FACTOR ANALYSIS OF THE MILLON ADOLESCENT CLINICAL INVENTORY: TESTING THE GOODNESS-OF-FIT OF MILLON'S MEASURE OF ADOLESCENT PSYCHOPATHOLOGY

By

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To the Faculty of Washington State University:

The members of the Committee appointed to examine the dissertation of PATRICK BRYAN CARRILLO find it satisfactory and recommend that it be accepted.

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Chair

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Abstract

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The purpose of this research was to assess the reliability and validity of the Millon Adolescent Clinical Inventory (MACI). The MACI is a widely used assessment with adolescents; however, little reliability or construct validity data has been published to date. In addition, no confirmatory analyses of the underlying structure of the assessment have been published. This study used principal components analysis and confirmatory factor analysis with the data from 450 severely emotionally disturbed (SED) adolescent inpatients to review the factor structure of the MACI. In addition, concurrent validity analyses were conducted with the Revised Children's Manifest Anxiety Scale and the Reynolds Adolescent Depression Scale.

Results of the analyses indicate that the MACI is a highly intercorrelated measure and do not support the presence of a 27-factor structure. Rather, the underlying structure may be more consistent with a single factor structure that measures distress and/or the willingness to admit to distress. Principal components analysis found evidence of four factors that accounted for 81.5% of

the variance. The first two factors alone accounted for 57.5% and appeared to measure constructs consistent with Internalizing and Externalizing dimensions of behavior.

Concurrent validity analyses with the RCMAS and RADS found that twenty-one of the twenty-seven scales were found to correlate with the RCMAS, while twenty-four MACI scales were found to correlate with the RADS. These results indicate that while the MACI may correlate highly with measures of anxiety and depression, it appears to lack discriminant validity.

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Chapter 1

Introduction

Accurate assessment of clinical issues is a crucial first step when beginning treatment with an adolescent. Used appropriately, assessment informs and guides the treatment process. The Millon Adolescent Clinical Inventory (MACI) is a self-report assessment instrument designed to assess adolescent personality characteristics and clinical syndromes (McCann, 1997; Millon, 1993; Millon & Davis, 1993). It was developed to address issues pertaining to adolescent behaviors and concerns. Specifically, it was developed as a tool for working with adolescents in clinical, residential, and correctional settings (Millon, 1993; Millon & Davis, 1993; Murrie & Cornell, 2000).

The MACI is based on Millon's theory of personality and psychopathology that has evolved over the years and which is outlined in his books, *Modern Psychopathology* (Millon, 1969), *Disorders of Personality* (Millon, 1981), and *Toward A New Personology* (Millon, 1990). Millon conceptualized personality styles as developing out of a combination of three polarities: (a) pleasure-pain, (b) active-passive, and (c) self-other (Strack, 1999a). The combination of various elements of the three domains creates patterns that make up the various Personality Patterns described by Millon in the MACI manual (Millon, 1993). The Expressed Concerns domain addresses the perceptions (feelings and attitudes) that adolescents have about developmental issues that are of concern to most troubled adolescents (e.g., individual development, peer and family relationships). Finally, the Clinical Syndromes domain adds an element that

addresses more transient states, rather than trait-related features such as those addressed in the Personality Patterns. Millon cautions, however, that the clinical states should be interpreted along with the pattern(s) noted for the personality style of the adolescent as they will be filtered through or take on meaning based on an individual's contextual interpretation. The interpretation, in turn, will be influenced by his or her personality style, as well as the specifics of the situation facing them at the moment (Strack, 1999b). Millon's theory of personality and psychopathology will be further discussed in the following chapter.

The MACI was released in 1993 as a replacement for the Millon Adolescent Personality Inventory (MAPI) (Davis, Woodward, Goncalves, Meagher, & Millon, 1999), which was developed and published in 1982. The MAPI was the successor to the original scale, developed by Millon in 1974, the Millon Adolescent Inventory (MAI). The MAI and the MAPI were identical in item content, but were used for differing purposes and employed different norm groups. The MAPI was divided into two scales: the MAPI-C(linical) and the MAPI-G(uidance). The MAPI-C was designed to aid clinicians in assessing adolescents who displayed emotional or behavioral disorders. The MAPI-G was designed for use with adolescents in a school setting in order to identify those who may benefit from further psychological assessment or attention. The MAPI-C and the MAPI-G utilized a shared norming population that consisted of mixed clinical and non-clinical individuals. This mixed population contributed to a lack of precision and to criticisms by clinicians seeking a more relevant reference group for clinical populations.

The MACI was developed in order to address the weaknesses inherent in the old scales, to broaden its clinical scope, to strengthen its connection with new developments in the underlying theory, and to bring it into concordance with new developments in the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV; APA, 1994) classification system (McCann, 1997; Millon, 1993; Millon & Davis, 1993). Cross-validation and cross-generalization studies were executed in the development of the scale. Data from 579 adolescents (Group A) were utilized in the Development Sample (the group from which items for the final scale were selected and base rates were calculated) (Millon, 1993; Millon & Davis, 1993). The cross-validation studies consisted of two groups: Group B consisted of 139 adolescents and Group C consisted of 194 adolescents.

The MACI is a 160-item self-report instrument that provides an assessment across three domains, Personality Patterns, Expressed Concerns, and Clinical Syndromes. It utilizes a True/False response format. The MACI consists of 31 total scales: twelve Personality Patterns scales, eight Expressed Concerns scales, and seven Clinical Syndromes scales, plus three Modifying Indices, and a 2-item scale (VV) that identifies invalid test reports (test reliability). There is significant item overlap among the scales. The *Personality Patterns* scales consist of: Introversive (1), Inhibited (2A), Doleful (2B), Submissive (3), Dramatizing (4), Egotistic (5), Unruly (6A), Forceful (6B), Conforming (7), Oppositional (8A), Self-Demeaning (8B), and Borderline Tendency (9). The *Expressed Concerns* scales consist of: Identity Diffusion (A), Self-Devaluation

(B), Body Disapproval (C), Sexual Discomfort (D), Peer Insecurity (E), Social Insensitivity (F), Family Discord (G), and Childhood Abuse (H). The *Clinical Syndrome* scales consist of: Eating Dysfunctions (AA), Substance-Abuse Proneness (BB), Delinquent Predispositions (CC), Impulsive Propensity (DD), Anxious Feelings (EE), Depressive Affect (FF), and Suicidal Tendency (GG). Finally, the three Modifying Indices, Disclosure (X), Desirability (Y), and Debasement (Z) are used to gauge response tendencies of the adolescent test-taker and to adjust the base rate scores appropriately. The specific descriptors of each scale are explicated further in Chapter 3.

A review of the literature revealed few published reports investigating the factor structure of the MACI. Romm, Bockian, and Harvey (1999) utilized a principal components factor analysis to factor the 27 “clinical” subscales of the MACI. The purpose of their study was to “develop a more clinically useful understanding” of adolescents referred to residential treatment, and to “add to the utility of the MACI by reporting MACI data with factor analysis and development of factor-based profiles” (Romm, Bockian, & Harvey, 1999, p. 127). The authors identified five factors that described adolescents referred to a residential treatment facility: Defiant Externalizers, Intrapunitive Ambivalent Types, Inadequate Avoidants, Self-Deprecating Depressives, and Reactive Abused Types. These factors were used to develop five factor-based prototypes as well as prototype descriptions. Hiatt and Cornell (1999) examined the concurrent validity of the MACI with the Children’s Depression Inventory (CDI). Two scales of the MACI, Doleful (Personality Scale) and Depressive Affect were

found to correlate moderately (.67 and .77, $p < .001$) with the CDI. Salekin (2002) performed a factor analysis of the MACI subscales with a juvenile offender population (N = 250) and identified a two-factor structure for the clinical scales, a two-factor structure for the personality scales, and a two-factor structure for the expressed concerns scales. Factor I of the clinical scales represented Depressed Mood and consisted of three scales; Factor II was labeled Psychopathic Precursors and also consisted of three scales. The two factors identified within the Personality Pattern scales were labeled as (a) Introversive, Inhibited, and Doleful, and (b) Forceful, Unruly, and Dominant. Finally, two factors were identified within the expressed concerns scales; the authors identified those factors as Identity Confusion and Social Sensitivity.

To date, no published studies have attempted to confirm the scale structure of the MACI with a severely emotionally disturbed (SED) adolescent psychiatric population. Only a limited number of studies have examined the validity of the MACI with SED psychiatric adolescents (Hynan, Pantle, & Foster, 1998 [MAPI, not MACI]; Romm, Bockian, & Harvey, 1999; Salekin, 2002). Furthermore, no studies have attempted to confirm the underlining 27-scale structure of the MACI using exploratory or confirmatory factor analyses. It is of import to note that no previously published studies have attempted to confirm the underlying factorial structure by performing an item-level analysis. All previously published studies have utilized the MACI subscales in their analyses.

The MACI is an assessment instrument that is widely utilized by clinicians with adolescents throughout the United States. Critical decisions in the

treatment, diagnosis, and placement of adolescents are guided by the information gleaned from this tool (Murrie & Cornell, 2000). To date, limited validity or reliability analyses have been conducted with SED adolescents and no confirmatory analyses have been conducted of the underlying factor structure of the MACI. This research will utilize a large SED adolescent psychiatric population and make a substantial contribution to the scientific literature concerning the Millon Adolescent Clinical Inventory and provide useful information for clinicians working with SED adolescent clients/patients.

Adolescents admitted to the Kobacker Inpatient Treatment Unit of the Medical College of Ohio were routinely administered the MACI as part of a standard intake assessment battery over the period from 1994 – 2003. Adolescents admitted to the facility automatically meet the criteria for SED based on the admissions criteria (risk of harm to self or others and other corresponding diagnoses). This research project proposes to utilize the MACI data (individual item responses & subscale scores) from January 1994 to May 2003 to further examine the reliability (internal consistency) and validity (construct and concurrent validity) of the MACI as used with SED adolescents. Construct validity of the MACI will be further established by conducting exploratory factor analyses of the subscales of the MACI using the principal components method. In addition, confirmatory factor analyses will be utilized with the individual items of the MACI in order to determine the goodness-of-fit of the existing scale/factor structure. Concurrent validity of the MACI will be examined by looking at other measures included in the standard intake assessment battery (i.e., Revised

Children's Manifest Anxiety Scale [RCMAS] and the Reynolds Adolescent Depression Scale [RADS]).

On the basis of this review, the following hypotheses were generated:

1) It is hypothesized that the reliability of the scales will be in the moderate to high range, resembling the reliability reported by Millon (1993).
2) It is hypothesized that the item factor loadings will replicate Millon's proposed factor structure with low (close to zero) fitted residuals. It is further hypothesized based on Millon's reporting (1993) that the 27 factors will be intercorrelated, as might be expected with items loading on multiple factors.
3) It is predicted that scales 1, 3, 5, 7, and 8B of the MACI will load on a "passive" factor and that scales 2A, 4, 6A, 6B, and 8A of the MACI will load on an "active" adaptation factor. In addition, a second set of higher order factors (internalizing and externalizing dimensions of behavior) is hypothesized to be uncovered in the Clinical Scales, based on Romm, Bockian, and Harvey's (1999) findings.
4) Principal components analysis of the MACI subscales are hypothesized to be similar in variable or subscale structure to those found by other researchers (Romm, Bockian, & Harvey, 1999; Salekin, 2002).

5) It is predicted that elevated scores on the RCMAS will correlate highly with elevations on subscales of the MACI that also assess elements of anxiety, such as the Anxious Feelings (EE), Identity Diffusion (A), Self-Devaluation (B), Peer Insecurity (E), and Inhibited (2A) subscales. Conversely, elevations on the RCMAS should not correlate highly with elevations on MACI subscales that assess a construct in opposition or unrelated to anxiety, such as Social Insensitivity (F) and Egotistic (5).
6) It is hypothesized that elevations on the RADS will be correlated with elevations on the Doleful (2B), Self-Demeaning (8B), Self-Devaluation (B), Family Discord (G), Childhood Abuse (H), Eating Dysfunctions (AA), Depressive Affect (FF), and Suicidal Tendency (GG) scales. In addition, elevations on the RADS are hypothesized to be inversely correlated to scores on the Egotistic (5), Unruly (6A), Social Insensitivity (F), and Impulsive Propensity (DD) scales.

Chapter 2

Review of the Literature

In order to assess the validity of a measure, it is first necessary to understand the theoretical rationale behind the development of the scale. Millon's theoretical approach to personality and the manner in which his theory guided the development of his measure are addressed in this chapter. In addition, research conducted on the MACI since its publication is also examined in this review, with attention to how that research may guide or influence the questions addressed by this study. Finally, criticisms and controversies that have been addressed in the literature with regards to the development of the MACI or similar scales by the author are also discussed herein.

Theoretical Basis

In 1969, Theodore Millon proposed a classification system for emotional and psychiatric disorders based on a biosocial-learning theory: the idea that biophysical constitution and past experiences are the determinants of the personality style with which an individual learns to relate to his or her world (Choca, 1999; Davis, R.D., 1999). His classification system included groups of disorders: personality disorders (e.g., avoidant, narcissistic, dependent), symptom disorders (e.g., anxiety, psychophysiologic, and psychotic disorders), pathological behavior reactions (e.g., transient situational reactions and circumscribed learned reactions), and biophysical defects (i.e., disorders that are a direct result of a brain dysfunction).

According to Millon, a child's perception and response to an event is influenced by their basic traits and capabilities: intelligence, strength, energy, motivation, temperament, and vulnerabilities (Dorr, 1999). Under most circumstances, a child will respond or relate to a given set of circumstances in such a way that "fits" with their disposition. These everyday events enable a child to learn what is "good," where they obtained that "good" feeling, and how to act in order to obtain that rewarding response again. When the pressures of demands of a situation become too severe, however, the child might be forced to develop a response style that is in opposition to their natural tendencies. It is through the development, practice, and internalization of an inconsistent system of interacting with and responding to the environment that a person develops a disturbed emotional state or disordered personality style.

In his book, *Modern Psychopathology* (1969), Millon proposed his system of 8 personality prototypes. The prototypes were devised as less pathological versions of personality disorders of the *Diagnostic and Statistical Manual of Mental Disorders, second edition* (*DSM-II*; American Psychiatric Association, 1952). These eight prototypes were considered to be disordered styles of interpersonal interactions that were the basis for the development of personality disorders, yet that were themselves construed as being only mildly severe personality patterns as compared to fully diagnosable personality disorders. Each prototype was described fully by Millon based on three elements: behaviors, self-perceptions, and intrapsychic processes.

In order to organize the eight personality prototypes, Millon developed an organizational strategy (Strack, 1999a) that focused on two domains: the types of interpersonal relationships that individuals typically established and the manner in which they accommodated to the environment. Four styles of engaging in interpersonal relationships were described by Millon as tendencies that existed either toward attachment or toward dominance (detached, dependent, independent, and ambivalent). Each interpersonal style also entailed a mode of accommodation or adaptation to the environment, *active* or *passive* (Davis, et al., 1999). Individuals whose personality styles tended more toward the active mode would attempt to change their environment to suit their needs; those who were more passively inclined would be more apt to accept and adjust themselves to their environment. Figure 1 provides a display of the eight personality prototypes proposed by Millon in 1969.

Millon further took into account the level of severity of the symptomatology in developing his model. As the severity increases (Mild → Borderline → Marked → Profound), the features of each prototype become blurred and the clinical presentation of each becomes less distinct. The eight prototypes lead to three borderline severity disorders; these lead to three markedly severe personality disorders (schizoid, cycloid, and paranoid); and finally, at the level of profound severity, Millon described the final stage of complete dysfunction as the terminal personality (Guevara & Strack, 1998).

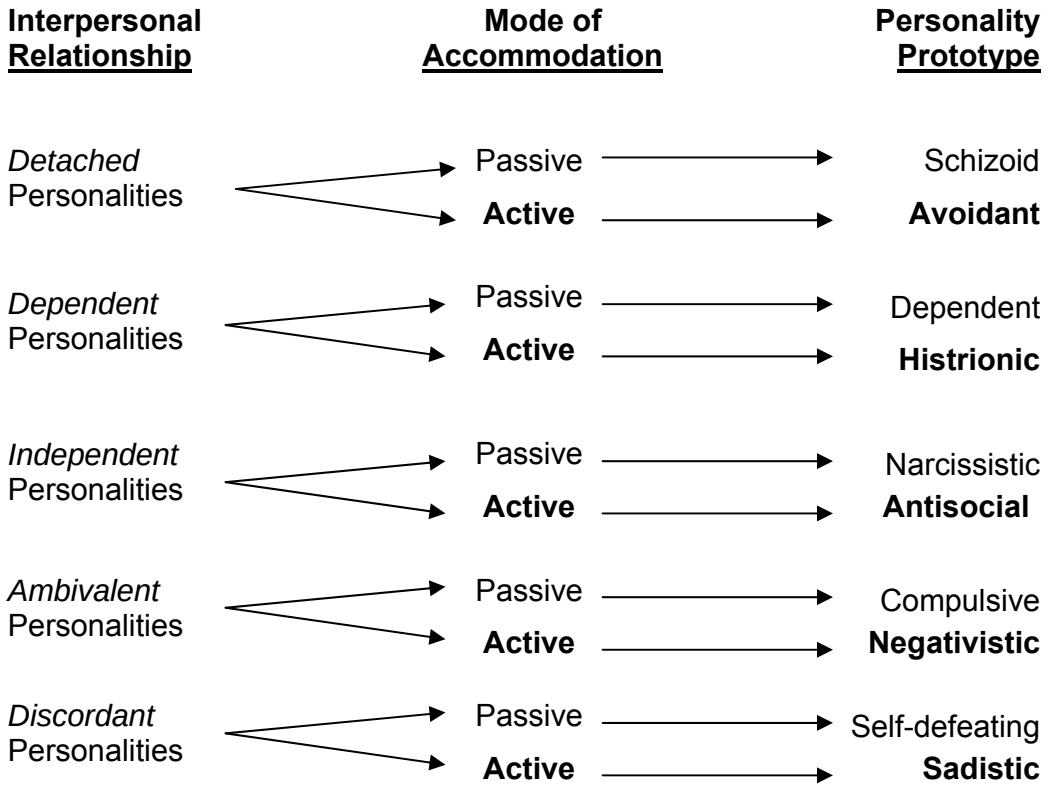

Figure 1. Personality Prototypes

Adapted from: Choca, J.P. (1999). Evolution of Millon's personality prototypes. *Journal of Personality Assessment, 72*(**3**), 353-364.

In addition to his descriptions of personality disorders that were utilized in his scales, Millon also developed two other areas of assessment: the Expressed Concerns domain and the Clinical Syndromes domain. The expressed concerns scales deal with the personal perceptions of adolescents of their psychological development and actualization, and their personal fears or concerns (Salekin, 2002). The clinical syndromes scales deal with transient states, those that are influenced by both the general concerns of the adolescent, as well as their way of looking at themselves and the world (e.g., personality patterns or traits).

In order to keep pace with changes in nomenclature and the understanding of personality disorders (Axis II) that developed over the years from DSM-II through DSM-III, DSM-III-R, and DSM-IV, Millon (1990) widened the focus of his theory. He incorporated an evolutionary framework for his model of personality (Guevara & Strack, 1998; Strack, 1999b) and added a dimension that reflects a reversal of reinforcement between pleasure and pain (e.g., discordant) (Strack, 1999a). This new dimension was used in the development of the self-defeating personality (passive-discordant) and the sadistic personality (active-discordant), increasing his eight personality prototypes to ten.

The current form of the MACI also incorporates several attributes which are in line with the diagnostic conceptual model represented by the DSM-IV (APA, 1994) (Davis, et al., 1999; McCann, 1997). It contains two scales that measure transient clinical syndromes similar to Axis I diagnostic concerns and more stable personality traits that are characteristic of Axis II diagnoses.

Reliability and Validity Studies

Although a number of studies (e.g., Hynan, Pantle, & Foster, 1998; Johnson, Archer, Sheaffer, & Miller, 1992) have examined the structure of the Millon Adolescent Personality Inventory (MAPI, Millon, Green, & Meagher, 1982), few studies have been conducted of the reliability and validity of the MACI. Due to the differences in the development of the MACI and MAPI, information based on the MAPI is not generalizable to the MACI. The MACI retained only 49 items from its predecessor the MAPI (Hiatt & Cornell, 1999; Millon, 1993) and was normed on a solely clinical population, as compared to the MAPI which was normed with both clinical and non-clinical adolescents (Hiatt & Cornell, 1999; Millon, 1993, Millon & Davis, 1993). A review of the literature found only four published articles that involved investigations of the MACI. Grilo, Fehon, Walker, and Martino (1996) compared adolescent inpatients with and without a history of substance abuse using the MACI. Hiatt and Cornell (1999) examined the concurrent validity of the MACI with the Children's Depression Inventory (CDI; Kovacs, 1992) in hospitalized adolescents. Romm, Bockian, and Harvey (1999) developed factor-based prototypes of the MACI in adolescents who were in residential treatment. Salekin (2002) examined the psychometric properties of the MACI in a juvenile offender population.

Grilo, Fehon, Walker, and Martino (1996) utilized the MACI in a comparison of adolescent inpatients with and without substance use disorders (SUD) across multiple domains. They compared the groups (SUD, n = 44; non-SUD, n = 61) on clinical syndromes, expressed concerns, and personality

patterns. Fifty-six percent of the population was female; ages ranged from 12 to 20 years (M = 15.7), and the average school grade was 9.7. The overall groups (SUD vs. non-SUD) did not differ with regard to age, gender, or ethnicity.

T-tests for independent samples were used in the comparisons of SUD and non-SUD scores. Due to the large number of comparisons performed, the authors elected to use a conservative level of .005 in order to determine significance. Results of the study found that the two groups did not differ on the three modifying indices (disclosure, desirability, and debasement). With regards to the clinical syndromes, SUD adolescents were found to score significantly higher ($p = .0001$) on the substance abuse proneness and delinquent predisposition scales. The non-SUD adolescents, however, scored significantly higher ($p = .0001$) on the anxious feelings scale of the MACI. SUD adolescents were also found to score high on the impulsive propensity and depressive affect scales, thus indicating areas of potential problems.

In the expressed concerns domain, SUD adolescents showed significantly ($p = .003$) higher scores on the social insensitivity scale than non-SUD adolescents. SUD adolescents also scored significantly ($p = .001$) lower on the sexual discomfort scale than non-SUD adolescents. Family discord, however, was the highest rated area of concern for SUD adolescents, while family discord and self-devaluation were the two highest areas for non-SUD adolescents.

The final domain, personality patterns, showed some similarities for both SUD and non-SUD adolescents. Both scored highly on the oppositional, unruly, and doleful scales. SUD adolescents, however, scored significantly higher ($p =$

.001) on the unruly (antisocial) scale and lower (p = .003) on the submissive (dependent) scale than non-SUD adolescents. The authors note that the use of the MACI with relevant comparison groups allows for important comparison analyses that allow for adequate and relevant interpretations. They also note the importance of the MACI as a dimensional assessment that can accompany and enhance other more categorical (diagnostic) assessments.

Another of the previous studies is an analysis by Hiatt and Cornell (1999) in which they examined the concurrent validity of the MACI in an assessment of depression with clinical diagnoses and the Children's Depression Inventory (CDI; Kovacs, 1992). The authors noted that no previously published studies addressed the question of how well the MACI was able to identify depression in adolescents. They used two scales of the MACI designed to correspond with clinical diagnoses of depression (Depressive Affect [FF] and Doleful Personality [2B]), as well as one scale that assesses suicidality (Suicidal Tendency [GG]). Subscale scores were compared to discharge diagnosis, scores on the CDI, and staff judgments of patients' suicidality after hospital admission.

The study initially included 101 adolescents ages 12 to 17, with 45 male and 56 female participants. Approximately 75% of the sample was White, with the remainder made of up African American, Asian American, Hispanic, and Native American adolescents. Due to the sample size and variety of diagnoses, all adolescents with depressive disorders were lumped into one category for analysis at discharge (primary diagnosis of depression). These included major depressive disorder, dysthymic disorder, adjustment disorder with depressed

mood, depressive disorder not otherwise specified, bipolar disorder, and mood disorder not otherwise specified.

At discharge, data on 88 patients with valid MACI scores and discharge diagnoses were available. Fifty-four percent (n = 48) of the adolescents received a primary diagnosis of depression at discharge. The authors used both cutoff scores of the MACI for their analyses, the lower cutoff (BR = 75; trait or condition is *present*) and the upper level (BR = 85; trait or condition is *prominent*). At the cutoff level of base rate = 75 to indicate depression, the overall classification accuracy of the Doleful Personality scale was 59% (n = 52; kappa = .195). Sensitivity was rated at 50%, specificity at 70%; the predictive value of a positive score (scores above the cutoff range) was 66% and the predictive value of a negative score (below the cutoff score) was 54% (Hiatt and Cornell, 1999).

When the more strict cutoff score (BR = 85) was used, classification accuracy decreased to 56% (n = 49; kappa = .173). Sensitivity decreased significantly to 19%, with a corresponding increase in specificity to 100%. Positive predictive value also increased significantly to 100%, with a minimal decrease in negative predictive value to 51%.

Overall classification accuracy of the Depressive Affect subscale was 57% using the BR = 75 cutoff (n = 50; kappa = .118). Sensitivity was 67%, specificity 45%; positive predictive value was 59%, and negative predictive value was 53%. With the increase in cutoff value to 85, accuracy decreased slightly to 53% (n = 47; kappa = .081), while sensitivity dropped to 46%, specificity increased to 62%,

positive predictive value remained at 59%, and negative predictive value decreased slightly to 49%.

Combined scores were utilized in an attempt to improve diagnostic accuracy. Adolescents were classified as being depressed if they score higher than 85 on either the Doleful Personality or Depressive Affect scale. This lowered the overall classification accuracy to 54% (n = 48; kappa = .102). Sensitivity was 48%, specificity 62%; positive predictive value was 60%, and negative predictive value was 50%. Changing the cutoff level to 75 resulted in a slight improvement in classification accuracy at 58% (n = 51; kappa = .136). Sensitivity increased to 71%, specificity was 42%; positive predictive value was 60%, and negative predictive value was 55%.

The final combination consisted of adolescents who scored 85 or above on both the Doleful Personality scale and the Depressed Affect scale. Under these criteria, classification accuracy decreased to 54% (n = 48; kappa = .154). Sensitivity decreased significantly to 17%, with a corresponding increase in specificity to 100%. Positive predictive value also increased significantly to 100%, with a minimal decrease in negative predictive value to 50%. Using the less strict criteria, the classification accuracy increases to 58% (n = 51; kappa = .178). Sensitivity increased significantly to 46%, with specificity decreased to 72%. Positive predictive value also decreased significantly to 67%, with a minimal increase in negative predictive value to 53%.

CDI data were available for only thirty-seven adolescents. Correspondence of the Doleful Personality scale and the CDI was moderate, with

a correlation of .67 ($p < .001$); correlation of the Depressive Affect scale was .77 ($p < .001$) with the CDI scores. A cutoff score of 12 was used for the CDI as indicative of clinical depression. In the analysis of the CDI criteria and a cutoff of 75 on the MACI Doleful Personality scale, overall classification accuracy was 73% (kappa = .50); with a MACI cutoff of 85, classification accuracy was 46% (kappa = .10). At the BR=75 level, sensitivity was 56%, specificity 100%; positive predictive value was 100%, and negative predictive value was 58%. For Depressive Affect, at the cutoff of 75, accuracy was 81% (kappa = .10), sensitivity was 83%, specificity was 78%, positive predictive value was 86%, and negative predictive value was 73%.

In a combined analysis, using either the Doleful Personality or Depressed Affect score at BR = 75, overall classification accuracy was high at 84% (kappa = .66), as were sensitivity and specificity (87% and 78% respectively); positive predictive value and negative predictive value were similar at 87% and 78% respectively.

The final analysis performed in this study was the assessment of scores on the suicidal tendency scale and its ability to identify patients at risk for suicide. This was assessed by comparing the scores on the MACI to the records of adolescents in this study who were kept on suicide precautions (n = 21). Using the cutoff of 75 yielded a classification accuracy rate of 64% (kappa = .18). Sensitivity was 52%, specificity was 68%, positive predictive value was 35%, and negative predictive value was 81%. Increasing the cutoff to 85, the accuracy rate increased to 69% (kappa = .12). While sensitivity decreased to 28%, specificity

increased significantly to 82%. Positive predictive value remained at 35%, and negative predictive value decreased slightly to 78%.

As the authors note, the results provide moderate support for the MACI as a measure of depression in inpatient adolescents. The more stringent cutoff level of base rate equal to or above 85 sacrifices sensitivity but provides a corresponding increase in specificity. The MACI scales correspond more highly to the CDI than to diagnoses of depression, possibly because the CDI is also a self-report measure, but also possibly due to the nature of categorical versus dimensional assessments. The MACI is designed to assess for the presence of symptoms, but does not take into consideration exclusionary criteria as required by categorical or diagnostic assessments. As noted by both the authors (Hiatt and Cornell, 1999) and the author of the MACI (Millon, 1993), the MACI is a useful tool as a measure of depression, but should be used in concert with information gleaned from a comprehensive clinical evaluation.

Similarly to the published studies of the MAPI, few published studies exist that have examined the factorial structure of the MACI. Romm, Bockian, and Harvey (1999) and Salekin (2002) are the only available published studies that appear to have done so as of this time. In their article, Romm, Bockian, and Harvey (1999) noted that there were no published studies describing the use of the MACI with a residential treatment population, nor were there published studies of the factor structure of the scale. Their goals were to “develop a more useful understanding of this group of adolescents [and] to add to the utility of the

MACI by reporting MACI data with factor analysis and development of factor-based profiles" (p.127).

Data from 251 adolescents (160 male, 91 female) being screened for admission to a residential treatment facility were utilized in their study. Approximately half were African-American, and one-quarter were White or Hispanic. The MACI was part of a standardized screening assessment protocol that also included a social history interview with an admissions case worker, a clinical interview with a psychologist, and completion of several other self-report instruments. Data utilized in this study included MACIs both from those that were admitted to the facility and those that were not admitted (did not meet criteria).

T-tests were conducted in order to assess for gender differences; significance level was reportedly determined by Bonferroni correction (< .002) for pairwise comparisons. Results indicated that girls were more likely to disclose than boys ($t = 3.29$, $df = 249$, $p = .001$) as noted in the Modifying Index Scale, Disclosure (X). The Personality Patterns results showed only one significant difference. Girls were significantly more likely to report Self-Demeaning traits than boys ($t = 4.52$, $df = 249$, $p = .001$). Similarly, on the Expressed Concerns scales, only one significant difference was found. Girls were found to endorse higher levels of Body Disapproval than boys ($t = 4.13$, $df = 249$, $p = .001$). Analyses of the Clinical scales, however, found several differences between genders. Girls were found to report more Eating Dysfunction ($t = 6.23$, $df = 249$, $p = .001$), Depressive Affect ($t = 3.88$, $df = 249$, $p = .001$), and Suicidal Tendency ($t = 5.39$, $df = 249$, $p = .001$), while boys reported significantly more Delinquent

Predisposition (t = 3.45, df = 249, p = .001). According to the authors, the fact that significant differences arose primarily in the clinical domain serves to confirm the gender neutrality of the MACI personality traits.

Principal components analysis (at the subscale level) of all MACI scales and sex were also performed. Gender was included in the analysis in order to determine whether there were any significant differences in profile scores based on sex. According to the authors, varimax rotation with Kaiser normalization was utilized in order to assist in interpretation of factor loadings. Factor loadings of greater than .30 were considered in the interpretation of factors. Five factors were retained (eigenvalues > 1.0) and accounted for 77.4% of the variance. The first factor, Factor I accounted for 25.1% of the variance. Factor I was interpreted as defining a Defiant Externalizing dimension; it consisted of significant positive loadings on 11 subscales (e.g., Unruly [6A], Forceful [6B], and Impulsive Propensity [DD]) and negative loadings on 7 scales (Submissive [3], Conforming [7], and Anxious Feelings [EE]). Factor II was labeled Intrapunitive Ambivalent, and consisted of 14 positive loadings (e.g., Doleful [2B], Depressive Affect [FF], and Debasement [Z]) and 4 negative loadings (e.g., Egotistic [5] and Conforming [7]). Factor II accounted for 23.9% of the total variance.

The third identified factor, interpreted as Inadequate Avoidant, was made up of 10 total subscales and accounts for 13.3% of the variance. Six subscales loaded in a positive direction (e.g., Introversive [1], Inhibited [2A], and Peer Insecurity [E]), while four scales loaded in a negative direction (e.g., Dramatizing [4], Egotistic [5], and Desirability [Y]).

Factor IV was labeled as a Self-Deprecating Depressed dimension and it accounted for 9.4% of the variance. Factor IV was made up of six positive loadings (e.g., Self-Devaluation [B], Body Disapproval [C], and Eating Dysfunctions [AA]) and three negative loadings (e.g., Egotistic [5] and Social Insensitivity [F]), as well as a negative loading for gender. Finally, Factor V, which consisted of 4 subscales (all positive loadings), was labeled Reactive Abused and accounted for 5.7% of the variance. Factor V consisted of positive loadings on Body Disapproval (C), Family Discord, (G), Childhood Abuse (H), and Suicidal Tendency (GG); it also had a significant negative loading for gender. Upon examination of the profiles, Factors IV and V, interestingly, were found to load more for girls than for boys.

The authors noted that there were significant intercorrelations between the five factors; however, this was not unexpected due to the item overlap of the MACI scales as noted by Millon (1993) and Millon and Davis (1993). The authors also noted that the intercorrelations occurred in theoretically expected directions. A second-order factor analysis of the five factors produced a reduction to two factors, Internalization versus Externalization.

The factors produced from the analysis were used to develop written "prototypes" or descriptions of prototypical individuals who fit the description of each produced factor. The authors found that the descriptions thus generated were consistent with the types and clusters of problems experienced by adolescents who are often referred for long-term residential treatment. It was also noted that certain individuals who fit into one of the prototype descriptions,

namely the Inadequate Avoidant individuals, often had trouble fitting into the residential milieu and were often more difficult to treat than might have been anticipated from the initial assessment alone. Females who fit the Factor V description (Reactive-Abused) appeared to make up the second largest group in treatment, thus suggesting that childhood victimization is a strong predictor of the types of problems that eventually lead adolescents into residential placements.

Overall, it was found that the development of factor based prototypes or profiles allowed for greater interpretation of the information gleaned from the MACI than might the standard codetype analysis alone. In addition, utilization of prototype descriptions could be beneficial to mental health workers working with adolescents in guiding treatment and further assessment (e.g., clinical interviews).

Finally, in the most recent examination of the factorial structure of the MACI, Salekin (2002) investigated the psychometric properties of the MACI with 250 juvenile offenders. He conducted separate factorial analyses of the MACI Clinical, Expressed Concerns, and Personality scales. According to the author, principal components analysis was employed along with varimax rotation. Factors were retained using the criteria of eigenvalues greater than 1.0 as well as through examination of the scree plots.

Within the Clinical scales, two factors were identified. The first (Factor I) consisted of three scales: Depressive Affect (FF), Suicidal Tendency (GG), and Eating Dysfunctions (AA), and represented 34.8% of the variance (eigenvalue = 3.31); the authors labeled this factor Depressed Mood. The second factor

(Factor II), labeled Psychopathic Precursors, also consisted of three scales: Delinquent Predisposition (CC), Substance-Abuse Proneness (BB), and Impulsive Propensity (DD), and accounted for 31.3% of the variance (eigenvalue = 1.94). The substance-abuse scale was found to load on both factors (Salekin, 2002).

Factor analysis of the personality scales similarly identified two factors that accounted for 67.8% of the variance. The first factor (labeled Introversive, Inhibited, and Doleful) consisted of six subscales and included aspects of abasement, downheartedness, inhibition, and introversion. The first factor accounted for 54.4% of the variance (eigenvalue = 6.82). The second factor was labeled Forceful, Unruly, and Dominant, and consisted of three subscales, including forceful, unruly, and dominance. The second factor accounted for 13.4 % of the variance (eigenvalue = 1.97). As with the Personality and Clinical scales, factor analysis performed on the Expressed Concerns scales revealed the presence of two factors; these two factors accounted for 54.4% of the variance. The first factor was identified as Identity Confusion and produced positive loading on the Identity Diffusion and Family Discord scales, and a negative loading on the Sexual Discomfort scale. The first factor accounted for 28.6% of the variance (eigenvalue = 3.64). The second factor, labeled by the author as Social Sensitivity, included positive loadings for Body Disapproval and Peer Insecurity, and a negative loading for Social Insensitivity. The second factor accounted for 25.8% of the variance (eigenvalue = 1.59).

A goal of Salekin's (2002) study was to determine if there were ways in which the test results or scores could be developed into more practical summarizations or prototypical descriptions. By utilizing the factors that were elicited in the analysis to create clinical summaries, the author hoped to develop a clearer description of the symptomatology being described by the analysis, and thereby create a more descriptive picture of the adolescent being described therein. This gives the courts, clinicians, and other mental health professionals the information they need to better develop services that can target the specific needs of each adolescent. According to the author, the MACI provides adolescent forensic settings with an understanding of symptom patterns and personality styles that is essential for treatment planning. By developing composite indices that are appropriate to the venue (adolescent forensics), the information can be used in the development of treatment targets, understanding possible responses to treatment, and in planning for potential behavior management concerns (e.g., suicidal ideation, at-risk for rule-breaking while in the institution).

In summary, previous research into the reliability and validity of the MACI, including the factor structure underlying the scale is scarce. Although two studies, Romm, Bockian, and Harvey (1999) and Salekin (2002), have included examinations of the factor structure of the MACI, both were aimed at using the subscales to develop composite indices or condensed factors in order to aid in the interpretation and utility of the scale with specific populations. None of the prior research has conducted a large scale examination of the underlying factor

structure of the scale at the item level (e.g., exploratory or confirmatory factor analysis). In addition, no post-construction studies have examined the internal consistency reliability of the individual subscales. Finally, although the MACI was normed on a clinical population, until now, no research has been conducted confirming the structure solely with a severely emotionally disturbed population; the Romm, Bockian, and Harvey (1999) study included MACI profiles from adolescents who did not meet criteria for admission to residential treatment, and Salekin's (2002) study was conducted with juvenile offenders. Although some may have indeed met clinical criteria, it was not a factor considered for inclusion in his study.

Scale Development Criticisms and Controversies

Although not much discussion has been published regarding the development of the MACI, a number of researchers have shared their concerns regarding Millon's other assessment instruments, such as the Millon Clinical Multiaxial Inventory (MCMI) (Choca et al., 1992; Dana & Cantrell, 1988) and the MAPI (Hynan et al., 1998). Specific concerns have included the use of base rate scores rather than raw scores, and significant item overlap.

Item-overlap in the MAPI had been discussed as a concern due to the corresponding lack of simple structure to the scale and because it was thought that the overlap alone may be responsible for the factor structure (Hynan et al., 1998). Romm, Bockian, and Harvey (1999) point out that the item-weighted scoring of the MACI was developed in order to limit the effects of item overlap. Choca et al. (1992) also state that the use of weighted raw scores (base rates) is

theoretically sound and may prove advantageous in reducing the high interscale correlations.

Choca et al. (1992) also noted that the MCMI was a useful measure of personality styles, rather than personality disorders and should not be used as a DSM-III-R measurement tool. Similarly, Millon (1993) has stated that the MACI is not intended to diagnose, but rather to serve as a guide for further assessment and treatment. The MACI is a tool to identify patterns of thinking and behaving that may be hindering positive growth in the individual.

Chapter 3

Methodology

The following chapter presents the methodology followed in this research study. To begin with, the participants and instruments that were used for this evaluation of the MACI are described. At the end, the methods of analysis that were used in this research are specified, including the types of statistics utilized and the means by which the analyses were performed.

Participants

The Kobacker Center of the Medical College of Ohio is a child and adolescent inpatient acute care treatment facility that serves families in Northwestern Ohio. The facility exists to serve children and adolescents who are severely emotionally disturbed (SED) and who are at risk of harm to self or to others. The objective of this project was to review and analyze the data from 450 archival records (individual item responses and subscale scores) of adolescents (male and female, ages 13-18, all racial and ethnic groups) admitted and treated during the period beginning January 1994 and ending May 2003. There were 273 females (61%) and 177 males (39%). The overwhelming majority of the adolescents were Caucasian (n = 332; 74%), followed by African American (n = 49; 11%), and Hispanic adolescents (n = 25; 6%); 6% of the sample were bi-racial or “other,” and the remaining 3% did not have their ethnicity labeled in their chart. The average age was 14.8 years; the majority (88.5%) of the adolescents were 13-16 years old. Tables 1 and 2 show the breakdown by age and grade.

In order to be included, participant records required valid completion of all psychological assessments, thus excluding the records of any individuals who were so cognitively impaired (i.e., IQ<70) or agitated that they were unable to complete testing. In addition, only those MACI profiles that were valid were utilized in this study. In order to be considered valid a profile must be missing no more than 9 responses, the two "validity" items must have been answered correctly (i.e., false), the raw score on Scale X (Disclosure) must be between 201 and 589 (<201 = underreporting; >589 = overreporting), and, at least one of the base rate scores on the Personality Patterns scales must be above 59 (in order to determine a clear personality pattern from the data) (Millon, 1993).

Table 1

Age Distribution

AGE	FREQUENCY	PERCENT
13	99	22.1
14	94	20.9
15	101	22.4
16	104	23.1
17	51	11.3
18	1	.2
Total	450	100.0

Table 2

Grade Distribution

GRADE	FREQUENCY	PERCENT
6	2	.4
7	59	13.1
8	101	22.4
9	114	25.3
10	79	17.6
11	64	14.2
12	18	4.0
Drop out	13	2.9
Total	450	100

Procedures

Adolescents (aged 13-18) admitted to the Kobacker Inpatient Treatment Unit of the Medical College of Ohio were routinely administered the MACI, RCMAS, and RADS as part of a standard intake assessment battery over the period from January 1994 – May 2003. Assessments were generally conducted within one to five days of admission to the unit. Assessments were conducted by a licensed psychologist, or by a psychology intern under the supervision and guidance of a licensed psychologist. In addition to formal psychological assessment, all adolescent inpatients were assessed in a clinical interview by the attending psychiatrist and given a DSM-IV based diagnosis.

The data utilized in this project were all archival. Human subjects approval was granted from both Washington State University and the Medical College of Ohio (see Appendix). The Institutional Review Boards of both Washington State University and the Medical College of Ohio waived informed consent requirements. Waiver of Informed Consent was requested and granted based on the following three primary reasons: (a) the possibility existed that by re-contacting the families of the adolescents involved in this research, the families could be reminded of a difficult period in their lives and be, in essence, re-traumatized; (b) most of the adolescents whose data was used for this study live in families that live at or below the poverty level and the families live transient lives, therefore the likelihood of locating them to obtain informed consent was minimal; and finally, (c) no protected health information (PHI) was utilized for this study, thus negating the possibility that a breach of confidentiality could occur; if

a written consent form would have been utilized, it would exist as the only record to tie the individuals to the data, thus creating a potential for breach of confidentiality.

Instrumentation

Millon Adolescent Clinical Inventory (MACI). The MACI is a 160-item self-report instrument that assesses adolescents on three dimensions: Personality Patterns, Expressed Concerns, and Clinical Syndromes. It utilizes a dichotomous response format: True or False.

The MACI consists of 31 total scales: twelve Personality Patterns scales, eight Expressed Concerns scales, and seven Clinical Syndromes scales, plus three Modifying Indices, and a 2-item scale (VV) that identifies invalid test reports (test reliability). A brief description of each scale from the Millon Adolescent Clinical Inventory manual (1993) follows:

The *Personality Patterns* domain consists of the following twelve scales:

1 – Introversive: These adolescents are described as lacking the capacity to experience life as pleasurable or painful; apathetic and asocial, they neither strive to achieve rewards, nor seek to avoid punishment. This personality type is described as similar to the DSM-IV disorder of Schizoid personality disorder. Adolescents who fit this pattern type may have a passive-detached style of interacting with others.

2A – Inhibited: This personality pattern fits adolescents who have a diminished capacity to experience pleasure, yet are hyperalert and

sensitive to anticipated distress (pain). This adolescent is also likely to experience anxiety and anguish. This individual fits the active-detached pattern of interaction.

2B – Doleful: The Doleful personality type is similar to the Depressive personality disorder in the DSM-IV; this person experiences pain as a permanent event in their life with no hope for pleasure. Often there has been a significant loss in this adolescent's life, followed by giving up on hope that happiness may return at some point in the future.

3 – Submissive: This personality pattern contains elements consistent with the DSM-IV diagnosis of Dependent personality disorder. In the self-other dimension, the Submissive adolescent is almost wholly focused on others as a form of reinforcement or pleasure. These adolescents show a strong need for attention and external support, without which they experience anxiety and sadness. They wait passively for whatever comes to them.

4 – Dramatizing: Similarly dependent on others, the Dramatizing adolescent seeks to maximize attentive nurturance and protection. They do so, however, in an active, manipulative, often seductive, attention-seeking manner. The Dramatizing personality pattern closely aligns with the DSM-IV diagnostic category of Histrionic personality disorder.

5 – Egotistic: Turning exclusively to self for reinforcement and ignoring the balance appropriate in the self-other dimension, Egotistic adolescents display a self-image of superior worth, often as a result of overly doting parents. They expect others to recognize their inherent superiority, often without real achievement. These individuals will exploit others without thought or conscious intent. The Egotistic personality type is reminiscent of the DSM-IV Narcissistic personality disorder, and is considered a passive-independent style of interaction.

6A – Unruly: The Unruly style of interacting fits in the active-independent orientation. The Unruly adolescent exhibits traits consistent with the DSM-IV diagnosis of Antisocial personality disorder. These adolescents act out of a desire to obtain retribution for ills (real, perceived, or anticipated) suffered at the hands of others. They act in a hostile manner and engage in illegal, impulsive behaviors in order to gain strength, power, and revenge, exploiting others, taking, never giving of themselves.

6B – Forceful: The Forceful adolescent seeks or creates painful events. Unlike others, however, these adolescents experience some of these events as pleasurable and view pain (fear, cruelty) as the preferred mode of relating to others. These adolescents seek to control, dominate, and intimidate others and take pleasure from humiliating or demeaning others. This active-discordant

dimension of interaction is akin to the DSM-IV diagnosis of Sadistic personality disorder.

7 – Conforming: The Conforming personality type is similar to the Obsessive-Compulsive personality disorder in the DSM-IV. This person appears compliant and other-directed on the service, but is dominated by a fierce desire to assert self-oriented feelings. They deny their own feelings and wishes to avoid punishment (pain) and adopt the values of others. The tension brought on by this internal dichotomy causes psychological rigidity and physical tension, thus leading them to think and act in a perfectionistic manner.

8A – Oppositional: The active-ambivalent dimension of behavior expressed by the Oppositional adolescent arises out of their vacillation between self- and other-focus. These adolescents will occasionally act appropriately and at other times, act in defiance of others. Their feelings and behaviors may shift between guilt over not meeting the expectations of others to resistance and defiant negativism. This type of adolescent is similar to the DSM-IV negativistic personality.

8B – Self-Demeaning: Similar to the Forceful personality pattern, the Self-Demeaning adolescent has learned to prefer pain to pleasure. In this case, however, the Self-Demeaning adolescent is not causing others pain, but is the recipient, however passively, in their relationships with others. This individual interacts with others

in a self-sacrificing manner, intensifying their deficits, and placing themselves in inferior positions, allowing, if not inviting exploitation by others.

9 – Borderline Tendency: The Borderline Tendency is the most severely dysfunctional personality style in Millon's model; it may include elements of the previously discussed personality patterns, but to a more problematic degree. These individuals have more disorganized personalities and are less effective at coping with stressful situation. They are more likely to decompensate when faced with life stressors. The Borderline adolescent experiences conflicts across all dimensions: self-other, pleasure-pain, and active-passive; they tend to fluctuate from one extreme to the other and are highly labile in mood. Borderline adolescents often express thoughts related to suicide and may act on those or engage in self-mutilating behaviors. As expected, the Borderline Tendency personality pattern corresponds to the DSM-IV Borderline personality disorder.

The second defined domain, *Expressed Concerns,* consists of eight scales:

A – Identity Diffusion: This scale focuses on the tasks of the adolescent as they leave childhood behind and move towards adulthood, developing a sense of who they are, where they are going, and how they are going to get there. This may include

issues related to parent-child relationships, the capacity to establish independence, to become a member of a peer group, and the development of a sexual identity.

B – Self-Devaluation: Adolescence is a period of critical self-examination. The adolescent views herself against ideals that seem far out of their reach and struggles to reconcile the differences between the two perceptions. This may be affected by two factors: the presence of true deficits in the individual that may prevent them from attaining a certain level of achievement; and, the level of critical evaluation the adolescent subjects himself to during this period.

C – Body Disapproval: Physical growth and change are a part of adolescence; changes in shape, form, and attractiveness. Sexual development takes place. The adolescent is faced with changes that may or may not be in line with their hopes or expectations. In addition, the judgment of one's physical appearance and body image is also influenced by the perceptions of others. Negative peer or family attitudes can create or intensify facial- or body-image dissatisfaction.

D – Sexual Discomfort: From infancy onward, the process of filling a male or female role is developed. Sexual exploration occurs early in childhood then fades from attention during later childhood. Adolescence brings on new challenges and awareness of sexuality

from a position of new physical and emotional maturity and development, including the need to accept the changes that are taking place and to integrate a new sense of self as a sexual adult.

E – Peer Insecurity: Peer groups allow adolescents to practice relating to others at a common level of development. Adolescent peer groups are seen as sources both of dependency, as well as opportunities to try new elements of independence. Those adolescents with low self-esteem often fail to move into healthy balanced peer relationships and therefore are unable to move through the stages from dependency to self-confidence and autonomy.

F – Social Insensitivity: Individuals who score highly on this scale show a generalized indifference to the feelings and reactions of others. This is differentiated from overt hostility in that the person appears unmoved at the discomfort or pain of others. This adolescent may chose to remain isolated from others and advocate ideas that are contrary to the rights of others. Often these adolescents live diminished interpersonal lives with no desire to change; it is easier to not care than to change their behavior.

G – Family Discord: This scale assesses the adolescent's relationships within the family, along with his or her perceptions of what it should be like. Of note is that this scale assesses the adolescent's feelings and perceptions of the relationship, rather

than what may really exist. The scale addresses issues related to adolescent rebellion as well as the role that family plays in precipitating, intensifying, or solving conflict within the family.

H – Childhood Abuse: This scale was designed to elicit information pertaining to possible physical, sexual, or emotional abuse or neglect in the adolescent's background. As with the previous scale, this scale does not necessarily confirm the existence of any particular events, but rather assesses the adolescent's perception and recall of those events.

The third domain, *Clinical Syndromes,* consists of the following seven scales:

AA – Eating Dysfunctions: Eating disorders are the focus of this scale, targeting the various symptoms that meet criteria for anorexia nervosa and bulimia. Factors such as self-starvation, binge eating, and purging behaviors, as well as excessive body preoccupation and concern with weight are included.

BB – Substance-Abuse Proneness: The items in this scale ask questions regarding the use of drugs and alcohol. In addition, the scale attempts to bring to focus why the substance use occurs and what purpose it serves for the adolescent.

CC – Delinquent Predisposition: The focus of this scale is to assess the propensity of the adolescent to engage in problem-causing behaviors among family, friends, and teachers. The scale

addresses not only behaviors, but also feelings and cognitions that lead to acts against others.

DD – Impulsive Propensity: Impulsivity in adolescence is common as the adolescent deals with strong feelings and is required to learn and utilize the restraint required of a mature adult. The difficulty lies when the lack of restraint leads to behaviors that are beyond the bounds of what may be tolerated (despite the fact that society expects and makes allowances for certain adolescent behaviors).

EE – Anxious Feelings: This scale focuses on the elements of anxiety that could lead to an anxiety disorder. Symptoms addressed include generalized feelings of tension, inability to relax, somatic complaints, worry, and hyperalertness to the environment.

FF – Depressive Affect: The Depressive Affect scale contains items that assess the features of a dysthymic mood in adolescents. Symptoms assessed include depressed mood, low self-esteem, hopelessness, pessimistic outlook, loss of interest in pleasurable activities, and suicidal ideation (also assessed in the next scale).

GG – Suicidal Tendency: The features in this scale are geared toward identifying adolescents who may be at risk for suicide attempts, either through past history of attempts, or thought current thoughts about intentionally causing self-harm. Also assessed in this scale are feelings of emotional isolation, lack of social support networks, and feelings of alienation from peers.

Finally, the three Modifying Indices, Disclosure (X), Desirability (Y), and Debasement (Z) are used to gauge response tendencies of the adolescent test-taker and to adjust the base rate scores appropriately. Invalid profiles are noted based on significant elevations in the modification indices. Invalid profiles were not included in this research.

Reliability and validity studies of the MACI by the author were conducted in the test construction phase and showed acceptable levels. Internal consistency (alpha) analyses ranged from 0.73 to 0.91 with the initial development sample (n=579). Cross-validation samples (n=333) produced internal consistency rates that were very similar (alpha range= .69 - .90). Test-retest reliability analyses conducted three to seven days after the initial administration achieved correlations ranging from 0.57 to 0.92 (median stability = .82) (Millon, 1993). There are no published follow up item-level studies of the reliability of the MACI.

Scoring of the MACI is based on Base Rate scores. Raw scores are weighted and transformed into base rate scores using base rate transformation tables provided in Appendix C of the manual (Millon, 1993) or are done automatically when using computer scoring software. Base rates were developed based on prevalence rates of the characteristics represented by each of the MACI Personality Patterns, Expressed Concerns, and Clinical Syndromes in the target population. These prevalence rates were derived through clinician-rated judgments of the adolescents who were in the development sample.

Base rate scores range from 0 to 115. "Anchor points" were established by Millon to indicate meaningfulness: a base rate of 85 was established as the point at which a characteristic was most prominent in the population; a base rate of 75 was at the point where the characteristic was present, though not necessarily prominent or problematic in the population. The base rate of zero is equivalent to a raw score of zero; a base rate of 115 is equivalent to the maximum raw score for that scale (McCann, 1997). Based on the system described above, base rates were separately established for each scale within each age/gender grouping (e.g., 13-15 year old males, 13-15 year old females, 16-19 year old males, 16-19 year old females).

One limitation of using base rate statistics is that they are not equivalent across groups, but rather are specific to the group upon which the base rates were developed. Despite these limitations, base rate scores were utilized in this research due to the fact that raw scores are not interpretable in the MACI. All other research using the MACI has been conducted using base rate scores; this will enable the results of this research to be compared to past and future investigations of the MACI.

Revised Children's Manifest Anxiety Scale (RCMAS): The RCMAS is a 37-item self-report measure that is designed to measure the level and nature of anxiety in children and adolescents (ages 6-19) (Lee, Piersel, & Unruh, 1989; it is one of the most widely used instruments to assess anxiety in children and adolescents (Turgeon & Chartrand, 2003). The 37 items are written using language at a third-grade reading level and item response is via a Yes / No

response format. The RCMAS provides clinical data on three subscales, as well as a Total Anxiety rating, consisting of the sum of the three clinical subscales. It also includes a reliability/validity scale (Lie scale). Twenty-eight items measure anxiety and make up the Total Anxiety score while nine items assess social desirability and produce the Lie scale score. The three clinical subscales are: Worry / Oversensitivity, Physiological Anxiety, and Social Concerns / Concentration.

Scoring of the RCMAS consists of totaling the Yes responses. All Yes responses are indicative of some form of anxiety. Raw scores for each subscale, as well as Total Anxiety, are calculated and then converted to T-scores and percentiles utilizing norms tables in the RCMAS manual. Pathological elevations are identified as T>60.

The following provides a brief description of the constructs or general domains that are assessed by each scale (Reynolds, C.R., & Richmond, 1985):

Worry / Oversensitivity: The focus of this scale is to assess general levels of worry and rumination. The scale contains 11 total items such as “I worry a lot of the time,” “I am afraid of a lot of things,” and “I worry about what is going to happen.” The symptoms assessed by this scale are generally vague or nebulous worries in the test taker’s mind.

Physiological Anxiety: The physiological manifestations of anxiety are the targets for the physiological anxiety subscale. These include symptoms such as sleep problems, nausea, and fatigue. The subscale consists of ten items.

Social Concerns / Concentration: The Social Concerns / Concentration subscale consists of seven items. It is considered useful in identifying children who have school problems due to lack of concentration or attention that is anxiety based (as opposed to being caused by attention-deficit hyperactivity disorder, another common cause of school difficulties in children). The scale assesses thoughts and/or fears that are socially or interpersonally based.

The RCMAS has been researched extensively and has been found to have acceptable reliability and validity as a measure of general anxiety (Hagborg, 1991; Mattison, Bagnato, & Brubaker, 1988; Muris, Merckelbach, Ollendick, King, & Bogie, 2002). Normative data (broken down by age, gender, and ethnicity) is available for nearly 5000 children aged 6-19 years from 13 states (Reynolds, C.R. & Paget, 1981), as well as multiple reliability and validity studies since (Lee, Piersel, Friedlander, & Collamer, 1988; Reynolds, C.R., 1982; Wilson, Chibaiwa, Majoni, Masukume, & Nkoma, 1990). Studies that examined the internal consistency of the RCMAS have found acceptable levels of internal consistency (range= .79-.85) and test-retest reliability (e.g., 3 weeks, r=.90; 9 month, r=.68; Reynolds, C.R., 1982; Reynolds, C.R. & Richmond, 1978).

Reynolds Adolescent Depression Scale (RADS). The RADS is a 30-item self-reported questionnaire. It was developed both to measure symptoms related to depression, including cognitive, motoric-vegetative, somatic, and interpersonal symptoms (Reynolds, W.M., 1987, 1994). As noted by W.M. Reynolds (1987) in the manual for the RADS, the scale “is designed to assess symptomatology

associated with depression, and not to provide a diagnosis of a specific and definitive depressive disorder" (p. 1). Questions include items such as "I feel sad" and "I feel like crying," and responses are rated by the adolescent on a 4-point Likert scale (1=almost never, 2=hardly ever, 3=sometimes, and, 4=most of the time). The RADS was developed to assess symptomatology both in school and in clinical settings for adolescents ages 13 through 18.

The RADS provides a Depression Total score that represents the overall severity of depressive symptomatology. In addition, the RADS contains six critical items that may be indicative of a significant level of depression, despite the presence of a clinically elevated overall score. The RADS is a continuous score measure, which indicates that the higher the score on the scale, the greater the level of depressive symptomatology (Reynolds, W.M., 1987). In order to determine a cutoff score for significance, the frequency distribution of RADS scores in approximately 5000 adolescents, as well as covariance analyses with the Hamilton Depression Rating Scale were utilized. A cutoff score of 77 and above was determined to represent a level of symptom endorsement associated with clinical depression (Reynolds, W.M., 1987).

The RADS has been demonstrated to have excellent reliability and validity (Reynolds, W.M., 1994; Reynolds, W.M. & Mazza, 1998). Internal consistency reliability analyses by grade revealed coefficient alphas from .91 to .94 with a total of 2,402 students; by gender, the coefficient ranged from .90 - .94; split-half reliability for the total sample was .91 (Reynolds, W.M., 1987). Test-retest reliability analyses obtained a reliability coefficient of .80 at six weeks, .79 at

three months, and .63 at one year. The validity of the RADS has been evaluated in a number of studies examining the convergent and discriminant validity of the RADS (Atlas & DiScipio, 1992; Krefetz, Steer, Gulab, & Beck, 2002; Reynolds, W.M. & Mazza, 1998). Convergent validity analyses with the Beck Depression Inventory (BDI), Center for Epidemiological Studies-Depression Scale (CES-D), the Self-Rating Depression Scale, and the Children's Depression Inventory (CDI) resulted in correlation coefficients ranging from .68 to .76 ($p<.0001$) (Davis, N.L.F., 1990). Discriminant validity analyses found low magnitude negative correlations between the RADS and social desirability (-.25 and -.24), as well as low to negative correlations (.06 to -.24) with academic achievement (GPA) (Davis, N.L.F., 1990). The RADS has also been shown to be sensitive to changes due to treatment outcomes in depressed adolescents (Davis, N.L.F., 1990; Reynolds & Coates, 1986).

Design

This research project utilized the archival MACI data (individual item responses and subscale scores) from January 1994 to May 2003 to further examine the reliability (internal consistency) and validity (construct and concurrent validity) of the MACI as used with SED adolescents. Construct validity of the MACI was further established by conducting exploratory factor analyses of the subscales of the MACI using the principal components method. In addition, confirmatory factor analyses was utilized with the individual items and the subscales of the MACI in order to determine the goodness-of-fit of the existing scale/factor structure, as well as to confirm the presence of the higher-

order active vs. passive accommodation factors proposed by Millon. Concurrent validity of the MACI scales was examined by looking at other measures included in the standard intake assessment battery. Specifically, concurrent validity of the MACI with a measure of anxiety was conducted using the Revised Children's Manifest Anxiety Scale. In addition, concurrent validity of the MACI with a measure of depression was conducted using the Reynolds Adolescent Depression Scale.

Analyses

Hypothesis I: Internal consistency reliability analyses were computed for the individual subscales of the MACI using the items from the data set. Alpha levels near .70 - .90 were used as general guidelines in order to determine whether the subscales meet the criteria for moderate to high reliability. SPSS 11.5 was utilized for the analyses.

Hypothesis II: The originally stated factor structure (Millon, 1993) was used as the parameters (presumed latent factors) for the hypothesized factor structure of the data utilized in this study. Confirmatory factor analysis was used to test the goodness-of-fit of the presumed 27-factor, oblique (intercorrelated) model. Standardized residuals and overall maximum likelihood chi-squared values were calculated and interpreted in order to determine whether the model generated from the data was consistent with the proposed model. Due to the large sample size, however, the likelihood of the chi-squared value approaching significance was high, therefore multiple indices were utilized in order to assess goodness-of-fit as suggested by Stevens (2002). These include the following:

Joreskog and Sorbom's (1989) Goodness-of-Fit Index (GFI) and Adjusted-Goodness-of-Fit Index (AGFI), and Bentler and Bonnett's (1980) Normed Fit Index (NFI), and Nonnormed Fit Index (NNFI). Scores above .85 on the indices were considered indicative of models that provide a good fit to the data. The Goodness of Fit index (GFI) represents the covariation among the observed variables that can be accounted for by the hypothesized model. The Adjusted Goodness-of-Fit Index adjusts the GFI for degrees of freedom. Bentler and Bonnett's (1980) Normed Fit Index (NFI) and Nonnormed Fit Index (NNFI) compare the fit of the hypothesized model to a baseline or null model (Stevens, 2002) and determine the amount by which the hypothesized model improves the fit over the null model. Finally, the root mean square error of approximation (RMSEA) provides a standardized measure of error of approximation. Error of approximation refers to the lack of fit of the hypothesized model to the population. RMSEA measures a lack of fit per degree of freedom and, as opposed to the other fit indices, low scores (.08 or less) are representative of a close fit. CFA was conducted via the software package LISREL 8. As noted in Church and Burke (1994), it was possible that the CFA would reveal a poor fit of the original model due to the inherent complexities in personality theories. In that case, the model would be respecified based on the modification indices, as well as on substantive considerations (e.g., Millon's theoretical basis) in the hopes of achieving a better fit of the instrument to the model.

Hypotheses III: Confirmatory factor analysis was utilized with the subscales in the data set in order to attempt to confirm the presence of two sets of second order factors. The first, proposed by Millon, (a) an active mode of adaptation to the environment, and (b) a passive mode of accommodation to the environment, and a second set of higher order factors found by Romm, Bockian, and Harvey (1999), (a) internalizing traits or behaviors, and (b) externalizing traits or behaviors.

Hypotheses IV: Principal component analysis was utilized in order to attempt to reproduce the factors noted more recently by other investigators (e.g., Romm, Bockian, and Harvey, 1999; Salekin, 2002). Retention of factors for the analyses were based on the criteria used in prior research findings (e.g., Romm, Bockian, and Harvey, 1999; Salekin, 2002). The statistical process utilized by each investigator was used in this study. For replication of the Romm, Bockian, & Harvey (1999) study results, principal components analysis with varimax rotation was used with all 27 subscales; because 5 factors were found in the prior study, 5 factors were specified in the extraction criteria. For replication of the Salekin (2002) study, principal components analysis with varimax rotation was used with each domain separately (e.g., Personality Patterns, Expressed Concerns, Clinical Syndromes); 2 factors were specified in the extraction criteria for each. SPSS 11.5 was utilized for all analyses in hypothesis IV.

Hypotheses V & VI: The data from the MACI, along with the RCMAS and RADS, respectively, were examined in order to determine the concurrent validity of the subscales. Correlations (Pearson's r) were computed for corresponding

subscales of the MACI and RCMAS and RADS. Significance levels were set to $p < .001$ for all correlations due to the large number of correlation analyses being run and in order to minimize the possibility of obtaining Type II error results.

Chapter 4

Results

The results of the analyses performed in this research are presented in this chapter. The results for each analysis are given in order by hypothesis as presented in the introduction and methodology sections. A summary of results is included at the end of the chapter.

Reliability

In order to begin exploring the factorial structure of the MACI, it was first necessary to determine whether or not the individual scales met the criteria of internal consistency (reliability). Hypothesis I stated that the scales would be found to be moderately to highly reliable, as was found by Millon (1993). To test this hypothesis, internal consistency reliability analyses were computed for each of the subscales using coefficient alpha. The results of the analysis are presented in Table 3. Overall, the subscales were found to have high reliability (alpha = .90 - .98). The findings are consistent, if somewhat higher, with those found by Millon during the development phase of the scale. The high reliability levels are a function of the high inter-item correlations and the large number of items in each subscale (which contributes to alpha level).

Table 3

Reliability Analysis – Scale (alpha)

SCALE	ALPHA	ITEMS
PERSONALITY PATTERNS		
1 – INTROVERSIVE	.98	44
2A – INHIBITED	.97	37
2B – DOLEFUL	.97	24
3 – SUBMISSIVE	.98	48
4 – DRAMATIZING	.98	41
5 – EGOTISTIC	.97	39
6A – UNRULY	.97	39
6B – FORCEFUL	.96	22
7 – CONFORMING	.97	39
8A – OPPOSITIONAL	.98	43
8B – SELF-DEMEANING	.98	44
9 – BORDERLINE TENDENCY	.95	21
EXPRESSED CONCERNS		
A – IDENTITY DIFFUSION	.97	32
B – SELF-DEVALUATION	.97	38
C – BODY DISAPPROVAL	.95	17
D – SEXUAL DISCOMFORT	.97	37
E – PEER INSECURITY	.95	19
F – SOCIAL INSENSITIVITY	.97	39
G – FAMILY DISCORD	.96	28
H – CHILDHOOD ABUSE	.96	24
CLINICAL SYNDROMES		
AA – EATING DYSFUNCTIONS	.96	20
BB – SUBSTANCE-ABUSE PRONENESS	.98	35
CC – DELINQUENT PREDISPOSITION	.97	34
DD – IMPULSIVE PROPENSITY	.95	24
EE – ANXIOUS FEELINGS	.98	42
FF – DEPRESSIVE AFFECT	.97	33
GG – SUICIDAL TENDENCY	.97	25
MODIFYING INDICES		
X – DISCLOSURE	---	
Y – DESIRABILITY	.90	17
Z – DEBASEMENT	.96	16

Confirmatory Factor Analysis

The purpose of this analysis (hypothesis II) was to determine whether Millon's instrument accurately measures or describes adolescent psychopathology along the factors or scales that it is designed to assess. Initial confirmatory factor analyses at the item level were unsuccessful due to the large number of parameters (> 2400) specified in the model and produced estimated results that were considered unreliable. When the MACI was developed, the original scales consisted of items that were allowed to load on only one scale; these items were given a weight of 3. Factor analyses of the original scales produced additional items that were added or deleted based on theoretical grounds and consistency with the underlying theory; these items were weighted 1 or 2.

For this study, the initial analysis consisted of specifying all 27 factors with all item loadings (see Table 3 for a listing of all scales and the number of items per scale) listed in the MACI manual. In order to reduce the number of parameters, the item loadings were then respecified according to Millon's original theoretical basis and limited to only those items that were in the original form of the subscale and assigned a weight of 3. The results were indicative of a lack of simple structure and no clear unique determination due to extremely high factor intercorrelations and loadings of each variable on multiple factors; according to the modification indices, nearly half of the remaining items could have been added to most scales and improved their fit significantly. Due to these

circumstances, and the overall lack of simple structure, it was not possible to respecify the model as originally hoped and still retain any semblance to the original purpose of the scale (i.e., the purported model). The fit indices (χ^2 (7200) = 12733, $p < .001$) indicated a poor fit (GFI = .62, RMSEA = .05); the indices that adjust for model parsimony also indicated a lower estimation of the fit of this sample to the model (AGFI = .59; PGFI = .58). As noted in Chapter 3, chi-squared values are inflated due to the large sample size and thus are used as more of a descriptive index of fit in this case as compared to the other fit indices.

In order to attempt to reduce the potential numbers of intercorrelations and to determine whether there was simple structure within each domain, the three domains, Personality Patterns (12 subscales), Clinical Syndromes (8 subscales), and Expressed Concerns (7 subscales), were analyzed separately. Those results are presented in Table 4. Overall, the results continue to demonstrate only fair fit, with evidence of significant scale intercorrelations (Personality Patterns subscales range = .49 - .96; Expressed Concerns subscales range = .72 – 1.00; Clinical Syndromes subscales range = .72 – 1.00) and multiple item loadings across subscales.

Of the three domains, the Clinical Syndromes subscales came closest to meeting the criteria of this study for a “good” fit (.85 and above on the fit indices) with the model proposed by Millon [(χ^2 (7200) = 12733, $p < .001$); NFI = .86; NNFI = .90); however, again, the parsimony indices, which account for the higher number of parameters by adjusting for degrees of freedom, reflect only a fair fit for the model (AGFI = .71; PGFI = .66).

Table 4

Overall Goodness-of-Fit Indices for Millon Adolescent Clinical Inventory

Model	χ^2	df	χ^2/df	RMSEA	GFI	NFI	NNFI	AGFI	PGFI
Millon's 27 Factor Model (base items)	12733.52	7200	1.77	.05	.62	.75	.87	.59	.58
Personality Pattern scales	6061.47	3249	1.87	.05	.69	.79	.88	.67	.65
Expressed Concerns scales	3518.16	674	5.22	.13	.60	.71	.73	.53	.51
Clinical Syndromes scales	2409.51	881	2.73	.08	.74	.86	.90	.71	.66

Confirmatory factor analyses at the subscale level were conducted separately on both the Personality Patterns subscales and the Clinical Syndromes subscales in order to establish the presence or absence of two higher order constructs or factors, Active versus Passive (Personality Patterns) and Internalizing versus Externalizing (Clinical Syndromes). It was hypothesized that the Personality Patterns subscales would be subsumed under two higher order factors, the Active and Passive dimensions of adaptation to one's environment. It was specified in the analysis that scales 1 (Introversive), 2B (Doleful), 3 (Submissive), 5 (Egotistic), 7 (Conforming), and 8B (Self-Demeaning) will load on a "passive" factor and that scales 2A (Inhibited), 4 (Dramatizing), 6A (Unruly), 6B (Forceful), and 8A (Oppositional) will load on an "active" adaptation factor. Due to the nature of the personality pattern or type described by scale 9

(Borderline Tendency), it was assumed to load on both the Active and Passive factors.

Results of the analyses are listed in Table 5. The results were indicative of a poor fit to the model (χ^2 (3301) = 7247.46, $p < .001$; $\chi^2/df = 2.20$); RMSEA = .07; GFI = .62; NFI = .75), and obviously below the conventional parameters for a "good" fit (>.85). When the parsimony indices are examined the overall fit decreases even more (AGFI = .60; PGFI = .59). Only one subscale (Introversive) had a significant positive loading (.96) on the Passive factor. There were significant negative loadings by six subscales ranging from -0.68 to -1.00. The Active factor consisted of significant unique positive loadings of five subscales ranging from 0.84 to 0.96.

Analysis of the modification indices for this analysis was not possible. Despite 1000 iterations, the results did not converge. In other words, the solution could not be computed because there was no possible clear solution.

The fit results improve somewhat with the second higher order analysis conducted with the data. It was hypothesized that a higher order factor would underlie the Clinical Syndromes scales. It was specified in the analysis that scales AA (eating Dysfunction), BB (Substance-Abuse Proneness), EE (Anxious Feelings), FF (Depressive Affect), and GG (Suicidal Tendency) will load on an "internalizing" factor and that scales CC (Delinquent Predisposition) and DD (Impulsive Propensity) will load on an "externalizing" factor.

The examination of the Clinical Syndromes subscales for the presence of two higher order factors, Internalizing and Externalizing, again produced a

significant chi-square, χ^2 (894) = 2632.53, $p < .001$; $\chi^2/df = 2.94$. Results of the analyses are displayed in Table 6. The fit indices results (GFI = .72; NFI = .85; NNFI = .89) ranged from poor to good. The parsimony indices however, adjusting for the parameters in the model, were lower (AGFI = .69; PGFI = .65). For the Internalizing factor, five scales had significant and unique loadings that ranged from 0.90 to 0.95. For the Externalizing factor, two scales had significant and unique loadings that ranged from 0.85 to 1.00. Examination of the correlation matrices also indicate that the two factors are highly intercorrelated (KSI = .96).

Table 5

Goodness-of-Fit Indices: Active – Passive Dimensions

Model	χ^2	df	χ^2/df	RMSEA	GFI	NFI	NNFI	AGFI	PGFI
Active-Passive Dimensions	7247.46	3301	2.20	.07	.62	.75	.84	.60	.59

Table 6

Goodness-of-Fit Indices: Internalizing – Externalizing Dimensions

Model	χ^2	df	χ^2/df	RMSEA	GFI	NFI	NNFI	AGFI	PGFI
Internalizing - Externalizing Dimensions	2632.53	894	2.94	.08	.72	.85	.89	.69	.65

Principal Components Analysis

Previous researchers have conducted principal components analyses with the MACI and have obtained results that range from five factors (Romm, Bockian, and Harvey, 1999) to six factors (Salekin, 2002). Because both prior researchers used principal components analysis with varimax rotation (with Kaiser normalization), the same was utilized in this study. In the first analysis, an attempt was made to replicate the findings of Romm, Bockian, and Harvey (1999). Five factors were specified in the extraction criteria for this first analysis.

Five factors with eigenvalues greater than 1 were obtained accounting for 81.5% of the variance. Table 7 contains the information on the five factors and all factor loadings above .30.

Factor 1, which defines a Negative Self-Evaluation Depressive dimension, accounted for 31.9% of the variance in this sample (eigenvalue = 9.57). This factor strongly resembles an Internalizing component. Factor 2 defines an Aggressive, Impulsive, Antisocial dimension and accounted for 25.6% of the variance in the sample (eigenvalue = 7.67). Factor 2 contains elements that are consistent with an Externalizing dimension. Factor 3 is an Introverted, Socially Insecure dimension. Factor 3 accounted for 12.6% of the variance in the sample (eigenvalue = 3.79). Factor 4 accounted for 7.9% of the variance (eigenvalue = 2.38) and is a Negative Body (Self) Image / Eating Disordered dimension. The last factor, Factor 5, accounted for 3.5% of the variance (eigenvalue = 1.05) and included moderate loadings on Sexual Discomfort (.583) and Childhood Abuse (.472).

Romm, Bockian, and Harvey (1999) reported a factor they called a Defiant Externalizing dimension, which accounted for 25.1% of the variance. This is consistent with the second factor produced in this study labeled the Aggressive, Impulsive, Antisocial dimension. The first factor generated by this sample, the Negative Self-Evaluation, Depressive dimension, was consistent with Romm, Bockian, and Harvey's (1999) second factor, labeled Intrapunitive Ambivalent, which accounted for 23.9% of the total variance in their sample.

The third identified factor in this study was labeled the Introverted, Socially Insecure dimension. This was structurally consistent with the third factor derived in Romm, Bockian, and Harvey's (1999) study, interpreted as Inadequate Avoidant, which accounted for 13.3% of the variance. The fourth factor identified in this study is a Negative Body (Self) Image / Eating Disordered dimension. Factor IV in Romm, Bockian, and Harvey (1999) was labeled as a Self-Deprecating Depressed dimension and it accounted for 9.4% of the variance. Structurally, the subscales and factor loadings were nearly identical. Finally, the fifth factor found by Romm, Bockian, and Harvey (1999), which they labeled Reactive Abused, bore slight resemblance to the fifth factor found in this analysis, which included loadings on Sexual Discomfort and Childhood Abuse.

Table 7

PCA of all MACI scales

	Component				
	1	**2**	**3**	**4**	**5**
Disclosure (X)	.784	.331			
Desirability (Y)			-.571		.528
Debasement (Z)	.843		.307		
Introversive (1)	.510		.706		
Inhibited (2A)	.396	-.436	.644		
Doleful (2B)	.869				
Submissive (3)		-.869			
Dramatizing (4)	-.559		-.742		
Egotistic (5)	-.660		-.560	-.343	
Unruly (6A)		.874			
Forceful (6B)		.861			
Conforming (7)	-.596	-.644			
Oppositional (8A)	.730	.473			
Self-Demeaning (8B)	.815				
Borderline Tendency (9)	.755	.340			
Identity Diffusion (A)	.705	.305	.359		
Self-Devaluation (B)	.789		.355	.392	
Body Disapproval (C)	.475			.810	
Sexual Discomfort (D)	-.380	-.523			.583
Peer Insecurity (E)	.324		.715		
Social Insensitivity (F)	-.352	.755			
Family Discord (G)	.438	.606	-.316		
Childhood Abuse (H)	.616				.472
Eating Dysfunctions (AA)	.425			.848	
Substance-Abuse Proneness (BB)	.330	.803			
Delinquent Predisposition (CC)		.830			
Impulsive Propensity (DD)	.341	.803			
Anxious Feelings (EE)		-.877			
Depressive Affect (FF)	.822		.307	.324	
Suicidal Tendency (GG)	.824				

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a Rotation converged in 9 iterations.

In the next set of analyses, the attempt was made to replicate the findings of Salekin (2002). For these analyses, 2 factors were produced for each domain. The twelve Personality Patterns subscales revealed two factors which together accounted for nearly 80% of the variance. The first factor accounted for 44.8% of the variance (eigenvalue = 5.37) and had substantial loadings by six scales. It strongly resembled the factor identified by Salekin (2002) which included components of inhibition, abasement, downheartedness, and introversion, and accounted for 54.4% of the variance. The second factor identified in this study appeared to be an Unruly, Non-conforming, Oppositional type. This factor accounted for 33% of the variance. Factor two was also strongly consistent with the second factor identified by Salekin (2002), although the second factor produced in that analysis only accounted for 13.4% of the variance. Results of the analysis are presented in the following table.

Table 8

PCA of MACI Personality Patterns subscales

	Component	
	1	**2**
Introversive (1)	.847	-.127
Inhibited (2A)	.814	-.378
Doleful (2B)	.834	.235
Submissive (3)		-.884
Dramatizing (4)	-.898	
Egotistic (5)	-.918	
Unruly (6A)	-.322	.849
Forceful (6B)		.877
Conforming (7)	-.529	-.770
Oppositional (8A)	.566	.686
Self-Demeaning (8B)	.778	.296
Borderline Tendency (9)	.577	.563

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.
a Rotation converged in 3 iterations.

Factor analysis of the eight Expressed Concerns subscales also produced two interpretable factors. Table 9 shows the results of the factor analysis of the Expressed Concerns subscales. The two factors somewhat resembled those found by Salekin (2002). Together these factors made up 68.5% of the variance. The first factor (eigenvalue = 3.34) resembled a Negative Self-Image, Overly Sensitive type and accounted for 41.7% of the variance. This was somewhat similar to the second factor found by Salekin (2002) which had similar positive loadings on Body Disapproval and Self-Devaluation, and a negative loading on Social Insensitivity. Factor one also had a moderate loading (.64) for Childhood Abuse, which appears consistent with what is known about the effects of childhood abuse on body image, sense of self, and general level of sensitivity.

Factor two included a high positive loading (.84) on Family Discord and a high negative loading (-.80) on Sexual Discomfort, as well as moderate loadings on Identity Diffusion and Peer Insecurity. This may reflect the difficulties of adolescence as the individual separates from his family and yet is not secure in himself or his relationship with his peers. The high negative loading on Sexual Discomfort combined with the other results may be reflective of an adolescent seeking to establish relationships or intimacy (emotional closeness) through sexual behavior(s).

Table 9

PCA of MACI Expressed Concerns subscales

	Component	
	1	**2**
Identity Diffusion (A)	.641	.535
Self-Devaluation (B)	.921	.229
Body Disapproval (C)	.832	
Sexual Discomfort (D)		-.795
Peer Insecurity (E)	.729	-.268
Social Insensitivity (F)	-.662	.525
Family Discord (G)		.838
Childhood Abuse (H)	.641	.348

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.
a Rotation converged in 3 iterations.

Table 10

PCA of MACI Clinical Syndromes subscales

	Component	
	1	**2**
Eating Dysfunctions (AA)		.816
Substance-Abuse Proneness (BB)	.869	.297
Delinquent Predisposition (CC)	.838	-.426
Impulsive Propensity (DD)	.851	.191
Anxious Feelings (EE)	-.908	.105
Depressive Affect (FF)		.932
Suicidal Tendency (GG)	.176	.882

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.
a Rotation converged in 3 iterations.

As noted in Table 10, principal components analysis of the Clinical Syndromes subscales resulted in two interpretable factors that accounted for 81% of the variance. The first factor produced accounted for 43.4% of the variance (eigenvalue = 3.04) and represented an Impulsive Antisocial dimension (Externalizing), with high scores on Substance Abuse and a significant negative loading on Anxious Feelings. This factor was similar to the second factor produced in Salekin's (2002) study which accounted for 31.3% of the variance in his sample.

Factor two accounted for 37.6% of the variance (eigenvalue = 2.63) and represented an Internalizing dimension with elements consistent with depression, suicidal ideation, and eating dysfunction. Again, there were strong similarities between this factor and the first factor revealed in Salekin's (2002) study, with consistent loadings across scales.

Concurrent Validity Analyses

Revised Children's Manifest Anxiety Scale (RCMAS). Of the total sample of 450 adolescents, 315 also completed the RCMAS. It was hypothesized that elevations on the RCMAS would correlate highly with elevations on subscales of the MACI that assess elements of anxiety (hypothesis V). Specific subscales include Anxious Feelings (EE), Identity Diffusion (A), Self-Devaluation (B), Peer Insecurity (E), and Inhibited (2A) subscales. Conversely, elevations on the RCMAS should not correlate highly with elevations on MACI subscales that assess a construct in opposition or unrelated to anxiety, such as Social Insensitivity (F) and Egotistic (5).

Because of the high intercorrelations of the MACI subscales a more stringent significance value (Bonferroni correction) was applied ($p < .001$) in order to reduce the risk of Type II error. As noted in Table 8, the RCMAS corresponds highly with a large number of subscales of the MACI. Consistent with the hypotheses, there was a significant association between the RCMAS total anxiety score and the Identity Diffusion (A) scale, $r = .53$, $p < .001$, Self-Devaluation (B) scale, $r = .69$, $p < .001$, Peer Insecurity (E) scale, $r = .42$, $p < .001$, and Inhibited (2A) scale, $r = .47$, $p < .001$. In total, there were significant positive associations between the RCMAS total anxiety score and 15 MACI subscales. There were significant negative associations between the RCMAS total anxiety score and 6 MACI subscales. As hypothesized, there were significant inverse correlations between the RCMAS total anxiety score and the

Social Insensitivity (F) scale, $r = -.45$, $p < .001$, as well as the Egotistic (5) scale, $r = -.68$, $p < .001$.

Considering that only 6 MACI subscales failed to correlate with the RCMAS, it is interesting to note that the Anxious Feelings (EE) scale failed to achieve significance at the more stringent $p < .001$ level ($r = .15$, $p = .009$), despite the fact that the EE scale is highly correlated with most of the other subscales.

Table 11

Concurrent Validity – RCMAS

PERSONALITY PATTERNS		Total RCMAS Score
BR_1	Pearson Correlation	.461(**)
Introversive	Sig. (2-tailed)	**< .001**
	N	315
BR_2A	Pearson Correlation	.467(**)
Inhibited	Sig. (2-tailed)	**< .001**
	N	315
BR_2B	Pearson Correlation	.634(**)
Doleful	Sig. (2-tailed)	**< .001**
	N	315
BR_3	Pearson Correlation	-.043
Submissive	Sig. (2-tailed)	.443
	N	315
BR_4	Pearson Correlation	-.560(**)
Dramatizing	Sig. (2-tailed)	**< .001**
	N	315
BR_5	Pearson Correlation	-.676(**)
Egotistic	Sig. (2-tailed)	**< .001**
	N	315
BR_6A	Pearson Correlation	-.129
Unruly	Sig. (2-tailed)	.022
	N	315
BR_6B	Pearson Correlation	-.004
Forceful	Sig. (2-tailed)	.945
	N	315
BR_7	Pearson Correlation	-.442(**)
Conforming	Sig. (2-tailed)	**< .001**
	N	315
BR_8A	Pearson Correlation	.442(**)
Oppositional	Sig. (2-tailed)	**< .001**
	N	315
BR_8B	Pearson Correlation	.603(**)
Self-Demeaning	Sig. (2-tailed)	**< .001**
	N	315
BR_9	Pearson Correlation	.516(**)
Borderline	Sig. (2-tailed)	**< .001**
Tendency	N	315

** Correlation is significant at the 0.001 level (2-tailed).

Table 11 (con't)

Concurrent Validity – RCMAS

EXPRESSED CONCERNS		Total RCMAS Score
BR_A	Pearson Correlation	.530(**)
Identity Diffusion	Sig. (2-tailed)	**< .001**
	N	315
BR_B	Pearson Correlation	.689(**)
Self-Devaluation	Sig. (2-tailed)	**< .001**
	N	315
BR_C	Pearson Correlation	.533(**)
Body Disapproval	Sig. (2-tailed)	**< .001**
	N	315
BR_D	Pearson Correlation	-.180(**)
Sexual	Sig. (2-tailed)	**.001**
Discomfort	N	315
BR_E	Pearson Correlation	.420(**)
Peer Insecurity	Sig. (2-tailed)	**< .001**
	N	315
BR_F	Pearson Correlation	-.449(**)
Social	Sig. (2-tailed)	**< .001**
Insensitivity	N	315
BR_G	Pearson Correlation	.168
Family Discord	Sig. (2-tailed)	.003
	N	315
BR_H	Pearson Correlation	.524(**)
Childhood Abuse	Sig. (2-tailed)	**< .001**
	N	315

** Correlation is significant at the 0.001 level (2-tailed).

Table 11 (con't)

Concurrent Validity – RCMAS

CLINICAL SYNDROMES		Total RCMAS Score
BR_AA	Pearson Correlation	.506(**)
Eating	Sig. (2-tailed)	**< .001**
Dysfunctions	N	314
BR_BB	Pearson Correlation	.212(**)
Substance-Abuse	Sig. (2-tailed)	**< .001**
Proneness	N	314
BR_CC	Pearson Correlation	-.324(**)
Delinquent	Sig. (2-tailed)	**< .001**
Predisposition	N	314
BR_DD	Pearson Correlation	.126
Impulsive	Sig. (2-tailed)	.025
Propensity	N	314
BR_EE	Pearson Correlation	.146
Anxious Feelings	Sig. (2-tailed)	.009
	N	314
BR_FF	Pearson Correlation	.686(**)
Depressive Affect	Sig. (2-tailed)	**< .001**
	N	314
BR_GG	Pearson Correlation	.636(**)
Suicidal	Sig. (2-tailed)	**< .001**
Tendency	N	314

** Correlation is significant at the 0.001 level (2-tailed).

Reynolds Adolescent Depression Scale (RADS). Of the total sample of 450 adolescents, 413 also completed the RADS. It was hypothesized that elevations on the RADS would correlate highly with elevations on subscales of the MACI that assess elements of depression (hypothesis VI). Specific subscales include the Doleful (2B), Self-Demeaning (8B), Self-Devaluation (B), Family Discord (G), Childhood Abuse (H), Eating Dysfunctions (AA), Depressive Affect (FF), and Suicidal Tendency (GG) scales. In addition, elevations on the RADS are hypothesized to be inversely correlated to scores on the Egotistic (5), Unruly (6A), Social Insensitivity (F), and Impulsive Propensity (DD) scales.

As with the RCMAS, due of the high intercorrelations of the MACI subscales Bonferroni correction was applied ($p < .001$) in order to reduce the risk of Type II error. As noted in Table 9, the RADS corresponds highly with a large number of subscales of the MACI. Consistent with the hypotheses, there was a significant association between the RADS depression total score and the Doleful (2B), $r = .75$, $p < .001$, Self-Demeaning (8B), $r = .66$, $p < .001$, Self-Devaluation (B), $r = .74$, $p < .001$, Family Discord (G), r - .25, $p < .001$, Childhood Abuse (H), $r = .56$, $p < .001$, Eating Dysfunctions (AA), $r = .54$, $p < .001$, Depressive Affect (FF), $r = .79$, $p < .001$, and Suicidal Tendency (GG) scale, $r = .76$, $p < .001$.

The RADS depression total score also inversely correlated with the predicted subscales, including Egotistic (5), $r = -.74$, $p < .001$, Social Insensitivity (F), $r = -.41$, $p < .001$. Despite prediction, the RADS depression total score did not inversely correlate with the Impulsive Propensity scale, but rather had a low, but significant positive correlation ($r = .17$, $p < .001$). In addition, the RADS did

not meet the hypothesized inverse correlation with the Unruly (6A) subscale ($r = -.10$, $p = .04$). In examining the specific subscale items for the Unruly scale, it appears that the lack of correlation is accurate and the hypothesized relationship was inaccurate. The scales are inherently unrelated and, therefore, the lack of correlation is appropriate.

Table 12

Concurrent Validity – RADS

PERSONALITY PATTERNS		Total RADS Score
BR_1	Pearson Correlation	.510(**)
Introversive	Sig. (2-tailed)	**< .001**
	N	413
BR_2A	Pearson Correlation	.487(**)
Inhibited	Sig. (2-tailed)	**< .001**
	N	413
BR_2B	Pearson Correlation	.753(**)
Doleful	Sig. (2-tailed)	**< .001**
	N	413
BR_3	Pearson Correlation	-.202(**)
Submissive	Sig. (2-tailed)	**< .001**
	N	413
BR_4	Pearson Correlation	-.658(**)
Dramatizing	Sig. (2-tailed)	**< .001**
	N	413
BR_5	Pearson Correlation	-.739(**)
Egotistic	Sig. (2-tailed)	**< .001**
	N	413
BR_6A	Pearson Correlation	-.101
Unruly	Sig. (2-tailed)	.041
	N	413
BR_6B	Pearson Correlation	.057
Forceful	Sig. (2-tailed)	.246
	N	413
BR_7	Pearson Correlation	-.571(**)
Conforming	Sig. (2-tailed)	**< .001**
	N	413
BR_8A	Pearson Correlation	.559(**)
Oppositional	Sig. (2-tailed)	**< .001**
	N	413
BR_8B	Pearson Correlation	.664(**)
Self-Demeaning	Sig. (2-tailed)	**< .001**
	N	413
BR_9	Pearson Correlation	.588(**)
Borderline	Sig. (2-tailed)	**< .001**
Tendency	N	413

** Correlation is significant at the 0.001 level (2-tailed).

Table 12 (con't)

Concurrent Validity – RADS

EXPRESSED CONCERNS		Total RADS Score
BR_A	Pearson Correlation	.603(**)
Identity Diffusion	Sig. (2-tailed)	**< .001**
	N	413
BR_B	Pearson Correlation	.739(**)
Self-Devaluation	Sig. (2-tailed)	**< .001**
	N	413
BR_C	Pearson Correlation	.588(**)
Body Disapproval	Sig. (2-tailed)	**< .001**
	N	413
BR_D	Pearson Correlation	-.266(**)
Sexual	Sig. (2-tailed)	**< .001**
Discomfort	N	413
BR_E	Pearson Correlation	.454(**)
Peer Insecurity	Sig. (2-tailed)	**< .001**
	N	413
BR_F	Pearson Correlation	-.410(**)
Social	Sig. (2-tailed)	**< .001**
Insensitivity	N	413
BR_G	Pearson Correlation	.251(**)
Family Discord	Sig. (2-tailed)	**< .001**
	N	413
BR_H	Pearson Correlation	.585(**)
Childhood Abuse	Sig. (2-tailed)	**< .001**
	N	413

** Correlation is significant at the 0.001 level (2-tailed).

Table 12 (con't)

Concurrent Validity – RADS

CLINICAL SYNDROMES		Total RADS Score
BR_AA	Pearson Correlation	.536(**)
Eating	Sig. (2-tailed)	**< .001**
Dysfunctions	N	412
BR_BB	Pearson Correlation	.292(**)
Substance-Abuse	Sig. (2-tailed)	**< .001**
Proneness	N	412
BR_CC	Pearson Correlation	-.321(**)
Delinquent	Sig. (2-tailed)	**< .001**
Predisposition	N	412
BR_DD	Pearson Correlation	.169(**)
Impulsive	Sig. (2-tailed)	**.001**
Propensity	N	412
BR_EE	Pearson Correlation	.040
Anxious Feelings	Sig. (2-tailed)	.412
	N	412
BR_FF	Pearson Correlation	.787(**)
Depressive Affect	Sig. (2-tailed)	**< .001**
	N	412
BR_GG	Pearson Correlation	.764(**)
Suicidal	Sig. (2-tailed)	**< .001**
Tendency	N	412

** Correlation is significant at the 0.001 level (2-tailed).

Summary of Results by Hypotheses

Hypothesis 1: To test the internal consistency reliability of the Millon Adolescent Clinical Inventory, coefficient alpha's were computed for all subscales. The subscales were found to have high reliability (alpha = .90 - .98). The findings are consistent with those reported by Millon, although the alpha levels found in this study were higher.

Hypothesis 2: Confirmatory factor analysis was used to test the goodness-of-fit of an oblique 27 factor model in concordance with Millon's proposed theoretical scale structure. It was hypothesized that the item factor loadings would show low fitted residuals and that the overall fit indices would show results above .85. This hypothesis was not supported by the data. Fit indices indicated only a poor to fair fit, with a range from .59 - .90 and the modification indices indicated a saturated model with no clear or independent factor solution.

Hypothesis 3: Confirmatory factor analysis was used to confirm the presence of 2 pairs of higher order factors. The first pair, Active versus Passive was hypothesized to underlie the Personality Patterns subscales. This hypothesis was rejected when the fit indices did not indicate a good fit value (GFI = .62; AGFI = .60). In addition, the model was unable to be reliably computed despite over 1000 iterations. The second pair or higher order factors, Internalizing versus Externalizing were hypothesized to underlie the Clinical Syndromes subscales. This hypothesis, also, must be rejected. Although some fit indices came significantly closer to the level required to meet the hypothesis

(NFI = .85; NNFI = .89), the more parsimonious indices indicated only a poor to fair fit to the model (AGFI = .69; PGFI = .65). The two factors were also shown to be highly intercorrelated (KSI = .87), thus no simple solution was feasible.

Hypothesis 4: Principal components analysis was utilized to determine the factor structure of the Millon Adolescent Clinical Inventory. Varimax rotation with Kaiser normalization was used in order to maintain consistency with prior research. The hypothesized relationships with factors derived from prior research were supported. Five factors similar in content and loadings were produced in the comparison with the findings of Romm, Bockian, and Harvey (1999). Six factors, two from each domain, were produced in the replication of Salekin's (2002) research, with high consistency across factors in terms of content and factor loadings.

Hypothesis 5: The Anxious Feelings (EE), Identity Diffusion (A), Self-Devaluation (B), Peer Insecurity (E), and Inhibited (2A) subscales of the Millon Adolescent Clinical Inventory were hypothesized to correlate with the Revised Children's Manifest Anxiety Scale (RCMAS) total anxiety score. Results indicated that the MACI subscales correlated significantly ($p < .001$) with the RCMAS total anxiety scale in support of the hypothesis, with the exception of the Anxious Feelings (EE) subscale, which did not meet criteria for significance ($p < .009$). It is also important to note, however, that there were significant correlations between many MACI subscales and the RCMAS that theoretically should not have occurred. Overall, the RCMAS had significant correlations with

twenty-one of the twenty-seven MACI subscales. The MACI appears to lack discriminant validity based on the results of these analyses.

Hypothesis 6: The Doleful (2B), Self-Demeaning (8B), Self-Devaluation (B), Family Discord (G), Childhood Abuse (H), Eating Dysfunctions (AA), Depressive Affect (FF), and Suicidal Tendency (GG) scales of the Millon Adolescent Clinical Inventory were hypothesized to correlate with the Reynolds Adolescent Depression Scale (RADS) depression total scale. The hypothesized correlations were supported with two exceptions. Again, it is important to note that there were significant correlations between many MACI subscales and the RADS that theoretically should not have been present. Overall, there were significant correlations between twenty-four of the MACI subscales and the RADS.

Chapter 5

Discussion

This was the first investigation to subject the Millon Adolescent Clinical Inventory to rigorous statistical analysis in order to determine the validity of the underlying subscale structure. This is relevant because the MACI is so widely used across a variety of clinical settings. Decisions regarding placement, treatment, and diagnosis are influenced by this instrument. Millon states in the MACI manual that the MACI is a tool for developing diagnoses and treatment plans, and is useful as an outcomes measure. He places emphasis on the work that was done to improve the MACI over its predecessor, the Millon Adolescent Personality Inventory (MAPI), and the importance of the scales' accurate assessment of issues faced by adolescents. Unfortunately, while the scale may indeed address issues related to adolescents, the format in which data is reported and interpreted from the scale does not accurately reflect those issues.

The primary goal of this research was to utilize confirmatory factor analysis in order to confirm the presence of the 27 scale structure (hypothesis II). This investigation revealed a highly intercorrelated structure where the items and factors are not independent of each other. Attempts to reduce the factor structure and derive a simpler structured model were unsuccessful due to the high item intercorrelations. Examination of the modification indices suggested that almost any item could have been added to almost any scale in order to "improve" the fit, thus suggesting at least the existence of a single underlying factor solution, rather than a set of 27 separate factors. This overall factor may

be more related to distress level, and/or the willingness of the adolescent to admit to distress. This finding is also consistent with the lack of a number of reverse-scored items in the MACI. This adds to the weakness of the scale in terms of the ability of the measure to address acquiescence-response biases and may make it more susceptible to adolescents who are more "True" saying, or willing to endorse the existence of problems.

Reliability of the scales was confirmed (for hypothesis I), as was the high level of intercorrelations among the items as well as the subscales (all correlations were at least .49 or above). The high item intercorrelations as well as the scale correlations obviously would have directly influenced the high coefficient alpha levels.

Factor analytic findings (hypothesis IV) are consistent with those of previous researchers. Overall, principal components analysis of the full scale supported the presence of two strong and possibly two weaker factors. These are consistent with prior research into the MACI (Romm, Bockian, & Harvey, 1999). When analyses were conducted of the three domains separately (Personality Patterns, Expressed Concerns, and Clinical Syndromes), two factors were extracted for each domain. Again, this was consistent with the results of prior research (Salekin, 2002). In both sets of analyses, two significant and unique factors were identified that appeared to represent Internalizing and Externalizing dimensions. These emerged as the two primary factors from the comparison with the Romm, Bockian, and Harvey (1999) research, and as the two factors that developed in the analysis of the Clinical Syndromes subscales

during the comparison with the Salekin (2002) study results. These findings suggest that the MACI may be more useful as a measure of a few broad or higher-order dimensions rather than a measure of a large number of distinct diagnostic categories. If this is indeed the case, then it is unsurprising that the confirmatory factor analysis was unable to provide support for a twenty-seven factor solution.

Concurrent validity analyses of the MACI provided support for the correlation of the MACI scales with measures of both anxiety and depression. However, due to the high scale intercorrelations and multiple loadings of each item across subscales, the correlations were widespread across the MACI and were not limited to those scales that purported to address issues related specifically to anxiety or depression. In fact, the Anxious Feelings subscale ($p < .009$) did not meet criteria for significance and did not correlate sufficiently well with the Revised Children's Manifest Anxiety Scale (RCMAS), yet the Delinquent Predispositions subscale had a significant correlation ($p < .001$) with the RCMAS. The scales were so intercorrelated that nearly all addressed anxiety and/or depression as well as what they purported to address. There were significant correlations between twenty-one of the MACI subscales and the RCMAS; eighteen of these were in the moderate to high range (.42 - .69). There were also significant correlations between twenty-four of the MACI subscales and the RADS; eighteen in the moderate range (.41 - .79). This lack of specificity is indicative of a lack of discriminant validity in the MACI.

In conclusion, statistically, Millon's overall scale structure appears unsupported. Does this make the scale unworthy of further use? Is there valid information that may be gleaned from the product of the MACI? These are important questions. If the MACI is serving as only a measure of distress and willingness to disclose, then it may be serving a purpose still. Adolescents have enough difficulties opening up in therapy and any tool that aids in getting to the core of their issues or facilitates disclosure is of use. What is of import is that the scale be recognized for what it is producing and not operating on the assumptions that it provides information that is beyond it's scope (based on it's design). It is possible that the MACI could be re-tooled, with the redundancies removed, the scale streamlined, and its purpose clarified. However, in order to do so, it may be necessary to limit the scope of the scale. Creating a more focused approach (e.g., abolishing the Expressed Concerns and Clinical Syndromes scales) will allow the author to select items that are more defining of concrete constructs (consistent with the underlying theory) and reduce the overlap of items amongst scales. While some overlap is useful in terms of providing reliability checks in response styles, as well as providing for discriminant validity checks, it is also important that the overlap be carefully considered and that it be kept to a necessary minimum in order to maintain simple structure in the overall measure.

On another note, but of similar importance are those adolescents whose profiles are never examined due to producing invalid profiles. The manner in which they are addressed and followed up on is equally important to the way in

which valid completers are evaluated and treated. It is important that adolescents who do not endorse a valid response style (e.g., those who do not wish, or are unready to disclose) are given equal attention from treatment providers. Many adolescents, whether because of personality issues (e.g., borderline traits) or simply due to the vagaries of adolescence, may not be willing to disclose issues on such a level, particularly those who are in clinical settings against their will (e.g., brought in by parents, police, the juvenile justice system). What an adolescent chooses not to say can, at times, be equally telling.

Further research with clinical samples would continue to be valuable in the further investigation and potential future refinement of this popular instrument. It is important to determine the appropriate use of a measure that continues to be used as a guide in the treatment and diagnosis of adolescents across numerous clinical, residential, and forensic settings. If there is a desire that the MACI continue to serve in its present role, then the instrument needs further refinement as to its factorial structure. Focusing on reducing the item overlap and working towards the goal of achieving a less complex structure is critical in improving the Millon Adolescent Clinical Inventory and in providing a tool that reliably and validly achieves its stated goals.

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APPENDIX

WASHINGTON STATE UNIVERSITY
Office of Grant and Research Development

MEMORANDUM

TO: Patrick Bryan Carrillo, BA
Educational Leadership & Counseling Psychology, WSU Pullman (2136)

FROM: Jamie Murphy (for) Cindy Corbett, Chair, WSU Institutional Review Board (3140)

DATE: 21 June 2004

SUBJECT: Approved Human Subjects Protocol - New Protocol

Your Human Subjects Review Summary Form and additional information provided for the proposal titled *"Factor Analysis of the MACI: Testing the Goodness-of-Fit of Million's Model of Adolescent Psychopathology,"* IRB File Number **8009**-a was reviewed for the protection of the subjects participating in the study. Based on the information received from you, the WSU-IRB **approved** your human subjects protocol on **21 June 2004**.

IRB approval indicates that the study protocol as presented in the Human Subjects Form by the investigator, is designed to adequately protect the subjects participating in the study. This approval does not relieve the investigator from the responsibility of providing continuing attention to ethical considerations involved in the utilization of human subjects participating in the study.

This approval expires on 20 June 2005. If any significant changes are made to the study protocol you must notify the IRB before implementation. Request for modification forms are available online at http://www.ogrd.wsu.edu/Forms.asp.

In accordance with federal regulations, this approval letter and a copy of the approved protocol must be kept with any copies of signed consent forms by the principal investigator for THREE years after completion of the project.

This institution has a Human Subjects Assurance Number FWA00002946 which is on file with the Office for Human Research Protections. WSU's Assurance of Compliance with the Department of Health and Human Services Regulations Regarding the Use of Human Subjects can by reviewed on OGRD's homepage (http://www.ogrd.wsu.edu/) under "Electronic Forms," OGRD Memorandum #6.

If you have questions, please contact the Institutional Review Board at OGRD (509) 335-9661. Any revised materials can be mailed to OGRD (Campus Zip 3140), faxed to (509) 335-1676, or in some cases by electronic mail, to *ogrd@mail.wsu.edu*.

Review Type: NEW OGRD No.: NF
Review Category: XMT Agency: NA
Date Received: 17 June 2004

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Dr. Carey and Patrick,

Attached is a copy of the text of the IRB approval memo for the above referenced research.

SUBJECT: IRB # 104761 - Factor Analysis of the MACI: Testing the Goodness-of-Fit of Million's Model of Adolescent Psychopathology.

It was determined by the Vice-Chair of the Medical College of Ohio Institutional Review Board that this project can be designated as exempt research (category #4). This review and approval includes the data collection tools submitted with the MCO IRB application. The requirement to obtain a signed consent/authorization for use and disclosure of protected health information form has been waived as this research is determined to be minimal risk and a signed consent/authorization document would be the only record linking the subject to the data. It was determined that this waiver for signed consent/authorization for use and disclosure of protected health information form will not adversely affect the rights and welfare of the participants. The full board will be notified of this action at its meeting on 08/19/2004.

DESIGNATED as EXEMPTED RESEARCH: 7/13/2004

It is the Principal Investigator's (P.I.'s) responsibility to:
1. Abide by all federal, state, and local laws and regulations; the MCO federal assurance and institutional policies for human subject research and protection of individually identifiable health information including those related to record keeping and be sure that all members of your research team have completed the required education in these areas.
2. Promptly notify the MCO IRB at (419) 383-6796 of any untoward incidents or unanticipated adverse events that develop in the course of your research. Please complete and submit RGA Form 317 for ALL SUCH REPORTS for this protocol. The Principal Investigator is also responsible for submitting to the MCO IRB reports of adverse events that occur at other sites conducting this study and for maintaining an up-to-date cumulative table of adverse events (RGA Form 316) and submitting it to the MCO IRB for each research project. The Principal Investigator is responsible for reporting adverse events to the appropriate federal agencies and the sponsor (when one exists).
3. Report promptly to the MCO IRB any deviations, violations or participant non-compliance from the MCO IRB approved protocol in accordance with the procedures outlined in RGA Form 309. In your report include the protocol number and title, the subject's initials/specimen identifier (as appropriate) and study I.D. number, date of the event, a brief description of the occurrence and a description of any corrective actions taken. The Principal Investigator is responsible for reporting deviations, violations and participant non-compliance to the appropriate federal agencies and the sponsor (when one exists) in accordance with federal regulations, institutional policy and any other legal agreements with these organizations.
4. Obtain prior MCO IRB review and approval for changes in study personnel and for any and all changes/new information that may require additional information be provided to participants.
5. Report promptly to the MCO IRB, sponsor (if this is research is sponsored) and all other required federal and state agencies all new information affecting the risk/benefit ratio and obtain prior MCO IRB approval for any changes in the study documents that may be required by the new information.
6. Obtain prior MCO IRB review and approval for all modified and/or added incentives going to the P.I., study coordinator, other study personnel, and/or the institution. These incentives may be in the form of money or other items of value, including, but not limited to, equipment, such as computers, and intangibles, such as frequent flyer miles.
7. Promptly notify the MCO IRB; other required MCO committees, departments or individuals; the sponsor (if this is research is sponsored); and all other required federal and state agencies of all potential conflicts of interest before beginning this research and, during the course of this research report to these committees, individuals and agencies any changes that may affect conflict of interest for any of the study personnel.

Prior MCO IRB approval must be obtained for any changes in the study documents that may be required by information related to conflict of interest or any changes in this information during the course of the research.

8. Promptly notify the MCO IRB of any changes in contracts, budgets, grants or other agreements with sponsors, agencies or individuals regarding the conduct of this research before initiating these changes.

The IRB reserves the right to review these study related documents and changes to them to verify accuracy and consistency with regard to the research protocol in order to protect the rights and welfare of the study subjects. Changes in these documents that have the potential to affect the rights, welfare or willingness of the study subjects to participate in or continue to participate in this research and changes in subject documents (such as informed consent, assent or authorization for use and disclosure of protected health information forms, etc.) that are a result of these changes must be reviewed and approved by the MCO IRB prior to being instituted.

Additional Information:

Ø Other Required Review(s) or Approval(s)

Review or approval by the MCO Institutional Review Board/Privacy Board does not take the place of any other review or approval required by the Medical College of Ohio, non-MCO performance sites, the government and/or the study sponsor.

Ø Required Procedure to Request Review and Approval for Changes/Updates to MCO IRB Approved Research:

Please complete and submit the Request for Amendment/Changes/Updates (RGA Form 314 found at <http://www.mco.edu/research/rga_frms/rga314.doc>;) with a copy of all materials relevant to the requested change (including consent/assent/authorization for use and disclosure of protected health information forms if applicable) with the changes underlined. If you are requesting review and approval of consent/assent/authorization for use and disclosure of protected health information forms, please attach a clean copy of the revised forms for the MCO IRB to stamp. Please remember that all changes and correspondence submitted to the MCO IRB (regardless if they are generated by a sponsor, the P.I. or requested by the MCO IRB) must be in writing, signed and dated by the Principal Investigator.

Ø Required Final Report Upon Termination of Research:

When you decide to stop this research, you are responsible for completing and submitting a Final Report (RGA Form 320 found at < http://www.mco.edu/research/rga_frms/rga320.doc>;) to the MCO IRB for review.