMPI-2 PSY-5 Psychoticism scale. As in the Arnau et al. (2005) study, three facet scales for the Psychoticism scale (e.g., Psychotic Experiences, Paranoia, and Mistrust/Withdrawal) were identified across the three samples using both principal component analysis (PCA) and factor analysis (FA) utilizing unweighted least squares. However, component/factor differences were noted across the current study's samples and the samples of the original study. These differences included the order in which components/factors appeared, percentage of variance accounted for by each set of components/factors extracted, and the item composition of each component/factor.

There are several explanations for the observed differences among the components/factors obtained in the current and original study. One explanation is the type of extraction method (i.e., PCA and FA) used in the current study. Given the purpose of these two extraction methods, it was expected that different components/factors would emerge in the current study. As previously mentioned, PCA is a data reduction procedure, whereas FA determines factors from a larger set of variables. Therefore, PCA reduces a large number of variables to a much smaller number of components but not used to establish factors. PCA and FA provide different explanations as to why variables and factors relate to one another. Factors cause the variables in FA, whereas the variables cause the components in PCA (Tabachnick & Fidell, 2001). This likely contributed to the differences observed in the components/factors obtained in this study. In addition, the mathematical differences between PCA and FA also contributed in the differences in the components/factors obtained in this study. Because PCA analyzes shared, unique, and error variance and FA analyzes only shared variance (Gorsuch, 1983; Tabachnick & Fidell, 2001) it was expected that these differences would be found in this study.

Another explanation for the observed differences in the obtained components/factors was likely due to the different samples (MMPI-2 normative sample, inpatient sample, and college student sample) utilized in this study as well as that in the original study. It is probable that the demographic and personal differences in the samples (e.g., age, psychiatric diagnosis, and level of intellectual ability) impacted the manner in which individuals endorsed items on the MMPI-2 and influenced the components/factors obtained in the study. For instance, participants from the inpatient sample tended to respond in the true direction to items because the MMPI-2 PSY-5 Psychoticism scale measure pathology. Therefore, participants from the MMPI-2 normative sample and college student sample did not endorse experiencing many symptoms which made it challenging to establish stable components/factors across the three samples.

In the present study, the age ranges varied depending on the sample. The youngest participants came from the college student population, with an age range of 18 to 24 years. The age range was 18 to 63 years for the inpatient sample, and 18 to 85 years for the MMPI-2 normative sample. The age differences in the samples may have impacted the components/factors found between each of the samples. It is likely that older participants may have had more lived experiences than younger participants increasing the chances of them experiencing mental health symptoms. Thus, older participants endorsed experiencing more MMPI-2 Psychoticism items as these items depict mental health problems. This could explain why the components/factors obtained for the college student sample were more different than for the other two samples, which were older. In addition, the college student sample is younger than in the sample in the original study (see Arnau et al., 2005). Furthermore, the mere fact that the college student sample pursued a higher education likely skewed this sample in terms of

intellectual ability. As a result, this sample is likely exposed to different lived experiences than those that came from the MMPI-2 normative sample and the inpatient sample.

Participants in this study who had a psychiatric diagnosis primarily came from the inpatient sample. Thus, participants in the inpatient sample likely endorsed items differently than those in the other two samples and also experienced more mental health problems than individuals without a psychiatric diagnosis. Individuals with a psychiatric diagnosis endorse MMPI-2 items differently as compared to those without mental health problems (Graham, 2006). As a consequence, this impacted the components/factors obtained in the current study. Although the MMPI-2 can be used with both normal and abnormal populations, it was specifically designed to examine abnormal personality characteristics and psychopathology; this may explain why the components/factors obtained in this study were more stable for the inpatient sample as compared to the MMPI-2 normative sample and college student sample.

In addition, the motive for completing the MMPI-2 varied among the three samples in the current study and those in the original study (see Arnau et al., 2005). Participants from the MMPI-2 normative sample and college student sample completed the MMPI-2 for some form of incentive. In contrast, the inpatient sample underwent testing as part of the admission process in order to receive psychological treatment. Thus, participants from the inpatient sample may have endorsed more items in a particular direction to create a favorable or unfavorable impression, which may have impacted the components/factors obtained among the samples.

Given the differences in the components/factors in the samples, the data supports that the facet scales for the MMPI-2 PSY-5 Psychoticism scale are more useful and meaningful for an inpatient population. In the current study, the components/factors obtained for the inpatient sample had a higher amount of variance accounted for by the components/factors that were

extracted. This study supports the notion that these facets scales focus primarily on identifying personality characteristics that are more common among an abnormal population than a normal population. Although the PSY-5 scales were developed to describe personality for both normal and abnormal populations, they were specifically designed to measure abnormal personality and psychopathology (Harkness et al., 1995). Thus, the facet scales for the MMPI-2 PSY-5 Psychoticism scale are more useful among individuals with mental health problems.

This study also provides evidence that the facet scales of the MMPI-2 PSY-5 Psychoticism scale are not applicable to a non-clinical population. However, given that these facet scales were recently developed (see Arnau et al., 2005), no research exists to date supporting whether they are applicability to a non-clinical population. In the current study, the facets scales obtained using both the MMPI-2 normative sample and college student sample found components/factors that were less meaningful and useful than the facet scales obtain using the inpatient sample. In addition, the items found in the obtained components/factors for the college student sample were dispersed across different components in the original study (see Arnau et al., 2005). This implies that these facet scales should not be utilized among a non-clinical population as the information provided is not interpretable. It is possible that different populations (e.g., clinical and non-clinical) may need different components/factors in order to obtain interpretable information.

Clinical Implications

Research has shown the benefits of utilizing facet scales in order to obtain more detailed information about personality descriptions than broad or parent scales (Eysenck, 1967). Costa and McCrae (1998) indicated that facet scales are needed to understand the content of broad scales. Understanding the content of broad scales, such as the content of the MMPI-2 PSY-5

Psychoticism scale, is important as they will inform psychologists which content areas are causing clinical elevations in the broad scales (Arnau et al., 2005).

Psychologists will benefit by interpreting the MMPI-2 PSY-5 facet scales once they become empirically established. They will eventually use these facet scales to aid in diagnosing psychiatric disorders and to gain a better understanding of personality characteristics. These facet scales will be as useful as the MMPI-2 content and supplemental scales are to the eight clinical scales (e.g., Depression, Paranoia, and Schizophrenia scales). Psychologists rely on additional supplemental and content scales in order to accurately interpret a profile and fully understand what is causing the elevation in the clinical scales. This is important given that broad scales often provide misleading information about individual personality characteristics and psychiatric diagnoses.

Given that the facet scales are not empirically established, they are not yet ready for clinical use for either normal or abnormal populations. However, the results of this study provide additional empirical evidence that the facet scales may be more useful for an abnormal population. For example, the factors obtained for the inpatient sample were more stable than those for the MMPI-2 Normative sample and college student sample.

Research Implications and Limitations

Future researchers should focus on understanding the content and item composition of the facet scales in order to determine how they are contributing to each component/factor. In the current study, several items overlapped across multiple facet scales or failed to load on any of the components/factors. These items should be identified and possibly excluded in order to identify the most parsimonious components/factors of the PSY-5 scales. Additionally, exploratory factor analyses should be conducted with a larger sample in order to further understand the factors of

the MMPI-2 PSY-5 Psychoticism scale. In the current study, two of the samples were small considering the type of analysis and the number of variables. However, PCA should not be utilized to identify components because it is considered a data reduction estimator (Floyd & Widaman, 1995). Therefore, it is not recommended if the goal is to identify factors from a large set of variables which was the case in the current study. In this study, PCA was utilized to further illustrate that it is not the best extraction method to use. In addition, one major disadvantage of PCA is that the magnitude of the component loadings will always be higher as compared to factor loadings of the FA which leads researchers to misinterpret data (Floyd & Widaman, 1995; Gorsuch, 1983). Thus, additional evidence that PCA is not recommended to identify the factors of the MMPI-2 PSY-5 Psychoticism scale, as well as the other PSY-5 scales, is needed.

Once the PSY-5 factors are stable, confirmatory factor analysis (CFA) should be conducted in order to identify the variables that load on a particular factor. CFA will test the model to determine if it fits the data. Quilty and Bagby (2007) used CFA to further understand the facet scales of the MMPI-2 PSY-5 scales, and revealed that they have yet to be empirically established. Additional research should focus on identifying how these facet scales should be interpreted and utilized with other scales. This includes identifying behavior correlates for each of the PSY-5 facet scales.

Understanding the facet scales of the MMPI-2 PSY-5 Psychoticism scale and the other PSY-5 facet scales is challenging. Discrepancies in the components/factors identified have been found in the current and previously published studies. To date, limited research in this area is available. This is important given that finding more effective ways to utilize the MMPI-2 is encouraged as it is one of the most widely used personality instruments among psychologists.

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Table 1

PSY-5 Facet Scales and Number of Items per Scale by Study

PSY-5 Facet Scales	Number of Items
Aggressiveness	
Assertiveness	7
Physical/Instrumental Aggression	8
Grandiosity	3
(AGGR-I)	4
(AGGR-II)	7
(AGGR-III)	4
Psychoticism	
Psychotic Experiences	11
Paranoia	7
Mistrust/Withdrawn	7
(PSYC-I)	10
(PSYC-II)	5
(PSYC-III)	3
(PSYC-IV)	3

(continued)

Table 1

PSY-5 Facet Scales and Number of Items per Scale by Study (continued)

PSY-5 Facet Scales	Number of Items
Disconstraint	
Antisocial History/Norm Violation	18
Impulsivity/Low Harm Avoidance	8
(DISC-I)	7
(DISC-II)	4
(DISC-III)	7
(DISC-IV)	4
Negative Emotionality/Neuroticism	
Irritability/Dysphoria	24
Phobias	4
(NEGE-I)	6
(NEGE-II)	9
(NEGE-III)	2
(NEGE-IV)	10
(NEGE-V)	2

(continued)

Table 1

PSY-5 Facet Scales and Number of Items per Scale by Study (continued)

PSY-5 Facet Scales	Number of Items
Introversion/Low Positive Emotionality	
Disengagement/Anhedonia	18
Low Sociability	8
Low Diligence/Hypomania	3
(INTRO-I)	12
(INTRO-II)	3
(INTRO-III)	4
(INTRO-IV)	9

Note: Information is based on the research findings of Arnau et al. (2005) and Quilty and Bagby (2007). Facet scales in parentheses = facet scales from the replication study.

Table 2

Promax Rotated Loadings: Principal Components vs. Factor Analysis with Unweighted Least Squares for the MMPI-2 Normative Sample (N = 2600)

	Principal Components Analysis			Unweighted Least Squares		
Item	Factor 1	Factor 2	Factor 3	Factor 1	Factor 2	Factor 3
24	.202	**.405***	.185	.382	.194	.148
42	-.114	-.100	**.843***	-.051	-.106	**.764***
48	**.752***	-.124	.097	-.127	**.705***	.078
72	-.064	**.906***	-.248	**.892***	-.055	-.285
96	.014	**.658***	-.034	**.596***	.033	-.045
99	.045	-.188	**.881***	-.219	.027	**.908***
138	-.015	-.124	**.862***	-.116	-.025	**.840***
144	-.342	.344	**.576***	.373	-.322	**.508***
184	**-.636***	-.094	.313	-.055	**-.477***	.207
198	-.040	**.531***	.376	**.572***	-.036	.291
241	.392	-.093	.380	-.016	.343	.283
259	.256	-.107	**.652***	-.095	.245	**.605***
315	**.463***	-.039	.146	.015	.372	.102
319	.252	.310	.211	.302	.234	.166
336	.028	.366	.330	.345	.038	.285
355	-.133	**.417**	**.431***	**.431***	-.129	.371
361	-.121	**.453***	**.440**	**.455***	-.115	.392
374	.397	-.096	.367	-.026	.347	.276
427	.068	**-.740***	.145	**-.627***	.033	.113
448	**.608***	.048	.025	.057	**.500***	.030
466	**.456***	.249	-.120	.188	.369	-.061
490	.126	**.592***	-.021	**.509***	.135	-.012
508	.317	**.426***	-.014	.357	.281	.010
549	.242	.230	.374	.237	.238	.309
551	.305	**.516***	-.002	**.474***	.288	-.017
			Factor Correlations			
Factor 1	--	--	--	--	--	--
Factor 2	.328	--	--	.418	--	--
Factor 3	.394	.541	--	.619	.486	--

Note. Factor = component or factor. Factor loadings ≥ .40 are in boldface. PCA: Factor 1 = Mistrust/Withdrawal, Factor 2 = Psychotic Experiences, Factor 3 = Paranoia. FA: Factor 1 = Psychotic Experiences, Factor 2 = Mistrust/Withdrawal, Factor 3 = Paranoia.
* Item assigned to factor.

Table 3

Promax Rotated Loadings: Principal Components vs. Factor Analysis with Unweighted Least Squares for the Inpatient Sample (N = 487)

	Principal Components Analysis (PCA)			Unweighted Least Squares (ULS)		
Item	Factor 1	Factor 2	Factor 3	Factor 1	Factor 2	Factor 3
24	.050	.024	**.763***	.097	**.685***	.060
42	-.182	**.542***	.395	**.598***	.165	.085
48	**.693***	.146	.071	-.120	.252	**.554***
72	.169	-.068	**.768***	-.002	**.734***	.101
96	-.042	-.184	**.920***	.021	**.829***	-.132
99	-.302	**.540***	**.487**	**.781***	.167	-.072
138	-.264	**.450**	**.565***	**.689***	.274	-.077
144	-.198	.074	**.875***	.354	**.682***	-.193
184	**-.763***	-.025	-.014	.198	-.230	**-.514***
198	.082	-.138	**.878***	-.048	**.854***	.003
241	.209	**.832***	-.256	**.432**	-.244	**.539***
259	.021	.323	**.510***	.327	.393	.149
315	.102	**.739***	-.145	.389	-.121	.382
319	.171	-.125	**.821***	-.054	**.815***	.067
336	-.013	-.049	**.908***	.133	**.824***	-.086
355	.041	-.103	**.806***	.051	**.723***	-.031
361	-.024	-.019	**.874***	.157	**.771***	-.066
374	.250	**.814***	-.206	**.413**	-.224	**.619***
427	-.194	-.022	**-.560***	.006	**-.532***	-.200
448	**.525***	.215	.262	-.076	.365	**.567***
466	.268	.100	**.428***	.024	**.439***	.250
490	.184	-.089	**.653***	-.028	**.606***	.124
508	.327	.076	**.479***	-.033	**.506***	.315
549	.170	**.508***	.178	.296	.152	.363
551	.246	.057	**.663***	.021	**.568***	.234
			Factor Correlations			
Factor 1	--	--	--	--	--	--
Factor 2	.394	--	--	.436	--	--
Factor 3	.302	.609	--	.622	.531	--

Note. Factor = component or factor. Factor loadings ≥ .40 are in boldface. PCA: Factor 1 = Mistrust/Withdrawal, Factor 2 = Paranoia, Factor 3 = Psychotic Experiences. FA: Factor 1 = Paranoia, Factor 2 = Psychotic Experiences, Factor 3 = Mistrust/Withdrawal.
* Item assigned to factor.

Table 4

Promax Rotated Loadings: Principal Components vs. Factor Analysis with Unweighted Least Squares for the College Student Sample (N =284)

	Principal Components Analysis (PCA)			Unweighted Least Squares (ULS)		
Item	Factor 1	Factor 2	Factor 3	Factor 1	Factor 2	Factor 3
24	**.662***	.388	.194	**.411**	**.572***	.250
42	.197	**.715***	-.138	**.707***	.111	-.087
48	-.049	**.707***	.089	**.662***	-.114	.137
72	**.771***	-.176	.273	-.174	**.745***	.291
96	.371	-.039	.345	-.000	.313	.315
99	.266	**.765***	-.197	**.822***	.154	-.163
138	**.638***	**.477**	-.271	**.560***	**.541**	-.259
144	**.721***	.097	.030	.158	**.632***	.040
184	.049	**-.317**	-.143	-.268	.053	-.143
198	**.599***	.014	.379	.020	**.535***	**.414**
241	-.083	**.442***	.148	.321	-.065	.181
259	.016	**.416***	.219	.333	-.002	.247
315	-.164	**.730***	-.159	**.585***	-.182	-.048
319	.184	-.149	**.674***	-.120	.180	**.591***
336	**1.024***	-.247	-.145	-.223	**1.097***	-.209
355	**.803***	.011	-.187	.057	**.695***	-.127
361	.383	-.026	**.504***	.004	.366	**.438***
374	-.395	**.480***	.310	.357	-.315	.277
427	-.149	-.144	**-.425***	-.162	-.114	-.375
448	.081	**.414***	.313	.357	.034	.344
466	-.218	.200	**.703***	.187	-.220	**.641***
490	.019	-.136	**.553***	-.080	.064	.395
508	.387	.137	.375	.120	.325	**.401***
549	-.212	**.453**	**.507***	.389	-.227	**.506***
551	.158	-.208	**.789***	-.260	.153	**.801***
			Factor Correlations			
Factor 1	--	--	--	--	--	--
Factor 2	.412	--	--	.463	--	--
Factor 3	.421	.370	--	.428	.473	--

Note. Factor = component or factor. Factor loadings ≥ .40 are in boldface. PCA: Factor 1 = Psychotic Experiences; Factor 2 = Paranoia; Factor 3 = Mistrust/Withdrawal. FA: Factor 1 = Paranoia; Factor 2 = Psychotic Experiences; Factor 3 = Mistrust/Withdrawal.
* Item assigned to factor.

Table 5

Comparison of Factor Loadings among the Original and Current Study's Samples: Psychotic Experiences

Item	Arnau et al., 2005	Inpatient (PCA)	Inpatient (FA)	Normative (PCA)	Normative (FA)	College (PCA)	College (FA)
24	**.918***	**.763***	**.685***	**.405***	.382	**.662***	**.572***
42	-.221	.395	.165	-.100	-.051	.197	.111
48	.263	.071	.252	-.124	-.127	-.049	-.114
72	**.796***	**.768***	**.734***	**.906***	**.892***	**.771***	**.745***
96	**.786***	**.920***	**.829***	**.658***	**.596***	.371	.313
99	-.228	**.487**	.167	-.188	-.219	.266	.154
138	-.169	**.565***	.274	-.124	-.116	**.638***	**.541**
144	.175	**.875***	**.682***	.344	.373	**.721***	**.632***
184	-.399	-.014	-.230	-.094	-.055	.049	.053
198	**.792***	**.878***	**.854***	**.531***	**.572***	**.599***	**.535***
241	-.214	-.256	-.244	-.093	-.016	-.083	-.065
259	.053	**.510***	.393	-.107	-.095	.016	-.002
315	-.071	-.145	-.121	-.039	.015	-.164	-.182
319	**.756***	**.821***	**.815***	.310	.302	.184	.180
336	**.635***	**.908***	**.824***	.366	.345	**1.024***	**1.097***
355	.102	**.806***	**.723***	**.417**	**.431***	**.803***	**.695***
361	**.511**	**.874***	**.771***	**.453***	**.455***	.383	.366
374	-.064	-.206	-.224	-.096	-.026	-.395	-.315
427	**-.782***	**-.560***	**-.532***	**-.740***	**-.627***	-.149	-.114
448	**.405**	.262	.365	.048	.057	.081	.034
466	**.483***	**.428***	**.439***	.249	.188	-.218	-.220
490	**.769***	**.653***	**.606***	**.592***	**.509***	.019	.064
508	**.560***	**.479***	**.506***	**.426***	.357	.387	.325
549	.204	.178	.152	.230	.237	-.212	-.227
551	**.658***	**.663***	**.568***	**.516***	**.474***	.158	.153

Note. Factor loadings ≥ .40 are in boldface.

* Item assigned to component or factor.

Table 6

Comparison of Factor Loadings among the Original and Current Study's Samples: Paranoia

Item	Arnau et al., 2005	Inpatient (PCA)	Inpatient (FA)	Normative (PCA)	Normative (FA)	College (PCA)	College (FA)
24	.014	.024	.097	.185	.148	.388	**.411**
42	**.722***	**.542***	**.598***	**.843***	**.764***	**.715***	**.707***
48	-.191	.146	-.120	.097	.078	**.707***	**.662***
72	-.116	-.068	-.002	-.248	-.285	-.176	-.174
96	-.163	-.184	.021	-.034	-.045	-.039	-.000
99	**.931***	**.540***	**.781***	**.881***	**.908***	**.765***	**.822***
138	**.953***	**.450**	**.689***	**.862***	**.840***	**.477**	**.560***
144	**.800***	.074	.354	**.576***	**.508***	.097	.158
184	.119	-.025	.198	.313	.207	**-.317**	-.268
198	.084	-.138	-.048	.376	.291	.014	.020
241	.191	**.832***	**.432**	.380	.283	**.442***	.321
259	**.635***	.323	.327	**.652***	**.605***	**.416***	.333
315	-.010	**.739***	.389	.146	.102	**.730***	**.585***
319	.063	-.125	-.054	.211	.166	-.149	-.120
336	**.550**	-.049	.133	.330	.285	-.247	-.223
355	**.568***	-.103	.051	**.431***	.371	.011	.057
361	**.608***	-.019	.157	**.440**	.392	-.026	.004
374	.148	**.814***	**.413**	.367	.276	**.480***	.357
427	-.141	-.022	.006	.145	.113	-.144	-.162
448	-.201	.215	-.076	.025	.030	**.414***	.357
466	.029	.100	.024	-.120	-.061	.200	.187
490	-.065	-.089	-.028	-.021	-.012	-.136	-.080
508	-.072	.076	-.033	-.014	.010	.137	.120
549	.382	**.508***	.296	.374	.309	**.453**	.389
551	.037	.057	.021	-.002	-.017	-.208	-.260

Note. Factor loadings ≥ .40 are in boldface.

* Item assigned to component or factor.

Table 7

Comparison of Factor Loadings among the Original and Current Study's Samples:

Mistrust/Withdrawal

Item	Arnau et al., 2005	Inpatient (PCA)	Inpatient (FA)	Normative (PCA)	Normative (FA)	College Student (PCA)	College Student (FA)
24	-.154	.050	.060	.202	.194	.194	.250
42	**.410**	-.182	.085	-.114	-.106	-.138	-.087
48	**.739***	**.693***	**.554***	**.752***	**.705***	.089	.137
72	.163	.169	.101	-.064	-.055	.273	.291
96	-.070	-.042	-.132	.014	.033	.345	.315
99	.118	-.302	-.072	.045	.027	-.197	-.163
138	.084	-.264	-.077	-.015	-.025	-.271	-.259
144	-.067	-.198	-.193	-.342	-.322	.030	.040
184	**-.639***	**-.763***	**-.514***	**-.636***	**-.477***	-.143	-.143
198	.012	.082	.003	-.040	-.036	.379	**.414**
241	**.826***	.209	**.539***	.392	.343	.148	.181
259	.394	.021	.149	.256	.245	.219	.247
315	**.788***	.102	.382	**.463***	.372	-.159	-.048
319	-.073	.171	.067	.252	.234	**.674***	**.591***
336	-.376	-.013	-.086	.028	.038	-.145	-.209
355	-.180	.041	-.031	-.133	-.129	-.187	-.127
361	-.239	-.024	-.066	-.121	-.115	**.504***	**.438***
374	**.704***	.250	**.619***	.397	.347	.310	.277
427	-.087	-.194	-.200	.068	.033	**-.425***	-.375
448	**.662***	**.525***	**.567***	**.608***	**.500***	.313	.344
466	.201	.268	.250	**.456***	.369	**.703***	**.641***
490	-.043	.184	.124	.126	.135	**.553***	.395
508	.353	.327	.315	.317	.281	.375	**.401***
549	**.443***	.170	.363	.242	.238	**.507***	**.506***
551	.248	.246	.234	.305	.288	**.789***	**.801***

Note. Factor loadings ≥ .40 are in boldface.

* Item assigned to component or factor.

APPENDIX A: THE RESEARCH PROBLEM

The MMPI and MMPI-2

The Minnesota Multiphasic Personality Inventory (MMPI) was originally developed to aid in diagnosing psychiatric disorders (Hathaway & McKinley, 1943). Before the MMPI, a reliable, valid, and practical measure of personality and psychopathology had not been developed (Kleinmuntz, 1967); previous measures of personality and psychopathology had failed to fulfill the anticipated goals of the MMPI (Greene, 2001).

The construction of the MMPI differs from that of other measures of personality and psychopathology. Primarily rational approaches had been utilized to construct other measures of personality and psychopathology such as the Bernreuter Personality Inventory (Bernreuter, 1933), but this approach was judged to be unsuccessful because it often led to misdiagnosing both normal and abnormal populations (Super, 1942). Given the problems of rationally developed personality and psychopathology measures, Hathaway and McKinley (1943) used an empirical approach in developing the MMPI. This approach was atheoretical, and specific items were selected by test developers only if test items empirically differentiated between diagnostic and other groups (Greene, 2001; Jackson, 1971; Kleinmuntz, 1967; Meehl, 2000).

Hathaway and McKinley (1943) were convinced that their measure, the MMPI, could help identify a disorder based on the single elevations or spikes of a clinical parent scale. This task was eventually determined to be inappropriate given that MMPI test-takers would show elevations on multiple clinical parent scales, making it challenging for clinicians to accurately

identify and differentiate psychiatric diagnoses. It was later discovered that finding elevations on multiple clinical parent scales was unavoidable since items overlap across multiple scales (Greene, 2001). However, despite these unexpected problems, the MMPI was thoroughly researched and became the most widely used measure among normal and abnormal populations including ethnic minorities, medical patients, the elderly (Butcher & Tellegen, 1978), and university students (Sell & Torres-Henry, 1979).

The revised edition, the MMPI-2 (Butcher et al., 2001), enjoyed the same popularity as the original scale and became the most widely used measure of personality and psychopathology across multiple professional settings (Butcher, Lim, & Nezami, 1998; Watkins, Campbell, Nieberding, & Hallmark, 1995). In one survey, 86% of clinical psychologists reported using the MMPI-2 in their practice (Camara, Nathan, & Puente, 2000), and it is one of the most frequently utilized measures by counseling psychologists (Watkins, Campbell, & McGregor, 1988).

The MMPI-2 is currently one of the most widely researched measures (Greene, Gwin, & Staal, 1997), providing more empirical evidence of its practical and clinical use in assessing personality and psychopathology across settings and populations (Graham, 2006). Butcher, Derksen, Sloore, and Sirigatti (2003) reported that the MMPI-2 continues to be used and adapted across cultures and languages and has been accepted world-wide as a valid and objective personality measure. For instance, the MMPI-2 has been effectively used to assess personality and psychopathology among Asians (Butcher, Cheung, & Lim, 2003) and Mexican Americans (Velasquez et al., 1997).

The MMPI-2 is used to aid in diagnosing psychiatric disorders and to provide clinical descriptions of individuals. Multiple validity scales (e.g., Infrequency Scale, Variable Response Inconsistency Scale, and True Response Inconsistency Scale) and clinical scales (e.g.,

Depression, Paranoia, and Schizophrenia scales) are components of the standard MMPI-2 (Butcher et al., 2001). It also includes additional supplemental and content scales to aid in the interpretation of the profile. Recently, the Restructured Clinical scales ([RC] Tellegen et al., 2003) and Personality Psychopathology Five scales ([PSY-5] Harkness, McNulty, & Ben-Porath, 1995) were added to the standard MMPI-2 to provide more detailed and descriptive data that often are not measured or are overlooked by the clinical parent scales alone.

Specifically, the MMPI-2 PSY-5 scales were developed to measure normal and abnormal personality traits and psychopathology (Harkness et al., 1995). It was necessary to develop the PSY-5 scales because previous personality measures such as the NEO Personality Inventory-Revised ([NEO-PI-R] Costa &McCrae, 1992) and the California Personality Inventory ([CPI] Gough & Bradley, 1996) were primarily used to measure "normal" characteristics of personality. Recently, the PSY-5 scales have received additional attention as Arnau, Handel, and Archer (2005) developed facet scales for them; it is expected that these facet scales will be included as part of the MMPI-2 standard scoring and interpretation material as they become more psychometrically sound. Because facet scales have been found to be useful in other personality measures such as the NEO-PI-R, Arnau et al. are convinced that their facet scales will also be practical.

Understanding and replicating the factors of the entire MMPI has been challenging (Waller, 1999). Several attempts have been made to understand the factors of the MMPI-2 (Archer & Klinefelter, 1991; Costa, Zonderman, McCrae, & Williams, 1985; Johnson, Null, Butcher, & Johnson, 1984), but these were limited because of sample homogeneity and because of statistical computing limitations at the time these studies were conducted, such as having no computer program to compute tetrachoric correlations to measure associations instead of phi

coefficients (Waller, 1999). Therefore, research to firmly establish the factors of the MMPI-2 and its scales are needed to gain a better understanding of this widely used personality instrument.

Purpose of the Study

Given how challenging it has been to understand and replicate the factors of the MMPI-2, researchers have focused on examining particular scales of the MMPI-2. Arnau et al. (2005) developed facet scales for the MMPI-2 PSY-5 scales, and Quilty and Bagby (2007) conducted a replication study on their factors. In this study, I will examine one of the MMPI-2 PSY-5 scales, Psychoticism, to understand the components/factors and its utility for clinical and research purposes. I will also examine validity characteristics of the MMPI-2 PSY-5 Psychoticism facet scales by comparing the study sample and original published sample to determine whether similar components/factors are found for the MMPI-2 PSY-5 Psychoticism scale.

Research Questions

1. What are the components/factors for the MMPI-2 PSY-5 Psychoticism Scale?
2. Are the components/factors consistent with what has been published?
3. Do the components/factors differ across samples?
4. Would factor analyses yield scales with better clinical utility than principal component analysis?

Research Hypotheses

The hypotheses selected for this study consisted of the following:

1. The components/factors of the MMPI-2 Psychoticism scale will be established.
2. The components/factors of the MMPI-2 Psychoticism scale are not consistent with what has been published.

3. The components/factors of the MMPI-2 Psychoticism scale will differ across samples.
4. Factor analysis will yield scales with better clinical utility than principal component analyses.

Definition of Terms

The following terms were operationally defined for the purpose of this study. These definitions provided an understanding of these terms as they relate to the MMPI-2, in particular, its PSY-5 Scales.

1. *Aggressiveness*: mental state in which individuals engage in offensive and instrumental aggression. These individuals are likely to be hateful, desire power, and enjoy fulfilling their goals by intimidating and threatening others (Harkness, McNulty, Ben-Porath, & Graham, 2002; Harkness et al., 1995).
2. *Psychoticism:* mental state in which an individual is characterized by experiencing a distorted sense of reality, bizarre mentation, and unusual sensory and perceptual experiences. These individuals are likely to be socially alienated and have expectations of harm that are not realistic (Harkness et al., 2002; Harkness et al., 1995).
3. *Disconstraint*: mental state that refers to individual differences in risk-taking behaviors, impulsivity, and rule breaking. These individuals are likely to have a history of criminal activity and substance abuse (Arnau et al., 2005; Harkness et al., 2002).
4. *Negative Emotionality/Neuroticism*: mental state in which individuals demonstrate characteristics of experiencing negative emotions which focus on anxiety and nervousness. These individuals tend to be guilt-ridden, frequently worried, and self-critical (Greene, 2001; Harkness et al, 2002).

5. *Introversion/Low Positive Emotions*: mental state in which individuals demonstrate limited abilities to experience pleasure and happiness. These individuals are likely to be shy, socially withdrawn, and prone to be pessimistic and feel depressed (Harkness et al., 2002).

Limitations

The following were possible foreseeable limitations of the present study:

1. Archival data were used to develop and examine the components/factors of the MMPI-2 Psychoticism facet scale. This was a limitation as some of the research collected is older, and the participants used in the study may not portray an accurate representation of the individuals who currently take the MMPI-2.
2. Objective measures with empirically defined psychometric properties were used. This is a limitation because the MMPI-2 may be more applicable for a certain type of population or clinical presentation. Thus, by solely using the MMPI-2, it may have prevented me from further understanding personality characteristics that may be observed across different populations.

Delimitations

The following were possible foreseeable delimitations of the present study:

1. Participants 18 years of age and above were used; therefore, the variability of age impacted the research findings.
2. Participants comprised three different samples: an MMPI-2 normative sample, an inpatient sample, and a college sample. Three different components/factors were observed across the different samples. This was expected given that responses to the objective measures varied across samples.

Assumptions

The following were the assumptions for the purpose of this study:

1. Participants responded honestly on the objective measures.
2. Invalid profiles were removed from the original archival samples.
3. The instruments and methodology used were appropriate given the purpose of the study.
4. The samples studied were representative of individuals who typically take the MMPI-2.

APPENDIX B: LITERATURE REVIEW

This literature review covers relevant research in the area of personality and personality assessment. Although these areas have been researched extensively, it is important to recognize that the particular focus of this study has received minimal study or empirical support to date.

Early Research on Personality

Allport and Odbert (1936) laid the foundation of understanding and studying the structure of personality with their lexical hypothesis, in which they affirmed that individual differences are predetermined and proposed the use of single terms found in most known spoken languages to describe those individual differences (Goldberg, 1993). Using language to uncover the structure of personality was deemed appropriate because personality traits greatly influence our social interactions (McCrae & Costa, 1997). Thus, terms that people use daily were deemed appropriate to understand and describe personality. Allport and Odbert concluded that approximately 4,500 English words found in the Webster's New International Dictionary of the time described personality or traits. Through their work, objective measures of personality and psychopathology became recognized and heavily researched to assess the behaviors, cognitions, and emotions that structure personality (Costa & McCrae, 1998b).

Once it was determined that words found in most spoken languages can be used to describe personality, understanding the actual structure of personality was the next step. In order to do this, Allport and Odbert's (1936) list of terms was organized into meaningful personality constructs. Researchers in the area of personality made many attempts to uncover the constructs

(Piedmont, 1998). Most notable was Raymond Cattell, who organized the structure of personality into sixteen independent constructs (Cattell, 1947). The Sixteen Personality Factor Questionnaire (16PF) was later developed to measure normal personality characteristics using Cattell's sixteen personality constructs (Cattell, Eber, & Tatsuoka, 1970). These scales are considered bipolar, meaning that both high and low scores of the scales provide meaningful information (Cattell et al., 1970).

Five-Factor Model

Researchers who followed Cattell found differing personality constructs, but as more advanced statistical techniques were utilized, such as factor analysis, five personality constructs surfaced consistently (Digman, 1990). In an early study, Fiske (1949) found five factors of personality using 21 of Cattell's scales. Tupes (1957) conducted another study to determine the effectiveness of United States Air Force officers; he factor analyzed Cattell's bipolar scales and also found five factors of personality. Several other studies emerged to uncover the structure of personality (see Digman, 1990). As these researchers consistently found five factors of personality, these personality factors became known as the Five Factor Model (FFM) of personality (Digman, 1990; McCrae & John, 1992). Costa and McCrae's (1998b) FFM has been especially widely researched and continues to be the most utilized model in assessing personality traits (Briggs, 1992; Digman, 1990; Piedmont, 1998).

According to the FFM, the five factors identified by researchers are Openness to Experience (O) or Intelligence, Conscientiousness (C) or Will to Achieve, Extraversion (E) or Surgency, Agreeableness (A) versus Antagonism, and Neuroticism (N) versus Emotional Stability ([OCEAN] Briggs, 1992; Costa & McCrae, 1992; Goldberg, 1990). Although researchers agree that these are the five factors of personality, there is much controversy about

their titles and definitions (Digman, 1990; McCrae & John, 1992). Given that Costa and McCrae's (1992) FFM (OCEAN) has been the most widely used model of personality (Piedmont, 1998), the following descriptors will reflect that particular model.

According to Costa and McCrae (1992), Openness to Experience reflects individuals who are sensitive to art, insightful, intellectually curious, nonjudgmental, and who experience emotions in a positive manner. Conscientiousness reflects individuals who are strong-willed, determined, organized, and responsible. The factor Extraversion reflects individuals who are social and active and those who enjoy excitement and experience positive emotions. Agreeableness reflects those who are sympathetic, trusting, appreciative, and kind. The last factor, Neuroticism, reflects individuals who are emotionally distressed, worry-prone, anxious, and unstable. It should be noted that these descriptors are reserved for individuals who score high on these factors. To assess the factors, Costa and McCrae (1992) developed a personality assessment, the Revised Neuroticism, Extraversion, Openness Personality Inventory (NEO-PI-R). The NEO-PI-R consists of five broad factors (Neuroticism [N], Extraversion [E], Openness to Experience [O], Conscientiousness [C], and Agreeableness [A]), and six facet subscales for each domain (Costa & McCrae, 1992).

The utility of the FFM has been empirically supported (Costa & McCrae, 1992). Furthermore, empirical evidence supporting the existence of the FFM across different cultures and languages is robust (Digman, 1990). For example, the NEO-PI-R, the personality instrument most commonly utilized to assess the FFM, has been successfully translated into different languages and used with people from diverse cultural backgrounds (McCrae & Costa, 1997). The FFM has also been widely used to predict job performance (Barrick & Mount, 1991; Hurtz & Donovan, 2000). For example, in Barrick and Mount's (1991) meta-analysis, Extraversion

was found to be a valid predictor for jobs involving interactions with others, such as managers, and Conscientious was found to be a valid predictor for all types of occupations.

Social psychologists have also utilized the FFM to further understand their concept of self-monitoring (Avia, Sanchez-Bernardos, Sanz, Carrillo, & Rojo, 1998), which describes how people tend to monitor their behavior to best fit a particular social setting (Gangestad & Snyder, 2000; Snyder, 1987). Using the NEO-PI-R to measure personality, Avia et al. found Extraversion and Openness to be positively correlated with having an acquisitive self-monitoring presentation (i.e., power seekers), and that those who scored highly in Neuroticism tended to have a defensive self-monitoring presentation (i.e., to avoid rejection).

There is research indicating that the FFM is relatively successful in capturing abnormal personality traits (Trull, Widiger, Lynam, & Costa, 2003). However, researchers have also found that the FFM lacks the ability to indicate specific traits that are associated with extreme personality traits (Bagby, Costa, Widiger, Ryder, & Marshall, 2005). Since the FFM is empirically based in measuring normal traits, it is primarily practical for describing normal personality (Costa & McCrae, 1992; McCrae & John, 1992); however, it fails to measure abnormal personality or psychopathology (Harkness & McNulty, 1994; Harkness et al., 1995). The lack of ability to measure abnormal personality led Harkness and McNulty (1994) to develop a FFM that is applicable to a clinically disturbed population. As in Costa and McCrae's (1992) FFM, terms that describe personality were used, but Harkness and McNulty also selected terms from the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association [APA], 1987) that described abnormal personality in order to address more pathological personality traits.

Personality Psychopathology Five Constructs

Personality constructs to describe abnormal personality and psychopathology were developed (Harkness & McNulty, 1994; Harkness et al., 2002) using a measurement called psychological distance, which is utilized to describe how similar or different two concepts appear to be for an individual. Harkness et al. provide an example of this measurement using car brands. They stated that the psychological distance between Lexus and Ford is greater than between Lexus and Mercedes. In other words, this means that the majority of individuals recognize more differences between Lexus and Ford than between Lexus and Mercedes. In terms of the development of the PSY-5 constructs, the concepts of interest for Harkness et al. were normal personality and personality disorder descriptors.

Harkness et al. (2002) provide an extensive depiction of how the PSY-5 constructs were developed. The first step in developing the PSY-5 constructs was to select which normal personality and personality disorder descriptors to utilize. A total of 120 personality disorder descriptors were drawn from the Diagnostic and Statistical Manual, (APA, 1987) and reworded so that the average person could understand these terms. Using Cleckley's (1982) concept of psychopathy, Harkness et al. selected and reworded an additional 16 personality disordered descriptors. Ninety-four normal personality descriptors were selected from the Multidimensional Personality Questionnaire ([MPQ] Tellegen, 1982).

Once the selection of both normal personality and personality disordered descriptors was accomplished, each descriptor was assigned a number. A sample of lay individuals – volunteers from the University of Minnesota and the Veterans Affairs medical center – clustered together descriptors that belonged in the same category. These groups of descriptors were then subjected to a mathematical matrix that computed how similar or different these words were to one

another. One mathematical matrix was conducted for the normal personality descriptors, and another one for the personality disordered descriptors. Once these analyses were completed, a total of 65 personality groups (39 personality disordered and 26 normal personality descriptors) were uncovered and named. Upon further observation, it was noticed that five personality disorder group names were similar to five group names in the normal personality group. These five similar names were combined, which resulted in 60 group names.

The final step in developing the PSY-5 constructs was to have a different sample of 201 lay individuals consolidate the group names described above (Harkness & McNulty, 1994). These individuals completed several steps to accomplish this task. First, they examined the group names three times. While examining the group names, they were asked to determine which group names belonged in the same category. They were then asked to categorize the group names into smaller and more concise groups and to identify descriptors that were opposite to other descriptors. The researchers then used similar mathematical matrices to those they had used in the previous step to determine how similar or different these descriptors were to one another. Latent root analyses were examined, and five constructs of normal and abnormal personality were revealed: Aggressiveness, Psychoticism, Constraint, Negative Emotionality/Neuroticism, and Positive Emotionality/Extraversion. These constructs became known as the Personality Psychopathology Five constructs ([PSY-5] Harkness et al., 1995). Constraint and Positive Emotionality/Extraversion were later reversed and renamed Disconstraint and Introversion/Low Positive Emotionality in order to resemble abnormal personality and psychopathology.

Harkness et al. (2002) then defined the PSY-5 constructs. The Aggressiveness construct focused on offensive aggression, intimidation, and violence-proneness. Psychoticism was

reserved for individuals who experience a disconnection from reality, extraordinary beliefs and sensory processes, and isolation and idealistic anticipation of harm. Behavioral disinhibition and risk-taking behaviors were assessed in the Disconstraint construct. The Negative Emotionality/Neuroticism construct was reserved for those prone to increased worry, self-criticism, and shame. The Introversion/Low Positive Emotions construct was reserved for those who are incapable of experiencing any kind of joy and who feel interpersonal isolation and depression. Although these constructs described normal and abnormal personality, scales to measure these constructs were not developed at that time.

Personality Psychopathology Five Scales

The MMPI-2 PSY-5 scales (Harkness et al., 1995) were developed to measure the MMPI-2 PSY-5 constructs. The MMPI-2 was deemed appropriate to encompass the PSY-5 scales because of its extensive item set and its numerous validity scales that can identify test-takers' attitudes (Harkness et al., 1995). To develop the PSY-5 scales, Harkness et al. used replicated rational selection (RRS) to recognize which of the MMPI-2 items accurately assessed the PSY-5 constructs of Aggressiveness, Psychoticism, Disconstraint, Negative Emotionality/Neuroticism, and Introversion/Low Positive Emotions. They defined RRS as a deductive test construction method that requires constructs to have been previously developed and that items from a pre-existing pool are deduced from these constructs. Given that the PSY-5 constructs have been developed, and because the MMPI-2 items were to be used, this constructive method was deemed appropriate (Harkness et al., 2002).

Harkness et al. (1995) trained a total of 114 undergraduate student volunteers to understand certain characteristics of the PSY-5 constructs. The goal was to identify appropriate MMPI-2 items that assess these constructs. A total of 567 cards, each printed with a single

MMPI-2 item, were randomly sorted and given to each participant. Participants examined all cards in order to develop preliminary PSY-5 scales. These preliminary scales contained cards (MMPI-2 items) that were chosen by at least 51% of the participants. According to this selection criterion, a total of 242 items were selected.

The selected MMPI-2 items were then subjected to an expert review by Allan Harkness and John McNulty, who were allowed to delete items according to the following criteria: the keying direction was unclear, items were not written in the correct format, items described characteristics of multiple constructs, items were deemed inappropriate due to errors made during the selection process, or items failed to reflect any of the constructs. Using these criteria, 68 items were deleted. They deleted 35 additional items that did not correlate sufficiently with the constructs. After these deletions, the PSY-5 scales comprised 139 MMPI-2 items in all.

The clinical utility and psychometric properties for the MMPI-2 PSY-5 scales have been empirically established (Graham, 2006; Harkness et al., 1995; Harkness et al., 2002). For example, Vendrig, Derksen, and de Mey (2000) used the MMPI-2 PSY-5 scales to examine personality characteristics to predict treatment outcomes for people with chronic back pain. They determined that the PSY-5 Emotionality/Extraversion scale was useful in identifying people's satisfaction with treatment and treatment staff and also in predicting emotional changes while in treatment. Miller, Kaloupek, Dillon, and Keane (2004) further supported the clinical utility of the PSY-5 scales with a sample of Vietnam veterans diagnosed with posttraumatic stress disorder, finding that the PSY-5 scales can be used to provide information about the ways veterans may express psychological distress and symptoms.

Behavior correlates using the PSY-5 scales have also been empirically established, and their clinical utility is robust (Graham, 2006). For example, clinical outpatients with high scores

on the Aggressiveness scale had a history of hostility and aggressive and antisocial behaviors, whereas paranoid ideation, interpersonal sensitivity, and psychosis were common in those scoring high on the Psychoticism scale (Harkness et al., 2002). Similarly, high scorers on the Disconstraint scale were likely to be impulsive, had a history of arrest, became easily bored with customs, were less likely to follow rules, and typically were less traditional than those with low scores (Graham, 2006).

Although the scales can describe personality in normal and abnormal populations, they were specifically designed to measure abnormal personality and psychopathology (Harkness et al., 1995). These scales, along with other MMPI-2 scales (e.g., clinical, supplemental, and content scales) can be used to aid in interpreting profiles. Therefore, the PSY-5 scales are currently used to add further interpretive information that other scales may not be appropriate to measure (Graham, 2006).

Personality Psychopathology Five Facet Scales

Although the PSY-5 scales are useful in describing abnormal personality and psychopathology, they are considered too broad to provide detailed descriptions of an individual's personality (Arnau et al., 2005). Eysenck (1967) asserted that broad constructs such as the MMPI-2 PSY-5 and clinical scales tend to be heterogeneous, and that narrow constructs, or facets, can be used to obtain more constricted and detailed descriptions of personality than broad or parent constructs. Saucier (1998) indicated that broad or parent scales may be more empirically established factors, but they often lack the detailed information that comes with narrower constructs or facets. Facet scales have been shown to predict normal personality more accurately than broad or parent constructs in the Minnesota Multiphasic Personality Inventory-Adolescents ([MMPI-A] Bolinskey, Arnau, Archer, & Handel, 2004) and NEO PI-R (Reynolds

& Clark, 2001). For example, Costa and McCrae (1998a) stated that it is necessary to understand facet scales in order to understand the content of the corresponding broad and parent scales. For that reason, facet scales for the MMPI-2 PSY-5 scales were recently developed to help identify what content areas are causing clinical elevations in the corresponding parent PSY-5 scale (Arnau et al., 2005).

Arnau et al. (2005) used MMPI-2 protocols that were drawn from three extremely large, heterogeneous samples that consisted of participants who completed the MMPI-2 in a variety of clinical settings (i.e., outpatient or inpatient mental health centers, general medical centers, chronic pain programs, correctional settings, or college counseling centers) to develop the MMPI-2 PSY-5 facet scales. Utilizing one of the three samples, an item-level principal component analysis (PCA) using a promax rotation was carried out for each of the MMPI-2 PSY-5 scales (Aggressiveness, Psychoticism, Disconstraint, Negative Emotionality/Neuroticism, and Introversion/Low Positive Emotions). PCA is a factor extraction technique used to reduce a large set of variables into a much smaller number of components. It is utilized when the study of interest is exploratory in nature and takes into account and analyzes all of the variance: shared, unique, and error. To identify which components to retain, the first extracted component accounts for the most variability, subsequently followed by other components that account for more of the variability (Tabachnick & Fidell, 2001). A promax rotation, which is a type of oblique rotation, makes it easier to interpret components by adjusting the factor loadings without changing the underlying mathematical structure (Gorsuch, 1983; Tabachnick & Fidell, 2001). As it relates to Arnau et al.'s study, PCA using a promax rotation helped identify the factors of the MMPI-2 PSY-5 scales.

Arnau et al. (2005) used parallel analysis to determine which components to retain and interpret. These researchers further stated that in order to determine the number of components to retain, parallel analysis first requires researchers to compute a separate factor analysis using a random data set with a similar number of variables and item-response range as the actual dataset. This analysis yields the column sum of square and loadings for each factor called the eigenvalue (Hair, Tatham, Anderson, & Black, 1998). The obtained eigenvalues from both factor analyses are compared, and components are retained when the eigenvalues from the actual data are larger than those found in the random data set (Gorsuch, 1983). To replicate the PSY-5 facet scales obtained using the first sample, the same number of components were extracted from the second sample. Furthermore, Arnau et al. calculated the factor congruence coefficients to determine the reliability of the components found in the initial sample. Factor congruence provides information about the similarity of component loadings. Coefficients greater than .90 were used to accomplish this task. For those that were not greater than .90, the quantity of factors was lessened and recalculated until the factor congruence coefficients met this requirement. Component loadings greater than .40 were interpreted and used to determine if the number of items was sufficient. Furthermore, each component was required to have a minimum of three items.

Based on these steps, Arnau et al. (2005) developed the MMPI-2 PSY-5 facet scales. The Aggressiveness scale had three facet scales: assertiveness, physical/instrumental aggression, and grandiosity. The facet scales for the Psychoticism scale were psychotic experiences, paranoia, and mistrust/withdrawal. In the Disconstraint scale, facets of antisocial history/norm violation and impulsivity/low harm avoidance were revealed. The facet scales for Negative Emotionality/Neuroticism were irritability/dysphoria and phobias. Lastly, the three facet scales

for Introversion/Low Positive Emotions were disengagement/anhedonia, low sociability, and low diligence/hypomania. Table 8 displays the MMPI-2 PSY-5 facet scales and information about the amount of total variance accounted for by each component.

Arnau et al. (2005) used two samples to develop and replicate the MMPI-2 PSY-5 facet scales. A third sample was specifically utilized to conduct reliability analysis. Arnau et al. found that the MMPI-2 facet scales have variable internal consistency, with Cronbach's alphas ranging from low .41 (Diligence/Hypomania) to .86 (Irritability/Dysphoria).

Given the findings supporting the clinical utility of facet scales, Arnau et al. (2005) indicated that the PSY-5 facet scales could be used to further explain the significant clinical elevations of the corresponding PSY-5 parent scale once they have been empirically established. Following in the footsteps of Arnau et al., Quilty and Bagby (2007) further examined the psychometric properties and factors of the MMPI-2 PSY-5 facet scales. In contrast to Arnau et al., who had used PCAs, Quilty and Bagby utilized other extraction methods (i.e., exploratory factor analysis and confirmatory factor analysis) for each of the MMPI-2 PSY-5 scales. In addition, they used a smaller sample than in the original study, whose sample had consisted exclusively of psychiatric patients.

Quilty and Bagby (2007) found that the psychometric properties of the MMPI-2 PSY-5 facet scales have not yet been empirically established. For instance, it was noted that the internal consistency of the facet scales from the original study was inadequate. Unlike Arnau et al. (2005), who used Cronbach's alpha, Quilty and Bagby used the average inter-item correlation statistic. This is an internal consistency statistic that calculates the mean of the correlations obtained from the pairs of items that measure similar constructs. It was used because it was not

significantly influenced by the quantity of scale items, unlike Cronbach's alpha, which is swayed by the number of items.

The factors obtained by Quilty and Bagby (2007) were not consistent with what had been published (see Arnau et al., 2005). They noted significant differences in the item composition for each of the PSY-5 facet scales. For instance, upon further exploration of the PSY-5 Aggressiveness facet scales (Assertiveness, Physical/Instrumental Aggression, and Grandiosity), Quilty and Bagby observed the items that comprised the Assertiveness facet scale in the original study loaded across the first two components. Items in the original Physical/Instrumental Aggression facet scale were similarly noted across Components I and II, and one of the items failed to load on any of the three components. In addition, items that encompassed the original study's third facet scale, Grandiosity, loaded on the replication study's second component.

Quilty and Bagby (2007) also found four components for the Disconstraint scale as opposed to Arnau et al.'s (2005) two facets (Antisocial History/Norm Violation and Impulsivity/Low Harm Avoidance). Furthermore, items that encompassed the original Antisocial History/Norm Violation facet scale were found across Components I and III in the replication study. Two additional items were noted across Component II, and four items failed to load statistically significant across the replication study's four components.

Similar factor discrepancies were observed between the original and replication study. Table 1 provides information about the facet scales found in each study and the number of items in each one. The differences noted in these two studies indicated that the factors of the MMPI-2 PSY-5 facet scales has yet to be replicated, which indicates that these scales have not been empirically established. Although facet scales have provided more detailed descriptions of personality in other personality measures, research on the utility of the PSY-5 facet scales is very

limited. Therefore, evidence supporting the usefulness of the current facet scales is yet to be established. It has been predicted that these scales will be added to the standard scoring and interpretation once there is a better understanding of their factors.

Summary of Literature Review

The MMPI was developed to help more accurately diagnose psychiatric disorders (Hathaway & McKinley, 1943). Prior to the MMPI, there was no reliable, valid, and practical measure of personality and psychopathology (Kleinmuntz, 1967). Its revised edition, the MMPI-2, became the most widely used personality measure across multiple clinical settings (Watkins et al., 1995) primarily because of its objectivity, plethora of validity and clinical scales, straightforwardness of administration and scoring, and existing interpretive and correlate data (Velasquez et al., 1997).

Research in the area of personality is robust, but as more advanced statistical computations were used, five personality constructs emerged consistently (Digman, 1990). The five personality constructs became known as the Five Factor Model (FFM; Digman, 1990). The clinical utility of the FFM has been empirically established, but although it can be used to measure normal personality traits, it fails to capture the variations of abnormal personality traits (Harkness & McNulty, 1994). Thus, constructs (Harkness & McNulty, 1994) and scales were developed to obtain a more accurate measure of abnormal personality. These became known as the MMPI-2 PSY-5 Scales (Harkness et al., 1995). The PSY-5 scales have been empirically established and are useful in providing information that is often not captured in the clinical scales (Graham, 2006).

Arnau et al. (2005) recently developed facet scales for the PSY-5 scales, but these factors and its psychometric properties have yet to be replicated. Although facet scales have provided

greater detailed descriptions of personality in other personality measures (e.g., NEO-PI-R; Reynolds & Clark, 2001), only limited research has been conducted to determine the utility of the PSY-5 facet scales. Arnau et al. predicted that these facet scales will be added to the standard scoring and interpretation once there is a better understanding of their factors. Therefore, evidence supporting the usefulness of the PSY-5 facet scales is yet to be established.

APPENDIX C: METHOD

Participants

Archival data were used for the study. Participants were gathered from three different samples: an MMPI-2 normative sample, an inpatient sample from a mid-Atlantic region, and a college sample from a Midwestern university. The MMPI-2 normative sample included 2,600 participants (1138 men and 1462 women) with an age range from 18 to 85 years old (M = 41.04; SD = 15.29). Of this sample, 81% were White, 12% were African American, 3% were Hispanic, 3% were Native American, and 1% were Asian American. According to the 1980 Census, this sample was representative of the United States population at that time. This sample also represented different geographical areas: Minnesota, Ohio, North Carolina, Washington, Pennsylvania, Virginia, and California. Participants were randomly selected by using community or telephone directories and were given a monetary incentive for their participation, which was voluntary. The MMPI-2 normative sample was used to standardize the MMPI-2 and continues to inform the use of the instrument.

Data from participants from an inpatient mental health setting from a mid-Atlantic region were also utilized. This sample included a total of 487 adults (249 men and 238 women) with an age range of 18 to 63 years (M = 32.3, SD = 8.8 for men; M = 34.9, SD = 9.8 for women). Of this sample, 79% were White, 20.7% were African American, and 0.3% were classified as Other. Regarding psychiatric history, 37% reported no previous psychiatric admission, 20.8% had a

single psychiatric diagnosis and 42.2% had more than one psychiatric admission. Participants were required to undergo testing as part of the admission process.

A college sample from a Midwestern university was also used. Participants included 284 undergraduate students (96 men and 187 women) with an age range of 18 to 24 (M = 19.98, SD = 3.92 for men; M = 18.9, SD = 1.31 for women). Of this sample, there was a wide range of college majors, with the most popular being psychology (12%). Regarding ethnicity, 86.5% were Caucasian, 10.6% were African American, 1.4% were Asian, 0.7 were Hispanic, and 0.7% were classified as Other. Participants in this group were volunteers recruited in the fall semester of 2005. Participants received experimental psychology course credit for completing the study.

Several considerations were taken into account for the selection criteria of all participants. Participants must have been 18 years of age and above to be included in the study because the MMPI-2 is intended to be used with individuals who are at least 18 years old. In addition, the MMPI-2 was completed and valid for interpretation according to the varied T scores on the validity scales. Profiles with a Cannot Say Raw score < 30, Infrequency T score < 100, Back Infrequency T score < 100, Infrequency Psychopathology T score < 100, Variable Response Inconsistency T score < 80, and True Response Inconsistency T score < 80 were deemed appropriate for the study.

According to Graham (2006), these validity scales are used to assess examinees' test-taking attitudes. The Cannot Say scale is used to obtain the number of omitted MMPI-2 items. A profile is considered invalid if 30 or more test items are omitted. The Infrequency scale assesses uncharacteristic ways of responding to test items. The Back Infrequency scale is similar to the Infrequency scale, but it assesses the second half of the MMPI-2. The Infrequency Psychopathology scale assesses infrequent responding throughout the MMPI-2. In particular, a

profile is considered invalid if the examinee repeatedly endorses test items that are typically not answered by individuals diagnosed with a mental illness and those in the MMPI-2 normative sample. Both the Variable Response Inconsistency and True Response Inconsistency scales assess inconsistency in the endorsement of test items. High scores on these validity scales invalidate the profile and should not be interpreted.

For the purpose of this study, participants who failed to meet the criteria described above were excluded. These criteria were used to maintain consistency with previous research. Appropriate Institutional Review Board forms and other relevant documents from all participating parties granting permission for the use of this archival data were obtained.

Instrumentation

The MMPI-2 is a 567-item, true/false structured inventory designed to measure an individual's personality characteristics and emotional adjustments. It is written at a sixth-grade reading level and is designed to be administered to individuals who are 18 years old or older. It consists of validity scales used to measure accuracy, response bias, and test-taker attitude as well as clinical scales which measure personality characteristics and emotional adjustments. Reliability analysis for the clinical scales for men and women in the normative sample determined that this inventory has an alpha coefficient between low .34 and .87 and a test-retest reliability between .54 and .93 (Butcher et al., 2001). The validity of the MMPI-2 and its scales (e.g., validity scales, clinical scales, content scales) has been empirically established (Butcher et al., 2001; Graham 2006).

There are additional MMPI-2 supplemental and content scales, including the Restructured Clinical Scales (RC) and Personality Psychopathology Five Scales (PSY-5), to aid in the interpretation of the profile. The PSY-5 scales consist of five scales: Aggressiveness

(AGGR), Disconstraint (DISC), Negative Emotionality/Neuroticism (NEGE), Introversion (INTR), and Psychoticism (PSYC). These scales provide a synopsis of individual differences in normal and abnormal personality traits and psychopathology (Harkness et al., 1995). Recently, Arnau et al. (2005) developed facet scales for the PSY-5 scales to provide more meaningful information about the elevated corresponding parent scale. In particular, the Psychoticism scale, which measures disconnection from reality (Harkness et al., 2002), is comprised of three facet scales: Psychotic Experiences (PSYC1), Paranoia (PSYC2), and Mistrust/Withdrawal (PSYC3). Although the psychometric properties of the PSY-5 scales have been empirically established (see Graham, 2006), the PSY-5 facet scales are new and not yet psychometrically sound. An extensive review of the MMPI-2's purpose, development, use, interpretation, and psychometric properties can be found in the test manual (Butcher et al., 2001).

Procedures

Permission to use participants' data has been granted to this researcher by the holders of the archival data. Informed consent to use participants' data for research purposes was obtained prior to the study, and participants in the three samples were informed that their data might be used for research purposes in the future. Identifying information that can be used to link the data to the participant had been removed, so the participants' identities were not disclosed to the experimenter. Instructions were given to participants verbally and in print to ensure that participants understood the MMPI-2.

Participants in the MMPI-2 normative sample gave informed consent to use their data for potential MMPI-2 research in the future. Participants in the MMPI-2 normative sample completed the instrument in one of seven testing sites located in different geographical locations.

Necessary documents and measures were provided to participants. Adequate time was provided to complete the study.

Participants from the mid-Atlantic region were admitted to an inpatient facility. Each participant in this sample was required to complete the MMPI-2 independently in an interviewing room as part of the admission process to the facility. To gain more precise data, information from medical and psychiatric charts, family members, and other medical and mental health facilities previously attended was used if applicable. Adequate time was provided to each participant to complete the MMPI-2. Participants from the college sample were required to complete the MMPI-2 independently in a private interview or conference room at the university. Adequate time was given to complete all the measures.

Once participants completed the MMPI-2, the primary holders of the data interpreted the MMPI-2 profiles. Profiles that were deemed valid given the selection criteria described above were entered into the Statistical Package for the Social Sciences (SPSS) version 15.0 software (SPSS Inc., 2006). Each primary holder coded the data and sent it to the experimenter to conduct appropriate statistical analyses initially using SYSTAT version 11 (SYSTAT, 2004). However, additional statistical programs were utilized, which will be explained below.

Research Design

In the present study, I examined the MMPI-2 PSY-5 Psychoticism scales to further understand their components/factors and their utility for clinical and research purposes. Archival data were used that consist of completed MMPI-2s from three different samples: an MMPI-2 normative sample, an inpatient sample, and a college student sample. The archival data were subjected to three separate factor analyses and three principal component analyses in order to determine which extraction method provides the most parsimonious model for the MMPI-2 PSY-

5 Psychoticism facet scale. In particular, the current study's PSY-5 Psychoticism facet scales were compared to the facet scales found in the original sample (see Arnau et al., 2005).

Data Analysis

The analyses built on a previous factor-analytic study of the PSY-5 facet scale items in the extant assessment literature (i.e., Arnau et al., 2005). In particular, Arnau et al. used principal components analyses to examine the dimensions of the PSY-5 facet scales across multiple samples. The current study contributes to previous investigations by examining the Psychoticism facet scale items across three samples. In addition, using principal components analysis (PCA) and factor analysis (FA) with the unweighted least squares procedure, comparisons of the dimensions of the 25-item Psychoticism (PSYC) facet scale scores were made within each sample. Table 9 provides the 25 items that make up the MMPI-2 PSY-5 Psychoticism scale. The ULS method was chosen as a common factor analytic method because the PSYC items are dichotomous.

PCA and FA were used because both are utilized to reduce a large variable set and determine structure (Devillis, 2003; Gorsuch, 1983). PCA is considered a data reduction procedure because its goal is to reduce a large number of variables to a much smaller number of components (DeCoster, 1998; Mertler & Vannatta, 2005); therefore, PCA presents original items in a variety of ways (DeVellis). FA is a similar extraction method that also determines factors from a large set of variables. Both PCA and FA reduce large sets of variables based on correlations and require researchers to examine these correlations in a correlation matrix (Tabachnick & Fidell, 2001).

Differences between these two extraction methods have been noted. First, in FA, it is important to recognize that there are different explanations for why variables and factors are

related. In FAs, factors cause the variables, whereas the opposite is true for PCA (Devillis, 2003; Tabachnick & Fidell, 2001). In addition, the mathematical differences between these analyses are related to the variance that is analyzed (Tabacknick & Fidell, 2001). PCA analyzes shared, unique, and error variance (Devillis, 2003; Gorsuch, 1983; Tabachnick & Fidell, 2001), while FA ignores unique and error variance and analyzes shared variance only (Tabachnick & Fidell, 2001). Because of the differences in which variance is analyzed, the diagonal of the correlation appears differently. PCA uses number ones along the diagonal of the correlation matrix because it takes into account all of the variance, whereas FAs uses communalities. Communities signify the proportion of a variable's variance that is accounted for by the factors (Mertler & Vannatta, 2005). Given the purpose of PCA and FA, they both helped identify the components/factors of the MMPI-2 PSY-5 Psychoticism scale.

In the current study, the decision to select an estimator in conducting the factor analyses was based on the scaling of the PSYC items. In particular, for self-report instruments that are scored on a continuous scale (i.e., Likert-type), the data can be either normal or non-normal. If the scaling is continuous, and the distributions of responses are normal, the recommended estimator when conducting factor analysis would be the maximum likelihood factoring extraction (ML) method. Unfortunately, given the non-normality of responses in self-report, the ML estimator is not used frequently in the extant factor analytic literature. However, as observed in responses to most self-report instruments, when the rating scale is continuous and the distributions of responses to the items are non-normal, exploratory principal factoring extraction (PAF) method is considered appropriate for conducting the analyses (see Nunnally, 1970).

Unlike continuous scales, researchers also tend to use self-report instruments with limited range of response alternatives. As an example, the current study used data on a self-report scale with items that are rated as "true" or "false." Responses from these instruments are typically coded as "1" or "0" when conducting the related analyses. These types of scales tend to yield data that are usually referred to as categorical (dichotomous). Additionally, unlike continuous scales, scores on non-continuous scales (i.e., categorical) tend to yield highly non-normal data; that is, the scores are not distributed across a range of response options. As noted previously, the use of estimators for continuous scaling such as ML is considered inappropriate. Following recommendations in the factor analytic literature, the appropriate estimator for dichotomously scored instruments should include the unweighted least squares (ULS) procedure (see, Brown, 2006; Floyd & Widaman, 1995; Nunnally, 1970).

In a series of preliminary analyses of the data in each of the samples in the current study, the PAF method with polychoric (tetrachoric) matrix in SYSTAT 11.0 resulted in warnings that a singular matrix was encountered in the interative process. A singular matrix indicates that the obtained matrix is poorly scaled and does not result in any meaningful set of solutions. There are several good indicators of a singular matrix each of which impact the results obtained in factor analysis. First, it is common for the intercorrelations of items to be high and linked to one another. In order to extract factors, low to moderate intercorrelations among the items in the matrix are needed. When the matrix does not have low to moderate interactions among the items, the rotation does not allow for independent factors to be obtained. Therefore, it does not provide facet scales for a given parent scale.

A second indicator of a singular matrix is that the factors also are highly correlated. Highly correlated factors imply that the factors may not be as independent as they appear to be.

This is often expected given that facet scales come from the same parent scale which was the case in this study. Therefore, it is important to determine the utility of the obtained facet scales if the factors are highly correlated. Thirdly, complex loadings are common when a singular matrix is obtained. Complex loadings mean that items load highly on more than one factor which makes it challenging to assign the item to a given factor.

One potential solution to a singular matrix is for the researcher to force the factors by specifying an interpretable set of factors to extract (see Brown, 2006). In particular, the responses of most dichotomous data tend not to be distributed (i.e., high frequency of zero scores tend to be obtained for nonclinical samples on clinically related scales) as much as necessary to allow for the exaction of interpretable set of factors.

Because of the limitations noted above, the analyses were conducted in both STATISTICA 9.0 (StatSoft, Inc., 2009) and FACTOR 7.02 (Lorenzo-Seva & Ferrando, 2006) with the ULS common factor analytic method. Unlike PCA, the ULS procedure can differentiate between the common and unique variance in the sample data (Fabrigar, Wegener, MacCallum, & Strahan, 1999). ULS is also robust against the violation of normality in data. Furthermore, because the PSYC is composed of dichotomous items, the analyses were conducted on the polychoric (tetrachoric) matrix. In addition, because the components/factors were expected to be correlated, an oblique rotation (e.g., promax rotation method) was used in all the analyses. In an oblique rotation, the number of correlations between items and components/factors will be more controlled and there will be less artificial inflation of component/factor loadings. This occurs when components/factors are held constant. Oblique rotations provided a more accurate view of the components/factors. The oblique rotation allowed the resulting components/factors to correlate with one another, which was expected given that test items came from the same parent

scale. Regarding missing data, participants with five or more missing responses to the items were removed from the data set before specifying the listwise deletion procedure.

The STATISTICA 9.0 and FACTOR 7.02 programs were used because they offer several advantages in determining the number of components/factors to extract. Four methods (eigenvalues, scree plots, the percentage of total variance extracted, and parallel analysis) were used in the determination of the final existing components/factors of the current sample in order to determine how many components/factors to retain and interpret.

Eigenvalues explain the amount of variance accounted for by each component/factor (Mertler & Vannatta, 2005; Tabachnick & Fidell, 2007). In other words, eigenvalues inform researchers how much information is obtained by a certain component/factor (DeVellis, 2003). According to Kaiser's (1960) rule, components/factors with eigenvalues greater than 1 provide more information than other items about the amount of variance accounted for by a component/factor, while those less than 1 should not be used as they provide irrelevant information. The goal of eigenvalues is to find test items that contain the greatest amount of information that is explained by each component/factor (DeVellis, 2003). Therefore, eigenvalues greater than 1 were utilized to determine how many components/factors to retain and interpret.

Scree plots were also utilized because they provide similar visual information pertaining to the retention of specific components/factors in the model (Cattell, 1966). Scree plots provide graphs of each eigenvalue (Y-axis) by factor number (X-axis). To determine which components/factors to retain using the scree plot, each bend in the line of the plot was observed until the line leveled off (Mertler & Vannatta, 2005). Large eigenvalues portrayed on scree plots cause a significant bend and indicate that components/factors beyond these values is no longer

parsimonious and will not significantly increase the variance accounted for in the model (Tabachnick & Fidell, 2007). In other words, the first component/factor will have the highest eigenvalues, and those eigenvalues will begin to decrease for other components/factors until it becomes insignificant (Tabachnick & Fidell). In lay terms, a significant bend can be identified on the scree plot by observing where it resembles an elbow. Significant bends in scree plots were also used in this study to determine how many components/factors to retain and interpret.

The third method used to determine which components/factors to retain and interpret is percentage of total variance extracted. According to Gorsuch (1983), the goal of this method is to retain and interpret as many components/factors as possible that account for the most variance. Gorsuch indicated that the retained components/factors should account for at least 75% of the total variance and that components/factors that account for a minimal amount of the variance should not be extracted because the information gained is irrelevant. Therefore, in this study, components/factors that account for at least 75% of the total variance were considered. However, none of the components/factors met this criterion.

Parallel analysis (Horn, 1965) procedures were also used to determine the number of components/factors to extract. The FACTOR 7.02 program computes the mean of random eigenvalues, the 95th percentile eigenvalues, and the real-data eigenvalues. Because the program randomly draws from the real-data to compute the eigenvalues, the 95th percentile eigenvalues were examined in conjunction with the other extraction methods to determine the initial number of components/factors to extract.

Using the four methods to determine how many components/factors to retain and interpret, different results were obtained. When this occurred, all four factor extraction methods were observed to determine which provided the most parsimonious components/factors.

However, given the exploratory nature of the analyses, the final decision regarding the number of components/factors to retain was based on the comprehensibility of the item-factor composition.

Additionally, based on recommendations in the factor analytic literature, the polychoric (tetrachoric) matrix was estimated for use in the both the ULS and PCA procedures (see Gorsuch, 1983; Nunnally, 1970; Tabachnick & Fidell, 2001). Consistent with exploratory factor analytic procedures, the pattern matrix (i.e., loadings of items) provides standardized estimates that yield interpretable results. In particular, the pattern matrix provides reliable information (i.e., standardized coefficients) regarding the unique relation between each item and the related component/factor. Thus, the current study focused on examining the pattern matrix to interpret the study findings. Another matrix that is extracted is usually referred to as the structure matrix. In contrast to pattern matrix, the structure matrix provides additional information regarding the components/factors that are extracted. Specifically, in addition to the unique item-factor relationships, the structure matrix provides additional information about the relationships among the components/factors. Because of this excessive information, item-factor loadings included in the structure matrix tend to be much higher than those included in the pattern matrix. Thus, it is misleading to base interpretations of the unique item-factor relationships on the structure matrix. Therefore, structure matrices were not needed for the interpretation of findings in the current study. Taken together, using the pattern matrix in each analysis, only items that loaded $\geq .30$ on a component/factor were interpreted as contributing meaningfully to the component/factor. Items that loaded highly on more than one component/factor (complex loadings) were assigned to a given component/factor based on the loading and also the content of the item. The content of the item was of great interest as the goal was to place items in a component/factor that makes

the most sense. Therefore, in these situations, the loading and content of the items were examined to determine which component/factor to place that item.

Lastly, the components/factors for the MMPI-2 PSY-5 Psychoticism facet scale of each sample was compared to the existing components reported by Arnau et al. (2005) to determine the level of incongruence. I examined each of the current samples (i.e., an MMPI-2 normative sample, an inpatient sample from a mid-Atlantic region, and a college sample from a Midwestern university) for significant between group variation in order to determine if the MMPI-2 PSY-5 Psychoticism facet scale differed across the three samples. This also provided information about which of the two extraction methods used in this study (i.e., principal component analysis or factor analysis) created the most parsimonious model and yielded scales with better clinical utility. The most parsimonious model is the one that "makes sense" and explains the most amount of variance with the smallest number of factors (Mertler & Vannatta, 2005; Tabachnick & Fidell, 2001).

APPENDIX D: RESULTS

PSYC Factors for the MMPI-2 Normative Sample

Results of the PCA and FA utilizing ULS are presented in Table 10. For the PCA, the first six eigenvalues of the real-data were 7.80, 1.96, 1.77, 1.38, 1.23, and 1.15; the corresponding 95th percentile of random eigenvalues were 1.20, 1.17, 1.15, 1.13, 1.11, and 1.09. Pre-specified component extraction criteria indicated that six components could be extracted, only three of the components were comprehensible. Thus, three components were extracted and submitted to a promax rotation; all three components explained approximately 46.10% of the variance in the item responses. The first component (Mistrust/Withdrawal) was composed of ten general items. Of the ten, seven of the items (Items 48, 184, 241, 315, 374, 448, and 466) loaded on this component. The second component (Psychotic Experiences) was defined by 13 general items. However, only eleven items (Items 24, 72, 96, 198, 319, 336, 361, 427, 490, 508, and 551) loaded on this component. The third component (Paranoia) was also defined by 13 general items. Of the 13, seven items (Items 42, 99, 138, 144, 259, 355, and 549) loaded to this component.

In the factor analysis involving the ULS procedure, similar eigenvalues and variance estimates from the PCA were obtained for the 25 PSYC items. As in the PCA, six factors could be extracted, but only three were comprehensible. The first factor (Psychotic Experiences) was defined by 13 general items, but only twelve (Items 24, 72, 96, 198, 319, 336, 355, 361, 427,

490, 508, and 551) loaded on this factor. Factor 2 (Mistrust/Withdrawal) was composed of eight items, seven of which (48, 184, 241, 315, 374, 448, and 466) loaded on this factor. The third factor (Paranoia) was defined through eight general items, but only six (Items 42, 99, 138, 144, 259, and 549) loaded on this factor.

PSYC Factors for the Inpatient Sample

Results of the PCA and the ULS are presented in Table 11. The first six eigenvalues of PCA from the real-data were as follows: 12.21, 1.80, 1.45, 1.10, 1.04, and 0.82. The corresponding 95th percentile of random eigenvalues were 1.50, 1.41, 1.36, 1.31, 1.27, and 1.23. All the pre-specified component extraction criteria indicated that a three-component solution could be extracted. Thus, three components were extracted and submitted to promax rotation; all three components explained approximately 61.85% of the variance in the item responses. For the PCA, Component 1 was composed of five general items. Of the five items, only three items (Items 48, 184, and 448) loaded on this component; the component was named Mistrust/Withdrawal. Component 2 was defined by eight general items; six of the items (Items 42, 99, 241, 315, 374, and 549) loaded on the component referred to as Paranoia. One of these items (Item 99) had complex loading on Component 3. Component 3 was composed of 17 general items. Of the items on this Psychotic Experiences component (i.e., Component 2), only 16 (Items 24, 72, 96, 138, 144, 198, 259, 319, 336, 355, 361, 427, 466, 490, 508, and 551) loaded on this component. However, one of these items (Item 138) had a complex loading on Component 2.

In the factor analyses involving the ULS procedure, similar eigenvalues and variance estimates from the PCA were obtained for the 25 PSYC items. The first factor included eight general items, and only four items (Items 42, 99, 138, and 315) loaded on this Paranoia factor.

The second factor was defined by 16 general items, and 15 items (Items 24, 72, 96, 144, 198, 259, 319, 336, 355, 361, 427, 466, 490, 508, and 551) loaded on this Psychotic Experiences factor. The third factor included eight general items, only six of which (Items 48, 184, 241, 374, 448, and 549) loaded on this Mistrust/Withdrawal factor.

PSYC Factors for the College Student Sample

Results of the PCA and ULS are presented in Table 12. For the PCA, the first six eigenvalues of the real-data were 8.49, 2.46, 2.07, 1.66, 1.42, and 1.32; the corresponding 95th percentile of random eigenvalues were 1.68, 1.56, 1.48, 1.41, 1.35, 1.30. Pre-specified component extraction criteria indicated that five to six components could be extracted, but most of the components were defined by one or two items, and the related components were not comprehensible. Thus, a three-component solution was extracted and submitted to a promax rotation; all three components explained approximately 52.08% of the variance in the item responses. Furthermore, although the first component (Psychotic Experiences) was composed of 11 items, only nine of these loaded (Items 24, 72, 96, 138, 144, 198, 336, 355, and 508) on this component. One item (Item 138) had substantive cross-loading on Component 2. The second component (Paranoia) was defined by 12 general items; however, 9 items (Items 42, 48, 99, 184, 241, 259, 315, 374, and 448) loaded on this component with one item (Item 138) from Component 1 cross-loading on this component. The third component (Mistrust/Withdrawal) was composed of 12 general items; seven items (Items 319, 361, 427, 466, 490, 549, and 551) loaded on this component.

Results of the factor analysis ULS estimation method are also presented in Table 12 (see last three columns). The eigenvalues for the factors were the same as in the PCA procedure. Similarly, although it was indicated that five to six factors could be extracted, only three of the

factors were comprehensible. The first factor (Paranoia) was defined by 11 general items. However, only nine items (Items 42, 48, 99, 138, 241, 259, 315, 374, and 448) loaded on this factor. The second factor (Psychotic Experiences) was defined by 11 general items. Of the 11, six of the items (Items 24, 72, 144, 198, 336, and 355) loaded on this factor. The third factor (Mistrust/Withdrawal) was also defined by 11 general items. However, only nine items (Items 96, 319, 361, 427, 466, 490, 508, 549, and 551) loaded on this factor.

APPENDIX E: DISCUSSION

In the present study, I examined the MMPI-2 PSY-5 Psychoticism scale in order to further understand its components/factors and utility for clinical and research purposes. Three samples (i.e., an MMPI-2 normative sample, an inpatient sample from a mid-Atlantic region, and a college sample from a Midwestern university) were utilized to empirically establish the facet scales of the MMPI-2 PSY-5 Psychoticism scale which were originally developed by Arnau et al. (2005). Although the facet scales were developed, the findings of this study demonstrated that these facet scales have yet to be empirically established and that they may be more meaningful and useful for an inpatient population.

The hypotheses selected for this study consisted of the following:

1. The components/factors of the MMPI-2 Psychoticism scale will be established.
2. The components/factors of the MMPI-2 Psychoticism scale are not consistent with what has been published.
3. The components/factors of the MMPI-2 Psychoticism scale will differ across samples.
4. Factor analysis will yield scales with better clinical utility than principal component analyses.

The components/factors for the MMPI-2 Psychoticism scale were established among the three samples. However, the results of this study provide a clear confirmation that the facet scales for the Psychoticism scale are yet to be empirically established given that different

components/factors were obtained between the three study samples and the original study (see Arnau et al., 2005). As in Arnau et al. study, three facet scales for the Psychoticism scale (e.g., Psychotic Experiences, Paranoia, and Mistrust/Withdrawal) were identified across the three samples using both principal component analysis (PCA) and unweighted least squares (ULS). The component/factor differences noted across the current study's samples and the samples of the original study included the order in which component/factors appeared, percentage of variance accounted for by each set of components/factors extracted, and the item composition of each component/factor.

There are several explanations for the observed differences between the components/factors in the current and original studies. One explanation for these noted differences is the type of extraction method (e.g., PCA and FA) utilized in the current study. It was expected that different components/factors would be established in the current study given the purpose of PCA and ULS. PCA is a data reduction procedure, whereas the purpose of ULS is to determine factors from a larger set of variables. PCA and FA, such as ULS, provide different explanations as to why variables and factors relate to one another. Factors cause the variables in FA, whereas the variables cause the components in PCA (Tabachnick & Fidell, 2001). This likely contributed to the differences observed in the components/factors obtained in this study. The mathematical differences between PCA and FA also contributed in the observed differences in the factors obtained in this study. Because PCA analyzes shared, unique, and error variance while FA, such as ULS, analyzes only shared variance (Gorsuch, 1983; Tabachnick & Fidell, 2001), it was expected that there would be differences between the studies.

Another explanation for the observed differences in the obtained components/factors are the different samples (MMPI-2 normative sample, inpatient sample, and college student sample)

utilized in this study as well as those in the original study. It is probable that the demographic and personal differences (e.g., age, psychiatric diagnosis, and level of intellectual ability) impacted the direction in which participants endorsed items on the MMPI-2 and influenced the components/factors obtained in the study.

In the present study, the age ranges varied depending on the sample. The youngest participants came from the college student population, with an age range of 18 to 24 years. The age range for the inpatient sample was 18 to 63 years, and 18 to 85 years for the MMPI-2 normative sample. Thus, the age differences in the samples may have impacted the components/factors found between each of the samples. This could explain why the components/factors obtained for the college student sample were more different than for the other two samples, which were older. In addition, the college student sample is younger than what was found in the original study (see Arnau et al., 2005). Furthermore, the simple fact that the college student sample pursued a higher education likely skewed this sample in terms of intellectual ability. As a result, this sample is likely exposed to different lived experiences than those that came from the MMPI-2 normative sample and the inpatient sample.

Participants in the current study with a psychiatric diagnosis primarily came from the inpatient sample. Thus, participants in this sample likely endorsed items differently than those in the other two samples (MMPI-2 normative sample and college student sample) and also experience more mental health problems than individuals without a psychiatric diagnosis. Researchers have demonstrated that individuals with a psychiatric diagnosis endorse MMPI-2 items differently than those without mental health problems (Graham, 2006). This likely impacted the components/factors obtained in the current study. Although the MMPI-2 can be used with both normal and abnormal populations, it was specifically designed to examine

abnormal personality characteristics and psychopathology. This may further explain why the components/factors obtained in the current study were more stable for the inpatient sample than for the MMPI-2 normative sample and college student sample.

In addition, the motive for completing the MMPI-2 varied among the three samples in the current study and those in the original study (see Arnau et al., 2005). Participants from the MMPI-2 normative sample and college student sample completed the MMPI-2 for some form of incentive. In contrast, the inpatient sample underwent testing as part of the admission process in order to receive psychological treatment. They may have endorsed more items in a particular direction to create a favorable or unfavorable impression, which may have impacted the components/factors obtained among the samples.

Further observation of the component/factor loadings is of great interest. In the current study, only items with loading of .30 or higher were interpreted as making substantive contributions to a component/factor. Although this loading cut-off is lower than the one used in the original study (see Arnau et al., 2005), it was applied to the current study to determine if more items loaded that resemble the ones found in the original study. This was accomplished because few items loaded when using the .40 cut-off. Overall, more items loaded on a given component/factor for most of the components/factors. However, this suggests that the items may not be a true measure of a given component/factor. This was likely due to the fact that several items were endorsed in the same direction.

Given the differences in the components/factors in the current study's samples, the data supports that the facets scales for the MMPI-2 PSY-5 Psychoticism scale are more useful and meaningful for an inpatient population. For example, in the current study, the components/factors obtained for the inpatient sample had a higher amount of variance accounted

for by the components/factors that were extracted. This suggests that these facet scales are primarily useful for identifying personality characteristics that are more common among an abnormal population than a normal population. Although the PSY-5 scales were developed to describe personality for both normal and abnormal populations, they were specifically designed to measure abnormal personality and psychopathology (Harkness et al., 1995). Thus, the facet scales for the PSY-5 Psychoticism scale are more useful among individuals with mental health problems.

This study also provides evidence that the facet scales of the MMPI-2 PSY-5 Psychoticism scale are not applicable to a non-clinical population. In the current study, the facets scales obtained using both the MMPI-2 normative sample and college student sample found components/factors that are less meaningful and useful. In addition, the obtained components/factors for the college student sample were composed of many items that were not found in the original study (see Arnau et al., 2005). This implies that these facet scales should not be utilized among a non-clinical population as the information provided is not interpretable. It is possible that different populations (e.g., clinical and non-clinical) may need different components/factors in order to obtain interpretable information.

Clinical Implications

Researchers have shown the benefits of utilizing facet scales in order to obtain more detailed information about personality descriptions than broad or parent scales (Eysenck, 1967). Costa and McCrae (1998a) indicated that facet scales are needed to understand the content of broad scales. Understanding the content of broad scales, such as the content of the MMPI-2 PSY-5 Psychoticism scale, is important as they will inform psychologists which content areas are causing clinical elevations in the broad scales (Arnau et al., 2005).

Psychologists will benefit by interpreting the MMPI-2 PSY-5 facet scales once they become empirically established. They will eventually use these facets scales to aid in diagnosing psychiatric disorders and to gain a better understanding of personality characteristics. These facet scales will be as accommodating as the MMPI-2 content and supplemental scales are to the eight clinical scales (e.g., Depression, Paranoia, and Schizophrenia scales). Psychologists rely on additional supplemental and content scales in order to accurately interpret a profile and fully understand what is causing the elevation in the clinical scales. This is important given that broad scales often provide misleading information about individual personality characteristics and psychiatric diagnoses.

Given that the facet scales are not empirically established, they are not yet ready for clinical use for both normal and abnormal populations. However, the results of this study provide additional empirical evidence that the facet scales may be more useful for an abnormal population. For example, as mentioned above, the components/factors obtained for the inpatient sample were more stable than those for the MMPI-2 normative sample and college student sample.

Research Implications and Limitations

Future researchers should focus on understanding the content and item composition of the facet scales in order to determine how they are contributing to each component/factor. In the current study, several items overlapped across multiple facet scales or failed to load on any of the components/factors. These items should be identified and possibly excluded in order to identify the most parsimonious components/factors of the PSY-5 scales. Further exploratory factor analyses with a larger sample should be conducted in order to better understand the components/factors of the MMPI-2 PSY-5 Psychoticism scale. In the current study, two of the

samples were small considering the type of analysis and the number of variables. However, PCA should not be utilized to identify factors because it is considered a data reduction estimator (Floyd & Widaman, 1995). Therefore, it is not recommended if the goal is to identify factors from a large set of variables which was the case in the current study. In addition, one major disadvantage of PCA is that the magnitude of the component loadings will always be higher as the factor loadings obtained using ULS which leads researchers to misinterpret data (Floyd & Widaman, 1995; Gorsuch, 1983). Thus, providing additional evidence that PCA is not recommended to identify the factors of the MMPI-2 PSY-5 Psychoticism scale, as well as the other PSY-5 scales is needed.

Once the PSY-5 factors are stable, confirmatory factor analysis (CFA) should be conducted in order to identify the variables that load to a particular factor. CFA will test the model to determine if it fits the data. Quilty and Bagby (2007) used CFA to further understand the factors of the MMPI-2 PSY-5 scales and revealed that the facet scales have yet to be empirically established. Additional research should focus on identifying how these facet scales should be interpreted and utilized with other scales. This includes identifying behavior correlates for each of the PSY-5 facet scales.

Understanding the factors of the MMPI-2 PSY-5 Psychoticism scale and the other PSY-5 facet scales is challenging. Discrepancies in the components/factors identified have been found in the current and previously published studies. To date, limited research in this area is available. This is important given that finding more effective ways to utilize the MMPI-2 is beneficial as it is one of the most widely used personality instruments among psychologists.

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Table 8

PSY-5 Facet Scales and Total Variance Accounted for by Each Component by Sample

	Total Variance	
PSY-5 Facet Scales	Sample 1	Sample 2
Aggressiveness	79.0%	79.0%
Assertiveness		
Physical/Instrumental Aggression		
Grandiosity		
Psychoticism	66.4%	68.9%
Psychotic Experiences		
Paranoia		
Mistrust/Withdrawn		
Disconstraint	62.5%	62.5%
Antisocial History/Norm Violation		
Impulsivity/Low Harm Avoidance		
Negative Emotionality/Neuroticism	81.7%	81.8%
Irritability/Dysphoria		
Phobias		
Introversion/Low Positive Emotionality	69.2%	73.3%
Disengagement/Anhedonia		
Low Sociability		
Low Diligence/Hypomania		

Note: Information is based on the research findings of Arnau et al. (2005).

Table 9

MMPI-2 Personality Psychopathology Five Psychoticism Scale Items

24.	Evil spirits possess me at times.
42.	If people had not had it in for me, I would have been much more successful.
48.	Most anytime I would rather sit and daydream than do anything else.
72.	My soul sometimes leaves my body.
96.	I see things or animals or people around me that others do not see.
99.	Someone has it in for me.
138.	I believe I am being plotted against.
144.	I believe I am being followed.
184.	I daydream very little.
198.	I often hear voices without knowing where they come from.
241.	It is safer to trust nobody.
259.	I am sure I am being talked about.
315.	I tend to be on my guard with people who are somewhat more friendly than I had expected.
319.	I hear strange things when I am alone.
336.	Someone has control over my mind.
355.	At one or more times in my life I felt that someone was making me do things by hypnotizing me.
361.	Someone has been trying to influence my mind.
374.	Most people will use somewhat unfair means to get ahead in life.
427.	I have never seen a vision.
448.	I have a daydream life about which I do not tell other people.
466.	Sometimes I am sure that other people can tell what I am thinking.
490.	Ghosts or spirits can influence people for good or bad.
508.	I often feel I can read other people's mind.
549.	In everything I do lately I feel that I am being tested.
551.	I sometimes seem to hear my thoughts being spoken out loud.

Note: Information obtained from the MMPI-2 test booklet (Hathaway et al., 1989).

Table 10

Promax Rotated Loadings: Principal Components vs. Factor Analysis with Unweighted Least Squares for the MMPI-2 Normative Sample (N = 2600)

	Principal Components Analysis			Unweighted Least Squares		
Item	Factor 1	Factor 2	Factor 3	Factor 1	Factor 2	Factor 3
24	.202	**.405***	.185	**.382***	.194	.148
42	-.114	-.100	**.843***	-.051	-.106	**.764***
48	**.752***	-.124	.097	-.127	**.705***	.078
72	-.064	**.906***	-.248	**.892***	-.055	-.285
96	.014	**.658***	-.034	**.596***	.033	-.045
99	.045	-.188	**.881***	-.219	.027	**.908***
138	-.015	-.124	**.862***	-.116	-.025	**.840***
144	**-.342**	**.344**	**.576***	**.373**	**-.322**	**.508***
184	**-.636***	-.094	**.313**	-.055	**-.477***	.207
198	-.040	**.531***	**.376**	**.572***	-.036	.291
241	**.392***	-.093	**.380**	-.016	**.343***	.283
259	.256	-.107	**.652***	-.095	.245	**.605***
315	**.463***	-.039	.146	.015	**.372***	.102
319	.252	**.310***	.211	**.302***	.234	.166
336	.028	**.366***	**.330**	**.345***	.038	.285
355	-.133	**.417**	**.431***	**.431***	-.129	**.371**
361	-.121	**.453***	**.440**	**.455***	-.115	**.392**
374	**.397***	-.096	**.367**	-.026	**.347***	.276
427	.068	**-.740***	.145	**-.627***	.033	.113
448	**.608***	.048	.025	.057	**.500***	.030
466	**.456***	.249	-.120	.188	**.369***	-.061
490	.126	**.592***	-.021	**.509***	.135	-.012
508	**.317**	**.426***	-.014	**.357***	.281	.010
549	.242	.230	**.374***	.237	.238	**.309***
551	**.305**	**.516***	-.002	**.474***	.288	-.017
			Factor Correlations			
Factor 1	--	--	--	--	--	--
Factor 2	.328	--	--	.418	--	--
Factor 3	.394	.541	--	.619	.486	--

Note. Factor = component or factor. Factor loadings ≥ .30 are in boldface. PCA: Factor 1 = Mistrust/Withdrawal, Factor 2 = Psychotic Experiences, Factor 3 = Paranoia. FA: Factor 1 = Psychotic Experiences, Factor 2 = Mistrust/Withdrawal, Factor 3 = Paranoia.
* Item assigned to factor.

Table 11

Promax Rotated Loadings: Principal Components vs. Factor Analysis with Unweighted Least Squares for the Inpatient Sample (N = 487)

	Principal Components Analysis (PCA)			Unweighted Least Squares (ULS)		
Item	Factor 1	Factor 2	Factor	Factor 1	Factor 2	Factor 3
24	.050	.024	**.763***	.097	**.685***	.060
42	-.182	**.542***	**.395**	**.598***	.165	.085
48	**.693***	.146	.071	-.120	.252	**.554***
72	.169	-.068	**.768***	-.002	**.734***	.101
96	-.042	-.184	**.920***	.021	**.829***	-.132
99	**-.302**	**.540***	**.487**	**.781***	.167	-.072
138	-.264	**.450**	**.565***	**.689***	.274	-.077
144	-.198	.074	**.875***	**.354**	**.682***	-.193
184	**-.763***	-.025	-.014	.198	-.230	**-.514***
198	.082	-.138	**.878***	-.048	**.854***	.003
241	.209	**.832***	-.256	**.432**	-.244	**.539***
259	.021	**.323**	**.510***	**.327**	**.393***	.149
315	.102	**.739***	-.145	**.389***	-.121	**.382**
319	.171	-.125	**.821***	-.054	**.815***	.067
336	-.013	-.049	**.908***	.133	**.824***	-.086
355	.041	-.103	**.806***	.051	**.723***	-.031
361	-.024	-.019	**.874***	.157	**.771***	-.066
374	.250	**.814***	-.206	**.413**	-.224	**.619***
427	-.194	-.022	**-.560***	.006	**-.532***	-.200
448	**.525***	.215	.262	-.076	**.365**	**.567***
466	.268	.100	**.428***	.024	**.439***	.250
490	.184	-.089	**.653***	-.028	**.606***	.124
508	**.327**	.076	**.479***	-.033	**.506***	**.315**
549	.170	**.508***	.178	.296	.152	**.363***
551	.246	.057	**.663***	.021	**.568***	.234
			Factor Correlations			
Factor 1	--	--	--	--	--	--
Factor 2	.394	--	--	.436	--	--
Factor 3	.302	.609	--	.622	.531	--

Note. Factor = component or factor. Factor loadings ≥ .30 are in boldface. PCA: Factor 1 = Mistrust/Withdrawal, Factor 2 = Paranoia, Factor 3 = Psychotic Experiences. FA: Factor 1 = Paranoia, Factor 2 = Psychotic Experiences, Factor 3 = Mistrust/Withdrawal.
* Item assigned to factor.