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Verification of the Number of Factors in the MMPI -A with Adolescent Females

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Verification of the Number of Factors in the MMPI-A
with Adolescent Females

by

Kristina M. Kays

Presented to the Faculty of
George Fox College
in partial fulfillment
of the requirements for the degree of
Doctor of Psychology
in Clinical Psychology

Newberg, Oregon

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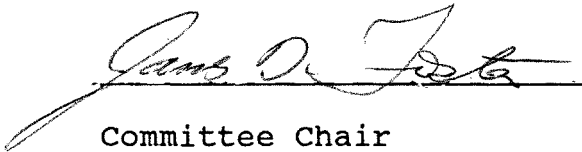
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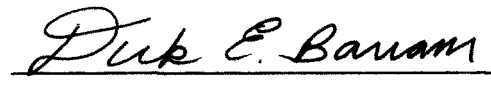
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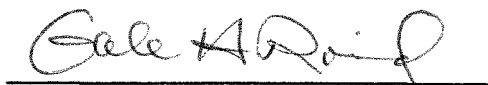
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Date: August 11, 1994

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Newberg, Oregon

Abstract

The Minnesota Multiphasic Personality Inventory-Adolescent (MMPI-A) was factor analyzed using the adolescent female normative sample. A Maximum Likelihood (ML) factor analysis with an oblimin rotation produced both a 4-factor solution and a possible 8-factor solution. However, analysis of the eigenvalues and the Scree test plot indicated a 4-factor solution obtained the best data fit.

Factor 1 identified a general sense of maladjustment characterized by anxiety, depression, and physical complaints. Factor 2 distinguished features of social introversion, obsessive thoughts, and depression. Factor 3 described features of unusual

behavior, thought disorders, and social deviance.

Factor 4 reflected the need for control in terms of internal and external resources.

The four factors are consistent with those previously identified by Butcher et al. (1992).

Erikson's developmental theory provides a framework for the discussion of the factors identified by the MMPI-A.

Acknowledgements

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I would like to honor my children, David, Erin, and Megan, who have been such crucial ingredients and pleasure throughout this program.

To my husband, Robert, I dedicate this research. He is my best friend and most passionate advocate. His steadfast belief in me and our family has been the fuel for the completion of this dream. Thank you for every adventure.

Finally, thanks be to God whom I continue to seek after. "But seek first his kingdom and his righteousness, and all these things will be given unto you as well" (Matt. 6:33).

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CHAPTER 1

INTRODUCTION

In Arthur Miller's Death of a Salesman, Biff states "I just can't take hold, Mom, I can't take hold of some kind of a life." His thoughts sum up for many adolescents the struggles they face in moving from life as carefree children to life as responsible adults. Transitioning effectively, from childhood to adulthood requires mature coping abilities in dealing with the expanding responsibilities of life (Petersen & Hamburg, 1986).

Inadequate coping systems can contribute to various problem behaviors in adolescence. Likewise, developmental deficiencies in adolescence can result in psychopathology (Archer, 1992). Adolescence is often characterized by physical changes, however there are many changes, including cognitive and psychological that impact the various facets of adolescent life (Archer, 1992; Blos, 1962).

Between 13 and 19 years old, development is both rapid and complicated. At times transitioning through

the adolescent period does not progress smoothly and the result can be impaired psychological development. Understanding the complexities of adolescence and the possible resulting psychopathologies is important for professionals who work with this age group. However, tools for adolescent evaluations are not always available, or when available, are not adequate to identify psychological disorders with adolescents. Accurate assessments are essential in order to determine the most appropriate treatment. Therefore, continued development of adolescent assessment is essential.

Dramatic physical changes involving biochemistry and endocrinology contribute to rapid growth and signal the commencement of puberty (Stone & Church, 1957). Intellectual abilities also change as the adolescent transitions from concrete thinking to more abstract styles (Elkind, 1974; Piaget, 1969). As a result of the improving abstract ability, issues of identity, self-concept, competence, and individuation become the prominent concerns of the adolescent developmental period (Blos, 1962; Erikson, 1956). All of these changes combine to make adolescence one of the most complex stages of life.

Literature Review

This section will: (a) review adolescent psychopathology, (b) overview the MMPI and the development of the adolescent MMPI (MMPI-A), (c) discuss adolescent development in terms of Erikson's theory of development, and (d) conclude with the statement of the purpose and the specific questions addressed in the present research.

Adolescent Psychopathology

Weiner and Del Gaudio (1976) reviewed adolescent psychopathology literature and concluded (a) that psychiatric symptoms are not typical during adolescent development; (b) that though complicated, guidelines can be established to discriminate between normal and abnormal adolescent behavior; and (c) that adolescent emotional disturbance is not merely "a passing phase", but usually requires interventions for remission. Although adolescence does not necessitate emotional upheaval, evidence suggests that 20% of adolescents exhibit psychopathology (Offer & Schonert-Reichl, 1992).

Recently research has centered on discriminating the causes of adolescent psychopathology. The goal is to influence change at the etiology of the disturbance rather than treating the symptoms.

Psychopathology, for some adolescents, appears to be related to a mismatch between the developing adolescent's needs and their home and school environmental opportunities (Eccles, Midgley, & Wigfield, 1993). For example, research by Kurdek and Sinclair (1988) indicates that psychological adjustment decreases as family conflicts and the use of external coping mechanisms increase. The adolescent's motivation and self-perception are connected to emotional and physiological developmental changes. Motivation and self-perception can be negatively affected by changes in the developmental process (Eccles et al., 1993).

Occurrence of negative events in life is another identified factor in adolescent maladjustment. Larson and Ham (1993) found that adolescents experiencing higher rates of daily distress also had a larger number of reported negative events in their lives. The older the student the more likely the increase of negative affect. This was attributed to the increased

opportunities for social activities and the greater opportunity for conflict within these activities. Montemayor (1986) found that disturbance in adolescence was related to the experience of life stress and the availability of social supports.

Antisocial Behavior

Some of the effects of these disturbances manifest themselves in the form of antisocial behavior. Adolescents break the law more than any other group of the population (Gold & Petronio, 1980). These violations include both delinquency and crime. In the United States where those under 18 make up only about 25% of the population, they commit nearly half of all crimes against property (U.S. Bureau of the Census, 1985).

Unsocialized delinquents are those who have failed to learn basic norms and values of society. Socialized delinquents are those who have internalized social values and mores, yet tend to have less parental supervision than nondelinquents and are more susceptible to peer pressure (Brown, Clasen, & Eicher, 1986; Patterson & Stouthamer-Loeber, 1984). Treatment interventions are able to provide a more positive

prognosis for the socialized delinquent than for the unsocialized delinquents.

Depression

Depression is the most common psychological disturbance of adolescence (Weiner, 1980). Although depression is rare in childhood, 25% of United States teens experience minor episodes, while about 3% have severe enough forms to be classified as major depression (Chartier & Ranieri, 1984). While depression is more common in males prior to puberty and females after pubertal onset, male adolescents are more likely to successfully commit suicide (Steinberg & Levine, 1990).

Depressive symptoms in adolescents are not as easy to identify as they are with adult populations. Adolescent self-esteems are fragile and admitting such feelings appears difficult. Often depression is masked as academic or relational difficulties, physical problems or delinquency. The suicidal risk with depressed adolescents is great, however treatment can be very effective (Steinberg & Levine, 1990).

Although most adolescents successfully make the difficult transition from childhood to adulthood, life for others is often plagued with serious psychological

or social problems. Accurate assessment of adolescent psychopathology is essential to successful treatment.

Gender Differences in Adolescent Psychopathology

Gilligan (1982) has discussed basic gender differences apparent in morality and choice, descriptions of self, and interpersonal dynamics. She found that males are socialized to be autonomous and emotionally detached. However, females are taught to value intimate relationships, emphasizing sensitivity to others needs rather than equality. These differences imply more internalized value systems for females, while males rely mainly on externalized value systems. These differences are also apparent in the psychopathology exhibited in adolescents.

Harris, Blum, and Resnick (1991) surveyed 36,284 teens grades 7-12 and found that female adolescents revealed greater emotional stress and had an increased likelihood of attempting suicide than males. They found females are more likely "to act out psychological distress in self-directed, quietly disturbed behaviors" (Harris et al., 1991, p. 119). Summerville, Abbate, Siegel, and Serravezza (1992) confirmed that psychopathology in adolescent females is

escalated and believed it is because of the degree to which females internalize difficulties.

Adolescent females are more likely to exhibit symptoms of depression and anxiety, while adolescent males are more prone to act out behaviorally (Ostrov, Offer, & Howard, 1989). Other researchers report that females are proportionately more likely to exhibit affective problems of anxiety, depression, and feelings of suicide than males (Colton, Gore, & Aseltine, 1991).

Females also report more than two times as many body-related problems than males (Colton et al., 1991). Colton et al. also supported previous studies showing that males were more likely than females to have problems of delinquent behavior, school related problem behavior, poor grades, and more drinking problems.

Adolescent females have also been found to report more mental and physical symptoms and a greater number of stressful events as compared with males. These are, however, less likely to influence grade performance and acting out in females than males (Dornbusch, Mont-Reynaud, Ritter, Chen, & Steinberg, 1991). Primary caregivers, trained mental health workers, psychological assessment, and self report all indicate

a higher level of symptom severity in female adolescents than in males (Thurber & Osborn, 1993).

Research consistently demonstrates differences in gender manifestations of psychopathology (Colten et al., 1991; Harris et al., 1991; Ostrov et al., 1989). Female adolescents evidence a tendency toward self-directed acting out, while males are more likely to act out socially (Dornbusch et al., 1991; Thurber & Osborn, 1993). Gender differences are evident in adolescent psychopathology. Further research of these differences is invaluable in assessing and treating dysfunction.

Personality/Psychopathology Assessment and the MMPI

MMPI History

The MMPI was developed in 1940 (Hathaway & McKinley, 1940) for use in the University of Minnesota Hospitals, as a diagnostic aid for psychiatric and medical screenings (Dahlstrom, Welsh, & Dahlstrom, 1972). However, it quickly became popular in many other settings. The inventory has been used actively in outpatient clinics, inpatient settings, hospitals, correctional facilities, drug and alcohol treatment

programs, military programs, and schools throughout the country (Butcher & Williams, 1992).

The MMPI has also been used in industrial settings and as a tool in forensic psychology (Pope, Butcher, & Seelen, 1993). Many factors have contributed to its strength and popularity as an assessment tool, including: validity; reliability; control over undesirable response patterns; detection of invalid records, including those from nonreaders; use of simple language; simplicity of administration and scoring; and general clinical familiarity with profile variables (Hathaway & Monachesi, 1963).

The MMPI is an objective measure of 550 statements which the test taker sorts into "true", "false", or "cannot say" responses. The inventory is designed to provide an assessment of personality status and emotional adjustment in quantitative form. The standard response scoring produces a profile presenting three validity indicators and ten clinical scales. These profiles are plotted on standard scoring sheets. Each scale on the profile has both abbreviations of scale names and code numbers. Table 1 summarizes these scales, using the name, abbreviation, and code number.

The validity of an individual's profile is easily assessed by evaluating the three validity scales. These scales are able to indicate response styles and personality characteristics not directly picked up by the clinical scales. The ability to interpret an individual's responses within the normative framework adds valuable insights to the application of the inventory data (Butcher & Williams, 1992).

Adolescents and the MMPI

The MMPI has become one of the most widely used psychological tests in the assessment of adolescents (Archer, Maruish, Imhof, & Piotrowski, 1991). This popularity is largely due to its ability to produce meaningful clinical descriptions within a comprehensive group of dimension. Few adolescent objective personality measures offer genuine competition with the MMPI.

The MMPI was originally developed for use with adult populations ages 16-65 (Hathaway & McKinley, 1940). It has been used extensively in measuring psychopathology in psychological, medical, and psychiatric research within this age range (Butcher & Williams, 1992).

Table 1

MMPI Validity and Clinical Scale Names, Abbreviations,
and Code Numbers

Scale Name	Abbreviation	Code Number
<u>Validity Scales</u>		
Lie	L	
Infrequency	F	
Correction	K	
<u>Clinical Scales</u>		
Hypochondriasis	Hs	1
Depression	D	2
Hysteria	Hy	3
Psychopathic Deviate	Pd	4
Masculinity-Femininity	Mf	5
Paranoia	Pa	6
Psychasthenia	Pt	7
Schizophrenia	Sc	8
Hypomania	Ma	9
Social Introversion	Si	10

In the past, MMPI responses from adolescents were analyzed according to adult norms, which using K-corrections typically produced profiles with elevations on Scales F, 4, 6, 7, 8, and 9 (Hathaway & Monachesi, 1963; Marks, Seeman, & Haller, 1974). Clinically significant elevations are consistently found on Scales F, 4, 6, and 8 across both inpatient and outpatient samples with both male and female adolescents (Archer, 1984, Klinge & Strauss, 1976). Research using adult norms with normal adolescent subjects found that nearly two thirds of the subjects produced "psychotic-like" profiles (Gottesman & Fishman, 1961). Research has also shown high rates of (false-positive) errors for schizophrenic diagnoses when adult norms were used to evaluate adolescents (Archer, 1984, Klinge & Strauss, 1976). Typical adolescent behaviors often resemble serious psychological disturbance found in adult populations (Archer & Ball, 1988).

In the early 1960s researchers noticed trends in adolescent MMPI response patterns (Hathaway & Monachesi, 1963). These response patterns with adults were identified with either severe psychopathology, careless response patterns, exaggerated symptomatology, or illiteracy. For adolescents, however, this response

pattern was interpreted as a result of their characteristic feelings of alienation or identity diffusion. Recently, however, this pattern has been interpreted as a result of the inventory being developmentally inappropriate for the population (Butcher et al., 1992).

Adolescence is a unique developmental period with characteristic behaviors and experiences. Comparisons of aberrant adolescent behavior and experiences require standards based upon the adolescent population as opposed to adult populations.

Adolescent MMPI Norms

In 1974, Marks et al. developed the first MMPI adolescent norms and an interpretive manual based upon data sets obtained between 1940 and 1970. These norms were grouped by gender and age. They became the standard adolescent MMPI interpretive norms and extended standard use to teens age 14, with special usage with individuals ages 12 and 13. MMPI use with adolescents has rapidly increased since these original adolescent norms were developed (Archer, 1984, 1987; Williams, 1986).

Dissatisfaction has increased with the Marks et al. (1974) norms as a result of norms developed from an

outdated normative sample. In response Colligan and Offord (1989), and Gottesman, Hanson, Kroeker, and Briggs (1987) have presented contemporary sets of adolescent norms. However, both sets have exhibited methodological problems in their statistical analyses, and clinical use is suggested to be limited to comparisons with the Marks et al. (1974) norms.

Consequently, the Marks et al. (1974) adolescent norm set continues to be the primary standard for interpreting adolescent MMPI profiles, even though they are based upon data obtained 25-50 years ago. Significant cultural changes have occurred in the last fifty years and these may effect response patterns with adolescent samples on the original MMPI.

Despite the use of adolescent norms, various limitations have been cited in using the MMPI with adolescent populations (Archer, 1984; Butcher & Pope, 1992; Hathaway & Monachesi, 1963). Because the MMPI was originally intended for adult subjects, it includes both adult wording and content. For example, some of the MMPI items discuss sexual material, occupational preferences, and situations implying childhood in the past tense. These items have always been an issue when utilizing MMPI results with adolescent subjects

(Archer, 1984; Butcher et al., 1992; Hathaway & Monachesi, 1963).

Dissatisfaction with existing adolescent norms has resulted in an increasing need for adolescents norms based upon the distinctions associated with modern adolescents (Archer, 1990; Colligan & Offord, 1987, 1989). In addition, significant item problems exist with the MMPI which make it inappropriate for adolescence, limiting its usefulness. These two factors suggest the necessity of a search for a reliable and valid scale based on a current adolescent normative population.

The MMPI-A

In 1982 the MMPI Restandardization Committee launched a revision and expansion of the MMPI for adolescents. Development began by revising the MMPI item pool and incorporating new items specific to adolescents (Butcher et al., 1992). Further explanation of the MMPI-A will be presented in Chapter 2.

As previously discussed the language and item content of the original MMPI questions were major factors affecting interpretations of adolescent

profiles. These problems resulted in the creation of the MMPI-A version which contains adolescent-specific revisions of the language and item-content. The creation of items containing family relations, school issues, and peer-group influences were elements of this item revision. For example, included in the inventory are items which address parental approval of the adolescent's friends, attendance at school, and feelings of social rejection.

Also, items representing little psychological meaning for adolescents were eliminated from the MMPI-A. These include items which were archaic or gender biased such as references to games like drop the handkerchief or to occupations such as a librarian or florist. The resulting 478-item MMPI-A is a much shorter version than the 566-item original MMPI (Butcher et al., 1992).

MMPI-A norms were based upon 1620 adolescents (805 males and 815 females) evaluated from diverse regions and minority groups across the United States. Further description of the normative sample will be discussed in Chapter 2.

The fundamental substance of the validity and clinical scales was maintained in the transition from

the MMPI to the MMPI-A. Various content scale substance was also maintained including the MacAndrew Alcoholism Scale (MAC-R), Anxiety (A) Scale, and Repression (R) Scale. The MMPI-A scale descriptors are based upon data from both adolescent clinical and normative samples (Butcher et al., 1992). Research has continued to support gender differences affecting responses with adolescents; therefore separate descriptors were incorporated into the MMPI-A scoring materials (Butcher & Williams, 1992; Hathaway & Monachesi, 1963). Uniform T-score transformations were utilized across the MMPI scale scores to ensure percentile equivalence within the measure (Butcher & Williams, 1992).

The MMPI-A provides many advantages over the original MMPI in use with adolescent populations. For example, a single norm set will reduce confusion in profile interpretations and comparisons. Also, utilizing uniform T-score cut-offs of 65 for clinical interpretive levels will allow consistency within the MMPI-A and comparison to the MMPI-2 (Butcher & Williams, 1992). As a result of these improvements, the MMPI-A has addressed many of the concerns

confronted by clinicians and researchers in their use of the MMPI with adolescents.

Understanding and applying the MMPI/MMPI-A and resulting profiles is limited because no underlying theory of personality exists upon which the MMPI was developed (Archer, 1992). Many of the authors working with the MMPI set the stage for understanding their work by including a theoretical framework (Archer, 1984, 1992; Butcher & Pope, 1992; Colligan & Offord, 1987).

Adolescent Development

Adolescence is often thought of as a second infancy (Jones, 1968), where individuals are faced with instability in many of their physiological, cognitive, and psychological processes (Blos, 1962; Piaget, 1969; Stone & Church, 1957). Adolescence has been described as a stage of developmental disturbance resulting in disruptive conduct (Freud, 1969). This period of development is often a time of emotional upheaval and transition (Hombeck, Grayson, & Hill, 1988; Larson & Ham, 1993). The emotional turbulence evident in adolescence often resembles, or can generate,

psychopathology or emotional illness (Blos, 1962; Masterson, 1968).

Physical/Sexual Development

Physical growth and sexual maturation in puberty influences many behaviors, however physical performance is the most directly affected. Males and females are emotionally affected differently by their physical maturation (Malina, 1990). Developmental rates vary widely within genders (Malina, 1990; Tanner, 1972).

Generally, early maturation allows males to perform better in competitive social situations, while early maturation in females is associated with a greater sense of acceptance by the opposite sex and increased independence, but lower self esteem (Cobb, 1992; Malina, 1990). Whether early or late in physical maturation the sense of group and personal identity is often determined by physical development (Petersen, 1984).

Cognitive Development

Adolescent cognitive development involves the progression from what Piaget (1969) postulated as Concrete Operations to the stage of Formal Operations.

Formal Operations provide the individual with the ability to "think about thinking", allowing for the developing of ideas or theories, and concepts. Formal Operations become consistent only when enough environmental stimulation exists to permit practicing, resulting in assimilation of the new concept (Kuhn, Langer, Kohlberg, & Haan, 1977).

These new cognitive skills can cause a preoccupation of egocentric thinking (Elkind, 1978). Concern for what others think about them can become excessive and can affect adolescent behavior (Elkind & Bowen, 1979).

Psychological Development

Many theorists have explored human development, yet Erik Erikson's theory has emerged as one of the more comprehensive and influential. Erikson's developmental stage theory provides a broad framework that is considered both intuitive and logical in its propositions (Hawley, 1985), and provides a good foundation for discussing adolescent development. Erikson's developmental theory also provides a framework for understanding psychopathology.

Erikson's Developmental Theory

Erikson was clearly influenced by Freud; however, Erikson believed that personality development continues throughout the entire life cycle, with significant stages continuing past childhood. Erikson's theory posits eight stages of personality development, each of which involves an ego crisis. Table 2 lists Erikson's primary stages/ages of personality development, each accompanying ego crisis, and the resulting ego strength that results from successful crisis resolution.

Each stage "crisis" or conflict has both psychological and social dimensions. Erikson agreed with Freud regarding the inevitability of human struggle, yet he was less pessimistic about the outcome of conflict resolution (Erikson, 1950). He suggested that self-insight, and control, are basic tools to assist in coping with the problems and transitions of life. These are the processes through which he indicated that maturation and developmental progression occurs.

To Erikson (1963), developmental stages are both psychosocial and epigenetic (epi = upon, genesis = emergence). Ego development continues throughout life. According to Erikson, development unfolds in an

Table 2

The Eight Stages of Ego Development

Stage/Age	Ego Crisis	Ego Strength
Early Infancy (birth-1)	Basic Trust vs Mistrust	Hope
Late Infancy (2-3)	Autonomy vs Shame and Doubt	Will
Early Childhood (4-5)	Initiative vs Guilt	Purpose
Middle Childhood (6-12)	Industry vs Inferiority	Competency
Adolescence (13-19)	Identity vs Role Confusion	Fidelity
Young Adulthood (20-24)	Intimacy vs Isolation	Love
Middle Adulthood (25-64)	Generativity vs Stagnation	Care
Late Adulthood (65-death)	Ego Integrity vs Despair	Wisdom

inherited, predetermined manner, much like our physical body develops. Each subsequent stage becoming the completion of the preceding ones, and yet at the same time introducing an entirely new level of development.

Erikson believed that, no matter what the culture, social interactions became increasingly important in the maturational process (Erikson, 1963). This becomes the context for what he termed as the psychosocial crisis. Particular crises become crucial turning points, where the individual is compelled to turn one way or another (Erikson, 1964). These are moments of decision between developmental regression or progression.

The crisis of each stage is triggered by a combination of physical maturation and external demands from family and society. In normal development the role of the ego is to resolve these crises during the appropriate stage, so that personality development can proceed successfully. However, these resolutions, or virtue formations, are not necessarily permanent and a later crisis resolution may affect previous development (Erikson, 1963). These resolutions have the capacity to carry both positive and negative value (Evans, 1967). Both positive and negative learning occur

during each crisis resolution. A positive resolution is produced when the positive learning during a crisis outweighs the negative learning (Hawley, 1985).

Identity versus role confusion. Erikson regarded adolescence as a period of considerable importance (Erikson, 1968). He identified adolescence as a stage with the psychosocial need of self-definition or ego identity (Erikson, 1950). The formation of identity begins in early childhood through the resolution of the early psychosocial crises (see Table 2). However, during adolescence a sense of identity becomes the critical issue (Douvan & Adelson, 1966).

The adolescent climate challenges the dependence characteristic of childhood and requires an internalization of the skills allowing individual independence. This process assists the formation of personal identity.

An adolescent's concept of identity concentrates on the merging of personal identifications, capacities, opportunities, and ideals to form a viable self-definition (Douvan & Adelson, 1966). Adolescents are searching for "men and ideas to have faith in" (Erikson, 1968, p. 128). This search becomes critical and the ensuing strength of allegiances determines

whether an adolescent has firmly established an identity. Erikson viewed identification with cliques and crowds, occupational choices, energetic competition, and needs for intimate relationships as integral pieces of this identity formation.

Erikson believed healthy ego development will result in an individual who can both love and work well (Erikson, 1963). During adolescence the establishment of an appropriate sex-role, and achieving a satisfying occupation, are the necessary components to develop this capacity of loving and working (Erikson, 1968). Successful resolution of the adolescent identity crisis will reflect the ego quality of fidelity, or "the ability to sustain loyalties freely pledged in spite of the inevitable contradictions of value systems" (Erikson, 1964, p. 125).

Erikson (1956) suggested that departure from normal development will result in "identity confusion." If identity is not obtained and confusion ensued, he believed the result would be developmental disturbance and psychopathology (Erikson, 1963). This psychopathology may manifest itself as intimacy issues, lost sense of workmanship, negative identity, or diffusion of time perspective (Erikson, 1968).

Dimensions of Adolescent Psychopathology

The creators of the original MMPI began with the goal of meeting the needs of a few clinicians. The MMPI has since become indispensable for assessment throughout the United States and overseas and is used in exploring and identifying individual psychopathology. Its use, however, has primarily been examined with adult populations. Use of the MMPI with adolescent populations has increased over the last decade (Butcher et al., 1992; Butcher & Williams, 1992).

Due to the MMPI's popularity, it has often been used in research exploring the dimensionality of psychopathology. The MMPI-A is designed to measure specific adolescent personality characteristics. The MMPI-A's development has suggested the need to explore the dimensions of adolescent psychopathology measured by this new instrument. Understanding dimensions of adolescent psychopathology requires that research move into the realm of "dimensionality" which can be assessed with the statistic known as factor analysis.

Factor Analysis

The goal of factor analysis is predominately to "summarize the interrelationships among the variables in a concise but accurate manner as an aid in conceptualization" (Gorsuch, 1983, p. 2). It is used to simplify an explanation of data through the reduction of the number of variables to the main factors which sufficiently "account for all the common variance" (Anastasi, 1982, p. 358). This can often reduce a battery of many tests down to the fundamental factors without sacrificing integral information.

MMPI and Factor Analysis

The MMPI factor structure has been investigated at both the item-level and the scale-level using factor analysis. These analyses have produced various numbers of factors and identifying factor names (Archer, 1984; Archer & Klinefelter, 1991; Archer, White, & Orvin, 1979; Bernstein, Teng, Grannemann, & Garbin, 1987; Wheeler, Little, & Lehner, 1951). Factor research has been used in the development of content scales, including the Harries-Lingoes and the Serkownek content scales incorporated in the adult MMPI versions (Butcher, Dahlstrom, Graham, Tellegen, & Kaemmer, 1989).

Factors 1 and 2. Dahlstrom et al. (1972)

researched the internal structure of the MMPI using the three validity scales and ten clinical scales and found two basic dimensions. Welsh (1952) and Eichman (1961, 1962) also identified two factors that are consistent with the Dahlstrom et al. (1972) research. Welsh considered the first factor A, as an anxiety dimension. Other studies have labeled this factor as "general maladjustment." Welsh labeled the second factor R, as a repression dimension. Other studies have referred to this factor as "overcontrol of psychopathology" or "generalized inhibition" (Butcher et al., 1992). A great deal of MMPI factor research supports Welsh's and Eichman's two dimensional approach and finds that it accounts for the majority of the variance within the inventory (Butcher et al., 1989; Butcher et al., 1992; Dahlstrom et al., 1972).

Factors 3 and 4. Research finding a third and fourth factor has not been as consistent. Some have obtained additional factors by choosing to rotate the original solution to obtain the greatest degree of predictability. The resulting modified set of dimensions has required adjusted psychological interpretations. Kassebaum, Couch, and Slater (1959)

define their third and fourth factors as "ego-strength vs. ego-weakness" and "extraversion-introversion." Butcher et al. (1992) differed slightly by classifying their third and fourth factors as dimensions of "social introversion" and "masculinity vs. femininity", respectively.

Variations within factor studies are affected by the samples and the specific factor analysis used. Eichman's research (1961, 1962), for example, produced factor variations between genders.

MMPI Factors with Adolescents

Factor analyses of the MMPI with adolescents are limited (Archer & Klinefelter, 1991). Currently, only one existing MMPI-A factor analysis study is published (Butcher et al., 1992). Table 3 summarizes the published adolescent factor analyses with the MMPI using adolescent samples, and the MMPI-A.

MMPI research (Archer, White, & Orvin, 1979) with an inpatient adolescent sample utilizing principle-components analysis of the 13 validity and clinical scales, generated three orthogonally rotated factors with eigenvalues of greater than 1.0. These factors were identified as General Maladjustment, Defensiveness, and Sociopathy. These three factors

Table 3

Published Adolescent Factor Analysis Summary

Study (Sample)	Statistic	Factors
<u>MMPI</u>		
Archer et al., (1979) (Male/Female Mixed, Inpatients)	Principal Component	1. General Psychopathology 2. Defensiveness 3. Sociopathy
Archer, (1984) (Male/Female Mixed, Inpatients)	Principal Component Orthogonal Rotation	1. Psychotisisism 2. Neurotic/ Characterological 3. Overcontrol/ Defensiveness 4. Masculinity/ Femininity & Introversion/ Extroversion

(table continues)

Table 3--Continued

Study (Sample)	Statistic	Factors
Archer & Klinefelter, (1991) (Male/Female Separate, Clinical Sample)	Varimax Rotation	1. Maladjustment 2. Introversion/ Depression 3. Hysteria 4. Denial/Anxiety 5. Masculinity/ Femininity
<u>MMPI-A</u>		
Butcher et al., (1992) (Male/Female Separate, Clinical & Norm Sample)	Principal Components	1. General Maladjustment 2. Overcontrol 3. Social Introversion 4. Masculinity/ Femininity

accounted for 67% of the total variance. Factor 1 was characterized by high loadings on eight MMPI scales which are measures representing neurotic, psychotic, and character-disordered symptomatology. Factor 2 was associated with elevations on measures of defensiveness and denial and low Si Scale scores. Factor 3 clearly demonstrated associations with antisocial behavior with loadings on Scales Ma and Pd.

Archer (1984) found a four factor solution (see Table 3) with an inpatient population using a principal component factor analysis. These orthogonally rotated factors accounted for 69% of the variance. These factors were identified as Psychoticism, Neurotic/Characterological Symptomatology, Overcontrol/Defensiveness, and Masculine/Feminine plus Introversion/Extroversion. These factors are similar to those found by Block (1965) with an adult sample.

Archer and Klinefelter (1991) chose a five factor solution in interpreting adolescent data with their MMPI research (see Table 3). Their results indicate a general first factor which is similar to that identified in other MMPI research (e.g. General Maladjustment). Factor 2 was identified as a combination of Social Introversion and Somatic

Preoccupation for males. However, Factor 2 for females was identified as Social Introversion with Depressive features. Factor 3 was identified as a Depression measure for males and a Hysteria measure for females. Factor 4 was specified as a measure of Denial for males and Denial/Anxiety for females. Finally, Factor 5 was labeled Masculinity/Femininity and Anxiety for males and Masculinity/Femininity for females. This orthogonally rotated study accounted for 74% of the total variance with the five factor solution. It also presents more support for gender differences in factor solutions.

The initial analysis of the MMPI-A began with a principal components analysis with a varimax rotation using the MMPI-A normative data set of 1620 subjects. This was done separately for the 805 males and 815 females. A Scree test suggested a four-factor solution as appropriate for both genders (Butcher et al., 1992). Butcher et al. identified the four factors as (a) General Maladjustment, (b) Overcontrol, (c) Social Introversion, and (d) Masculinity/Femininity. This four factor solution accounts for 78.6% of the variance for males and 78% of the variance for females.

Beck et al. (1989) previously raised concerns about gender differences in specific MMPI interpretations. Butcher et al. (1989) indicated that the factor structure found in the MMPI-2 is partially distinct for males and females, consistent with the Beck et al. (1989) suggestion of specific interpretations for each gender. Based upon these research contributions and the MMPI-A statistical results, the MMPI-A authors incorporate gender specific interpretations where statistically indicated (Butcher et al., 1992).

The MMPI-A is the first version to incorporate adolescent-specific content scales not contingent upon the standard clinical scales. However, their potential predictive power is not yet known.

Rationale and Purpose of the Study

Research indicates that adolescents and adults respond differently to the MMPI. This is evident in profile elevation, item endorsement frequency, and profile configuration (Archer, 1984). While the dimensionality of the MMPI with adult populations has been extensively investigated, little research has been done on the underlying factor structures resulting from

adolescent populations. Due to the recent release of the MMPI-A, the Butcher et al. (1992) study is the only MMPI-A factor research at this time.

Also, as previously presented, notable gender differences are found in adolescent manifestations of psychopathology. Since little factor research has been done with adolescent populations and distinct gender differences appear, further research of the gender-specific dimensionalities of the MMPI-A is warranted.

Butcher et al. (1992) stated that the MMPI-A is an inventory intended for use in the assessment of adolescent psychopathology. However, due to the limited research on its dimensionality, ongoing factor analytic exploration of the MMPI-A is warranted (Archer & Klinefelter, 1991). The purpose of the present study was to conduct an exploratory factor analysis to investigate the factor structure of the MMPI-A, in an adolescent female normative sample data set. Demonstration of consistency in factor structure across research would clearly support the construct validity of the MMPI-A as a measure of adolescent psychopathology.

The specific questions addressed in the present study are:

1. How many factors are identified by the MMPI-A with adolescent females?
2. How do the resulting factors of this study compare with other adolescent MMPI factor analysis results and the only other MMPI-A research?

CHAPTER 2

METHODS

Participants

The participants of the present study consisted of the entire adolescent female MMPI-A normative sample ($N = 815$) (Butcher et al., 1992). Norms were established using subjects obtained from junior high and high school settings in eight different regions across the United States. These included Minnesota, Ohio, North Carolina, California, Pennsylvania, Virginia, and Washington State.

The sample was balanced for age, ethnic group membership, and rural/urban location. Over one third came from Minnesota, with about one tenth from North Carolina and Ohio, and just over one sixth from California and Virginia. Less than 10% of the sample was obtained from Pennsylvania and Washington State.

A ratio of at least 5:1 participants to variables was used. In common factor analysis this is considered sufficient for an adequate sample, however larger

samples will commonly lead to more distinct indications of the number of factors when the common factor model is appropriate (Gorsuch, 1983). The sample size of 815 adolescent females, calculated with the thirteen primary scales of the MMPI-A as variables of interest, produced a 63:1 ratio. Thus, this sample and ratio are large enough to reduce the effects of sampling errors.

The MMPI Restandardization Project Committee sought to obtain a sample more representative of the United States as a whole than was previously represented in the original MMPI normative sample (Butcher et al., 1992). Their strategy was school-based, which affected the representation, since school drop-outs and those frequently absent from school would not be included.

The Project Committee strategy improved the representation of black, Asian, and American Indian ethnic groups. However, the Hispanic normative subsample was influenced by the sixth-grade English reading level requirement, and this resulted in a probable underrepresentation (Butcher et al., 1992). Over 75% of the 815 girls in the normative sample were caucasian, with blacks representing 12.3%, and Asians,

American Indians, and Hispanics making up 8% of the sample.

Participants ranged in age from 14-18 (mean = 15.60; SD = 1.18). The project committee set a goal to obtain essentially equal numbers of subjects for each age group. However, high school settings contain fewer 18-year-olds as compared to the other age groups; therefore the normative sample reflects this in the age distribution. Grade level ranged from 7-12 (mean = 10.11; SD = 1.19). The majority of the subjects were in grades 9-12, with less than 10% of the subjects in grades 7 and 8.

Responses by the adolescents indicate that youngsters describe parental educational levels as ranging from some grade school through completion of graduate school for both parents. The median identified for both mothers and fathers was college graduate. Adolescent perceptions of parental occupations identified many as having professional and managerial positions, while relatively low percentages of homemakers and unskilled positions were reported. At least 63.6% of the sample reported living with both parents, while 28.1% indicated living with mother only, and 4.2% indicated living with father only.

Materials

MMPI-A

The MMPI-A (Butcher et al., 1992) is a 478 item objective (true-false) measure of adolescent personality and psychopathology. The inventory is based upon the most valuable features of the original MMPI. This is most noticeable in the retention of the ten basic clinical scales. Many of the innovations included in the MMPI-2 are also contained in the MMPI-A. These consist of uniform T scores for eight of the MMPI-A basic scales (excluding 5 and 0), 15 new Content Scales, and the inconsistency measures VRIN and TRIN.

Development of the MMPI-A involved reducing the original scale from 566 items to 478, modifying some MMPI-2 item contents to make them more age appropriate, and including specialized features specific to adolescents. Some of the previous and new items were used to develop new Content Scales: School Problems, Low Aspirations, Alienation, and Conduct Problems. Also three new supplementary scales were developed that assess alcohol (ACK), drug problems (PRO), and immaturity (IMM).

The inventory requires a sixth grade reading level and takes about sixty to ninety minutes to complete. Although, some of the initial data collected for the normative sample included 12 and 13 year-olds, the Project committee was of the general opinion that validity for these two age groups was in question based upon academic abilities and emotional development. Therefore, the instrument is for use with adolescents age 14-18. However, if 18-year-old clients are in college, working, or otherwise living an independent adult lifestyle, guidelines suggest that the MMPI-2 is a more appropriate measure.

Continuity was preserved between the MMPI and MMPI-A with scales L, K, the Clinical scales, the MacAndrew Alcoholism Scale (MAC-R), and the supplementary scales A and R (Butcher et al., 1992; Butcher & Williams, 1992). Extensive revisions of the MMPI-A were required to assure that the F scale performed as a measure of infrequent responses. The MMPI-A divides the F scale into a 33-item F1 scale obtained from the first half of the items, and a 33-item F2 scale gathered from the subsequent half of the inventory.

Rational procedures employing a developmental perspective were combined with statistical analyses in the development of the MMPI-A Content Scales and the VRIN and TRIN validity scales (Butcher & Williams, 1992). New adolescent-specific items were created for the development of three new Content Scales (School Problems, Low Aspirations, and Alienation).

The School Problems Scale (A-sch) is based on 20 items from the MMPI-A and addresses issues such as poor grades, truancy, and attitudes towards school and school personnel. High scores on this scale indicate academic and behavioral difficulties in school (Butcher et al., 1992).

The Low Aspirations Scale (A-las) is a 16 item scale dealing with issues of self motivation. High scorers exhibit a disinterest in personal success. This scale appears related to poor achievement and antisocial tendencies (Butcher et al., 1992).

The Alienation Scale (A-aln) is a 20 item scale identifying emotional distance in relationships. High scorers feel misunderstood and disliked by others. They do not express a sense of personal responsibility for relational difficulties (Butcher et al., 1992).

The Conduct Problems Scale (A-con) was developed to substitute for the MMPI-2 Antisocial Practices Scale (ASP), because the ASP's empirical validity was inadequate with adolescent populations (Williams, Butcher, Ben-Porath, & Graham, 1992). A-con is 23 item scale distinguishing individuals with a tendency to have behavior problems, including criminal activity (Butcher et al., 1992).

The Family Problems Scale (A-fam) is a 35 item scale that was updated with the addition of adolescent-specific content. High scorers on this scale indicate a great deal of familial discord (Butcher et al., 1992). More detailed descriptions of the new Content Scales and the remaining Content Scales is provided in Butcher et al.

MMPI-A Norms

Like the MMPI-2 norms, MMPI-A norms were based on a uniform T-score transformation insuring percentile equivalence across the two forms. This consistency of percentile equivalence between the MMPI-A and MMPI-2 allows for comparisons as subjects mature (Butcher et al., 1992). Clinically interpretable cut-offs of T-score = 65 are consistent for use with both the MMPI-A

and MMPI-2. T-scores 60-64 are advised to be considered elevated and useful as descriptors. However, T-scores < 60 are not considered clinically significant and should not be interpreted. The exceptions to this interpretive rule are scales 0 (Si) and 5 (Mf), which are bipolar in meaning. Low end and high end scores on these two scales have interpretive value (Butcher et al., 1992; Butcher & Williams, 1992). A more comprehensive presentation of the MMPI-A profile interpretation is available in Butcher et al., (1992).

Reliability

Reliability is the consistency, durability, or dependability of test scores with various occasions, testing conditions, or with different sets of equivalent items (Anastasi, 1982). Discussion of the MMPI-A test-retest and internal consistency reliabilities is discussed below.

A subsample (45 males and 109 females) of the MMPI-A normative subjects was used for a test-retest study. The subsample was retested one week after the initial administration. The resulting correlations for the validity scales ranged from .49 - .75 and are presented in Table 4. The clinical scales demonstrated coefficient values ranging from .65 - .84 (Butcher et

Table 4

Test-Retest Data for Validity and Clinical Scales:
Means, Standard Deviations, and Retest Coefficients for
154 Community Adolescents (45 Males and 109 Females)

Scale	First Test		Second Test		r
	Mean	SD	Mean	SD	
L	2.16	1.78	2.56	2.31	.61
F	6.64	6.53	8.66	8.10	.55
K	11.85	4.37	12.88	4.98	.75
Hs	8.91	4.75	8.27	5.25	.79
D	20.89	5.98	20.56	6.13	.78
Hy	22.67	5.43	22.32	5.58	.70
Pd	20.01	5.59	19.61	5.46	.80
Mf	26.56	5.00	25.63	5.05	.82
Pa	12.60	4.34	12.90	4.45	.65
Pt	20.84	8.99	19.28	8.92	.83
Sc	22.85	10.92	22.10	11.40	.83
Ma	21.32	5.02	21.09	5.26	.70
Si	27.41	8.52	27.28	8.10	.84

Note. Adapted from Butcher et al. (1992).

al., 1992). These results are comparable with those reported for the adult normative sample on the MMPI-2. The typical standard error of measurement reported for the basic scales in the MMPI-A manual (Butcher et al., 1992) is four to six T-score points.

Internal consistency, calculated as coefficient alpha for the MMPI-A thirteen basic scales, are presented for the normative sample in Table 5. Strong internal consistencies are demonstrated for many of the scales (e.g., the F, K, Hs, Pt, Sc, Si scales had coefficients of .82, .70, .79, .86, .89, and .80 respectively). Other scales demonstrated comparably low to moderate internal consistencies (.40 and .59 for Mf and Pa, respectively) (Butcher et al., 1992).

Table 4 Scales L, D, Hy, Pd, Mf, Pa, and Ma reported coefficient values of .58, .66, .55, .68, .40, .59, and .61, respectively. These scales have acceptable levels of internal consistency, specifically since coefficient alpha supplies a conservative estimate of reliability (Anastasi, 1982).

Validity

Validity evaluates "the degree to which the test actually measures what it purports to measure" (Anastasi, 1982, p. 27) and to what extent this is

Table 5

Internal Consistency of MMPI-A Validity and Clinical
Scales (815 Females)

Scale	Coefficient Alpha
<hr/>	
L	0.58
F	0.82
K	0.70
Hs	0.79
D	0.66
Hy	0.55
Pd	0.68
Mf	0.40
Pa	0.59
Pt	0.86
Sc	0.89
Ma	0.61
Si	0.80

Note. Adapted from Butcher et al. (1992).

accomplished. Further, validity assists in ascertaining the value of the information produced by the measure (Golden, Sawicki, & Franzen, 1990).

The term validity in context with the MMPI also has a second meaning. It describes the attitudes of the client taking the test. Therefore, if the client has responded in an accurate and consistent self-appraisal the profile is considered valid. This is actually a form of internal consistency reliability research, which has previously been discussed regarding the MMPI-A. Discussion of the validity of MMPI-A is briefly presented here. A more extensive review of the MMPI's validity is available in Dahlstrom, Welsh, & Dahlstrom (1975).

MMPI

The traditional MMPI clinical scales have been cross-validated in adolescent clinical settings (Butcher et al., 1992; Williams & Butcher, 1989). Because the validity and clinical scales of the MMPI-A are analogous to the MMPI validity and clinical scales, validity of the MMPI-A is assumed based upon the research supporting the validity of the original MMPI

(Butcher et al., 1992). Therefore, a brief review of the MMPI validity research is presented here.

Construct-Related Validity

Evidence of MMPI construct-related validity has been demonstrated (Dahlstrom et al., 1975). Group membership has been found correlated to specific profiles (e.g. inmates, high school student, and nurses) (Hathaway & Monachesi, 1953; McGuire & Megargee, 1974; Michael, Haney, Lee, & Michael, 1971). Maudal, Butcher, and Mauger (1974) found correlations between college adjustment problems and MMPI profiles, and McGuire and Megargee (1974) found correlations between amounts of marijuana use and amounts of delinquent behaviors.

Concurrent-Related Validity

Concurrent-related evidence of validity has been demonstrated by various researchers in a variety of research. For example, Panton (1973) has shown correlates identified with specific offensive sexual practices and MMPI profile scores.

Predictive Validity

Wirt and Briggs (1959) and Richardson and Roebuck (1965) both present research supporting the predictive ability of the MMPI in identifying adolescent

delinquent behavior among males. The MMPI has also been employed in identifying predelinquent behavior in the hope of preventing serious legal difficulties (Hathaway & Monachesi, 1963; Kanun & Monachesi, 1960).

Dahlstrom et al. (1975) cited many more studies demonstrating the evidence of the construct-related, concurrent-related, and predictive validity of the MMPI. This research indicates that reliable nontest correlates are available for MMPI.

The MMPI-A manual (Butcher et al., 1992) addresses the validity of the instrument by presenting construct-related validity results scale by scale. For example, on Scale 4 (Pd), research with the female normative sample utilizing the Biographical Information form and the Life Events form indicates correlation values of .34, .32, and .28 with number of school problems, increase in disagreements with parents, and course failure, respectively.

Traditional correlates established for the Hs, D, Hy, Pd, Pa, Pt, Sc, Ma, and Si scales have been found to apply to adolescents in mental health, drug and alcohol, and special school settings (Butcher et al., 1992). For further scale construct-related validity see Butcher et al.

Procedure

Although, the MMPI Restandardization Committee did not originally set out to develop an adolescent version of the MMPI, the consensus was to investigate the need for an adolescent inventory. This resulted in the administration to 815 girls and 805 boys in the normative sample.

The normative sample subjects were obtained from junior high and high schools in eight different geographic regions of the United States (as described earlier). These sites were chosen to maximize the opportunity for obtaining a balanced sample of subjects according to rural-urban residence, geographic region, and ethnic background. Permission to conduct the research was obtained from the administration of the specific schools identified. This procedure varied depending upon the guidelines established in each school system (Butcher et al., 1992).

Most subjects were paid \$10 for their participation and were asked to respond to the MMPI-A, the Biographical Information form, and the Life Events form. These were administered in approximately three hour sittings, including breaks. Only data from

subjects completing all three measures were included. A 154 participant subset (45 boys and 109 girls) was used for the test-retest study. These participants were paid a total of \$20 for their participation in the project. Additional exclusionary criteria was based upon the adult scales, as MMPI-A exclusionary criteria had not yet been developed. The adult criteria is based upon Cannot Say scores greater than 35 or a raw score of greater than 25 on scale F (Butcher et al., 1992).

Statistical analysis utilized a factor analytic method beginning with data in the form of the intercorrelation matrix for the female normative sample ($N = 815$) found in the MMPI-A manual (Butcher et al., 1992). This study employed a maximum likelihood factor analysis with an oblique rotation to determine the dimensionality of the MMPI-A. Statistical analysis proceeded according to the design outlined in the following section.

Statistical Design

Factor analysis is a technique designed to delineate a relatively small number of dimensions which

are used to represent relationships between sets of interrelated variables (Norusis, 1988). In the present study, the questions addressed involved determination of the number of factors identified by the MMPI-A with the adolescent female normative sample, and comparisons of these results with other adolescent MMPI factor analytic studies.

Factor analysis is often separated into exploratory and confirmatory. Confirmatory analysis evaluates whether predetermined limitations are represented. Exploratory analysis establishes the number of factors best represented by the variables. Because the true number of factors has not been established by theory or research, exploratory factor analysis was considered the most appropriate research technique to answer the questions of this study (Gorsuch, 1983).

Butcher et al. (1992) reported four factors after submitting the normative data from the MMPI-A to a principal components analysis with a varimax rotation. However, other studies using adolescent samples with the MMPI have proposed different numbers of factors to account for the instruments variability (see Table 3).

This study will use a maximum likelihood (ML) factor analysis to explore how many factors the MMPI-A has distinguished with the normative adolescent female sample.

A maximum-likelihood (common factor model) method of extraction was used and the progression of chi-square tests examined for two, three, four, five, and six factors. Under the assumption that the sample was from a multivariate normal population, the chi-square tests evaluated the goodness-of-fit of each successive k-factor model. After each factor was extracted, the chi-square procedure for goodness-of-fit was used until a nonsignificant chi-square was obtained, indicating good model-data fit.

Maximum likelihood was used because of its many attractive statistical qualities. First, ML has the highest probability of converging toward the parameters of the population as the sample size increases toward that of the population. In other words, the estimated parameters derived by ML are statistically consistent, having small variance across samples. Second, ML provides for a test of significance (Chi-square) for the number of factors (Gorsuch, 1983; Norusis, 1988).

The MMPI-A scales have been developed to measure the complex construct of psychopathology. Following the extraction of factors, several methods of rotation could be employed to produce factors that are more clearly interpretable in comparison to unrotated factors. Orthogonal (uncorrelated) and oblique (correlated) are two common kinds of rotations used. The oblique rotational technique is most suited to the construct of psychopathology because it allows for correlations among the factors (Gorsuch, 1983; Thurstone, 1947). Oblique minimization (oblimin) rotation assumes the variables are in some way correlated.

In summary, the three validity scales and the ten clinical scales from the MMPI-A were the variables in the present study. The research participants were 815 female adolescents identified from eight various regions throughout the United States. This study employed a maximum likelihood factor analysis with an oblimin rotation to evaluate the factors identified by the MMPI-A with adolescent females. The statistical package used for analyses was SPSS/PC+ Advanced Statistics V2.0 (Norusis, 1988). Psychological

meaningfulness of each factor was determined after the factors were extracted and rotated (Gorsuch, 1983).

CHAPTER 3

RESULTS

This chapter will present the results of the factor analysis outlined in the methods section. Results will be discussed in terms of (a) subjects, (b) exploratory factor analysis, (c) evaluation of factorial invariance, and (d) model assumptions.

Subjects

The subjects of the study consist of the adolescent female normative sample for the MMPI-A ($N = 815$) and sample size was adequate for factor analysis to proceed (Gorsuch, 1983).

Exploratory Factor Analyses

Maximum Likelihood Factoring

The intercorrelational matrix for the female normative sample of the MMPI-A (Butcher et al., 1992) was used for extracting the factors using a Maximum

Likelihood (ML) factor analysis. The correlation matrix is presented in Table 6. An oblique minimization (oblimin) rotation was used and the eigenvalue criterion (eigenvalue > 1.0) was used to define a factor (Norusis, 1988). The results of the ML factor analyses for two through eight factors are presented in Table 7. To further evaluate the factor structure a scree plot was developed from the ML factor analyses and is presented in Figure 1. Table 8 lists the ML factor analysis eigenvalues and percent of variance. Factor pattern, factor structure, and factor correlation matrices were constructed for four and five factors and are presented in Tables 9, 10, 11, 12, 13, and 14.

The four factor ML solution accounts for 77.9% of the variance in the MMPI-A Validity and Clinical Scale scores. The five factor ML solution explains 83.0% of the variance in the MMPI-A Validity and Clinical Scale scores. The first factor explains 43.4% of the total variance, the second factor accounts for 14.2%, the third factor 11.2, the fourth factor 9.1%, and the fifth factor 5.1%.

The ML chi-square tests of significance was examined (Table 7). The chi-square progression

Table 6

Intercorrelation Matrix of Validity and Clinical Scales
for Adolescent Female Normative Sample

Scales	L	F	K	Hs	D
L	1.00				
F	.19	1.00			
K	.37	-.20	1.00		
Hs	-.02	.47	-.35	1.00	
D	.08	.41	-.24	.60	1.00
Hy	.16	.23	.16	.64	.49
Pd	-.06	.52	-.29	.52	.56
Mf	-.16	-.35	-.06	-.06	.08
Pa	-.01	.59	-.24	.53	.49
Pt	-.27	.47	-.67	.63	.60
Sc	-.11	.70	-.56	.66	.56
Ma	-.22	.35	-.37	.30	.01
Si	-.06	.38	-.54	.42	.57

(table continues)

Table 6--Continued

Scales	Hy	Pd	Mf	Pa	Pt
L					
F					
K					
Hs					
D					
Hy	1.00				
Pd	.43	1.00			
Mf	.08	-.07	1.00		
Pa	.41	.60	-.06	1.00	
Pt	.27	.60	.01	.60	1.00
Sc	.31	.69	-.17	.71	.85
Ma	.10	.46	-.13	.36	.45
Si	.01	.30	.06	.31	.65

(table continues)

Table 6--Continued

Scales	Sc	Ma	Si
L			
F			
K			
Hs			
D			
Hy			
Pd			
Mf			
Pa			
Pt			
Sc	1.00		
Ma	.57	1.00	
Si	.56	.00	1.00

Note. Adapted from Butcher et al. (1992).

Table 7

Maximum Likelihood Factor Analyses: Goodness-of-fit
Indices for Seven Contrasting Modes

Model	Chi-Square	df	p	Improvement in Chi-Square
2-factors	1872.27	53	0.00	
3-factors	1063.24	42	0.00	809.02
4-factors	298.20	32	0.00	765.05
5-factors	142.01	23	0.00	156.18
6-factors	83.73	15	0.00	58.28
8-factors	7.99	2	0.02	74.75

Note. The 7-factor model could not be extracted after 80 iterations.

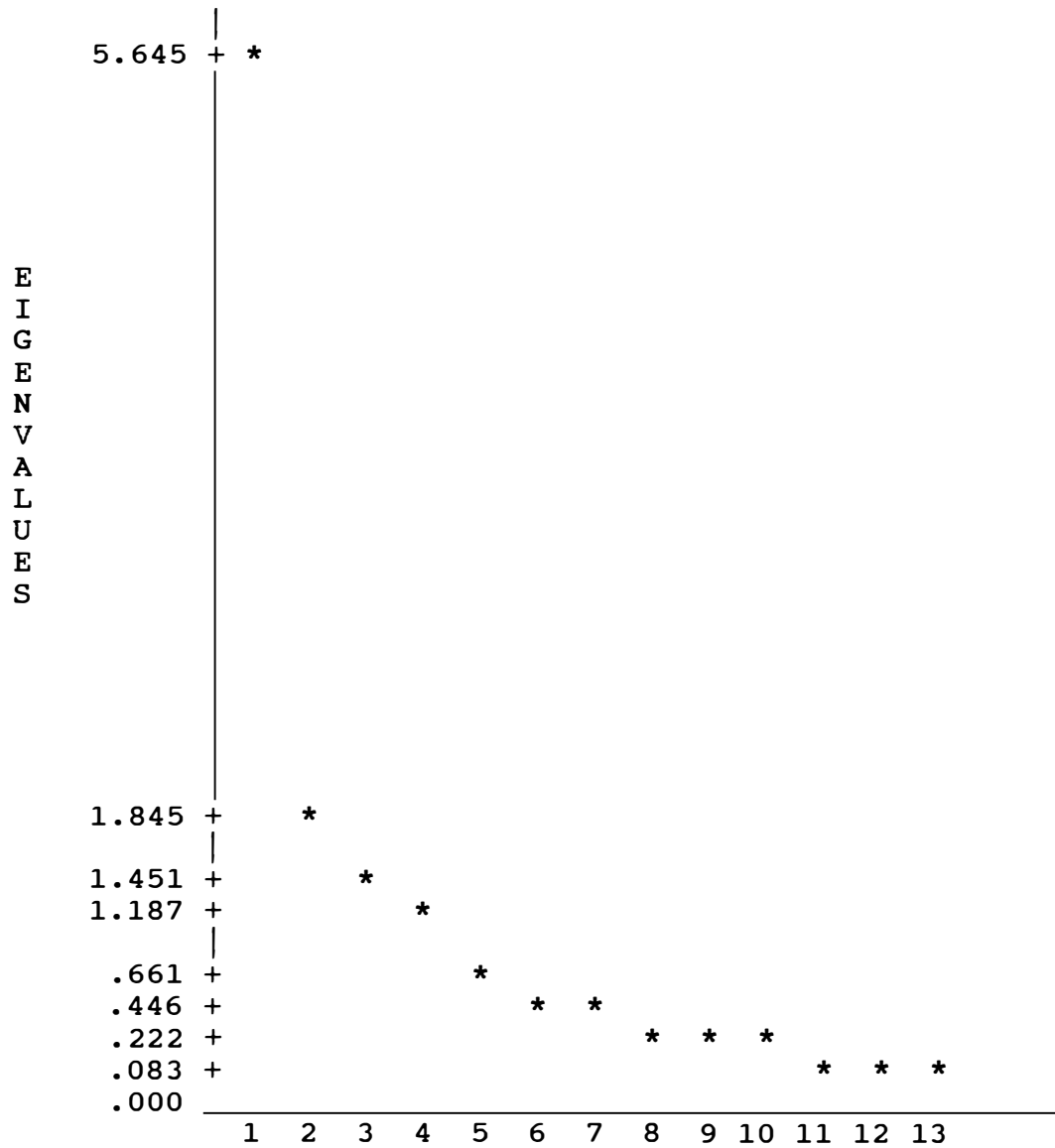


Figure 1. Scree Plot of Maximum Likelihood Factor Analysis of MMPI-A Female Normative Sample.

Table 8

List of Maximum Likelihood Factor Analysis Eigenvalues
of the MMPI-A Female Normative Sample

Factor	Eigenvalue	Pct. of Var.	Cum. Pct
1	5.65	43.4	43.4
2	1.85	14.2	57.6
3	1.45	11.2	68.8
4	1.18	9.1	77.9
5	0.66	5.1	83.0
6	0.56	4.3	87.3
7	0.45	3.4	90.7
8	0.33	2.5	93.2
9	0.27	2.0	95.3
10	0.22	1.7	97.0
11	0.18	1.4	98.3
12	0.13	1.0	99.4
13	0.08	0.6	100.0

Table 9

Four Factor Pattern Matrix of the MMPI-A Female
Normative Sample

Scale	Factor			
	1	2	3	4

L	.11	-.05	.33	.54
F	.15	.30	.72	.01
K	.17	-.55	.08	.52
Hs	.65	.28	.03	-.16
D	.45	.59	.01	.18
Hy	1.08	-.21	-.16	.10
Pd	.43	.18	.27	-.27
Mf	.13	.08	-.52	-.02
Pa	.39	.23	.36	-.19
Pt	.26	.60	.04	-.43
Sc	.28	.44	.40	-.40
Ma	.15	-.22	.31	-.76
Si	-.08	.93	.02	.10

Table 10

Four Factor Structure Matrix of the MMPI-A Female
Normative Sample

Scale	Factor			
	1	2	3	4
L	.12	-.13	.29	.50
F	.44	.44	.80	-.17
K	-.04	-.64	-.01	.66
Hs	.76	.53	.26	-.28
D	.62	.68	.18	-.04
Hy	.95	.08	.09	.07
Pd	.59	.44	.44	-.40
Mf	.01	.06	-.48	.00
Pa	.58	.45	.51	-.34
Pt	.51	.81	.23	-.64
Sc	.57	.70	.58	-.61
Ma	.24	.09	.41	-.75
Si	.21	.88	.11	-.18

Table 11

Four Factor Correlation Matrix of the MMPI-A Female
Normative Sample

Factor	Factor			
	1	2	3	4

1	1.00			
2	.32	1.00		
3	.27	.13	1.00	
4	-.11	-.29	-.11	1.00

Table 12

Five Factor Pattern Matrix of the MMPI-A Female
Normative Sample

Scale	Factor				
	1	2	3	4	5
L	.02	.01	-.01	.58	-.21
F	.06	.51	-.21	.19	-.52
K	-.11	-.04	.45	.64	.05
Hs	1.02	-.10	-.11	-.13	-.14
D	.24	.46	-.40	.26	.26
Hy	.62	.31	.31	.27	.26
Pd	.08	.74	.01	-.03	.05
Mf	-.03	-.00	-.04	-.08	.54
Pa	.09	.70	-.04	.03	-.07
Pt	.14	.54	-.38	-.36	.09
Sc	.12	.67	-.25	-.23	-.21
Ma	.04	.46	.31	-.54	-.26
Si	.06	.13	-.83	-.02	.01

Table 13

Five Factor Structure Matrix of the MMPI-A Female
Normative Sample

Scale	Factor				
	1	2	3	4	5
L	.03	-.02	.07	.57	-.20
F	.42	.66	-.33	.08	-.63
K	-.23	-.32	.57	.70	.06
Hs	.98	.62	-.33	-.11	-.10
D	.63	.63	-.55	.15	.17
Hy	.76	.53	.12	.29	.21
Pd	.53	.78	-.20	-.14	-.12
Mf	-.01	-.12	-.05	-.07	.54
Pa	.53	.77	-.24	-.08	-.22
Pt	.56	.76	-.60	-.48	-.02
Sc	.59	.89	-.48	-.36	-.35
Ma	.24	.54	.11	-.57	-.36
Si	.34	.39	-.89	-.15	-.01

Table 14

Five Factor Correlation Matrix of the MMPI-A Female
Normative Sample

Factor					
Factor	1	2	3	4	5

1	1.00				
2	.63	1.00			
3	-.23	-.26	1.00		
4	.02	-.15	.14	1.00	
5	.02	-.21	-.01	.02	1.00

indicated a possible 8-factor solution, however upon inspection of the final statistics for the 8-factor solution (Appendix A) only four factors remained with eigenvalues greater than one. Further review of the chi-square progression indicated that the four and five factor solutions show the greatest improvement in model to data fit.

Examination of the scree test indicated four factors with eigenvalues greater than 1. Factors were obliquely rotated and reached convergence after thirty-one iterations for four factors and thirty-six iterations for five factors.

The four factor correlation matrix (Table 11) indicates that the first and second factors are positively, but poorly related to each other. The relationship between the second and fourth factors approaches significance. However, the remaining factors have little or no significant relationship to one another. These findings suggest that the four factors identified in the normative sample are unique from each other.

Gorsuch (1983) recommended rotating one additional factor above the solution indicated by the scree plot to thoroughly examine possible factor solutions. The

five factor correlation matrix was examined and indicates that Factors 1 and 2 have a positively and moderately high relationship to each other (Table 14). The remaining factors have insignificant correlation values indicating that they are unique from each other.

Model Assumptions

In this study two model assumptions were tested. Bartlett's test of sphericity was used to test the assumption that the correlation matrix is not an identity matrix (Gorsuch, 1983; Norusis, 1988). The results of Bartlett's test are presented in Table 15. The large Bartlett value and accompanying small significance level indicates support for the assumption that this correlation matrix is not an identity, and, thus, can be examined for common factors.

The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy is used to evaluate whether the research sample is adequate to continue factor analysis. The KMO measure determined whether the correlation values between variable pairs could be attributed to other variables (Gorsuch, 1983; Norusis, 1988). Kaiser (1974) characterized measures in the .90's as

Table 15

Model Assumptions of the Correlation Matrix

Sample	Bartlett's	KMO
N = 815	7362.3*	.83

*p = .0001

marvelous, in the .80's as meritorious, in the .70's as middling, in the .60's as mediocre, in the .50's as miserable, and below .50 as unacceptable. KMO measure results are presented in Table 15. The value of the KMO statistic for the matrix was .83. Both model assumption tests indicated support for proceeding with the factor analysis.

Summary

Maximum likelihood (ML) factor analysis were conducted for two through eight factors. Results of the model assumption tests indicated the correlation matrix was suitable for factor analysis. Factors were

obliquely rotated to determine the simple structure of the factors.

The ML chi-square indices identified an eight factor solution as the best model fit for the MMPI-A female normative sample. However, ML exploratory factor analysis can identify some insignificant factors (Gorsuch, 1983). Therefore, after examination of the chi-square test of significance, the eigenvalue progression, the scree plot, and the psychological meaningfulness of the four and five factor solutions, the four factor solution was preferred. The four factors were determined to be mostly independent of each other. The Communalities Table is presented in Appendix B.

CHAPTER 4

DISCUSSION

This chapter examines the normative sample used in this study of the MMPI-A, discusses the results of the factor analysis, and evaluates the research questions in light of the results and Erikson's theory of development.

Exploratory Factor Analysis

The questions addressed in this study relate to the factorial composition of the MMPI-A at the scale level. Anastasi (1982) suggested that the "factorial validity" of an inventory is determined by factor analyses at the scale level. The scale level factor analysis of the study provides an empirical interpretation of the variance attributable to each factor in this sample. The results of the seven exploratory factor analyses answer questions related to how many factors are identified by the MMPI-A with adolescent females, and how the resulting factors

compare to other factor analyses of the MMPI/MMPI-A with adolescents.

Limitations of Maximum Likelihood Factor Analysis

Difficulties with factor analysis involve the non-scientific subjective components used in the process which may require precaution in interpretation of results. These difficulties include: determination of the number of factors to be retained, interpretation of factors, and assessing invariance among the factor solutions (Gorsuch, 1983). Difficulties specific to ML factor analysis involve the possibility that the ML significance test may label insignificant factors as significant, however significant factors will not be labeled insignificant.

Determination of the Number of Factors

Roots-greater-than-one. The roots-greater-than-one criterion (eigenvalue rule) is the most popular determinate of the number of factors. This is based upon Guttman's (1954) mathematical analysis. The eigenvalue rule is based on the fact that since a single variable added to the correlation matrix contributes 1.0 to the total extractable variance, any factor must have a total variance in excess of that

added by a single variable (Cattell, 1978; Gorsuch, 1983). Empirical analysis (Gorsuch, 1983) of the eigenvalue rule indicates that factors identified by this criterion are often interpretable by filtering factors that contribute no more total variance than single variables (Comrey & Lee, 1992).

Scree test. Scree plot analysis has been suggested to be an appropriate, yet not perfect criterion of factor determination. Scree plot analysis is based upon Cattell's (1978) guidelines involving human judgment. Predominant factors account for most of the variance and have large eigenvalues. Cattell indicated that insignificant factors, usually those extracted last, will form a straight downward-sloping line when plotted. Significant factors will fall clearly above the line, while smaller, yet important, factors will be near the line.

The main difficulty with the scree test is that often there are several breaks in the size of eigenvalues, resulting in decisions to extract too many irrelevant factors. Cattell (1978) and Comrey and Lee (1992) both clearly indicate that erring on the side of extracting too many factors is preferable. Appropriately rotated analyses will allow the

discarding of extra factors as residual factors without distorting the character of the major factors.

Test of significance. The ML factor estimates are hypothesized to account for all of the significant variance in the correlation matrix. Variables are assumed to have a multivariate normal distribution. The hypothesized factors are extracted and then their residuals tested for significance (Gorsuch, 1983). Although ML significance tests can label some insignificant factors significant, nevertheless, it remains the best extraction method currently available based on statistical criterion.

While the number of factors to extract is difficult to determine, the present study used three methods that tend to produce a balance in factor determination. The eigenvalue rule tends to underextract potentially important factors, the scree test tends to overextract unimportant or error factors, and the ML test of significance tends to identify insignificant factors as significant, yet does not identify significant factors as insignificant.

Interpretation of Factors

This study had factors which were correlated making the relationship of variables to factors

difficult to identify. A balanced evaluation of the salient variables (pattern matrix) and the correlated variables (structure matrix) allows subjective conclusions to determine the character of each factor.

The two matrices present different approaches to factor interpretation. The factor pattern matrix evaluates how the factor relates to the variables. It does not describe the relationship of variables to the factor (Gorsuch, 1983). The correlation matrix can be reproduced from the partial regression coefficients represented by the pattern matrix factor loadings. A limitation of the pattern matrix is that it identifies only the most salient variables of a factor.

An evaluation of the correlation coefficients in the factor structure matrix clarifies the relationship of the variables to the factor. This relationship provides a better understanding of the whole character of each factor. In contrast, limiting an evaluation to the pattern matrix will only provide an understanding of variables making distinctive contributions to the factors, thus, significant interpretive information may be lost.

Maximum Likelihood Factor Analysis Results

Comrey and Lee (1992) distinguished specific requirements which facilitate identification of the nature of factors. First, the higher the factor loadings, the greater the degree of true variance overlap between the data variable and the factor and the more the factor is like the data variable. Second, the more "factor unique" a defining variable is (having a significant factor loading on one factor, and near zero loading on all other factors), the easier to make inferences about the nature of the factor. Finally, the larger the number of variables with significant loadings on the factor, the easier to isolate what is being represented by the factor.

With obliquely rotated factor solutions, both factor loadings (pattern coefficients) and structure coefficients (correlations of variables with factors) should be considered when attempting to distinguish the factor nature (Comrey & Lee, 1992). Factor loadings and correlations of .71 are rated excellent, of .63 as very good, of .55 as good, of .45 as fair, and of .32 as poor. These criteria were used to identify the nature of the four factors extracted from the MMPI-A data in the present study.

Maximum likelihood factor analysis of the MMPI-A female normative correlation matrix provided a four-factor solution which accounted for 77.9% of the total variance. Evaluation of the ML test of significance suggested a possible eight-factor solution; however these results seem inconclusive, particularly when compared to the four-factor solution clearly identified by criterion of the eigenvalue rule and the scree test.

This four factor ML solution has factor loadings that are similar to those found in the MMPI-A manual factor analysis. Due to the similarity in factor analysis results with the factor analysis presented in the MMPI-A manual and for purposes of clarity, the four factors identified in this study will be labeled with the Butcher et al. (1992) factor labels. The four factors (General Maladjustment, Social Introversion, Masculinity/Femininity, and Overcontrol) identified by the structure matrix (Table 10) are considered separately in the sections below.

Factor 1--General Maladjustment. The first factor accounted for 43.4% of the variance. The highest pattern loading for any subscale was for the first factor, Hy (1.07). The variable Hs had a "very good"

pattern loading of over .63. Three variables had "poor" loadings (D, Pd, and Pa) on Factor 1.

The highest structure coefficient was for Hy (.95). One scale coefficient of over .70 was rated "excellent" and one of over .60 was rated "very good" (Hs and D, respectively). Several scales had coefficients in the .50's rated as "good". In decreasing order, these scales are Pd, Pa, and Sc. Scale Pt produced a coefficient with a "fair" loading (.51), while Scale F obtained a "poor" loading in the .40's.

This factor is identifying nonspecific, generalized anxiety, depression, and somatic complaints. Scales Hy, Hs, and D acknowledge a presence of life stress, both physical and emotional in nature. Coping mechanisms can be inadequate to manage the life stressors with individuals scoring high on these scales, and they are often found asking for help for many difficulties in both clinical and non-clinical environments. These individuals are translating personal difficulties into more socially accepted complaints which are somatic in nature.

Factor 2--Social Introversion. The second factor accounted for 14.2% of the variance. The highest

pattern loading was for Si (.93). A number of scales (Pt, D, and K) had "good" loadings in the .50's. Scale Sc was the one variable with a "fair" loading in the mid .40's. A break then occurs in the pattern loadings, and the remaining scales were of little interpretive value according to Comrey and Lee's (1992) guidelines.

Two structure coefficients were greater than .80 (Si and Pt). Scale Sc had a nearly "excellent" coefficient of .70. Scales with "very good" coefficients in the .60's included D with a positive coefficient and K with a negative coefficient. Scale Hs produced a nearly "good" coefficient of .53. Three scales had roughly "fair" coefficients in the mid-.40's (Pa, F, Pd).

This factor is identifying features such as social withdrawal, obsessive worry, lack of energy, and emotional agitation and negativity. Individuals scoring high on Scales Si, Pt, and Sc are tense, lacking in social skills, have difficulty forming and maintaining relationships, and often have deviant thought processes.

Factor 3--Masculinity/Femininity. The third factor accounted for 11.2% of the variance. The

highest pattern loading (over .70) on the third factor F. Scale Mf had a negative pattern loading (.52) rated as approximately "good" by Comrey and Lee (1992). Scale Sc obtained a "fair" pattern loading (.44).

Scale F had the highest structure coefficient at over .70. Two variables had coefficients in the .50's (Sc and Pa). Two scales (Pd and Ma) produced nearly "fair" positive coefficients in the 40's, while Mf produced a "fair" negative coefficient of -.48. Then a significant break occurred and the remaining scales produced no significant contributions.

This factor is identifying behavior that is bizarre or unusual. Individuals with high scores on Scales F and Sc are indicating a difficulty with mental organization, memory, and need fulfillment. They are likely to be acknowledging actual deviant behavior. These individuals have a tendency to not conform to standard social roles.

Factor 4--Overcontrol. The fourth factor accounted for 9.1% of the variance. Scale Ma had the highest negative pattern loading of over -.70. Two scales had nearly "good" loadings in the 50's (L and K). Two scales obtained approximately "fair" negative loadings in the .40's (Pt and Sc).

The highest structure coefficient of over $-.74$ was for Ma. Scale K had a "very good" coefficient of $.65$. Two scales (Pt and Sc) had "very good" and "good" negative coefficients, respectively. The L scale obtained a coefficient of $.50$ with a "fair" contribution towards interpreting this factor. Two scales had "poor" negative coefficients of $-.40$'s (Pd) and $-.34$ (Pa).

This factor is identifying characteristics of impulse control and describes the ability of an individual to use resources to deal with life challenges or crises. This factor reflects the degree to which these coping mechanisms are internalized versus externalized.

Research Questions

Number of Factors

The present study produced a four factor solution using a ML factor analysis with an oblimin rotation. Although, the ML test of significance suggested a possible 8-factor solution, the analysis of the eigenvalue rule and the Scree test indicated that the 4-factor solution was the best fit for the data.

Comparison with Previous Factor Research

Comparing the results of this study's four factor solution suggests that the ML factor analytic technique closely approximated the results found in the other factor analytic studies using other techniques.

MMPI

Archer, White, and Orvin (1979). Evaluation of the factors identified in the present study with those produced by Archer et al. (1979) indicated that both first factors had similar loadings. Both appear consistent with the adult research. The second and third Archer et al. (1979) factors had little resemblance to the present study's remaining factors.

Archer (1984). Comparison with Archer (1984) indicates that Archer's Factor 2 has some similarity to the present study's Factor 1. However, the remaining three factors produced minor or insignificant parallels to this study.

Archer and Klinefelter (1991). Archer and Klinefelter (1991) produced five factors which when compared to the present study's four factors shows limited similarities. Factor 1 in Archer and Klinefelter has similar characteristics with the present study's Factor 4. Likewise, Factor 2 in this

research appears to have a relatively similar structure to Factor 2 in Archer and Klinefelter. The five factor solution in Archer and Klinefelter seems to isolate the high loading of scale Hy. The remaining two factors in each study are slightly consistent in their structure.

MMPI-A

Butcher et al. (1992). Comparing the present four factor solution with the Butcher et al. (1992) four factor solution indicates that they both identified the same four factors. However, the two factor analytic techniques present the factors in different orders.

Summary

The various adolescent MMPI and MMPI-A factor analytic research has found varied factor solutions. The differing statistical techniques and the specific samples tested are presumed to be the influences affecting these results. The results of the present research indicate different factor loadings and coefficient than those obtained by Butcher et al. (1992), yet the factor structure between these two studies is analogous.

The primary difference between the Butcher et al. (1992) study and the present research is the factor order derived by the separate techniques. The first

factor (General Maladjustment) in both studies is consistently identified by the same eight scales (Hy, Hs, D, Pd, Pa, Sc, Pt, and F in descending order). The Butcher et al. (1992) first factor accounts for 29.9% of the total variance, compared to this study's first factor accounting for 43.4%.

A departure occurs in the order of the remaining three factor orders, however, the factor make-up remains consistent. The Butcher et al. (1992) study indicates a second factor (Overcontrol) consisting of scales Ma, K, Pt, Sc, L, and Pd (in descending order) which is consistent with the present study's fourth factor. This second Butcher et al. (1992) factor accounts for 20.9% of the total variance in contrast to the 14.2% of variance accounted for by the present study's fourth factor.

Butcher et al. (1992) presented a third factor (Social Introversion) derived from loadings on Si, Pt, Sc, D, K, Hs, Pa, F, and Pd (descending order) which is congruous with the second factor in the present research. This third Butcher et al. (1992) factor represents 14.5% of the variance, which is similar to the 14.2% attributed to the second factor in the present research.

Finally, Butcher et al. (1992) identified a fourth factor (Masculinity/Femininity) represented by scales F, Sc, Pa, Mf, Pd, and Ma (descending order). This final scale is consistent with the present study's third factor. This fourth Butcher et al. (1992) factor represents 12.7% of the total variance, which is similar to the 11.2% accounted for by the present study's third factor.

Clinical Relevance

Due to the lack of theoretical foundation for the MMPI-A, interpretation of the factors identified by the inventory is difficult. In order to improve the meaningfulness of the factors identified in the present study, adolescent psychopathology identified by the MMPI-A will be explained from the perspective of the developmental theory proposed by Erik Erikson.

Erikson's Theory of Psychopathology

According to Erikson (1963, 1964) psychopathology occurs when the normally competent ego is seriously weakened by social trauma, physical ills, and by the failure to resolve prior epigenetic crises. In

adolescence he believed this psychopathology could manifest itself as intimacy issues, lost sense of industry, negative identity, or diffusion of time perspective, all of which he considered to be an issue of identity confusion (Erikson, 1968). Identity confusion becomes manifest at a time when the adolescent becomes exposed to a combination of experiences which necessitate the "simultaneous commitment to physical intimacy (not by any means always overtly sexual), to decisive occupational choice, to energetic competition, and to psychosocial self-definition" (p. 166).

Diffusion of Time Perspective

Adolescents are often inconsistently aware of the concept of time as a dimension for living. In one setting time is an urgency, then in the next it becomes devoid of meaning. Nearly every adolescent experiences this form of disturbance as a sense of wanting the privileges of being an adult, yet not desiring the appropriate responsibility of adulthood. Disturbances of this type can be seen in the benign adolescent behavior of daydreaming. Yet, when severe, this category of identity confusion can become serious

enough to cause an adolescent to feel totally valueless and may result in an attempt of suicide.

This form of identity confusion appears to line up with Factor 1 in the present study. The "General Maladjustment" factor describes individuals who are anxious, depressed, and hurting individuals. This factor appears to be one measure of prior impaired developmental stage resolution, resulting in a general form of psychopathology. The impaired resolution could be either negative resolution or a nonresolution. Adolescents with issues of diffusion of time perspective are clearly unable to access the necessary mechanisms to cope with the demands of their lives.

Intimacy Issues

Adolescence is a time of engagement of the ego with others in the forms of friendship, competition, and love. When these situations are strained or assaulted, adolescents have a tendency towards regressed responses. The result for the adolescent is a "distantiation."

The present study's Factor 2 (Social Introversion) appears to be identifying this "distantiation." These individuals are withdrawn and anxious, particularly

within relationships requiring emotional intimacy.

Relationships are short-lived and infrequent.

Negative Identity

Erikson (1968) believed that identity confusion can lead to the adolescent choosing a negative identity. The adolescent expresses this as hostility towards the roles offered him/her. These include family, community, ethnic, and even gender roles. These adolescents fear losing their unique qualities or fear being unable to succeed within the limits of the appropriate roles.

Factor 3 (Masculinity/Femininity) in the present study appears to identify some aspects of this area of adolescent identity confusion. Often adolescents with a form of "negative identity" will behave in manners that are not fitting with the societal norms, including deviant behavior resulting in delinquent or criminal activity. The confusion resulting from needing an identity and refusing those offered can create fear, anger, mental confusion, and the inability to fulfill personal needs.

Lost Sense of Industry

Identity confusion is often accompanied by the inability to perform responsibly and to maintain

control of situations or self. Losing a sense of industry affects the adolescent's ability to concentrate, to compete, and to move forward in developing and obtaining appropriate life goals. The adolescent becomes overwhelmed by feelings of powerlessness.

This aspect of identity confusion appears comparable to the elements identified by Factor 4 (Overcontrol) in the present study. The sense of powerlessness creates an inability to identify and/or access the necessary resources to manage life's demands.

Adults Versus Adolescents

Research continues to indicate that the MMPI/MMPI-A identifies more than two factors with adolescent samples. However, research (Eichman, 1961, 1962; Welsh, 1952) with adult samples identifies only two consistent factors. One possible rationale for this disparity could be the maturation differences between adolescents and adults.

In the context of Eriksonian development the adolescent is focussed on identity formation, while the adult has resolved this crisis. Adolescents typically respond to this search for an identity in behaviors

often described as "acting out." These externalized behaviors are developmentally appropriate coping skills. However, adults have resolved the crisis of identity formation and respond to life stressors in a more internalized form. The commitment of the ego to an identity resulting in adulthood releases the tension and characteristic "acting out" behavior of adolescence.

The identity confusion and "acting out" of adolescence appears to influence the responses to the issues addressed in the MMPI-A. Examination of the present study's factor structure in light of Erikson's developmental theory suggests that maturation may affect not only the factor loadings, but also the number of factors identified by the MMPI-A.

Summary

Administration of the MMPI-A is a preliminary step in the treatment of adolescent psychopathology. It begins the treatment process by identifying the salient issues in the adolescent's life. From there, the clinician must develop a plan for treatment. Understanding the developmental issues in psychopathology facilitates the formation of therapeutic treatment plans. Erikson's developmental

theory provides a framework from which to understand adolescent psychopathology, from this foundation the clinician can apply training and clinical experience to develop an appropriate intervention plan to treat the disorders.

Conclusions

The aim of this study was to evaluate the factor structure of the MMPI-A. A four-factor solution was indicated by the ML factor analysis. The factors help to describe a range of adolescent female psychopathology. Additionally, understanding the factors in light of Erikson's developmental theory allows greater understanding of how to treat the psychopathology identified by the MMPI-A.

Suggestions for Future Research

Consideration of the statistical and sample limitation influences the clinical application of the results of this study. Limitation of factor analysis have previously been discussed.

The sample used in this study consisted of the female normative sample of the MMPI-A ($N = 815$). The

sample size was adequate for the study undertaken and was obtained from eight different geographic location across the United States in order to maximize the likelihood of obtaining diverse subgroups. However, an underrepresentation appears for Hispanics, and a higher level of representation from upper income and education levels is observed than would represent the United States population.

Therefore, further factor analytic studies using other samples (such as Hispanics and other ethnic groups, and other socio-economic groups) should be done in order to strengthen the interpretive value of the MMPI-A. Replication of the present study is suggested with the male normative sample in order to identify differences in psychopathology between genders.

Further factor analytic studies should be performed to evaluate the effects of maturation on the factor structure and the factors identified by the MMPI-A. Additionally, factor analysis at the item level should be used to evaluate the loadings of the variables that form the foundational elements of the variables factored in this study. This should be directed towards the reexamination of item-to-scale fit.

Likewise, a confirmatory factor analysis of the MMPI-A should be carried out to evaluate the goodness of fit of the four factor solution.

Summary

Adolescence is a time of many changes and challenges. Occasionally, if an adolescent does not adjust and proceed in adaptive development, the result can be psychopathology. Since research indicates gender differences exists in the manifestation of adolescent psychopathology, understanding these differences in order to facilitate appropriate treatment is necessary.

Currently, professionals working with adolescent psychopathology have limited assessment resources. The Minnesota Multiphasic Personality Inventory - Adolescent (MMPI-A) is a recently developed improvement of the MMPI for specific use in assessing psychopathology with adolescents. Research on the factor structure of the MMPI-A is limited. The present study sought to contribute to the understanding of the factors identified by the MMPI-A, specifically with adolescent females.

The present research used a Maximum Likelihood Factor Analysis which extracted four and five factor solutions using an oblimin rotation. Several lines of evidence suggested the superiority of the four factor solution. The four factors (General Maladjustment, Social Introversion, Masculinity/Femininity, and Overcontrol) were found to have similar structure as those identified with the MMPI-A manual factor analysis.

Erikson's developmental theory was used to better understand the clinical relevance of the factors identified by the MMPI-A. This research indicates that use of the MMPI-A to identify adolescent psychopathology with typical teens is appropriate; however, further research with the MMPI-A using other populations is necessary.

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Appendix A

Eight Factor Solution Final Statistics

Maximum Likelihood Eigenvalues for Eight Factor
Solution of the MMPI-A with the Adolescent Female
Normative Sample

Factor	Eigenvalue	Pct. of Var.	Cum. Pct.
<hr/>			
1	4.69	36.0	36.0
2	1.23	9.4	45.5
3	.58	4.5	50.0
4	1.86	14.3	64.3
5	1.01	7.8	72.1
6	.78	6.0	78.1
7	.36	2.8	80.9
8	.18	1.4	82.3

Eight Factor Pattern Matrix of the MMPI-A with the
Adolescent Female Normative Sample

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5
F	.09111	-.13100	.10948	.16543	-.24128
L	-.02169	-.02177	-.00919	-.00371	.03924
K	-.02466	-.02063	-.20108	-.44688	.20760
HS	.00762	-.02444	.96551	-.01643	.00670
D	.28920	.04080	.10080	.51029	.20920
HY	.06827	.05792	.29936	-.05237	-.05366
PD	1.00739	-.01189	-.01238	-.04135	-.04792
MF	-.00396	1.01276	-.01126	.02151	-.03956
PA	.04294	.01967	.03531	-.04521	.03782
PT	.04582	-.04670	.02441	.63606	-.24015
SC	.08608	-.07729	.07652	.42967	-.40260
MA	.10407	.00237	.02850	-.08447	-.82320
SI	.03709	.04353	.10291	.81735	.11866

	FACTOR 6	FACTOR 7	FACTOR 8
F	.35754	.17735	.45654
L	-.04755	-.05086	.61082
K	.04540	-.25977	.34554
HS	.02412	-.06589	-.01437
D	.09854	-.25306	.08468
HY	.06009	-.68562	.11282
PD	-.00101	.02080	-.02731
MF	.03233	.00627	.00961
PA	.87701	-.01974	-.04723
PT	.21766	-.19056	-.25690
SC	.30940	-.04829	.05435
MA	-.00539	-.01817	-.03662
SI	.00078	.15236	.06943

Eight Factor Structure Matrix of the MMPI-A with the
Adolescent Female Normative Sample

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5
F	.52662	-.38984	.47253	.42513	-.41357
L	-.03382	-.15073	-.03011	-.12320	.25967
K	-.27624	-.02664	-.38471	-.64666	.46261
HS	.54263	-.08434	.99697	.48586	-.30751
D	.60381	.05835	.59241	.65026	.01475
HY	.46000	.07384	.59736	.05745	-.04786
PD	.99644	-.10453	.50415	.37595	-.45303
MF	-.05298	.99762	-.04652	.05055	.16227
PA	.60589	-.10196	.51408	.38534	-.38758
PT	.60490	-.03590	.63747	.80361	-.51610
SC	.68811	-.22329	.66456	.68851	-.65597
MA	.41276	-.17019	.30052	.09153	-.86681
SI	.33387	.03268	.45114	.88230	-.03965

	FACTOR 6	FACTOR 7	FACTOR 8
F	.70128	.01621	.40898
L	.00232	-.16586	.63261
K	-.27887	-.35522	.52185
HS	.57030	-.40911	.03159
D	.53784	-.37507	.15783
HY	.41980	-.85426	.25111
PD	.65074	-.25255	.00206
MF	-.10745	-.12641	-.25796
PA	.88252	-.23226	.07822
PT	.67380	-.07304	-.32189
SC	.81388	-.04716	-.04447
MA	.41168	.05966	-.26731
SI	.36859	.18048	-.03031

Eight Factor Correlation Matrix of the MMPI-A with the
Adolescent Female Normative Sample

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5
FACTOR 1	1.00000				
FACTOR 2	-.08638	1.00000			
FACTOR 3	.52643	-.07167	1.00000		
FACTOR 4	.40828	.01612	.51482	1.00000	
FACTOR 5	-.39874	.20981	-.31366	-.14514	1.00000
FACTOR 6	.65665	-.15643	.55493	.45294	-.45216
FACTOR 7	-.28457	-.13597	-.35127	.13846	-.14636
FACTOR 8	.04050	-.25216	.01913	-.11669	.30120
	FACTOR 6	FACTOR 7	FACTOR 8		
FACTOR 6	1.00000				
FACTOR 7	-.20930	1.00000			
FACTOR 8	.12211	-.21457	1.00000		

Appendix B

Communalities Table

Communalities of the MMPI-A Adolescent Female Normative
Sample

Scale	Communality
<hr/>	
L	.30927
F	.64867
K	.65643
Hs	.70956
D	.66883
Hy	.68681
Pd	.60091
Mf	.26636
Pa	.59717
Pt	.84590
Sc	.89039
Ma	.59042
Si	.67499

Appendix C

Vita

Vita

Kris M. Kays

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DISSERTATION

Verification of the Number of Factors in the MMPI-A
with Adolescent Females.

REFERENCES

Available Upon Request