Validity of the MMPI-A Structural Summary in a Forensic Sample:
Effects of Ethnicity, Gender, and Age

by

Joshua Slatkoff,
B.A., McGill University, 1995
M.A., Lakehead University, 1999

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Dr. Esther Strauss (Department of Psychology)
Supervisor

Dr. Roger Graves (Department of Psychology)
Departmental Member

Dr. Helena Kadlec (Department of Psychology)
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Outside Member

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ABSTRACT

The Minnesota Multiphasic Personality Inventory-Adolescent (MMPI-A) Structural Summary was developed to aid in parsimonious interpretation of the instrument s 69 scales and subscales. The current study of 130 male and female young offenders had two goals: (1) evaluate the criterion validity of the Structural Summary as a function of ethnicity (First Nation versus Caucasian), gender, and age (16 years and under versus 17 years and older); (2) examine ethnic, gender, and age differences in the elevation of Structural Summary scores. The MMPI-A Structural Summary showed strong evidence of criterion validity and few ethnic, gender, or age differences were noted. However, compared to Caucasian youth, statistically significant and clinically meaningful elevations were found for First Nations youth on four of eight Structural Summary dimensions. As well, older adolescents were more elevated than younger adolescents on a dimension measuring general maladjustment. Results reflect substantive differences in psychopathology rather than an artefact of test bias.

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Introduction

The Minnesota Multiphasic Personality Inventory (MMPI) (Hathaway & McKinley, 1942) is one of the most used and well researched objective measures of psychopathology, with over 8000 published articles and books for the original adult version (Archer, 1987). Several problems limiting the use of the MMPI with adolescents led to the development of an adolescent-specific version of the test: For example, MMPI items were written from an adult perspective and were administered to adolescents without modification; MMPI scales were developed using adult samples and were assumed to apply to adolescent developmental psychopathology; there were no adolescent norms; and interpretations for adolescents were based on research with adult samples (Butcher & Williams, 1992). These limitations led to the development of the MMPI-Adolescent (MMPI-A) (Butcher et al., 1992).

The MMPI-A contains 69 scales and subscales which fall under four broad headings: Basic (Validity and Clinical), Content, Supplemental, and Harris-Lingoes (see Table 1). Clinical scales were empirically constructed to distinguish between psychiatric and non-clinical samples, where higher scores represent an increased likelihood that the individual belongs to a criterion group (e.g., individuals with depression) (Butcher & Williams, 1992). Harris-Lingoes scales were developed as subscales of the Clinical scales and are used to refine Clinical scale interpretation. Supplemental scales, for the most part, were empirically derived to maximally distinguish clinical from non-clinical samples, in a similar fashion as Clinical Scales. Finally, Content scales were rationally derived to measure a variety of areas of psychological functioning. High scores on Content scales indicate the individual has endorsed more of a group of symptoms, where scores are a direct reflection of the number of symptoms endorsed (Butcher & Williams, 1992).

Table 1

MMPI-A Scale Descriptions

MMPI-A Scale	Title	Number of Items	Changed since MMPI?
Basic Scales			
Validity			
VRIN	Variable Response Inconsistency	50	New
TRIN	True Response Inconsistency	24	New
F	Fake-bad	66	Modified
F_1	Fake-bad (first half of test)	33	Modified
F_2	Fake-bad (second half of test)	33	Modified
L	Lie (denial of problems)	14	Modified
K	Defensive response style	30	Same
Clinical (scale number)			
Hs (1)	Hypochondriasis	32	Modified
D (2)	Depression	57	Modified
Hy (3)	Hysteria	60	Same
Pd (4)	Psychopathic Deviate	49	Modified
Mf (5)	Masculinity-Femininity	44	Modified
Pa (6)	Paranoia	40	Same
Pt (7)	Psychasthenia (obsessive-compulsive disorder)	48	Same
Sc (8)	Schizophrenia	77	Modified
Ma (9)	Hypomania	46	Same
Si (0)	Social Introversion	62	Modified
Content Scales			
A-ANX	Anxiety	21	New
A-OBS	Obsessiveness	15	New
A-DEP	Depression	26	New
A-HEA	Health Concerns	37	New
A-ALN	Alienation	20	New
A-BIZ	Bizarre Mentation (Psychotic)	19	New
A-ANG	Anger	17	New
A-CYN	Cynicism	22	New
A-CON	Conduct Problems	23	New
A-LSE	Low Self-Esteem	18	New
A-LAS	Low Aspirations (school or life)	16	New
A-SOD	Social Discomfort	24	New
A-FAM	Family Problems	35	New
A-SCH	School Problems	20	New
A-TRT	Negative Treatment Indicators	26	New

MMPI-A Scale	Title/Description	Number of Items	Changed since MMPI?
Supplementary Scales			
A	Anxiety	35	Modified
R	Repression	33	Modified
MAC-R	MacAndew Alcoholism Scale – Revised	49	Modified
ACK	Alcohol/Drug Problem Acknowledgement	13	New
PRO	Alcohol Drug Problem Proneness	36	New
IMM	Immaturity	43	New
Harris-Lingoes subscales			
D_1	Subjective Depression	32	Modified
D_2	Psychomotor Retardation	14	Modified
D_3	Physical Malfunctioning	11	Modified
D_4	Mental Dullness	15	Modified
D_5	Brooding	10	Modified
Hy_1	Denial of Social Anxiety	6	Modified
Hy_2	Need for Affection	12	Modified
Hy_3	Lassitude-Malaise	15	Modified
Hy_4	Somatic Complaints	17	Modified
Hy_5	Inhibition of Aggression	7	Modified
Pd_1	Family Discord	11	Modified
Pd_2	Authority Problems	10	Modified
Pd_3	Social Imperturbability	12	Modified
Pd_4	Social Alienation	18	Modified
Pd_5	Self-Alienation	15	Modified
Pa_1	Persecutory Ideas	17	Modified
Pa_2	Poignancy	9	Modified
Pa_3	Naivete	9	Modified
Sc_1	Social Alienation	21	Modified
Sc_2	Emotional Alienation	11	Modified
Sc_3	Lack of Ego Mastery – Cognitive	10	Modified
Sc_4	Lack of Ego Mastery – Conative	14	Modified
Sc_5	Lack of Ego Mastery – Defective Inhibition	11	Modified
Sc_6	Bizarre Sensory Experiences	20	Modified
Ma_1	Amorality	6	Modified
Ma_2	Psychomotor Acceleration	11	Modified
Ma_3	Imperturbability	8	Modified
Ma_4	Ego Inflation	9	Modified
Si_1	Shyness	14	Modified
Si_2	Social Avoidance	8	Modified
Si_3	Self-Other Alienation	17	Modified

Revisions to the MMPI found in the MMPI-A included fifteen newly developed Content scales, six Supplemental scales, and some modifications to the Harris-Lingoes scales. Although there may be sufficient overlap between the MMPI-A and the original MMPI for much of the original MMPI research to apply to the MMPI-A, the significant modifications, in terms of item and scale content, warrant further research of this instrument (Archer & Krishnamurthy, 1997). A second version of the MMPI for adults, the MMPI-2 (Butcher, Dahlstrom, Graham, Tellegen, & Kaemmer, 1989), was also created in order to modernize content, delete offensive items, and include 15 newly developed Content scales (Archer, 1997b, 2005). However, the MMPI-2 is not germane to the current study, so its development and characteristics will not be described here.

Today, the MMPI-A is used extensively in forensic settings to assess youths' delinquent behaviour, family relations, substance use, and mental health needs. Much like its predecessor, the MMPI, MMPI-A profiles of young offenders are marked by elevations on scales 4 (Psychopathic Deviate) and 9 (Mania)(Hathaway & Monachesi, 1963; Pena, Megargee, & Brody, 1996). This particular pattern reflects externalizing tendencies and is associated with anger, cynicism, school problems, substance abuse, disrupted family relations, and an uninhibited, sensation-seeking orientation (Archer & Krishnamurthy, 2002).

In addition to assessing the specific forms of disturbances associated with juvenile delinquency, the MMPI-A measures a very broad range of psychopathology including, among others, somatization, depression, anxiety, obsessions, psychosis, social difficulties, low self-esteem, and factors affecting prognosis for treatment. In fact, the MMPI-A yields a potentially overwhelming amount of information for the clinician to interpret. As shown in Table 1, it contains 69 basic, content, Harris-Lingoes (Harris & Lingoes, 1955), and supplemental scales. There is concern, however, that scales do not always represent independent domains of

psychopathology (Archer & Krishnamurthy, 1997). Archer and Krishnamurthy (1994) cite substantial inter-correlation in the MMPI-A normative sample between Basic and Content scales and between Content scales themselves due to item overlap. For example, scale 1 (hypochondriasis) correlates with Health Concerns (r=.9), scale 7 (psychasthenia) with Anxiety (r=.8), scale 8 (schizophrenia) with Bizarre Mentation (r=.7), and Depression with Alienation (r=.7). Given the substantial overlap between scales and the sheer volume of information available to the clinician on the MMPI-A's interpretive outputs, attention has focused on reducing the MMPI-A's 69 scales and subscales to meaningful factor scores that will aid in parsimonious interpretation.

Development of the Structural Summary

Recent efforts have sought to identify the item- and scale-level factor structure of the MMPI-A in a normative sample consisting of 1620 adolescents with demographic characteristics representative of the general United States population (Archer, Belevich, & Elkins, 1994). Factor analysis of the MMPI-A's 478 items yielded 14 factors accounting for only 44% of the total item-level variance. However, scale-level factor analysis, which included all 69 scales and subscales, yielded eight factors accounting for 93% of the total scale-level variance. The authors labelled the scale-level factors: General Maladjustment, Immaturity, Disinhibition/Excitatory Potential, Social Discomfort, Health Concerns, Naivete, Family Alienation, and Psychoticism (see Table 2 for component scales of each of these dimensions). Collectively, these eight dimensions are referred to as the Structural Summary. The Structural Summary consists of these eight meta-scales which are meant to parsimoniously summarize all the clinical information conveyed by the MMPI-A. The Structural Summary helps focus the clinician's attention on the basic dimensions

Table 2

Composition of Structural Summary Dimensions (Archer & Krishnamurthy, 1994)

	Structural Summary Dimensions							
	GM	IMM	DEP	SD	HC	NAI	FAM	PSYC
Component Scales	Welsh's A	IMM	Scale 9	Scale 0	Scale 1	A-cyn (low score)	Pd_1 (Family Discord)	Pa_1 (Persecutory Ideas)
	Scale 7	Scale F	Ma_2 (Psychomotor Acceleration)	Si_1 (Shyness/Self-Consciousness)	Scale 3	Pa_3 (Naivete)	A-fam	Scale 6
	Scale 8	Scale 8	Ma_4 (Ego Inflation)	Hy_1 (Denial of Social Anxiety, low score)	A-hea	Hy_2 (Need for Affection)	Scale 4	A-biz
	Scale 2	Scale 6	Sc_5 (Lack of Ego Mastery-Defective Inhibition)	Pd_3 (Social Imperturbability, low score)	Hy_4 (Somatic Complaints)	Si_3 (Alienation-Self and Others; low score)	PRO	Sc_6 (Bizarre Sensory Experiences)
	Scale 4	ACK	D_2 (Psychomotor Retardation, low score)	Ma_3 (Imperturbability, low score)	Hy_3 (Lassitude-Malaise)	Scale K		
	D_1 (Subjective Depression)	MAC-R	Welsh's R (low score)	A-sod	D_3 (Physical Malfunctioning)			
	D_4 (Mental Dullness)	Pa_1 (Persecutory Ideas)	Scale K (low score)	A-lse				
	D_5 (Brooding)	Sc_2 (Emotional Alienation)	Scale L (low score)	Scale 7				
	Hy_3 (Lassitude-Malaise)	Sc_6 (Bizarre Sensory Experiences)	A-ang					
	Sc_1 (Social Alienation)	A-sch	A-cyn					
	Sc_2 (Emotional Alienation)	A-biz	A-con					
	Sc_3 (Lack of Ego Mastery-Cognitive)	A-aln	MAC-R					

	Structural Summary Dimensions							
	GM	IMM	DEP	SD	HC	NAI	FAM	PSYC
Component Scales	Sc_4 (Lack of Ego Mastery-Conative)	A-con						
	Si_1 (Alienation)	A-fam						
	Pd_4 (Social Alienation)	A-trt						
	Pd_5 (Self-Alienation)							
	Pa_2 (Poignancy)							
	A-dep							
	A-anx							
	A-lse							
	A-aln							
	A-obs							
	A-trt							

Note: GM = General Maladjustment, IMM = Immaturity, DEP = Disinhibited Excitatory Potential, SD = Social Discomfort, HC = Health Concerns, NAI = Naivete, FAM = Family Alienation, PSYC = Psychoticism. Scales are shown in descending order of strength of association with the parent dimension. Within this ordering, scales are grouped in terms of membership in Clinical, Harris-Lingoes and Si subscales, and Content scale categories. Component scales generally correlate $\geq .6$ or $\leq -.6$ with the parent dimension within the MMPI-A normative sample (Archer, Belevich et al., 1994).

of functioning and can be helpful in refining standard approaches to MMPI-A interpretation. It is suggested that the clinician interpret the Structural Summary dimension as meaningfully elevated if more than half its component scales are above T-score=60 (Archer, 1997b).

Since the original factor analytic study (Archer, Belevich et al., 1994), the MMPI-A has been subjected to two other scale-level factor analytic investigations. One study attempted to replicate the scale-level factor structure found in the normative sample in a clinical sample of 358 adolescent psychiatric inpatients and outpatients (Archer & Krishnamurthy, 1997). Nine factors emerged, accounting for 75.6% of the total variance in scale and subscale scores. Seven of the eight original factors were replicated, in terms of factor content and loadings, with the exception of Psychoticism. However, Psychoticism was the weakest factor in the Archer et al. (1994) study, with only two of 69 subscales loading greater than .5.

In the second study, the scale-level factor structure was investigated among 1610 juvenile delinquents (Archer, Bolinskey, Morton, & Farris, 2002). Analyses produced a similar seven-factor solution as was previously found (Archer, Belevich et al., 1994). The seven factors accounted for 79.1% of the scale raw score variance. The factor structure differed from Archer's original factor analytic investigation in that the General Maladjustment factor was divided into Dyscontrol and Distressed factors. As well, the Psychoticism factor was not replicated, consistent with findings from the clinical sample (Archer & Krishnamurthy, 1997). The extent to which these findings can be generalized to female forensic samples is limited in that only males were included in the Archer et al. (2002) study. Additionally, the ethnic composition of the sample was not representative of a Canadian forensic population; the sample was 51% African-American, 48% Caucasian, .9% Hispanic, and only .1% Native-American. In Canada, First

Nations youth are over-represented in the criminal justice system (Bittle, Quan, Hattem, & Muise, 2002).

In sum, the scale-level factor structure initially found in the normative sample (Archer, Belevich et al., 1994) has been shown to be fairly robust as it has been largely replicated in two additional independent samples of youth in clinical and forensic settings. Although samples have included minority groups commonly found in the United States, females and First Nations youth have been underrepresented in these factor analytic investigations (see Table 3). Despite these limitations, results from the original MMPI-A factor analysis have formed the basis for what is now known as the Structural Summary (Archer & Krishnamurthy, 1994) which is included in MMPI-A interpretive reports.

Validation of the Structural Summary

In order for the Structural Summary to be useful in clinical settings, recommendations for interpretation based on the dimensions' correlations with criterion variables must be established. This is essential with the Structural Summary as the selection of scales comprising its dimensions was determined by an exploratory factor analysis and was therefore not theory-driven. Further, the individual clinical scales underlying the dimensions and the items which comprise those scales are also not based on particular theoretical constructs. Rather, Clinical scale items were selected and scales were constructed to maximally distinguish psychiatric patients from various diagnostic categories from those without significant psychopathology (Butcher & Williams, 1992). Items comprising the Content scales were selected through a rational review of their content (McCarthy & Archer, 1998). However, narrative descriptions of Content scales were formulated via rational inferences based on scale content *and* scales' associations with empirical

Table 3

Sample Characteristics of Scale-Level Factor Analyses of the MMPI-A

	Archer, Belevich & Elkins (1994)	Archer, Bollinskey, Morton & Farris (2002)	Archer & Krishnamurthy (1997)
Sample	normal	juvenile delinquents	clinical
Gender	805 (m), 815 (f)	1610 (m)	266 (m), 92 (f)
Age			
M	15.5	14.8	15.06
(SD)	(1.17)	(1.3)	(1.46)
% Caucasian	76	48	82
% African-American	12	51	10
% Asian	3	.3	not reported
% Hispanic	2	.9	2
% Native	3	.1	1.3
Ethnic Differences	not reported	not reported	not reported
Gender Differences	not reported	n/a	not reported
Age Differences	not reported	not reported	not reported

correlates (Williams, Butcher, Ben-Porath, & Graham, 1992). As Structural Summary dimensions comprise both Clinical and Content scales, they cannot be seen as measuring purely theoretical constructs and their interpretation is largely limited to their relationship with external correlates.

To date, attempts to provide evidence of criterion validity of the MMPI-A Structural Summary have been limited to two reported studies, one of which comprised separate clinical and normal samples (Archer & Krishnamurthy, 1994) and the other which included only a clinical sample (Pogge, Stokes, McGrath, Belinger, & DeLuca, 2002). In Archer and Krishnamurthy's (1994) clinical sample, most common diagnoses were for Conduct Disorder (37%) and Dysthymia (35%). Criterion variables included demographic information about participants and their families, a Life Events form which asked about stressful life events in the six months preceding testing, the Child Behaviour Checklist (CBCL) (Achenbach & Edelbrook, 1983), and the clinician-rated Devreux Adolescent Behavior Checklist (Spivack, Haimes, & Spotts, 1967). In the second clinical sample, most common diagnoses were for mood disorders (70%) and disruptive behaviour disorders (13%) (Pogge et al., 2002). External correlates in this study were therapist ratings on the Hopkins Psychiatric Rating Scale (Derogatis, Lipman, Richels, Uhlenhuth, & Colvi, 1974), variables coded from a chart review, and an intelligence test (Wechsler, 1991, 1997). Characteristics of all three samples are shown in Table 4.

Both studies (Archer & Krishnamurthy, 1994; Pogge et al., 2002) correlated external criterion measures with continuous Structural Summary dimension scores. Due to the large number of variables in the analyses, only small to medium effect sizes ($r \geq .15$) were reported. Alpha was set at $p < .001$ for the normative sample and $p < .01$ for the clinical samples, reflecting the relatively smaller clinical samples.

Table 4

Sample Characteristics of MMPI-A Structural Summary Criterion Validity Studies

	Archer and Krishnamurthy (1994)	Archer and Krishnamurthy (1994)	Pogge et al. (2002)
Sample	normal	clinical	clinical
Gender	805 (m), 815 (f)	64 (m), 58 (f)	308 (m), 324 (f)
Age			
M	15.5	14.7	
(SD)	(1.17)	(1.37)	not reported
% Caucasian	76	80	68
% African-American	12	13	15
% Asian	3	not reported	not reported
% Hispanic	2	not reported	13
% Native	3	not reported	not reported
Ethnic Differences	not reported	not reported	not reported
Gender Differences	few differences; more significant correlations for females than males	not reported	some differences noted
Age Differences	not reported	not reported	not reported

It should be noted that although all three samples were moderately diverse in terms of ethnicity, gender, and age, comparisons between demographic groups within samples were seldom reported (see Table 4). As such, it is not known whether and how demographic characteristics relate to associations between Structural Summary dimension scores and external criteria.

Dimension correlates. The General Maladjustment (GM) dimension was related to a variety of social and psychological problems within the normal and clinical samples. Within the normal sample, GM correlated significantly with marks in school, school failure, lack of personal achievement, and referral to a counsellor. Within clinical samples, GM was related to not being liked by other youth, being withdrawn, sum of the CBCL internalizing scales, being dominated by peers, anxious self-blame, parental arguments worsened, suicidal ideation, and feeling depressed (Archer & Krishnamurthy, 1994). Further, GM was correlated with paranoia, suicidality, hallucinations, sleep difficulties, and self-mutilation (Pogge et al., 2002). Finally, for males, GM was associated with paranoia, bizarre thinking and sleep difficulties, whereas for females, GM was associated with poor self-esteem, interpersonal sensitivity, and eating disorders (Pogge et al., 2002).

The Immaturity (IMM) dimension was correlated with school suspensions, disciplinary problems in school, having been held back a grade, and serious parental disagreements within the normal sample (Archer & Krishnamurthy, 1994). Among the clinical samples, IMM was related to the sum of CBCL externalizing variables, showing off, impulsive acts, unpredictable behaviour, parents arguments worsened, suspended from school, and having fought (Archer & Krishnamurthy, 1994). IMM also correlated significantly with psychosis, paranoia, a history of physical abuse and was negatively correlated with full-scale IQ (Pogge et al., 2002).

The Dinhibition/Excititory Potential (DEP) dimension was related to having stolen something valuable, used drugs or alcohol, and with serious parental disagreements among normal adolescents (Archer & Krishnamurthy, 1994). Within clinical samples, DEP was associated with the sum of CBCL externalizing variables, hanging around with other youth who get in trouble, teasing/bullying, cheating in school, truancy, being verbally abusive, suicidality, and apathy (Archer & Krishnamurthy, 1994). DEP was also related to impulsive/violent behaviours, temper tantrums, and lower full-scale IQ (FSIQ) (Pogge et al., 2002).

The Social Discomfort (SD) dimension was associated with having gained a lot of weight and no personal achievements within the normal sample (Archer & Krishnamurthy, 1994). Within the clinical samples, SD was related to not being liked by other youth, self-conscious, worried, timid, shy, dominated by peers, and avoided peer competition (Archer & Krishnamurthy, 1994). Further, within a clinical sample, SD was related to social withdrawal, poor peer interactions, paranoid ideation, suicidal ideation, bizarre thinking, eating disorders, and depression (Pogge et al., 2002).

The Health Concerns (HC) dimension, within the normal sample, was related to having been referred to a therapist, treated differently by friends, and family earned much less money in the past six months (Archer & Krishnamurthy, 1994). Within the clinical sample, HC was associated with having been clingy, cried a lot, low endurance, schizoid withdrawal, loss of weight in the past six months, tiredness, and sleep difficulties (Archer & Krishnamurthy, 1994). Further, in Pogge and colleagues' (2002) clinical sample, HC was correlated with somatic complaints, lethargy, sleep disturbances, anxiety, suicidal ideation, and hallucinations. Females were more likely to also have reported self-mutilation and eating disorders. Males were more likely to report a history of fire setting and suicide attempts.

Within the normal sample, the Naivete (NAI) dimension was associated with serious parental disagreements (Archer & Krishnamurthy, 1994). Within the clinical samples, NAI was negatively correlated with the sum of CBCL internalizing scales, nervous, high strung or tense, feels worthless or inferior, had sex for the first time in the past six months, wore provocative clothes, and history of being sexually abused (Archer & Krishnamurthy, 1994). Further, NAI was related positively to full-scale IQ, and negatively with impulsive behaviours, paranoid ideation, and psychotic behaviours (Pogge et al., 2002).

The Familial Alienation (FAM) dimension was related to serious parental disagreements, parents' arguments grew worse over the past six months, lower marks in school, and disciplinary problems in school (Archer & Krishnamurthy, 1994). Within the clinical samples, FAM was correlated with the sum of CBCL externalizing variables, disobedient at school, got in many fights, expressed anger, poor emotional control, poor relationship with parents, ran away, and stole (Archer & Krishnamurthy, 1994). FAM was also related to oppositional behaviours, history of family problems, and having been physically abused among clinical adolescents (Pogge et al., 2002).

Within the normative sample, the Psychoticism (PSY) dimension was associated with having been treated differently by friends, appeared in court, and course failure in school (Archer & Krishnamurthy, 1994). In a clinical sample, PSY was related to stared blankly, obsessive thoughts, clumsy, felt others are out to get him, treated differently by friends, not having dated, suicidal ideation, and legal difficulties (Archer & Krishnamurthy, 1994). Within the other clinical sample, PSY was correlated positively with hallucinations and paranoid ideation, and negatively with full-scale IQ (Pogge et al., 2002).

Based on the correlates from the MMPI-A normative and clinical samples (Archer & Krishnamurthy, 1994), narrative descriptors have been developed (Archer, 1997b; Archer & Krishnamurthy, 2002; Archer, Krishnamurthy, & Jacobson, 1994). For the most part, scales were only included on a dimension if they correlated ≥.60 with the assigned dimension. Narrative descriptions reported by Archer and Krishnamurthy (1994) are summarized in Table 5.

Summary and analysis. The correlates of the Structural Summary have been the subject of two independent investigations, comprising one normal (Archer & Krishnamurthy, 1994) and two clinical (Archer & Krishnamurthy, 1994; Pogge et al., 2002) samples. Generally, the significant correlations found between Structural Summary dimension scores and the external variables they were related to provide evidence supporting the criterion validity of the Structural Summary. Narrative descriptions of the Structural Summary have been based on one of these investigations (Archer & Krishnamurthy, 1994), and provide an intuitively appealing description of the dimensions.

Nonetheless, the research conducted thus far on the criterion validity of the Structural Summary is limited in several respects. First, dimensions are sometimes correlated with external variables in a purely empirical manner that does not appear to make sense, given the dimension's title. For instance, criterion variables such as having been referred to a therapist, treated differently by friends, and family earned much less money in the past six months correlate significantly with Health Concerns (Archer & Krishnamurthy, 1994). In a clinical sample, Naivete was positively correlated with full-scale IQ and negatively correlated with impulsive behaviours, paranoid ideation, and psychotic behaviours (Pogge et al., 2002). These correlations, although statistically significant, are arguably only tangentially related to the construct they are

Table 5

Narrative Description of MMPI-A Structural Summary Dimensions (Archer & Krishnamurthy, 1994)

Dimension name	Number of scales or subscales	Description
General Maladjustment	23	This dimension is associated with substantial emotional distress, problems at home and at school, somatic complaints, and feeling different from other teens. Adolescents who score high on General Maladjustment are likely to report suicidal thoughts and to be referred for therapy.
Immaturity	15	This dimension reflects attitudes and behaviours regarding egocentricity, limited psychological mindedness, poor judgement and impulse control, and disturbed interpersonal relations. Adolescents who score high on Immaturity often have behavioural problems at school and are likely to bully or threaten others. They associate with deviant peers and display little remorse for their actions. Familial relationships are strained and may be marked by parental separation. High scoring boys are more likely to be hyperactive and immature whereas high scoring girls are likely to display aggressive or delinquent conduct.
Disinhibition/ Excitatory Potential	12	High scorers display impulsivity, disciplinary problems, and conflicts with parents or authority. They are boastful and attention-seeking and have histories of poor school work, truancy, school suspensions and drop-out. Interpersonal relationships are marked by domination and aggression and they are likely to engage in a number of problem behaviours such as drug abuse, stealing, cheating, and lying. Externalization is seen as the primary defence mechanism among high scorers.
Social Discomfort	8	High scorers are likely to feel withdrawn and uncomfortable in social situations and to display a range of internalizing behaviours. They tend to be dominated by peers and are viewed by others as timid, passive, and fearful. They may experience suicidal ideation and somatic complaints and are unlikely to engage in acting-out behaviours.
Health Concerns	6	High scorers are seen by others as dependent, socially isolated, and sad. They are likely to tire quickly and have a history of weight loss, sleep difficulties, suicidal ideation, academic problems, and sexual abuse. High scoring boys are likely to be seen as demonstrating schizoid withdrawal whereas high scoring girls are likely to express somatic complaints. High scoring adolescents are unlikely to exhibit antisocial behaviours.

Dimension name	Number of scales or subscales	Description
Naivete	5	These adolescents are likely to deny hostile or negative impulses and are likely to present themselves in a social conforming manner. They are unlikely to engage in oppositional or antisocial behaviour and are unlikely to experience internalizing symptoms such as nervousness or fear.
Familial Alienation	4	High scorers are likely to be seen by their parents as hostile and delinquent. These adolescents are likely to exhibit externalizing behaviours such as verbal abuse, disobedience, or threats at home. Relationships with parents are likely to be problematic. In clinical settings, these adolescents are likely to report sexual abuse, substance abuse, and disciplinary problems at school.
Psychoticism	4	High scorers are more likely to be seen by others as obsessive and socially disengaged. They may feel that others are out to get them and are likely to be rejected by their peers. Mood is poorly regulated and expressions of anger are likely. They may also exhibit problem behaviours such as cruelty to animals, property destruction, and fighting.

supposedly describing; they do not appear to tap to the core construct named in dimensions' titles.

Second, the two clinical samples studied were similar in terms of ethnicity and having both been recruited from general clinical inpatient settings (see Table 4). Although gender differences in correlations were examined by Pogge and colleagues (2002), other important demographic characteristics such as age and ethnicity have not been evaluated. In particular, although the samples were about 14% African-American, they contained very few Native-Americans. More research is needed to generalize prior criterion validity findings to samples from different clinical settings (e.g., a forensic clinic) and with differing demographic characteristics (e.g., Native status and age).

Third, the external criteria that have been examined thus far are applicable to general clinical settings and include such variables as acting out, social withdrawal, heterosexual interests, internalizing and externalizing behaviours, and psychiatric symptoms. In evaluating the Structural Summary for use in other specific settings, it would be helpful to examine external criteria specifically relevant to those settings. For instance, in a forensic setting, it would be important to know how dimension scores relate to variables of criminological interest such as maternal drinking during pregnancy, age at first contact with police, and age at first offence leading to a charge. Knowing these relationships will make the Structural Summary more useful to forensic psychologists conducting assessments of young offenders' psychological risks and needs.

Fourth, correlations between dimensions and criterion variables appear to differ as a function of the sample studied. For instance, the Social Discomfort dimension was associated with having gained a lot of weight and no personal achievements within the normal sample (Archer &

Krishnamurthy, 1994). Using the same criterion variables within a clinical sample, Social Discomfort was related to peer rejection, self-consciousness, worry, timidity, shyness, being dominated by peers, and avoiding peer competition (Archer & Krishnamurthy, 1994). The Health Concerns dimension, within a normal sample, was related to having been referred to a therapist, treated differently by friends, and family earned much less money in the past six months (Archer & Krishnamurthy, 1994). Within a clinical sample, the Health Concerns dimension was associated with clinging, crying a lot, low endurance, schizoid withdrawal, loss of weight in the past six months, tiredness, and sleep difficulties (Archer & Krishnamurthy, 1994). In the Archer and Krishnamurthy (1994) study, the correlates appear more intuitively related to the dimension's title for the clinical sample than for the normal sample.

Additionally, correlations differed between the two clinical samples studied. For instance, the Immaturity dimension was correlated with psychotic symptoms in one clinical sample (Pogge et al., 2002), but not the other (Archer & Krishnamurthy, 1994). Additionally, in one clinical sample, Naivete was negatively correlated with the sum of CBCL internalizing variables, acts too young for his age, nervous, high strung or tense, feels worthless or inferior, had sex for the first time in the past six months, wears provocative clothes, and history of being sexually abused (Archer & Krishnamurthy, 1994). However, in the other clinical sample, Naivete was related positively to full-scale IQ, and negatively related to impulsive behaviours, paranoid ideation, and psychotic behaviours (Pogge et al., 2002). The correlates of Naivete seem more relevant to the dimension's title in Archer and Krishnamurthy's study that they do in the study by Pogge and colleagues. It is worth noting that although the two investigations of clinical samples used different instruments, there was considerable overlap between the types of psychopathology and behaviour problems surveyed. Further, both studies sampled psychiatric inpatients. It is

therefore not clear why the correlates of these two clinical samples would differ. However, the discrepancy in correlations between samples studied begs the question as to whether Structural Summary dimensions are measuring the same constructs in these samples and whether narrative descriptions based on correlates from the Archer and Krishnamurthy (1994) study are applicable to other samples and settings. The extent to which this is the case remains an empirical question.

Group Differences in Scale Elevations

An important step in evaluating the applicability of a measure to groups that vary in terms of demographic characteristics is to examine whether it is biased. To evaluate test bias, two criteria must be assessed. First, do groups differ in their criterion validity (Greene, 1987; Greene, Robin, Albaugh, Caldwell, & Goldman, 2003; Gumbiner, 2000)? In the case of the MMPI-A Structural Summary, this question is answered by examining group differences in how test scores relate to extra-test correlates. For instance, gender differences in the strength of correlations between test scores and extra-test correlates suggest that descriptors based on correlations that collapsed across gender may not apply equally well to both males and females. As noted above, studies thus far have not examined how MMPI-A Structural Summary scores differentially correlate with external criteria as a function of important demographic characteristics as ethnicity, gender, and age within a forensic sample. The second criterion to be assessed is whether demographic groups differ in terms of levels of endorsement (Greene, 1987; Greene et al., 2003; Krishnamurthy & Archer, 1999). That is, does the magnitude of score elevation vary as a function of ethnicity, gender, or age?

Ethnic differences in profile elevation. Previous research examining ethnic differences on MMPI performance has primarily focussed on differences between Caucasian and African-American ethnic groups. Studies of adults in forensic (Ben-Porath, Shondrick, & Stafford, 1995)

and community samples (Timbrook & Graham, 1994) failed to find ethnic differences in Clinical or Content scale elevations on the MMPI-2 after controlling for age, income, and education. However, a study of 99 adolescent males in a correctional facility did find that scales 4 and 9 on the MMPI-A were higher among Caucasians than African-Americans (Cashel, Rogers, Sewell, & Holliman, 1998). Scales 4 and 9 on the MMPI-A and MMPI-2 are the Clinical scales most significant for distinguishing offenders from non-offenders in juvenile (Pena et al., 1996) and adult forensic samples (Hall, Bansal, & Lopez, 1999), respectively. Such differences raise the question of whether there is a lower threshold for incarcerating African-Americans as compared to Caucasians. Nonetheless, large-scale reviews have concluded that there are no systematic differences in scale elevations between Caucasians and African-Americans on the MMPI (Greene, 1987; Hall et al., 1999) or the MMPI-2 (Hall et al., 1999). These reviews noted that where differences are found, sometimes African-Americans score higher than Caucasians and sometimes the reverse. Further, none of the differences were clinically significant as they were all less than 5 T score points (Greene, 1987). Lack of differences was observed among males and females and among adolescents and adults on both the MMPI and MMPI-2.

Relatively few studies have compared the MMPI profiles of Caucasians and Native-Americans. In fact, a meta-analysis of studies of ethnic differences on MMPI and MMPI-2 profiles between 1967 and 1998 did not include comparisons of these ethnic groups because too few studies that met their inclusion criteria were available (Hall et al., 1999). In another review of ethnic differences, however, Native-Americans were the only group with scores significantly different from Caucasians on the MMPI (Greene, 1987).

It is interesting to note that the direction of Native-American - Caucasian differences appears to vary as a function of the study setting. Within non-clinical samples, Native-

Americans score higher than Caucasians on all Clinical scales except 5, 6, and 0 on the MMPI (Arthur, 1944; Herried & Herried, 1966). However, these two studies were limited in that they did not control for moderator variables, sample sizes were small, and empirical correlates of observed base rate differences were not examined (Greene, 1987). Another community-based study examined MMPI-2 scale scores among 720 Native-Americans from two distinct tribes (Greene et al., 2003; Robin, Greene, Albaugh, Caldwell, & Goldman, 2003). Native-Americans had higher scores (more than 5 T score points) on scales L, F, 1, 4, 8, 9 and several Content scales (DEP, HEA, BIZ, CYN, ASP) than the mostly Caucasian normative group. The two tribes did not differ from each other in terms of scale elevations. As the MMPI-2 scales that were elevated also significantly correlated with diagnostic interview scores, elevations on these scales are likely to reflect substantive problems rather than an exaggeration of symptoms. However, the sample did not include First Nations groups from Canada or adolescents. Therefore, the extent to which findings can be generalized to adolescents or a Canadian context is not known.

In psychiatric samples, the direction of Native-American – Caucasian differences is unclear. One study examined MMPI scores of 611 psychiatric inpatients matched for gender, occupational status, and socioeconomic status (Butcher, Braswell, & Raney, 1983). Native-American scores were lower than Caucasians' on scales F, 6, 8, 9 after controlling for socio-demographic variables. Although potential moderator variables were controlled for, external correlates of the between-group differences were not examined. These results are similar to those reported elsewhere for the MMPI-2 (Greene, 2000). However, in a sample of psychiatric patients, Native-Americans had elevated scores on Clinical scales 4 and 8 (relative to the normative sample) (Pollack & Shore, 1980). This latter study may have exaggerated differences

by comparing Native-American scores to the normative sample rather than to a Caucasian clinical sample.

In sum, ethnic differences in MMPI, MMPI-2 and MMPI-A scale elevations have been the subject of numerous investigations (see Table 6 for a summary). Most studies have looked for systematic differences in scale elevations between Caucasian and African-Americans, and failed to find any. Far fewer studies have examined differences between Caucasians and Native-Americans. In non-clinical samples, there is consistent evidence that Native-Americans score higher than Caucasians. These differences are seen to reflect true elevations in symptoms rather than being an artefact of test bias as similarities in criterion validity for Native Americans and Caucasians were noted. In clinical samples, there is some evidence that Native-Americans score lower on several MMPI and MMPI-2 scales than do Caucasians, although this evidence is less consistent. Little research has examined ethnic differences on the MMPI-A. To date, no studies in forensic settings have examined differences in profile elevation between Caucasians and First Nations youth on the MMPI-A Structural Summary.

Gender differences in profile elevation. As a measure of psychopathology, the MMPI-A takes into account gender differences in the base rate of many disorders (American Psychiatric Association, 1994) by using separate norms for males and females. Although most descriptors for the MMPI-2 apply equally well to males and females (Butcher & Williams, 1992), less is known about the MMPI-A. The factor analysis used to derive the Structural Summary collapsed across gender (Archer, Belevich et al., 1994) as previous factor analytic investigations of the MMPI-A's Clinical scales failed to reveal gender differences in factor structure (Butcher et al., 1992). This lack of gender differences in factor structure is consistent with a previous study that

Table 6

Summary of Group Differences in MMPI, MMPI-2, and MMPI-A Profile Elevation

Group	Test	Finding
Ethnicity		
Caucasian vs. African-American	MMPI/MMPI-2	• No systematic differences in scale elevation among normal, substance abuse, or psychiatric samples (Greene, 1987). • Limited evidence that African-Americans score lower on scale 4 in forensic settings (Hall et al., 1999).
Caucasian vs. African-American	MMPI-A	• Limited evidence that African-Americans score lower on scales 4 and 9 in forensic settings (Cashel et al., 1998).
Caucasian vs. Native-American	MMPI/MMPI-2	• In non-clinical samples, Native-Americans score higher on many scales (Greene, 1987; Robin et al., 2003). • In clinical samples, inconsistent evidence that Native-Americans score lower (Butcher et al., 1983; Pollack & Shore, 1980).
Caucasian vs. Native-American	MMPI-A	• No data are reported in the literature about Structural Summary profiles.
Gender		
Adult offenders	MMPI	• Overall, there were no clinically significant gender differences in Clinical scale scores (Megargee, Mercer, & Carbonell, 1999).
Adult offenders	MMPI-2	• Overall, scale scores were higher for females (Megargee et al., 1999).
Psychiatric inpatients	MMPI-A	• The Disinhibition/Excitatory Potential dimension of the Structural Summary was elevated more frequently among males (Krishnamurthy & Archer, 1999). • The Health Concerns dimension of the Structural Summary was elevated more frequently among females (Krishnamurthy & Archer, 1999).
Young offenders	MMPI-A	• No data are reported in the literature about gender differences in Structural Summary profiles.

Group	Test	Finding
Age		
Younger vs. older adults	MMPI/MMPI-2	• Older adults endorse somatic complaints, lower mood, lower risk-taking, and social introversion slightly more frequently (Butcher & Williams, 1992).
Adolescents vs. adults	MMPI	• Adults are more likely to have all scales within normal limits (Hathaway & Monachesi, 1963). • Adolescents score at least one standard deviation higher than adults on more than half the Clinical scales (Hathaway & Monachesi, 1963).
Adolescents vs. adults	MMPI-2	• Similar findings as for MMPI, but slightly attenuated (Butcher & Williams, 1992).
Younger vs. older adolescents	MMPI-A	• No frequency differences in Structural Summary dimension elevations between younger (age 13-14) and older (ages 15-18) inpatients (Krishnamurthy & Archer, 1999). • No differences in mean T scores for Validity, Clinical, Content, or Supplemental scales between 13- and 14-year-old inpatients (Janus, de Groot, & Toepfer, 1998). • Forensic samples have not been evaluated.

failed to find gender differences in the item-level factor structure of the MMPI (Beck et al., 1989). On the other hand, a scale-level factor analysis of the MMPI-A Content scales in the MMPI-A normative sample found a generalized maladjustment factor in both males and females, but an additional externalizing factor in males only (McCarthy & Archer, 1998). The gender difference in patterns of correlations among MMPI-A scales begs the question of whether there are also gender differences in patterns of profile elevations.

Only one study has specifically examined gender differences in profile elevations on the MMPI-A Structural Summary (Krishnamurthy & Archer, 1999). In a sample of 227 male and 136 female adolescent psychiatric inpatients, more males than females had elevations on Disinhibition/Excitatory Potential dimension and more females than males had elevations on the Health Concerns dimension. Although studies examining gender differences in MMPI-A profiles in forensic samples could not be located, several investigations of forensic samples have compared males and females on individual MMPI and MMPI-2 scale elevations. As one might expect in forensic sample, the Psychopathic Deviate scale is commonly elevated in both males and females on the original MMPI (Panton, 1974) and the MMPI-2 (Megargee et al., 1999). However, the Psychopathic Deviate scale is a more effective predictor of institutional adjustment for male than female offenders, at least among African-American juvenile delinquents (Boone & Green, 1991).

In terms of overall levels of scale elevation, results between studies conflict. In a sample of 364 male and 356 female adult prisoners, females' scale scores on the MMPI-2 were more elevated than males' on several scales, indicating higher levels of pathology (Megargee et al., 1999). However, that same study's review of 18 male offender (N=6794) and 15 female offender (N=1516) samples on the MMPI found no clinically significant differences between genders in

mean Clinical scale scores (i.e., >5 T-score points) (Megargee et al., 1999). Although the reason for this discrepancy is not clear, it is possible that it reflects the use of different test versions, differences in samples' ages, cohort effects, or changing referral patterns in the criminal justice and mental health systems over time.

In sum, limited findings of gender differences in the factor structure of the MMPI-A suggest the possibility of differences in males' and females' patterns of profile elevation (see Table 6). Only one study has examined gender differences in MMPI-A Structural Summary elevations (Krishnamurthy & Archer, 1999), but the sample did not comprise young offenders nor a significant proportion of First Nations youth. Finally, studies which have examined gender differences in MMPI and MMPI-2 scale elevations within forensic samples have yielded conflicting findings that are not easily resolvable. Further research is required to identify and characterize gender differences in profile elevations of the MMPI-A's Structural Summary within youth in forensic settings.

Age differences in profile elevation. Age differences in MMPI performance have been the subject of several investigations (see Table 6). Age differences in scale elevations were noted with the original MMPI and the MMPI-2. Specifically, compared to younger adults, older adults more frequently endorsed somatic complaints, lower mood, lower risk-taking, and more social introversion (Butcher & Williams, 1992). However, these differences have tended to be quite small and not clinically meaningful (Butcher et al., 1989).

Differences have also been noted between adolescents and adults on the original MMPI. Compared to adults, adolescents have tended to endorse items indicating greater interest in excitement, more emotionality, and less inclination toward intellectual pursuits. Adolescents were also more likely than adults to endorse pathological items such as strange thoughts, urges to

do harmful things, ideas of reference, and feelings of unreality (Williams et al., 1992). On the original MMPI, adults were more likely than adolescents to have all scales fall within normal limits (Hathaway & Monachesi, 1963). Adults were also more likely to yield neurotic code-types (i.e., elevations on scales 1,2, or 3) and less likely to yield sociopathic or psychotic code-types (elevations on scales 4, 8, or 9) (Hathaway & Monachesi, 1963). With regard to scale elevations, adolescents scored at least one standard deviation higher than adults on more than half the Clinical scales when using MMPI norms. This difference is attenuated slightly when using MMPI-2 norms (Butcher & Williams, 1992). Such significant differences led to the development of specific item and scale content for the MMPI-A, as well as specific norms for adolescents.

Given the MMPI and MMPI-2 findings that adolescents' profiles are more elevated than those of adults (Butcher & Williams, 1992; Hathaway & Monachesi, 1963), it might be expected that younger adolescents' profiles would be more elevated than those of older adolescents. Investigations to date have not found age differences on the MMPI-A. In a sample of 227 male and 136 female adolescent inpatients, no frequency differences in Structural Summary dimension elevations were found between older (ages 15-18 years) and younger (ages 13-14 years) adolescents (Krishnamurthy & Archer, 1999). Another investigation of psychiatric inpatients also failed to find age differences in Structural Summary dimension elevations, although how age groups were defined was not reported (Pogge et al., 2002). Finally, no differences were found between 13- and 14-year-old psychiatric inpatients in terms of mean T scores or percentage of scales in the clinical range for Validity, Clinical, Content, or Supplemental scales of the MMPI-A (Janus et al., 1998).

Although age differences have not been found within psychiatric samples, forensic samples have not been tested. Criminological theories have consistently identified early entry

into the justice system (i.e, 14 years of age or younger) as a significant risk factor for pervasive and chronic delinquency (Moffitt, 1993; Patterson, 1992; Patterson & Yoerger, 1997; Sampson & Laub, 1992). Further, early- and late-starting juvenile delinquents have been differentiated on the basis of psychopathology and personality structure such that early-starters are more likely to have weak bonds to family and psychopathic traits of alienation, callousness, and impulsivity in adolescence (Ge, Donnellan, & Wenk, 2001; Moffitt, Caspi, Dickson, Silva, & Stanton, 1996) and early adulthood (Moffitt, Caspi, Harrington, & Milne, 2002). Therefore, to the extent that younger age is an indicator of early entry into the justice system within forensic samples, younger adolescents could be expected to evidence more elevated psychopathology than older adolescents, particularly psychopathic-type traits.

Summary

The MMPI-A was developed in response to the need for an adolescent-specific version of the MMPI. It contains 69 scales and subscales which are highly inter-correlated due to item and construct overlap between scales. The Structural Summary was derived from a scale-level factor analysis in an attempt to provide clinicians with a more parsimonious method by which to summarize the vast amount of information contained within the MMPI-A profile. The scale-level factor structure of the MMPI-A has demonstrated its robustness through replication in clinical and forensic samples.

Previous investigations of the criterion validity of the Structural Summary are limited in several ways: dimension scores sometimes correlate with external criteria in non-intuitive ways; correlations vary depending on whether the sample is normal or clinical and even between what appear to be similar clinical samples; certain populations (e.g., forensic) and demographic group

differences (e.g., ethnicity, gender, age) have been little studied; and additional criterion variables may need to be studied to help apply the Structural Summary to forensic clinical settings.

An examination of MMPI-A Structural Summary bias requires comparisons of profile elevations across demographic groups that vary as a function of important characteristics such as ethnicity, gender, and age. Limited evidence suggests that, within non-clinical samples, Native-Americans have higher scores than Caucasians on individual MMPI and MMPI-2 scales, and that these differences cannot be accounted for by differences in extra-test measures. However, to date, no studies in forensic settings have examined differences in profile elevation between Caucasians and First Nations youth on the MMPI-A Structural Summary. Only one study has examined gender differences in MMPI-A Structural Summary elevations, but the sample did not comprise young offenders nor a significant proportion of First Nations youth. Two studies failed to find age differences in the frequency or magnitude of dimension elevations on the Structural Summary. Again, these studies did not comprise young offenders, nor a significant proportion of First Nations youth.

The current study has two goals. The first is to evaluate the criterion validity of the MMPI-A Structural Summary in a forensic sample and to assess whether its criterion validity differs as a function of ethnicity, gender, or age. The second goal is to examine ethnic, gender, and age differences in the elevation of Structural Summary dimensions. Together, these findings will permit conclusions as to the bias of the MMPI-A Structural Summary on the basis of ethnicity, gender, or age.

Research Questions and Hypotheses

Does the MMPI-A Structural Summary Show Evidence of Criterion Validity?

Evidence of criterion validity will be examined by correlating Structural Summary dimension scores with extra-test variables for the sample as a whole and for the sample broken down by ethnicity, gender, and age.

Hypothesis 1. Structural Summary dimension scores will correlate significantly with conceptually similar external variables (see Table 7). Previous research with the MMPI-A has generally not found gender differences in the strength of correlations between dimension scores and criterion measures. Therefore, no gender differences are expected in the current study. However, age and ethnic differences have not been examined. Consequently, there is no basis for a specific research hypothesis with respect to age and ethnic differences in the relationship between dimension scores and external variables.

How Do Elevations on the Structural Summary Vary as a Function of Demographic Characteristics?

Structural Summary scores will be examined for the entire sample as well as broken down by ethnicity, gender, and age. Group comparisons will be based on the mean elevation for each dimension (average of the T scores of the scales on that dimension).

Hypothesis 2a (total sample). Previous studies of psychiatric patients have found that Naivete (Krishnamurthy & Archer, 1999) and Familial Alienation (Pogge et al., 2002) are the dimensions most frequently elevated. However, the Immaturity dimension was the dimension most frequently elevated and with the highest mean elevation in a sample of male delinquents (Archer et al., 2002; Morton & Farris, 2002). Given the current forensic sample, Immaturity is expected to be the dimension with the highest mean elevation, for the sample as a whole.

Table 7

Predicted Correlations between MMPI-A Structural Summary Dimensions and Criterion Measures

	Factor							
Correlate	GM	IMM	DEP	SD	HC	NAI	FAM	PSYC
Criminological								
Age at first contact with police		-	-		+	+		-
Age at first offence leading to a charge		-	-		+	+		-
First offence sexual?		-	-					
First offence violent?		+	+		-	-		+
Prosocial involvement	-	-	-			+*	-	
Participate in Youth Violence Intervention Pgm?		+	+		-	-		+
Externalizing								
Peer delinquency		+	+	-*		-		
Ever suspended from school	+	+	+	-		-	+	
Ever expelled from school	+	+*	+*	-		-*	+*	
Ever attended an alternate school	+	+	+	-		-	+	
Cognitive								
Verbal IQ		-	-					-
Performance IQ		-	-					-
Freedom from Distractibility/Working Memory		-	-					
Processing Speed	-				-	+		
Full Scale IQ		-	-					-
Maternal drinking in pregnancy		+	+					
ADHD diagnosis ever given by psychiatrist		+	+*					
Substance use								
Alcohol use			+	-			+	
Tobacco use			+	-			+	
Cannabis use			+	-			+	
Cocaine use			+	-			+	
Hallucinogen use			+	-			+	
Dissociative anaesthetics use			+	-			+	
GHB (liquid ecstasy) use			+	-			+	
Stimulant use			+	-			+	
Opiate use			+	-			+	
Substance use total			+*	-*			+*	
Suicide								
Ever suicidal ideation	+		+	+	+	-		+
Ever para-suicidal behaviours	+		+	+	+	-		+
Ever suicide attempt	+		+	+	+	-		+
Suicide total	+*		+	+*	+*	-*		+*
Trauma								
Ever physically abused	+				+	-	+	
Ever sexually abused	+				+	-	+	
Ever emotionally abused	+				+	-	+	
Ever neglected	+				+	-	+	
Ever victim of sexual assault	+				+	-		
Trauma total	+				+*	-	+*	

Correlate	Factor							
	GM	IMM	DEP	SD	HC	NAI	FAM	PSYC
Psychiatric								
Anti-depressant medication ever prescribed	+*			+		-		
Anti-psychotic medication ever prescribed	+	+*		+		-		+*
Family								
Ever lived in a single parent household	+	+	+				+	
Ever lived with a step-parent	+	+	+				+	
Ever lived in a non-parent household	+	+	+				+	
Ever lived in foster care	+	+	+				+	
Number of foster care homes	+	+	+				+	
Ever prolonged separation from parents (>2 mo.)	+	+	+				+	
Ever temporarily separated from parents (< 2 mo.)	+	+	+				+	
Reference to domestic violence in the home	+	+	+				+	
Youth witnessed violence in the home	+	+	+				+	
Family total	+	+*	+				+*	
MACI – personality patterns								
Introversive				+	+*			+*
Inhibited	+			+*				
Doleful	+*			+				
Submissive				+		+*		
Dramatizing		+	+				-	
Egotistic							-	
Unruly		+*	+				+	+*
Forceful		+	+					+
Conforming						+		
Oppositional		+	+				+	
Self-demeaning	+			+				
Borderline tendency	+				+			
MACI – expressed concerns								
Identity diffusion		+						
Self-devaluation	+*			+				
Body disapproval	+			+	+*			
Sexual discomfort						-		
Peer insecurity	+			+*		-		+*
Social insensitivity		+						
Family discord	+	+	+				+*	
Childhood abuse					+*		+	
MACI – clinical syndromes								
Eating dysfunctions	+			+	+			
Substance-abuse proneness			+	-				
Delinquent predisposition		+	+*	-			+	+
Impulsive propensity		+*	+*					
Anxious feelings	+			+	+	-*		
Depressive affect	+*			+	+	-		
Suicidal tendency	+		+	+				+

Note: GM = General Maladjustment, IMM = Immaturity, DEP = Disinhibited/Excitatory Potential, SD = Social Discomfort, HC = Health Concerns, NAI = Naivete, FAM = Family Alienation, PSYC = Psychoticism. "+" indicates that a positive correlation is expected and "-" indicates that a negative correlation is expected. Empty cells indicate that no significant correlation is expected. Primary hypotheses are accompanied by an asterisk. Secondary hypotheses are unaccompanied by an asterisk.

Hypothesis 2b (ethnic differences). Structural Summary dimension scores will all be higher for First Nations youth than for Caucasian youth. The hypothesis is based on data comparing Native-Americans to Caucasians that suggest higher scale scores for Native-Americans (Arthur, 1944; Herried & Herried, 1966; Robin et al., 2003).

Hypothesis 2c (gender differences). Following from previous research in a clinical sample (Krishnamurthy & Archer, 1999), it is predicted that Health Concerns will have a higher mean elevation for females and that Disinhibition/Excitatory Potential will have a higher mean elevation for males. Based on recent data showing that the overall level of scale elevation is higher among female prisoners as compared to male prisoners (Megargee et al., 1999), General Maladjustment is expected to have a higher mean elevation for females than for males.

Hypothesis 2d (age differences). Despite findings from inpatient samples which showed no age differences, criminological theory (e.g. Moffitt, 1993; Sampson & Laub, 1992) suggests that adolescents who enter the justice system at a younger age (i.e., below age 15) are more likely to experience family problems and possess traits of callousness, alienation, and impulsivity than adolescents who enter at a later age. Therefore, it is predicted that the Immaturity, Disinhibition/Excitatory Potential, and Family Alienation dimensions will have higher mean elevations among younger adolescents than older adolescents.

Method

Sample

The research was formally approved by the University of Victoria Ethics Review Board and Youth Forensic Psychiatric Services (YFPS) Program Evaluation and Research Committee. YFPS is a province-wide Government of British Columbia agency charged with performing court-ordered psychological assessments of young offenders under the mandate of the federal Youth Criminal Justice Act. The service operates nine clinics across the province, one of which is in Victoria.

Data were collected from the clinical files of 142 youth who completed the MMPI-A as part of court ordered psychological assessments at YFPS in Victoria during 2002 and 2003. The response validity of youths' MMPI-A profiles was evaluated. Profiles with Infrequency (F) >90, Lie (L) >70, or Defensiveness (K)>70, which suggest a distorted response style, were eliminated from the sample. Identical exclusion criteria have been used in other studies of the MMPI-A in samples of young offenders (Morton & Farris, 2002; Pena et al., 1996), with the exception of VRIN and TRIN scores which were unavailable for the current sample. These criteria resulted in the exclusion of 12 (8.4%) profiles due to elevated L and/or K scores. Such a defensive pattern of responding would be expected in a forensic sample because youth are told that their responses will be presented to the court and will bear on their disposition. The current rate of profile exclusion due to defensive responding is consistent with previous investigations with the MMPI-A in adjudicated youth, where levels have ranged from 4% (Pena et al., 1996) to 12% (Morton & Farris, 2002).

Although the MMPI-A is technically to be used only for youth aged 14 to 18 years, recent data have shown no differences between 13- and 14-year-old inpatients on mean T scores and

percentage of T scores surpassing the threshold for clinical significance (Janus et al., 1998). Therefore, 13-year-olds were included in the current sample, as has been the practice in previous MMPI-A investigations with young offenders (Morton & Farris, 2002; Pena et al., 1996). Sample characteristics are shown in Table 8.

It should be noted that 49.3% of youth assessed at YFPS in 2002 and 2003 were not included in the current sample because they did not complete the MMPI-A. The decision to administer the MMPI-A to a youth was decided by the lead psychologist for each case. Reasons for not administering the MMPI-A included clinicians' preferences or concerns about a youth's level of comprehension of items, attention span, motivation, or demands for a quick submission of the report to the court. Chi-square tests revealed no significant ethnic, gender, or age differences between youth who completed the MMPI-A and those who did not, thus suggesting no sample selection bias based on these criteria. It should also be noted that youth seen at YFPS during 2002 and 2003 comprise about 50% of all adjudicated youth in British Columbia at that time (Markwart, 2004). As such, extrapolations from the current sample to young offenders, in general, should be made with caution. Rather, the current sample can be seen to represent young offenders with sufficient psychological, emotional, or social concerns as to warrant referral for a psychological assessment.

Criterion Measures

Intellectual functioning. Intellectual abilities were assessed by a standard test of intellectual functioning, the Wechsler Intelligence Scale for Children (WISC-III) (Wechsler, 1991), or the Wechsler Adult Intelligence Scale (WAIS-III) (Wechsler, 1997). The Wechsler scales contain two subscales. The verbal subscale is composed of tasks that require participants to reason with words and to articulate abstract concepts. The performance scale measures non-verbal reasoning.

Table 8

Sample Characteristics

	n	%
Ethnicity		
Caucasian	96	74
First Nation	24	18
Asian	1	1
Hispanic	1	1
African	1	1
Other	7	5
Gender		
Male	85	65
Female	45	35
Age		
<17 Years	97	75
≥ 17 Years	33	25

Note: Mean age for the sample was 15.95 years (SD = 1.33)

An intelligence quotient that measures an individual's ranking within the general population is generated for the verbal (VIQ) and performance (PIQ) scales. As well, a full-scale intelligence quotient (FSIQ) is generated that sums VIQ and PIQ. Each scale is arbitrarily assigned a population mean of 100 with a standard deviation of 15.

The Wechsler scales demonstrate excellent psychometric properties (Wechsler, 1991, 1997). Internal consistency of each scale was assessed using split-half reliability. Reliability estimates vary slightly by age but are almost all above $\underline{r}$=.9 for the WISC-III and $\underline{r}$=.8 for the WAIS-III. Three-week test-retest reliability was high for the WISC-III verbal ($\underline{r}$=.94), performance ($\underline{r}$=.87), and full scale ($\underline{r}$=.94) IQs, with similar results for the WAIS-III.

Factor analytic studies reviewed by Wechsler (1991, 1997) revealed the presence of a large unrotated first factor, *g*, which is represented by the full-scale IQ. Other factor analytic studies confirm the presence of distinct verbal and non-verbal factors. Evidence of the concurrent validity comes from high correlations (i.e., $\underline{r} \geq .4$) between the adult and child versions of the Wechsler scales and other measures of intellectual functioning such as spatial processing and executive functioning.

The WISC-III was used for youth 15 years of age and younger and the WAIS-III was used for youth who are 17 years of age or older. For youth aged exactly 16 years, the decision about which version was given depended on clinical considerations such as anticipated floor and ceiling effects. As the data were culled from clinical files, no systematic method can be assumed to have been used to determine which version of the test a 16 year-old youth would receive. In the current study, VIQ, PIQ, FSIQ, were used. Additionally, the Processing Speed and Freedom from Distractibility/Working Memory factors were used because of their association with

traumatic brain injury (e.g., Madigan, Deluca, & Diamond, 2000; van der Heijden & Donders, 2003) and ADHD (Mayes, Calhoun, & Crowell, 1998), respectively.

Personality. The Millon Adolescent Clinical Inventory (MACI) (Millon, 1993) is a 160-item self-report true/false inventory that assesses enduring personality patterns, acute clinical concerns, and specific clinical syndromes (see Appendix A and Table 7). Scale scores are reported as base rate scores and are adjusted to reflect the relative presence of a particular form of pathology in clinical samples as well as the individual test-taker's response style, acute distress state, and personality style. Scale scores reflect the individual's ranking within a clinical sample, with higher scores indicating more severe disturbances.

The MACI has adequate psychometric properties (Strack, 1999). Internal consistency coefficients for the subscales range from $\underline{r}$=.74 to .90. One-week test-retest reliability ranges from $\underline{r}$=.57 to .92, with a mean stability coefficient of $\underline{r}$=.82. Support for concurrent validity of the measure comes from strong correlations ($\underline{r}$>.4) between MACI Doleful, Oppositional, Self-Demeaning, Borderline Tendency, Identity Diffusion, Self-Devaluation, Body Disapproval, Depressive Affect, and Suicidal Tendency scales and the Beck Depression Inventory and the Beck Hopelessness Scale. The MACI Identity Diffusion, Self-Devaluation, Eating Dysfunctions, Depressive Affect, and Suicidal Tendency Scales were all correlated greater than $\underline{r}$=.4 with the Beck Anxiety Inventory. Finally, the MACI Eating Dysfunctions scale was correlated greater than $\underline{r}$=.4 with 8 of 11 scales of the Eating Disorder Inventory-2, and the Substance Abuse Proneness Scale was highly correlated ($\underline{r}$=.64) with the POSIT Substance Use or Abuse Scale.

Clinician ratings and chart review. The remainder of the variables were coded from information gathered by YFPS social workers, psychiatrists, and psychologists during the course of their clinical interviews with youth, their families, and their current and previous service

providers. In addition, information was obtained from reports to Crown Counsel detailing the offence which prompted the referral to YFPS (see Table 9). For some youth, data were coded directly by the clinician who obtained them and were recorded on a specifically designed research form. For other participants, data were gathered via a chart review conducted by two undergraduate research assistants or their supervisor, a doctoral-level psychologist, using the same research form. To achieve consistency in coding between all three research assistants, twenty files were coded as a team. Variables' operational definitions and the coding form remained consistent, regardless of the personnel involved in coding the data. To further ensure reliability of the data, 15% of the sample's files were recoded by an independent rater to assess inter-rater reliability.

Composite scales were derived for the current study for several groups of variables (see Table 10). Missing data for the variables comprising the composite scales were replaced with the sample mean for that variable, as suggested by Tabachnik and Fidell (1996). The initial selection of scales to comprise the composite variables was made rationally. The final selection maximized each scale's internal consistency and resulted in the deletion of two variables from the Trauma scale and four variables from the Family scale. The internal consistency of each composite scale (Cronbach's α) and indicators of its factor structure for the present sample are shown in Table 10.

Table 9

Criterion Measures from Chart Review

Measure	Description	Source
Criminological		
Age at first contact with police	Police called to school, returned child home	SW
Age at first offence leading to a charge	Youth's age at the first offence leading to a charge. (Offence does not necessarily lead to a conviction.)	SW
First offence sexual?	Was the first offence of a sexual nature? (e.g., touching for a sexual purpose, sexual assault, indecent act, sexual interference with a minor. Offence does not necessarily lead to a conviction.) (Yes/No)	SW
First offence violent?	Was the first offence of a violent nature? (e.g., assault, assault causing bodily harm, uttering threats, robbery. Offence does not necessarily lead to a conviction.) (Yes/No)	SW
Prosocial involvement	Involvement in prosocial activities (e.g., organized sports clubs, groups, etc.) or peer groups (i.e., youth not involved in delinquent or criminal activities) (Yes/No)	P
Participate in Youth Violence Intervention Pgm?	A psycho-educational violence prevention program for low- to moderate-risk youth (Yes/No)	SW
Externalizing		
Peer delinquency	Youth associates with delinquent peers (those who engage in even minor antisocial behaviour) (frequently, occasionally, not)	P
Ever suspended from school	Yes/No	P
Ever expelled from school	Yes/No	P
Ever attended an alternate school	Yes/No	P
Cognitive		
Verbal IQ	WAIS-III/WISC-III	T
Performance IQ	WAIS-III/WISC-III	T
Full Scale IQ	WAIS-III/WISC-III	T
Freedom from Distractibility/Working Memory	WAIS-III/WISC-III	T
Processing Speed	WAIS-III/WISC-III	T
Maternal drinking in pregnancy	Did the youth's mother consume alcohol during pregnancy? (Yes/No)	Ps
ADHD diagnosis	Current or historic (Yes/No)	Ps
Substance use		
Alcohol use	Ever used? (Yes/No)	P
Tobacco use	Ever used? (Yes/No)	P
Cannabis use	Ever used? (Yes/No)	P
Cocaine use	Ever used? (Yes/No)	P
Hallucinogen use	Ever used? (Yes/No)	P
Dissociative anaesthetics use	Ever used? (Yes/No)	P
GHB (liquid ecstasy) use	Ever used? (Yes/No)	P
Stimulant use	Ever used? (Yes/No)	P
Opiate use	Ever used? (Yes/No)	P
Suicide		
Ever suicidal tendency	Ever expressed desire to kill self (Yes/No)	P
Ever para-suicidal behaviours	Ever self-harm without wish to die (Yes/No)	P
Ever suicide attempt	Ever taken action to end life (Yes/No)	P

Measure	Description	Source
Trauma		
Ever physically abused	Abused by family or non-family member (Yes/No)	P
Ever sexually abused	Abused by family or non-family member (Yes/No)	P
Ever emotionally abused	Abused by family or non-family member (Yes/No)	P
Ever neglected	By family or non-family member (Yes/No)	P
Ever victim of sexual assault	Other than listed above (Yes/No)	P
Psychiatric		
Anti-depressant medication ever prescribed	Yes/No	Ps
Anti-psychotic medication ever prescribed	Yes/No	Ps
Family		
Ever lived in a single parent household	Lived with only one parent with no other caretaker present (Yes/No)	SW
Ever lived with a step-parent	Along with biological parent or alone (Yes/No)	SW
Ever lived in a non-parent household	Excludes foster care. Includes living with grandparents, aunts, uncles, siblings, friends (Yes/No)	SW
Ever lived in foster care	Youth is a ward of the government (includes group homes) (Yes/No)	SW
Number of foster care homes	Number of placements	SW
Ever prolonged separation from parents (≥2 mo.)	Yes/No	SW
Ever temporarily separated from parents (< 2 mo.)	Yes/No	SW
Reference to domestic violence in the home ever	Violence on part of parents to anyone in the household (Yes/No)	SW
Youth witnessed violence in the home ever	Can include hearing or seeing violence (Yes/No)	SW

Note: Source is the clinician who rated the variable. SW=Social Worker, P=Psychologist, Ps=Psychiatrist, T=formal testing conducted at YFPS

Table 10

Composite Scales Derived for the Current Study

Composite scale	Component variables (score)	Range	M	SD	Cronbach's α	% variance accounted for by first factor (number of factors with eigenvalues > 1)
Substance use total		0-9	3.9	2.0	.79	37.78 (2)
	Alcohol use (0, 1)					
	Tobacco use (0, 1)					
	Cannabis use (0, 1)					
	Cocaine use (0, 1)					
	Hallucinogen use (0,1)					
	Dissociative anaesthetics use (0, 1)					
	GHB (liquid ecstasy) use (0, 1)					
	Stimulant use (0, 1)					
	Opiate use (0, 1)					
Suicide total		0-3	.74	1.0	.74	66.49 (1)
	Ever suicidal tendency (0, 1)					
	Ever para-suicidal behaviours (0, 1)					
	Ever suicide attempt (0, 1)					
Trauma total		0-5	1.4	1.3	.64	41.32 (2)
	Ever physically abused (0, 1)					
	Ever sexually abused (0, 1)					
	Ever emotionally abused (0, 1)					
	Ever neglected (0, 1)					
	Ever victim of sexual assault (0, 1)					
Family total		0-8	4.5	2.1	.70	33.11 (2)
	Ever lived in a single parent household (0, 1)					
	Ever lived with a step-parent (0, 1)					
	Ever lived in a non-parent household (0, 1)					
	Ever lived in foster care (0, 1)					
	Ever prolonged separation from parents (≥2 mo.) (0, 1)					
	Ever temporarily separated from parents (< 2 mo.) (0, 1)					
	Reference to domestic violence in the home ever (0, 1)					
	Youth witnessed violence in the home ever (0, 1)					

Results

Data Screening

All data were screened for accuracy of data entry, missing items, and fit of their distributions with the assumptions of multivariate analyses. Accuracy of data entry was assessed by examining out-of-range values and the plausibility of means and standard deviations. Rates of missing data across variables ranged from 0-17%. Given the archival nature of the study, data may have been unavailable if the clinician did not attempt to gather it (possibly because it was not clinically relevant or because s/he forgot to ask) or if the informant providing that piece of data could not recall the information requested. Data did not appear to be missing in any systematic way; rates of missing data within variables did not appear to vary according to ethnicity, gender, or age. Cases missing data were deleted on a test by test basis, as suggested by Tabachnik and Fidell (1996).

Data grouped separately by ethnicity, gender, and age were screened for outliers. Dichotomous variables with extreme (greater than 90-10) splits may have given rise to truncated correlations and were removed from analyses (Tabachnik & Fidell, 1996). Several dichotomous variables were deleted including "convicted of first offence" (93%), "participated in a violent offender treatment program" (9%), "participated in a sex offender treatment program" (9%), "Fetal Alcohol Syndrome diagnosis suspected" (8%), "history of psychosis" (1%), "ever prescribed an anxiolytic" (4%), and "ever prescribed a sedative" (2%). Outliers within continuous variables were those whose standardized scores on that variable were in excess of 3.29 (Tabachnik & Fidell, 1996). Two male and two female cases were outliers on the Wechsler scales, one male was an outlier on MACI - Peer Insecurity, one male on MACI- Body Disapproval, one male on MACI- Sexual Discomfort, two males on MACI - Eating

Dysfunctions, one younger adolescent on MACI – Suicidal Tendency, and three male cases and one younger adolescent case were outliers on MMPI - Health Concerns. To reduce their influence, all outliers were assigned a score one unit larger (or smaller) than the most extreme score in their group, as suggested by Tabachnik and Fidell (1996).

Continuous measures were examined for normality. Examination of histograms with a super-imposed normal curve revealed no significant deviations from normality, in terms of skewness or kurtosis. As well, observed skewness and kurtosis values did not exceed critical z-values (3.29, $p<.001$), as recommended by Tabachnik and Fidell (1996).

Analytic Strategy

Calculating Structural Summary dimension scores. Previous investigations of MMPI-A Structural Summary correlates have calculated dimension scores as the unweighted mean T-score of all scales and subscales contained within that dimension (Archer & Krishnamurthy, 1994; Pogge et al., 2002). The identical procedure was used in the present study.

Inter-Rater Reliability of the criterion measures. A random selection of 15% of the sample's charts ($n=20$) were re-coded by a trained research assistant who was not involved in the original file coding process. The frequency of occurrence of each criterion within the entire sample, and the percentage agreement and kappa coefficients between raters based on occurrences and non-occurrences are reported in Table 11. Where there were discrepancies between raters, the score of the original rater was used.

Correlating dimension scores with criterion measures. Table 7 shows the hypothesized correlations for the current study. A priori hypotheses were formulated by examining MMPI-A scale and subscale loadings on the Structural Summary dimensions as reported in the scale-level factor analysis of the MMPI-A normative sample (Archer, Belevich et al., 1994), which was the

Table 11

Chart Review Variables: Inter-Rater Reliability

Measure	Percentage Occurrence	Percentage Agreement	Kappa
Criminological			
First offence sexual?	13.5	90	.77
First offence violent?	38.5	90	.80
Prosocial involvement	33.8	65	.16
Participate in Youth Violence Intervention Pgm?	12.0	75	.47
Externalizing			
Peer delinquency	73.8	67	.50
Ever suspended from school	69.2	94	.87
Ever expelled from school	42.3	75	.48
Ever attended an alternate school	56.2	84	.68
Cognitive			
Maternal drinking in pregnancy	23.1	92	.84
ADHD diagnosis	26.7	100	1.00
Substance use			
Alcohol use	88.5	94	.92
Tobacco use	50.8	100	1.00
Cannabis use	87.7	100	1.00
Cocaine use	36.9	100	1.00
Hallucinogen use	45.4	100	1.00
Dissociative anaesthetics use	6.9	100	1.00
GHB (liquid ecstasy) use	9.2	100	1.00
Stimulant use	20.8	100	1.00
Opiate use	10.8	100	1.00
Suicide			
Ever suicidal tendency	29.2	83	.61
Ever para-suicidal behaviours	22.3	84	.48
Ever suicide attempt	16.2	82	.34
Trauma			
Ever physically abused	38.5	89	.78
Ever sexually abused	14.6	100	1.00
Ever emotionally abused	32.3	81	.61
Ever neglected	30.0	94	.88
Ever victim of sexual assault	11.5	100	1.00
Psychiatric			
Anti-depressant medication ever prescribed	32.4	100	1.00
Anti-psychotic medication ever prescribed	14.4	100	1.00
Family			
Ever lived in a single parent household	82.3	95	.92
Ever lived with a step-parent	53.1	90	.79
Ever lived in a non-parent household	45.4	100	1.00
Ever lived in foster care	49.2	90	.79
Ever prolonged separation from parents (≥2 mo.)	46.9	94	.88
Ever temporarily separated from parents (< 2 mo.)	51.5	88	.75
Reference to domestic violence in the home ever	58.5	80	.76
Youth witnessed violence in the home ever	33.1	90	.78

Note: Percentage occurrence is the proportion of the sample (n=130) for which the variable is keyed in the critical direction.

sample used to create the Structural Summary (Archer & Krishnamurthy, 1994). Scales and subscales that load higher on a dimension to have stronger associations with the parent dimension than scales with weaker loadings. The five highest loading scales or subscales on each dimension (almost always correlating $\underline{r} \geq .6$ with the parent dimension; see Table 2) were used to rationally derive hypotheses regarding associations between each dimension score and its set of five criterion measures. To control for family-wise type I error, a modified Bonferroni correction was used (Hochberg, 1988). The Hochberg procedure is less conservative than the Bonferroni correction. Critical α for a member of a family is determined by its ranked observed probability value (p_{obs}) within that family. Smaller p_{obs} are assigned a smaller critical probability value (p_{crit}) than larger p_{obs}. For example, in a family of five, p_{crit} for the lowest p_{obs} is set at $\alpha/5$, p_{crit} for the next lowest p_{obs} is set at $\alpha/4$, and so on. This procedure permits more flexibility in rejecting the null hypothesis without inflating Type I error (Hochberg, 1988). It is recognized that defining the boundaries of an independent family of related significance tests is, to some extent, a subjective decision. As the Structural Summary dimensions are derived from factor analysis, they are arguably statistically independent and were treated as such for the purposes of the correlational analyses. To ensure that statistically significant associations are clinically meaningful, only medium effect sizes or greater ($\underline{r} \geq .3$) are discussed (Cohen, 1977).

Secondary hypotheses are also shown is Table 7. These correlations were predicted on the basis of previous findings from MMPI-A Structural Summary validation studies (Archer & Krishnamurthy, 1994; Pogge et al., 2002) and from the narrative descriptions of dimensions (Archer, Krishnamurthy et al., 1994). As these analyses are secondary, less stringent criteria were used in testing their significance. The critical value of $\underline{r}$ (.173) was set as the value that would be significant at $\underline{p}<.05$, $\underline{n}=130$, two tailed. This value is slightly greater than the conventional small to medium effect sizes ($r \geq .15$) (Cohen, 1977) that have been previously used as the criterion in previous MMPI-A Structural Summary investigations (Archer & Krishnamurthy, 1994; Pogge et al., 2002).

In the results reported below, point-biserial correlations were computed between the dimension scores and each of the categorical criterion variables listed in Table 7. Pearson correlations were calculated for continuous criterion variables. ANCOVA was used to test the significance of differences between correlation coefficients for sample sub-groups (i.e., ethnic, gender, and age groups). Specifically, ANCOVA was conducted by specifying the Structural Summary score as the dependent variable, group as the factor (independent variable), and the criterion variable as the covariate. The slope of the regression between the Structural Summary score and the criterion variable is directly related to the correlation between the Structural Summary score and the criterion variable. Parallelism of groups' regression slopes within ANCOVA was tested by examining the covariate by group interaction. A significant F test for the interaction indicated the regression slopes were not parallel, and that the correlation between the Structural Summary score and the criterion variable differed significantly by group.

Group differences in scale elevation. Structural Summary dimension scores were examined for the entire sample as well as broken down by ethnicity, gender, and age. Comparisons were based on the mean elevation for each dimension (average of the T scores of the scales on that dimension). MANOVA was used to test for group differences in overall elevation across the eight Structural Summary dimensions. Separate MANOVAs were conducted for ethnicity (Caucasian versus First Nation), gender, and age (14 years and younger versus 15 years and older). Where MANOVA was significant, repeated measures ANOVA was used to test the group by scale interaction, which indicated whether some pattern of Structural Summary scores was significantly different between groups. A multivariate test of this interaction was performed to protect against type I error, as there were few specific hypotheses as to on which dimensions groups might differ. If the group by scale interaction was significant, follow-up independent samples t-tests were conducted to test for group differences within individual Structural Summary dimensions. The decision to compare groups within individual Structural Summary dimensions was made because clinical interpretation of the

Structural Summary occurs at the individual dimension level. Within each set of group t-tests (eight comparisons per set; one for each Structural Summary score), family-wise type I error was maintained at $\alpha<.05$ using the Hochberg (1988) procedure described above. It is noted this control for type I error may be unduly conservative as Structural Summary dimensions are inter-correlated and Hochberg control for type I error assumes independence of tests. However, it is believed a cautious approach is warranted in drawing conclusions about group differences in psychopathology.

Hypothesis 1: Criterion Validity

The first research question was whether the Structural Summary dimensions showed evidence of criterion validity. It was predicted that Structural Summary scores would correlate significantly with criterion measures as shown in Table 7. No gender differences were expected, and there was no basis for predicting differences within age or ethnic groups. Initially, age comparisons in correlations were planned to be made between 14 year-olds and younger versus 15 year-olds and older. This age split was selected to coincide with hypothesis 2, which predicted differences between these age groups in mean Structural Summary dimension scores. As will be described in detail below, no age differences in mean Structural Summary dimension scores were found with age groups split in this manner. However, a non-hypothesized post-hoc finding revealed significant age differences in mean Structural Summary dimension scores when 16 year-olds and younger were compared to 17 year-olds and older. To synchronise with this post-hoc finding, the correlational analyses show age groups split as 16 year-olds and younger versus 17 year-olds and older.

Tables 12 to 19 show the correlations between each of the eight dimension scores, respectively, and criterion variables for the entire sample and the sample broken down by ethnicity, gender, and age. It should be noted that only hypothesized correlations (primary and secondary; see Table 7) are reported in Tables 12 to 19.

In general, Structural Summary scores correlated significantly with criterion measures as predicted. For the primary hypotheses, which had the strongest theoretical support in the current

Table 12

Correlations between General Maladjustment and Selected Criterion Measures

Correlate	Total Sample	Group: Ethnicity: Caucasian	Ethnicity: First Nation	Gender: Male	Gender: Female	Age: Older (≥17 y.)	Age: Younger (≤16 y.)
n	130	96	24	85	45	33	97
Criminological							
Prosocial involvement	-.14	-.16	.12	-.10	-.23	-.07	-.15
Externalizing							
Ever suspended from school	-.07	-.07	-.18	.01	-.20	-.13	-.04
Ever expelled from school	.10	.14	-.27	.17	.02	-.12	.18
Ever attended an alternate school	-.01	.02	-.09	-.07	.10	-.23	.08
Cognitive							
Processing Speed	-.07	-.02	-.41	-.20	.06	-.01	-.04
Suicide							
Suicide total	**.47***	**.43***	**.66***	**.47***	**.45***	**.57***	**.40***
Trauma							
Trauma total	.22*	.12	.23	.28*	.10	.26	.19
Psychiatric							
Anti-depressant medication ever prescribed	**.44***	**.52***	**.36**	**.36***	**.56***	**.43***	**.43***
Anti-psychotic medication ever prescribed	.12	.08	.40	.08	.27	.11	.14
Family							
Family total	.18*	.07	.24	.27*	-.09	.31	.13
MACI – personality patterns							
Inhibited	.37*	.34*	.48*	.37*	.38*	.53*	.31*
Doleful	**.76***	**.72***	**.83***	**.80***	**.66***	**.68***	**.77***
Self-demeaning	.74*	.74*	.74*	.75*	.69*	.78*	.72*
Borderline tendency	.72*	.68*	.78*	.74*	.64*	.69*	.71*
MACI – expressed concerns							
Self-devaluation	**.71***	**.66***	**.83***	**.78***	**.57***	**.79***	**.68***
Body disapproval	.38*	.41*	.21	.36*	.36*	.44*	.37*
Peer insecurity	.21*	.26*	-.04	.22*	.19	.28	.18
Family discord	.21*	.21	.37	.30*	.01	.24	.21
MACI – clinical syndromes							
Eating dysfunctions	.37*	.42*	.05	.44*	.30	.34	.41*
Anxious feelings	-.056	-.14	.37	-.15	.20	-.03	-.09
Depressive affect	**.77***	**.73***	**.81***	**.79***	**.72***	**.79***	**.75***
Suicidal tendency	.76*	.74*	.68*	.79*	.68*	.77*	.74*
% of predicted correlations achieving statistical and clinical significance							
Primary hypotheses	100.0	100.0	80.0	100.0	100.0	100.0	100.0
Secondary hypotheses	58.8	41.2	23.5	58.8	29.4	29.4	35.3
Primary and secondary hypotheses combined	68.1	54.5	36.4	68.1	45.5	45.5	50.0
% of predicted correlations with significant group differences (primary and secondary hypotheses combined)		0.0		0.0		0.0	

Note: Only hypothesized correlations are reported. Primary hypotheses are shown in **bold** and secondary hypotheses are shown in regular font. * indicates a statistically significant correlation according to the Hochberg (1988) criteria for primary hypotheses, and $p<.05$ for the secondary hypotheses. [a], [b], and [c] indicate a significant difference in correlations between ethnic groups, genders, and age groups, respectively. Clinical significance was defined as a medium effect size for primary hypotheses ($r\geq.30$) and a small to medium effect size for secondary hypotheses ($r\geq.17$)(Cohen, 1977).

Table 13

Correlations between Immaturity and Selected Criterion Measures

Correlate	Total Sample	Group: Ethnicity		Gender		Age	
		Caucasian	First Nation	Male	Female	Older (≥17 y.)	Younger (≤16 y.)
n	130	96	24	85	45	33	97
Criminological							
Age at first contact with police	-.03	-.01	-.10	.03	-.31	-.42[c]*	.11
Age at first offence leading to a charge	-.02	-.01	-.06	-.04	-.05	-.20	-.01
First offence sexual?	-.26*	-.34*	.03	-.27*	-.12	-.20	-.27*
First offence violent?	.06	.14	-.05	.13	-.11	-.10	.12
Prosocial involvement	-.17*	-.19	.13	-.17	-.21	-.03	-.22*
Participate in Youth Violence Intervention Pgm?	.01	-.02	-.06	-.01	.02	.11	-.02
Externalizing							
Peer delinquency	.23*	.26[a]	-.24	.26*	.07	.03	.26*
Ever suspended from school	.11	.13	-.08	.19	-.03	.15	.10
Ever expelled from school	**.24***	**.24**	**.05**	**.33***	**.17**	**.18**	**.27***
Ever attended an alternate school	.10	.12	.04	.05	.17	-.05	.15
Cognitive							
Verbal IQ	-.26*	-.25*	-.24	-.41*[b]	.06	-.38	-.26*
Performance IQ	-.10	-.11	-.17	-.24	.16	-.01	-.08
Freedom from Distractibility/Working Memory	-.18	-.17	-.01	-.30*	.06	-.26	-.15
Full Scale IQ	-.34*	-.31*	-.24	-.42*	-.18	-.13	-.32*
Maternal drinking in pregnancy	.25*	.10	.27	.34*	.12	.29	.22
ADHD diagnosis ever given by psychiatrist	.28*	.25*	.30	.27*	.17	.29	.27*
Psychiatric							
Anti-psychotic medication ever prescribed	**.10**	**.05**	**.41**	**.04**	**.30**	**.27**	**.06**
Family							
Family total	**.26***	**.16**	**.30**	**.40[b]***	**-.08**	**.39**	**.22**
MACI – personality patterns							
Dramatizing	-.38*	-.35*	-.38	-.46*	-.31	-.51*	-.33*
Unruly	**.11**	**.13**	**.06**	**.17**	**-.04**	**.04**	**.16**
Forceful	.31*	.38*	.04	.29*	.30	.06	.43*
Oppositional	.68*	.70*	.46*	.68*	.66*	.64*	.70*
MACI – expressed concerns							
Identity diffusion	.68*	.64*	.80*	.71*	.66*	.60*	.71*
Social insensitivity	-.03	-.05	.01	-.00	-.11	-.15	.02
Family discord	.37*	.40*	.47*	.39*	.28*	.39*	.36*
MACI – clinical syndromes							
Delinquent predisposition	.08	.05	.06	.12	-.01	.01	.14
Impulsive propensity	**.40***	**.41***	**.15**	**.43**	**.28**	**.23**	**.48***
% of predicted correlations achieving statistical and clinical significance							
Primary hypotheses	20.0	20.0	0.0	40.0	0.0	0.0	40.0
Secondary hypotheses	54.5	40.1	13.6	54.5	13.6	22.7	50.0
Primary and secondary hypotheses combined	48.1	37.0	11.1	51.9	11.1	18.5	48.1
% of predicted correlations with significant group differences (primary and secondary hypotheses combined)		3.8		7.7		3.8	

Note: Only hypothesized correlations are reported. Primary hypotheses are shown in **bold** and secondary hypotheses are shown in regular font. * indicates a statistically significant correlation according to the Hochberg (1988) criteria for primary hypotheses, and $p<.05$ for the secondary hypotheses. [a], [b], and [c] indicate a significant difference in correlations between ethnic groups, genders, and age groups, respectively. Clinical significance was defined as a medium effect size for primary hypotheses ($r\geq.30$) and a small to medium effect size for secondary hypotheses ($r\geq.17$)(Cohen, 1977).

Table 14

Correlations between Disinhibition/Excitatory Potential and Selected Criterion Measures

		Group					
		Ethnicity		Gender		Age	
Correlate	Total Sample	Caucasian	First Nation	Male	Female	Older (≥17 y.)	Younger (≤16 y.)
n	130	96	24	85	45	33	97
Criminological							
Age at first contact with police	-.18	-.20	-.11	-.14	-.40*	-.38	-.10
Age at first offence leading to a charge	-.19*	-.25*	.07	-.13	-.35*	-.26	-.18
First offence sexual?	-.18*	-.25*	.06	-.20	-.18	-.17	-.19
First offence violent?	.19*	.26*	.08	.24*	.09	-.05	.27*
Prosocial involvement	-.18*	-.17	-.06	-.15	-.24	.14[c]	-.30*
Participate in Youth Violence Intervention Pgm?	.03	-.01	.06	.06	-.01	.08	.02
Externalizing							
Peer delinquency	.22*	.20*	-.06	.31*	.02	.33	.19
Ever suspended from school	.15	.17	.06	.21*	.04	.28	.10
Ever expelled from school	**.28***	**.30***	**.08**	**.29***	**.30**	**.43***	**.23**
Ever attended an alternate school	.11	.14	.05	.01	.29	.13	.10
Cognitive							
Verbal IQ	-.13	-.12	-.38	-.36*[b]	.31	-.60	-.12
Performance IQ	.04	.03	-.01	-.12[b]	.33	-.56	.06
Freedom from Distractibility/Working Memory	-.01	-.01	-.32	-.25[b]	.28	-.09	-.01
Full Scale IQ	-.20	-.17	-.17	-.26	-.08	-.22	-.20
Maternal drinking in pregnancy	.18	.10	.01	.18	.22	.30	.13
ADHD diagnosis ever given by psychiatrist	**.22***	**.14**	**.45**	**.27***	**.05**	**.15**	**.24**
Substance use							
Substance use total	**.15**	**.25***	**-.19**	**.28***	**-.05**	**-.05**	**.21**
Suicide							
Suicide total	.17	.19	.22	.17	.27	.06	.21*
Family							
Family total	.17	.11	-.06	.24*	.01	.24	.14
MACI – personality patterns							
Dramatizing	-.08	.01	-.15	-.11	-.02	.06	-.15
Unruly	.29*	.34*	.05	.37*	.18	.54*	.20
Forceful	.41*	.48*	.12	.41*	.41*	.46*	.39*
Oppositional	.49*	.52*[a]	.08	.55*	.38*	.49*	.50*
MACI – expressed concerns							
Family discord	.36*	.42*	.32	.35*	.32*	.52*	.30*
MACI – clinical syndromes							
Substance-abuse proneness	.48*	.51*	.09	.56*	.31	.66*	.43*
Delinquent predisposition	**.29***	**.31***	**.16**	**.33***	**.23**	**.52***	**.20**
Impulsive propensity	**.48***	**.54***	**.12**	**.53***	**.37**	**.61***	**.43***
Suicidal tendency	.37*	.33*	.13	.42*	.28	.21	.46*
% of predicted correlations achieving statistical and clinical significance							
Primary hypotheses	20.0	60.0	0.0	40.0	0.0	60.0	20.0
Secondary hypotheses	47.8	43.4	0.0	47.8	21.7	21.7	34.7
Primary and secondary hypotheses combined	42.9	46.4	0.0	46.4	18.5	29.6	32.1
% of predicted correlations with significant group differences (primary and secondary hypotheses combined)		3.6		10.7		3.6	

Note: Only hypothesized correlations are reported. Primary hypotheses are shown in **bold** and secondary hypotheses are shown in regular font. * indicates a statistically significant correlation according to the Hochberg (1988) criteria for primary hypotheses, and $p<.05$ for the secondary hypotheses. [a], [b], and [c] indicate a significant difference in correlations between ethnic groups, genders, and age groups, respectively. Clinical significance was defined as a medium effect size for primary hypotheses ($r\geq.30$) and a small to medium effect size for secondary hypotheses ($r\geq.17$)(Cohen, 1977).

Table 15

Correlations between Social Discomfort and Selected Criterion Measures

		Group					
		Ethnicity		Gender		Age	
Correlate	Total Sample	Caucasian	First Nation	Male	Female	Older (≥17 y.)	Younger (≤16 y.)
n	130	96	24	85	45	33	97
Externalizing							
Peer delinquency	**.06**	**.08**[a]	**-.55***	**.11**	**-.14**	**-.15**	**.09**
Ever suspended from school	-.14	-16	-.18	-.11	-.17	-.26	-.08
Ever expelled from school	.03	.09[a]	-.43*	.08	.01	-.25	.13
Ever attended an alternate school	.07	.16	-.20	-.04	.29	-.12	.14
Substance use							
Substance use total	**.14**	**.19**	**-.16**	**.12**	**.02**	**.13**	**.13**
Suicide							
Suicide total	**.36***	**.34***	**.38**	**.39***	**.28**	**.29**	**.38***
Psychiatric							
Anti-depressant medication ever prescribed	.31*	.40*	.11	.24*	.39*	.23	.33*
Anti-psychotic medication ever prescribed	.23*	.21	.36	.20	.35*	.21	.25*
MACI – personality patterns							
Introversive	.53*	.48*	.62*	.63*[b]	.31	.64*	.46*
Inhibited	**.46***	**.39***	**.71***	**.47***	**.46***	**.63***	**.40***
Doleful	.61*	.53*	.70*	.70*[b]	.40*	.67*	.57*
Submissive	-.04	-.16[a]	.37	-.05	.07	.10	-.11
Self-demeaning	.58*	.52*	.70*	.60*	.54*	.70*	.54*
MACI – expressed concerns							
Self-devaluation	.60*	.49*[a]	.82*	.67*	.41*	.76*	.53*
Body disapproval	.29*	.30*	.20	.31*	.20	.43*	.24*
Peer insecurity	**.38***	**.41***	**.24**	**.39***	**.36**	**.40**	**.36***
MACI – clinical syndromes							
Eating dysfunctions	.33*	.36*	.06	.36*	.26	.45*	.30*
Substance-abuse proneness	.26*	.26*	-.12	.29*	.06	.29	.23*
Delinquent predisposition	-.21*	-.21	-.36	-.18	-.29	-.34	-.13
Anxious feelings	.12	.02[a]	.59*	.05	.40*	.14	.10
Depressive affect	.62*	.53*	.76*	.67*	.50*	.74*	.56*
Suicidal tendency	.54*	.48*	.48*	.60*	.36*	.53*	.52*
% of predicted correlations achieving statistical and clinical significance							
Primary hypotheses	60.0	60.0	40.0	60.0	20.0	20.0	60.0
Secondary hypotheses	70.5	58.8	47.1	58.8	47.0	47.0	64.7
Primary and secondary hypotheses combined	68.2	59.1	45.5	59.1	41.0	41.0	63.6
% of predicted correlations with significant group differences (primary and secondary hypotheses combined)		22.7		9.1		0.0	

Note: Only hypothesized correlations are reported. Primary hypotheses are shown in **bold** and secondary hypotheses are shown in regular font. * indicates a statistically significant correlation according to the Hochberg (1988) criteria for primary hypotheses, and $p<.05$ for the secondary hypotheses. [a], [b], and [c] indicate a significant difference in correlations between ethnic groups, genders, and age groups, respectively. Clinical significance was defined as a medium effect size for primary hypotheses ($r\geq.30$) and a small to medium effect size for secondary hypotheses ($r\geq.17$)(Cohen, 1977).

Table 16

Correlations between Health Concerns and Selected Criterion Measures

		Group					
		Ethnicity		Gender		Age	
Correlate	Total Sample	Caucasian	First Nation	Male	Female	Older (≥17 y.)	Younger (≤16 y.)
n	130	96	24	85	45	33	97
Criminological							
Age at first contact with police	.07	.10	-.18	.06	-.05	.00	.04
Age at first offence leading to a charge	.15	.20	-.20	.03	.27	.16	.03
First offence violent?	-.10	-.06	-.19	.01	-.32*	-.12	-.07
Participate in Youth Violence Intervention Pgm?	-.04	-.02	-.11	.00	-.11	.11	-.09
Cognitive							
Processing Speed	-.16	-.11	-.38	-.28*	-.08	-.37	-.15
Suicide							
Suicide total	**.41***	**.38***	**.53***	**.41***	**.38***	**.47***	**.36***
Trauma							
Trauma total	**.17**	**.07**	**.32**	**.16**	**.11**	**.03**	**.21**
MACI – personality patterns							
Introversive	**.28***	**.28***	**.33**	**.36***	**.26**	**.49***	**.14**
Borderline tendency	.49*	.50*	.50*	.47*	.52*	.39*	.52*
MACI – expressed concerns							
Body disapproval	**.38***	**.44***	**.20**	**.35***	**.31**	**.48***	**.35***
Childhood abuse	**.50***	**.51***	**.57***	**.48***	**.50***	**.35**	**.56***
MACI – clinical syndromes							
Eating dysfunctions	.38*	.41*	.20	.37*	.27	.43*	.39*
Anxious feelings	-.07	-.15[a]	.34	-.12	.15	.01	-.15
Depressive affect	.52*	.55*	.52*	.54*	.49*	.52*	.51*
% of predicted correlations achieving statistical and clinical significance							
Primary hypotheses	60.0	80.0	40.0	80.0	40.0	60.0	60.0
Secondary hypotheses	33.3	33.3	22.2	28.6	33.3	33.3	33.3
Primary and secondary hypotheses combined	42.9	42.9	28.6	57.1	35.7	42.9	42.9
% of predicted correlations with significant group differences (primary and secondary hypotheses combined)		7.1		0.0		0.0	

Note: Only hypothesized correlations are reported. Primary hypotheses are shown in **bold** and secondary hypotheses are shown in regular font. * indicates a statistically significant correlation according to the Hochberg (1988) criteria for primary hypotheses, and $p<.05$ for the secondary hypotheses. [a], [b], and [c] indicate a significant difference in correlations between ethnic groups, genders, and age groups, respectively. Clinical significance was defined as a medium effect size for primary hypotheses ($r\geq.30$) and a small to medium effect size for secondary hypotheses ($r\geq.17$)(Cohen, 1977).

Table 17

Correlations between Naivete and Selected Criterion Measures

		Group					
		Ethnicity		Gender		Age	
Correlate	Total Sample	Caucasian	First Nation	Male	Female	Older (≥17 y.)	Younger (≤16 y.)
n	130	96	24	85	45	33	97
Criminological							
Age at first contact with police	.03	-.07	.27	-.03	.20	.30	-.02
Age at first offence leading to a charge	-.01	-.02	-.04	-.06	.10	.24	.02
First offence violent?	-.20*	-.21*	-.27	-.26*	-.10	.01	-.28*
Prosocial involvement	**.16**	**.13**	**.09**	**.08**	**.31**	**-.02**	**.20**
Participate in Youth Violence Intervention Pgm?	.00	.02	.03	.06	-.11	-.16	.03
Externalizing							
Peer delinquency	-.13	-.11	.29	-.25*[b]	.19	-.35*	-.06
Ever suspended from school	-.08	-.11	.07	-.12	-.01	-.22	-.050
Ever expelled from school	**-.16**	**-.23[a]**	**.28**	**-.16**	**-.18**	**-.21**	**-.15**
Ever attended an alternate school	-.08	-.10	-.06	.02	-.30*	-.13	-.07
Cognitive							
Processing Speed	-.01	-.04	.43	.13	-.15	.28*	-.030
Suicide							
Suicide total	**-.24***	**-.22**	**-.29**	**-.21**	**-.31**	**-.02**	**-.28***
Trauma							
Trauma total	-.06	-.03	.26	-.16	.08	-.15	-.01
Psychiatric							
Anti-depressant medication ever prescribed	-.27*	-.36*	-.14	-.20	-.45*	-.21	-.28*
Anti-psychotic medication ever prescribed	-.22*	-.18	-.48*	-.14	-.44*	-.21	-.24*
MACI – personality patterns							
Submissive	**.20**	**.30***	**-.04**	**.23**	**.17**	**.50*[c]**	**.11**
Conforming	.42*	.45*	.19	.47*	.30	.58*	.39*
MACI – expressed concerns							
Sexual discomfort	.16	.20	-.26	.19	.09	.46*	.07
Peer insecurity	-.11	-.04	-.13	-.12	-.08	.04	-.14
MACI – clinical syndromes							
Anxious feelings	**.04**	**.17[a]**	**-.50**	**.12**	**-.14**	**.37**	**-.05**
Depressive affect	-.47*	-.39*	-.48*	-.52*	-.37*	-.21	-.53*
% of predicted correlations achieving statistical and clinical significance							
Primary hypotheses	0.0	20.0	0.0	0.0	0.0	20.0	0.0
Secondary hypotheses	33.3	26.7	13.3	26.7	26.7	20.0	33.3
Primary and secondary hypotheses combined	25.0	25.0	10.0	20.0	20.0	20.0	25.0
% of predicted correlations with significant group differences (primary and secondary hypotheses combined)		10.0		5.0		5.0	

Note: Only hypothesized correlations are reported. Primary hypotheses are shown in **bold** and secondary hypotheses are shown in regular font. * indicates a statistically significant correlation according to the Hochberg (1988) criteria for primary hypotheses, and $p<.05$ for the secondary hypotheses. [a], [b], and [c] indicate a significant difference in correlations between ethnic groups, genders, and age groups, respectively. Clinical significance was defined as a medium effect size for primary hypotheses ($r\geq.30$) and a small to medium effect size for secondary hypotheses ($r\geq.17$)(Cohen, 1977).

Table 18

Correlations between Familial Alienation and Selected Criterion Measures

Correlate	Total Sample	Group					
		Ethnicity		Gender		Age	
		Caucasian	First Nation	Male	Female	Older (≥17 y.)	Younger (≤16 y.)
n	130	96	24	85	45	33	97
Criminological							
Prosocial involvement	-.13	-.14	.15	-.10	-.24	.00	-.17
Externalizing							
Ever suspended from school	.14	.14	-.06	.26*	-.04	.25	.11
Ever expelled from school	**.16**	**.17**	**-.03**	**.27***	**.06**	**.05**	**.20**
Ever attended an alternate school	.07	.04	.02	.02	.17	.01	.10
Substance use							
Substance use total	**.26***	**.26***	**.10**	**.29***	**.04**	**.16**	**.28***
Trauma							
Trauma total	**.11**	**.10**	**-.05**	**.28*[b]**	**-.19**	**.34**	**.04**
Family							
Family total	**.24***	**.25**	**-.01**	**.39*[b]**	**-.15**	**.37**	**.20**
MACI – personality patterns							
Dramatizing	-.25*	-.16	-.54*	-.31*	-.25	-.41*	-.19
Egotistic	-.34*	-.32*	-.34	-.41*	-.25	-.43*	-.32*
Unruly	.21*	.23*	.01	.22	.10	-.02	.29*
Oppositional	.56*	.58*	.44*	.55*	.52*	.56*	.56*
MACI – expressed concerns							
Family discord	**.56***	**.56***	**.63***	**.51***	**.60***	**.55***	**.56***
Childhood abuse	.50*	.52*	.46*	.56*	.34	.71*	.43*
MACI – clinical syndromes							
Delinquent predisposition	.16	.17	.14	.17	.11	-.01	.23*
% of predicted correlations achieving statistical and clinical significance							
Primary hypotheses	20.0	20.0	20.0	40.0	20.0	20.0	20.0
Secondary hypotheses	55.5	44.4	33.3	55.5	11.1	44.4	55.5
Primary and secondary hypotheses combined	42.9	35.7	28.6	50.0	14.3	35.7	42.9
% of predicted correlations with significant group differences (primary and secondary hypotheses combined)		0.0		14.3		0.0	

Note: Only hypothesized correlations are reported. Primary hypotheses are shown in **bold** and secondary hypotheses are shown in regular font. * indicates a statistically significant correlation according to the Hochberg (1988) criteria for primary hypotheses, and $p<.05$ for the secondary hypotheses. [a], [b], and [c] indicate a significant difference in correlations between ethnic groups, genders, and age groups, respectively. Clinical significance was defined as a medium effect size for primary hypotheses ($r\geq.30$) and a small to medium effect size for secondary hypotheses ($r\geq.17$)(Cohen, 1977).

Table 19

Correlations between Psychoticism and Selected Criterion Measures

		Group					
		Ethnicity		Gender		Age	
Correlate	Total Sample	Caucasian	First Nation	Male	Female	Older (≥17 y.)	Younger (≤16 y.)
n	130	96	24	85	45	33	97
Criminological							
Age at first contact with police	-.04	-.02	-.04	.05	-.31	-.25	.03
Age at first offence leading to a charge	-.07	-.06	-.12	-.12	.-01	-.07	-.14
First offence violent?	.02	.08	-.06	.11	-.14	.00	.04
Participate in Youth Violence Intervention Pgm?	.00	.00	-.19	-.03	.03	.17	-.05
Cognitive							
Verbal IQ	-.22*	-.18	-.31	-.36*[b]	.05	-.28	-.21
Performance IQ	-.04	-.04	-.08	-.16	.18	-.06	-.01
Full Scale IQ	-.29*	-.26*	-.21	-.34*	-.18	-.21	-.27*
Suicide							
Suicide total	**.44***	**.42***	**.57***	**.49***	**.35**	**.54***	**.37***
Psychiatric							
Anti-psychotic medication ever prescribed	**.13**	**.00[a]**	**.62***	**.12**	**.18**	**.28**	**.09**
MACI – personality patterns							
Introversive	**.45***	**.41***	**.57***	**.48***	**.42***	**.59***	**.38***
Unruly	**-.08**	**-.06**	**-.33**	**.00**	**-.25**	**-.11**	**-.05**
Forceful	.10	.16	-.20	.11	.06	-.09	.20
MACI – expressed concerns							
Peer insecurity	**.26***	**.33***	**.08**	**.31***	**.17**	**.33**	**.24**
MACI – clinical syndromes							
Delinquent predisposition	-.12	-.14	-.23	-.05	-.24	-.20	-.06
Suicidal tendency	.65*	.65*	.48*	.67*	.63*	.64*	.65*
% of predicted correlations achieving statistical and clinical significance							
Primary hypotheses	40.0	60.0	60.0	60.0	20.0	40.0	40.0
Secondary hypotheses	30.0	20.0	10.0	30.0	10.0	10.0	20.0
Primary and secondary hypotheses combined	33.3	33.3	26.7	40.0	13.3	20.0	26.6
% of predicted correlations with significant group differences (primary and secondary hypotheses combined)		6.7		6.7		0.0	

Note: Only hypothesized correlations are reported. Primary hypotheses are shown in **bold** and secondary hypotheses are shown in regular font. * indicates a statistically significant correlation according to the Hochberg (1988) criteria for primary hypotheses, and $p<.05$ for the secondary hypotheses. [a], [b], and [c] indicate a significant difference in correlations between ethnic groups, genders, and age groups, respectively. Clinical significance was defined as a medium effect size for primary hypotheses ($r\geq.30$) and a small to medium effect size for secondary hypotheses ($r\geq.17$)(Cohen, 1977).

study, 40.0% of predicted correlations between Structural Summary scores and criterion variables were statistically and clinically significant within the overall sample, according to the criteria described above. The percentage of significant correlations was highest for General Maladjustment (100.0%) and lowest for Naivete (0%).

For secondary hypotheses, which were based on previous criterion validity studies and were thus of less theoretical importance, 53.0% of predicted correlations were statistically and clinically significant in the overall sample, according the criteria described above. The percentage of significant correlations was highest for Social Discomfort (70.5%) and lowest for Psychoticism (30.0%).

For both primary and secondary hypotheses, almost all correlations which did not achieve statistical and/or clinical significance were in the predicted direction. As predicted, few significant ethnic, gender or age differences in the strength of correlations were found. Across all the dimensions, 6.8% of correlations were significantly different for ethnic groups, 6.8% for genders, and 1.9% for age groups.

Hypothesis 2: Dimension Elevations

The second research question asked how Structural Summary scores varied as a function of ethnicity, gender and age. The mean score for each Structural Summary dimension was examined for the entire sample and for the sample broken down by ethnicity, gender and age.

Hypothesis 2a (overall sample). Given previous findings with young offenders (Archer et al., 2002; Morton & Farris, 2002), it was hypothesized that Immaturity would be the most elevated dimension. Contrary to what was predicted, Familial Alienation was the dimension with the highest mean, almost 4 T score points higher than the next highest dimension (Immaturity) (see Table 20). Although this difference is statistically significant, t (129) = 6.41, $p<.001$, it is not clinically meaningful according to Greene's (1987) criterion (i.e., >5 T score points).

Table 20

Structural Summary Score Means and Differences as a Function of Ethnicity, Gender and Age

Measure	Group	n	M	SD	Test of effects (t)
General Maladjustment	Total Sample	130	52.87	10.29	
	Caucasian	96	51.81	10.31	2.70*[a]
	First Nation	24	58.06	9.35	
	Male	85	52.03	10.24	1.28
	Female	45	54.46	10.32	
	Older (≥ 15 years)	97	54.04	10.33	2.27
	Younger (<15 years)	33	49.42	9.52	
	Older (≥ 17 years)	33	57.08	10.89	2.80*[a]
	Younger (<17 years)	97	51.43	9.72	
Immaturity	Total Sample	130	54.85	8.78	
	Caucasian	96	53.88	8.76	3.14*[a]
	First Nation	24	60.02	7.79	
	Male	85	54.03	8.81	1.46
	Female	45	56.39	8.60	
	Older (≥ 15 years)	97	55.57	8.80	1.62
	Younger (<15 years)	33	52.73	8.48	
	Older (≥ 17 years)	33	56.58	9.12	1.32
	Younger (<17 years)	97	54.26	8.63	
Disinhibition/Excitatory Potential	Total Sample	130	52.62	7.06	
	Caucasian	96	52.08	6.71	2.90*
	First Nation	24	56.60	7.32	
	Male	85	52.62	7.12	0.00
	Female	45	52.62	7.03	
	Older (≥ 15 years)	97	52.72	7.39	.26
	Younger (<15 years)	33	52.35	6.09	
	Older (≥ 17 years)	33	52.98	7.76	.33
	Younger (<17 years)	97	52.50	6.85	
Social Discomfort	Total Sample	130	47.00	6.81	
	Caucasian	96	46.23	8.54	2.52*
	First Nation	24	51.10	8.14	
	Male	85	46.05	8.63	1.73
	Female	45	48.78	8.37	
	Older (≥ 15 years)	97	47.57	8.87	1.30
	Younger (<15 years)	33	45.32	7.69	
	Older (≥ 17 years)	33	49.40	8.99	1.87
	Younger (<17 years)	97	46.18	8.37	

Measure	Group	n	M	SD	Test of effects (t)
Health Concerns	Total Sample	130	51.79	8.17	
	Caucasian	96	51.32	8.51	.70
	First Nation	24	52.64	7.19	
	Male	85	50.57	7.24	2.38
	Female	45	54.09	9.34	
	Older (≥ 15 years)	97	52.32	8.66	1.28
	Younger (<15 years)	33	50.22	6.36	
	Older (≥ 17 years)	33	55.07	9.84	2.74*
	Younger (<17 years)	97	50.67	7.24	
Naivete	Total Sample	130	48.39	8.35	
	Caucasian	96	49.20	7.94	3.19*[a]
	First Nation	24	43.39	8.15	
	Male	85	48.27	8.72	.23
	Female	45	48.61	7.71	
	Older (≥ 15 years)	97	48.07	8.05	.73
	Younger (<15 years)	33	49.30	8.12	
	Older (≥ 17 years)	33	45.29	7.58	2.51
	Younger (<17 years)	97	49.44	8.38	
Familial Alienation	Total Sample	130	58.65	9.88	
	Caucasian	96	58.49	10.35	.11
	First Nation	24	58.75	7.66	
	Male	85	57.35	9.77	2.09
	Female	45	61.11	9.73	
	Older (≥ 15 years)	97	59.48	9.68	1.64
	Younger (<15 years)	33	56.22	10.24	
	Older (≥ 17 years)	33	59.94	9.17	.87
	Younger (<17 years)	97	58.21	10.12	
Psychoticism	Total Sample	130	52.63	9.30	
	Caucasian	96	51.72	8.91	3.00*[a]
	First Nation	24	58.00	10.25	
	Male	85	52.42	9.43	.35
	Female	45	53.02	9.14	
	Older (≥ 15 years)	97	53.17	9.24	1.14
	Younger (<15 years)	33	51.04	9.44	
	Older (≥ 17 years)	33	54.66	10.16	1.46
	Younger (<17 years)	97	51.93	8.94	

Note: Independent sample t-tests were used to compare means across ethnicity (Caucasian versus First Nation), gender, and age. Age comparisons for <>15 years were hypothesized. Age differences for <>17 years were not hypothesized and were a post hoc observation. * indicates statistical significance using the Hochberg (1988) method for controlling family-wise type I error. [a] indicates a clinically significant difference (i.e., > 5 T-score points) according to Greene's (1987) criterion.

Hypothesis 2b (ethnic differences). Based on previous findings showing higher MMPI and MMPI-2 scores in Native Americans than Caucasians (Arthur, 1944; Herried & Herried, 1966; Robin et al., 2003), it was hypothesized that First Nations' Structural Summary scores would be higher than Caucasians'. MANOVA revealed overall higher Structural Summary scores for First Nations than Caucasians, Wilks' $\lambda = .82$, $F(8,111) = 3.04$, $p<.01$. A significant multivariate ethnicity by scale interaction was found indicating ethnic differences in the pattern of Structural Summary dimension scores, Wilks' $\lambda = .82$, $F(7,112) = 3.50$, $p<.01$. Follow-up independent samples t-tests showed that First Nations youth evidenced statistically significant elevations in distress on General Maladjustment, Immaturity, Disinhibition/Excitatory Potential, Social Discomfort, Naivete and Psychoticism relative to Caucasian youth (see Table 20). All differences met Greene's (1987) criterion for clinical significance (i.e., > 5 T-score points) with the exception of Disinhibition/Excitatory Potential and Social Discomfort.

Hypothesis 2c (gender differences). Following from previous research in a clinical sample (Krishnamurthy & Archer, 1999), it was predicted that Health Concerns would be more elevated in females and that Disinhibition/Excitatory Potential would be more elevated in males. Based on recent data showing that the overall level of scale elevation is higher among female prisoners as compared to male prisoners (Megargee et al., 1999), it was also predicted that General Maladjustment would have a higher mean elevation for females than for males.

These predictions were not borne out. MANOVA did reveal significantly higher overall Structural Summary scores for males than females, Wilks' $\lambda = .86$, $F(8,121) = 2.43$, $p=.02$. Further, repeated measures ANOVA showed a significant multivariate gender by dimension interaction, indicating gender differences in the pattern of Structural Summary dimension scores, Wilks' $\lambda = .89$, $F(7,122) = 2.18$, $p=.04$. However, follow-up independent samples t-tests with the Hochberg (1988)

correction for type I error did not reveal any statistically significant or clinically meaningful gender differences in individual Structural Summary dimension scores (see Table 20).

Hypothesis 2d (age differences). Based on criminological theory (Moffitt, 1993), it was predicted that adolescents under the age of 15 years would have higher mean scores than older adolescents on Immaturity, Disinhibition/Excitatory Potential, and Familial Alienation. MANOVA did not reveal an effect for age on overall Structural Summary scores Wilks' $\lambda = .93$, $F(8,121) = 1.17$, $p=.32$. Similarly, repeated measures ANOVA did not provide statistical support for group differences in patterns of Structural Summary dimension scores, Wilks' $\lambda = .93$, $F(7,122) = 1.34$, $p=.24$. Means and standard deviations for this age comparison are shown in Table 20.

A non-hypothesized post hoc observation with MANOVA found overall higher Structural Summary dimension scores for adolescents 17 years and older, Wilks' $\lambda = .84$, $F(8,121) = 2.86$, $p<.01$. Repeated measures ANOVA revealed a significant age by dimension interaction, indicating age differences in patterns of Structural Summary dimension scores, Wilks' $\lambda = .87$, $F(7,122) = 2.69$, $p=.01$. Follow-up independent samples t-tests showed adolescents 17 years and older had statistically significant higher scores on General Maladjustment and Health Concerns (i.e., more pathology), than adolescents under 17 years (see Table 20). However, only the difference on General Maladjustment was clinically significant (i.e., >5 T-score points).

Discussion

It was the aim of the current study to examine the criterion validity of the MMPI-A Structural Summary for young offenders in general, and as a function of ethnicity, gender and age, in particular. Second, the current study sought to look at ethnic, gender, and age differences in Structural Summary dimension scores. Results will be discussed in terms of congruence of the findings with stated hypotheses and prior research. Conclusions about the evidence for test bias will be presented. Strengths and limitations of the present investigation will be noted and directions for future research described.

Criterion Validity of the Structural Summary

Primary hypotheses for correlations between Structural Summary dimension scores and criterion measures were based on the MMPI-A scales and sub-scales comprising the parent dimension, as described in the Analytic Strategy section above. Secondary hypotheses were derived from findings from previous criterion validation studies (Archer & Krishnamurthy, 1994; Pogge et al., 2002) and from narrative descriptions of the dimensions reported by Archer, Krishnamurthy, and Jacobson (1994). To ensure statistically significant associations are clinically meaningful, only medium effect sizes (r_{crit}=.30) or greater for the primary hypotheses and small to medium effect sizes (r_{crit} =.17) or greater for the secondary hypotheses are discussed. Given the higher threshold for accepting primary hypotheses, more weight is accorded to these findings.

Prior to discussing the meaning of the criterion validity findings, a comment on the rate of rejecting the null hypotheses is warranted. As noted above, in the overall sample, correlations for 40.0% of primary hypotheses and 53.0% of secondary hypotheses were found to be statistically and clinically significant. While this rate may seem low, it actually exceeds the rate of previous studies of clinical samples. In previous studies, the proportion of tested null hypotheses which were rejected ranged from 18.8% (Archer & Krishnamurthy, 1994) to 27.6% (Pogge et al., 2002).

General Maladjustment. As predicted by primary hypotheses, in the overall sample, General Maladjustment (GM) was reliably related to indicators of negative emotionality including suicidality, depressive affect, and having been prescribed an anti-depressant medication. Youth with elevated GM scores were more likely to be doleful and to devalue themselves.

As predicted by secondary hypotheses, these youth were also likely to have experienced trauma, disrupted family relations, body disapproval and eating dysfunctions, and insecure peer relationships. These youth were likely to present as inhibited, self-demeaning and have borderline tendencies (see Table 12).

Findings were largely consistent with previous investigations (Archer & Krishnamurthy, 1994; Pogge et al., 2002), with the exception of findings by Pogge and colleagues (2002) who noted that GM was associated with oppositional behaviours and psychotic features. The low base-rate of psychosis in the current sample (<1%) may have resulted in a restricted range for "psychotic medication ever prescribed" (only 14% of the sample had ever been prescribed anti-psychotic medication), and obscured a significant correlation. Associations between GM and criterion measures did not differ across ethnic, gender and age groups, suggesting these descriptors are applicable across these demographic groups in this sample.

Immaturity. In the overall sample, consistent with primary predictions, those with high Immaturity (IMM) scores were likely to present as impulsive (see Table 13). Counter to predictions and findings from another clinical sample (Pogge et al., 2002), IMM scores were unrelated to anti-psychotic medication having been prescribed. Restricted range on this variable may have been a problem, as noted above. Also surprising was the failure to find a significant association between IMM and MACI-Unruly. Previous studies of male delinquents have found IMM to be the Structural Summary dimension most frequently elevated (Archer et al., 2002) and with the highest mean elevation (Morton & Farris, 2002). The present findings suggest that youth who score high on IMM

are less likely to present as dramatic and overtly antisocial and more likely to oppose authority and inflict pain on others using passive means. This interpretation is supported by IMM's significant but modest positive association with MACI-Oppositional and negative association with MACI-Dramatizing. Associations between IMM and school expulsions and family disturbances were statistically significant but did not meet the threshold for clinical significance set in the current study.

Secondary correlations indicated that high IMM scoring youth were less likely to have committed a sexual offence and be prosocially involved, and more likely to have delinquent peers and disturbed family relations. High scores were reliably associated with several indicators of compromised cognitive functioning including low Verbal and Full Scale IQ, increased likelihood of maternal alcohol consumption during pregnancy, and increased likelihood of an ADHD diagnosis. High scores were significantly associated with a number of personality indicators including being forceful, oppositional, and having a poorly defined identity.

These correlates are very similar to those found among Archer and Krishnamurthy's (1994) clinical and normal samples. Few ethnic, gender or age differences in strength of correlations between IMM scores and criterion variables were found, indicating that descriptors are generally applicable across demographic groups. Interestingly, a comparison of the negative correlations between IMM and Verbal IQ (see Table 13) found that this relationship was significantly stronger for males than for females, as was suggested by Pogge and colleagues (2002). Indeed, in the present sample, the relationship was only seen for males. Previous studies have highlighted the prominence of IMM in delinquent samples (Archer et al., 2002; Morton & Farris, 2002). The criminological literature has frequently demonstrated a connection between high levels of delinquency and low verbal intelligence, yet has focused primarily on males (Dishion, Loeber, Stouthamer-Loeber, & Patterson, 1984; Moffit, 1990; Wong & Cornell, 1999), thus precluding conclusions about this relationship in females. The current findings suggest that this relationship is more important for

males than females. Future research using more targeted and comprehensive measures of delinquency and verbal ability could further explore this relationship.

Disinhibition/Excitatory Potential. In line with primary predictions, high scores on Disinhibition/Excitatory Potential (DEP) were significantly related to indicators of behavioural disinhibition such as impulsive propensity (see Table 14). Statistically significant associations were also noted between DEP and school expulsions, ADHD diagnosis, and delinquent predisposition, although these associations did not achieve the standard set in the current study for clinical significance. Unexpectedly, DEP was unrelated to substance use. However, as described below, youth in this sample may use substances more to self-medicate anxiety than to lower their inhibitions.

Secondary analyses showed that DEP was related to a variety of criminological variables such as associations with delinquent peers, younger age at first offence leading to a charge, increased likelihood of a first offence being violent, and decreased likelihood of prosocial involvement and first offence being sexual. This last finding is consistent with data showing that impulsivity is less related to sexual offending than it is to violent offending (Craig, Browne, & Beech, 2004; Nussbaum et al., 2002; Parry & Lindsay, 2003). Significant correlations with MACI scales showed that high scorers on DEP were likely to be unruly, forceful, and oppositional. They were also likely to report problematic family relations, substance abuse, and suicidal thoughts and behaviours.

The current findings are consistent with previous Structural Summary criterion validity research (Archer & Krishnamurthy, 1994; Pogge et al., 2002). A number of associations were in the predicted direction (e.g., substance use, suicidality, and family problems) but failed to achieve significance levels.

In general, correlations for First Nations youth were similar to those of Caucasian youth. A number of MACI scales measuring externalizing behaviours showed weaker relationships to DEP for

First Nations youth than for Caucasian youth, although the difference was statistically significant only for MACI-oppositional. As with the IMM dimension, the correlation between DEP scores and Verbal IQ differed significantly for males and females. High DEP scores were negatively related to Verbal IQ for males, but positively related for females. As discussed above, these findings suggest the relationship between DEP (which is itself associated with criminological risk) and verbal intelligence is more salient for males than females. The only significant difference in correlations across age groups was "prosocial involvement" which was negatively related to DEP for younger participants, but unrelated within older youth. The relative infrequency of significant differences in correlations between groups suggests that DEP descriptors can be validly applied across ethnicity, gender and age.

Social Discomfort. As predicted by primary hypotheses, Social Discomfort (SD) was associated with indicators of internalizing psychopathology, with a particular focus on social anxiety. High scorers were likely to evidence suicidal ideation and behaviour, to be socially inhibited, and to feel insecure in peer relationships (see Table 15). Counter to previous findings (Archer, Krishnamurthy et al., 1994), SD was positively, rather than negatively, related to substance abuse. This reversal in direction of association may reflect the current sample's substance use as a means of self-medication rather than as a component of delinquent behaviour. The finding that SD was related to lower scores on MACI-Delinquent Predisposition lends credence to this interpretation.

Secondary correlations showed that high scoring youth were likely to have been prescribed antidepressant and antipsychotic medication. Correlations with MACI scales revealed that these youth were likely to demonstrate disordered eating, substance abuse, and depressive affect. Associations with MACI scales also indicated high scoring youth were likely to present as emotionally withdrawn, socially inhibited, hopeless, and self-demeaning. These youth were likely to

express confusion about their identities, hold negative attitudes toward their bodies, and feel insecure in peer relationships. High SD scores were inversely related to displaying delinquent behaviours.

The findings from the current study are largely congruent with those from previous studies (Archer & Krishnamurthy, 1994; Pogge et al., 2002). Counter to predictions and results from Archer, Krishnamurthy et al. (1994) who found that SD was related to problem behaviours at school, the present study found no associations between SD and school suspensions or expulsions. However, in the current sample, school suspensions and expulsions may have resulted from truancy, rather than school behavioural problems per se, and may therefore not be comparable to the school behavioural problems measured by Archer.

Generally, the correlations between SD and criterion measures did not differ as a function of ethnicity, gender or age. However, SD was significantly related to fewer associations with deviant peers and fewer school expulsions for First Nations youth, but not for Caucasian youth. These findings suggest SD is a protective factor with respect to externalizing problems, but only for First Nations youth. For First Nations youth only, SD was significantly related to MACI - Anxious Feelings. The MACI - Anxious Feelings scale consists of a substantial number of somatic symptoms, highlighting the importance of physical symptoms in First Nations' youth experience of social discomfort. Future research could examine specific Caucasian-First Nation differences in symptom presentation (e.g., relative expression of affective, cognitive or physical indicators) for social anxiety. However, the predominant congruence of findings across ethnicity, gender and age provides evidence for the criterion validity of SD across demographic groups.

Health Concerns. Associations were largely consistent with primary predictions. The Health Concerns (HC) dimension was related to a number of features associated with Borderline Personality Disorder (American Psychiatric Association, 1994). High scores were associated with suicidality, body disapproval, and a history of child abuse. Counter to prediction, HC was unrelated to the

trauma composite scale (see Table 16). The relatively limited range of the trauma composite scale (about 75% of participants scored less than 2 out of a possible score of 5) may have obscured a significant correlation. HC's strong relationship to MACI – Child Abuse, which contained a more evenly distributed range of scores, lends credence to this interpretation.

Secondary analyses showed that HC was also related to depressive affect, and MACI indicators of Borderline tendency and eating dysfunctions. Based on previous findings (Archer, Krishnamurthy et al., 1994), it was hypothesized that HC would be negatively related to criminological variables. Although current findings did not support this relationship, it is worth noting that within clinical samples, Archer and colleagues (1994) found only weak relationships between HC and stealing (r =-.22) and prior arrests (r = -.19). Pogge and colleagues (2002) similarly found a weak relationship between HC and oppositional behaviours, and no relationship between HC and fire setting. Therefore, HC seems to be weakly (if at all) related to criminal behaviours.

Associations did not differ across gender or age groups. One difference was noted between Caucasian and First Nations youth, although the correlation was not statistically significant for either group. Therefore, the reported associations are equally applicable across ethnic, gender, and age groups.

Naivete. Primary predictions were for Naivete (NAI) to be negatively associated with a range of indicators of criminal activity and psychopathology. However, NAI was unrelated to any criterion variables from primary analyses (see Table 17). Failure to find significant associations with criterion variables challenges the criterion validity of this dimension.

Consistent with secondary predictions, high scores on NAI were associated with decreased likelihood of the first offence being violent, of anti-depressant or anti-psychotic medication having been prescribed, and of depressive affect. High scores were positively associated with a conforming personality style.

Despite the significant findings from secondary analyses, it is noteworthy that NAI was the Structural Summary dimension with the lowest percentage of predicted correlations found to be significant (25% for primary and secondary predictions combined). Unlike findings reported by Archer et al. (1994) from a clinical sample, NAI was unrelated to externalizing correlates such as school suspensions/expulsions and spending time with delinquent peers. NAI was also unrelated to a history of having been abused, disturbed peer relations, anxious feelings, or sexual discomfort. The limited findings for NAI cannot be attributed to a restricted range as NAI was normally distributed in the current sample (NAI ranged from T = 31.2 to 71.4). Coupled with Pogge and colleagues (2002) finding that NAI was the dimension with the fewest correlates, its criterion validity is challenged.

Further casting doubt on NAI's criterion validity are findings showing ethnic, gender, and age differences in NAI's relationship to four correlates. Significant ethnic differences in NAI's relation to school expulsions and MACI-Anxious Feelings were noted, although correlations were not significant for either group. As well, NAI was negatively related to peer delinquency for males, but was unrelated for females. Finally, NAI was significantly related to MACI – Conforming for older adolescents but not for younger ones.

Familial Alienation. In line with primary hypotheses, Familial Alienation (FAM) was significantly associated with a MACI indicator of family discord (see Table 18). The effect sizes for the relationships between FAM and criterion variables measuring family disruption, substance use, and school expulsions were similar to those reported elsewhere (Archer, Krishnamurthy et al., 1994; Pogge et al., 2002), but did not surpass the more stringent threshold for clinical and statistical significance set in the current study. Unexpectedly, FAM was unrelated to a history of trauma, although the relatively low internal consistency of this composite scale may have obscured its relationship with FAM. Supporting this interpretation are post hoc analyses revealing that FAM was

moderately, but significantly, related to a history of physical and emotional abuse (two of the five variables comprising the trauma composite scale).

Secondary analyses showed FAM was related to MACI- Child Abuse. High scoring youth were likely to be oppositional and unruly. FAM was negatively associated with a need for attention and social approval (MACI – Dramatizing), as well as an inflated self-worth learned in response to doting and admiring parents (MACI – Egotistic).

Few group differences were found, with the exception of the family and trauma composite scales which were more strongly related to FAM for males than for females.

Psychoticism. In line with primary predictions, Psychoticism (PSY) was associated with a schizoid personality style (MACI-Introversive), suicidality, and weakly related to disturbed peer relations (see Table 19). Secondary analyses showed that PSY was negatively related to verbal IQ and full-scale IQ.

Results from primary and secondary analyses are consistent with previous studies (Archer, Krishnamurthy et al., 1994; Pogge et al., 2002). Unlike results reported by Archer et al., (1994), but similar to those reported by Pogge et al., (2002), PSY was unrelated to delinquent behaviours or a forceful or unruly personality style. Although the reason for these differences is not clear, Structural Summary dimensions' relation to correlates have been noted to vary as a function of the sample studied, as discussed in the introduction. For instance, only one of the ten correlates of PSY (treated differently by friends) reported by Archer and Krishnamurthy (1994) was significant within both samples (normative and clinical) of that study; the other nine reported correlates were different.

Few group differences in relation to correlates were noted. However, PSY was more strongly related to verbal IQ for males than for females, consistent with results reported by Pogge and colleagues (2002). High PSY scores were related to a history of having been prescribed anti-

psychotic medication for First Nations youth, but not Caucasian youth. This group differences raises the question as to whether ethnicity influences prescription practices.

Summary. Overall, with the exception of the Naivete dimension, the MMPI-A Structural Summary showed strong evidence of criterion validity. Correlations between Structural Summary dimension scores and criterion variables were as predicted and were broadly similar to results from prior studies. Further, the proportion of predicted relationships found to be significant was nearly double that found in previous criterion validity investigations. For the most part, relationships which were not statistically or clinically significant were in the direction predicted.

For the most part, Structural Summary dimension descriptors appear to apply equally well across ethnic, gender, and age groups. The strength of correlations between dimension scores and criterion variables rarely differed as a function of group status. Across all the dimensions, 6.8% of correlations were significantly different for ethnic groups, 6.8% for genders, and 1.9% for age groups.

Strengths and limitations. Several strengths were evident in the current study. First, as urged by Greene (1987) in his review of the methodological limitations of ethnic research on the MMPI, strict control for type I error associated with multiple comparisons was made for the primary predictions using the Hochberg (1988) correction, and an effect size criterion was used for the secondary predictions. While prior investigations (e.g., Archer & Krishnamurthy, 1994; Archer, Krishnamurthy et al., 1994; Pogge et al., 2002) have attempted to control for family-wise type I error by setting $\alpha < .05$, it is not clear that this was sufficient given the large number of correlations computed in those studies. In the present investigation, type I error was controlled by reducing the number of a priori predictions about correlations to those with the strongest theoretical support, and by creating composite scales to reduce the number of criterion variables, thus limiting the number of correlations tested.

Second, in the current study, efforts were made to ensure that reported correlations were not only statistically significant, but clinically meaningful. While prior investigations (Archer & Krishnamurthy, 1994; Archer, Krishnamurthy et al., 1994; Pogge et al., 2002) have set $r_{crit}>.15$ to reflect small to medium effect sizes, such values only represent a Structural Summary dimension's accounting of 2.2% of criterion variable variance. In the current study, for primary hypotheses, $r_{crit}>.30$ was set to ensure that at least 9.0% of criterion variable variance was accounted for by Structural Summary dimension scores.

Third, Greene (1987) stressed that a key issue in gauging the utility of the MMPI among groups varying in demographic characteristics involves assessing the extent to which interpretive statements are equally applicable across demographic groups. Interpretive statements for the MMPI-A Structural Summary are derived from dimensions' relationships to criterion variables. Therefore, a test of applicability requires a between group comparison of the associations between dimension scores and criterion measures. Very few studies have made comparisons. Among African-Americans, two comprehensive reviews of the MMPI/MMPI-2 and ethnicity (Greene, 1987; Hall et al., 1999) identified only three studies examining ethnic differences in empirical correlates of individual MMPI scales (Elion & Megargee, 1975; Genthner & Graham, 1976; Smith & Graham, 1981). Among Native-Americans, only one study has examined the empirical correlates of the MMPI-2 Clinical, Content and Supplemental scales (Greene et al., 2003) and no studies could be located that examined Native-American – Caucasian differences in empirical correlates of any scales on the original MMPI or the MMPI-A. Generally, in the studies that exist, few ethnic differences have been noted, suggesting that interpretive statements are equally applicable across groups. Similarly, previous Structural Summary criterion validity studies have reported few gender differences in correlations (Archer & Krishnamurthy, 1994; Archer, Krishnamurthy et al., 1994; Pogge et al., 2002), although age and ethnic differences have not been examined.

The approach typically taken in studies examining group differences in empirical correlates is to compute correlation coefficients between scale scores and criterion variables separately for each group under study (e.g., Archer & Krishnamurthy, 1994; Archer, Krishnamurthy et al., 1994; Greene et al., 2003; Pogge et al., 2002; Smith & Graham, 1981). If a coefficient in a given relationship is significant for one group but not the other, the groups are said to differ. The difficulty with such an approach is that statistical significance for one coefficient but not the other does not, on its own, imply the coefficients are significantly different from each other. For instance, in the current study, the correlation between Immaturity and school expulsion was significant for males (r=.33), but not for females (r=.17), but these correlations did not differ significantly from each other. Similarly, a pair of correlations may both be statistically significant, and also significantly different significantly from each other. Conducting significance testing between correlations, as was done in the current study, provides a more accurate assessment of group differences.

Despite these methodological strengths, the current study suffered from a number of limitations as well. First, and related to the significance testing just described, is the issue of power. In the current study, testing for group differences in correlation coefficients involved testing the parallelism of groups' regression slopes within ANCOVA. However, this procedure typically requires large samples to detect large effects (Hollingsworth, 1980). In the current study, the power to detect a medium-sized difference between correlations (i.e., f=.25) was assessed by G*Power (Buchner, Erdfelder, & Faul, 1997) and found to be .34, .51, .42, for analyses of ethnicity, gender, and age, respectively. The failure to find significant group differences in correlations may have been impacted by the relatively small sample size in the current study. Future studies should employ similar techniques with larger samples. Nonetheless, a visual inspection of correlation coefficients in Tables 12 to 19 reveals group differences are few and of small magnitude.

It should be noted that low power may also have made it difficult to detect significant correlations between Structural Summary dimensions and criterion variables for First Nation ($\underline{n}$=24) and older adolescents ($\underline{n}$=33). For primary analyses (r_{crit}=.30), power for First Nation and older adolescents was .31 and .41, respectively. For secondary analyses (r_{crit}=.17), power for First Nation and older adolescents was .21 and .25, respectively.

A second limitation is that the composite scales created for the current study demonstrated only modest internal consistency, ranging from Cronbach's α=.64 to .79. Low values indicate that composite scales may not have measured a singular, unified construct. If composite scales were multifactorial, their relationship to Structural Summary dimensions may have been washed out. This concern is attenuated by post hoc (unreported) analyses showing generally similar correlations with dimensions, regardless of whether composite scales or the component variables comprising them were used.

A third limitation has to do more with the MMPI-A Structural Summary itself than methods used in the current study. The Structural Summary was developed via a factor analysis with the goal of reducing overlap between the MMPI-A's 69 scales and subscales. This was to be achieved by identifying the smallest number of dimensions required to encapsulate all domains of functioning measured by the MMPI-A. However, during the original scale-level factor analysis of the MMPI-A, selection of an oblique rotation to aid in interpretation of the factors resulted in correlated dimensions (Archer, Belevich et al., 1994). In the current study, all dimensions were significantly correlated with each other, with correlations ranging from $\underline{r}$ =.23 to .90 (see Table 21). Such a high degree of inter-correlation among Structural Summary dimensions begs the question of whether the problem of scale overlap has really been addressed. Further, several criterion measures such as suicidality, family problems, and depressive affect were significantly related to more than one

Table 21

Bivariate Correlations Between Structural Summary Dimensions

Dimension	GM	IMM	DEP	SD	HC	NAI	FAM	PSY
GM	1							
IMM	.90**	1						
DEP	.56**	.72**	1					
SD	.75**	.62**	.34**	1				
HC	.74**	.62**	.23*	.48**	1			
NAI	-.65**	-.66**	-.72**	-.61**	-.28*	1		
FAM	.67**	.74**	.49**	.32**	.55**	-.38**	1	
PSY	.83**	.88**	.58**	.61**	.61**	-.57**	.55*	1

Note: GM = General Maladjustment, IMM = Immaturity, DEP = Disinhibited/Excitatory Potential, SD = Social Discomfort, HC = Health Concerns, NAI = Naivete, FAM = Family Alienation, PSYC = Psychoticism. Pearson correlations are two-tailed. n=130. * indicates p<.01, ** indicates p<.001.

dimension. However, scale inter-relatedness may also reflect true comorbidity inherent in psychiatric settings (American Psychiatric Association, 1994).

Group Differences in Structural Summary Elevations

A second goal of the current study was to examine elevation patterns of the Structural Summary within the whole sample as well as with the sample broken down by ethnicity, gender, and age.

Overall sample. Findings from the overall sample differed from previous studies of juvenile delinquents which found Immaturity to be the dimension with the highest mean elevation (Archer et al., 2002; Morton & Farris, 2002). In the current study, Familial Alienation was the most elevated dimension, mirroring results from psychiatric samples (Krishnamurthy & Archer, 1999; Pogge et al., 2002). The greater similarity to psychiatric than forensic samples is not surprising, considering that the current sample represents a sub-population of young offenders with suspected mental health challenges significant enough to prompt a referral for a psychological evaluation. Further, the current sample's substantially disrupted family relations would be expected to be reflected in an elevation on Familial Alienation. For instance, 20 percent of the sample had at least one parent with a mental illness, nearly half had lived in foster care or had been separated from their parents for more than two months, 19% had three or more foster placements, and nearly a third had suffered at least one form of child abuse.

Of interest is that the overall sample mean T score for every dimension was in the non-elevated range (i.e., T<60), as defined by MMPI-A Structural Summary interpretive guidelines (Krishnamurthy & Archer, 1999). Within a forensic psychiatric outpatient setting such as the one used in the current study, non-elevated scores could be interpreted as defensive responding. However, protocols invalidated by defensive responding were excluded from analyses. Clinical experience of the author suggests that many youth seen in this setting are anxious about being seen

as "crazy" and being mandated treatment, thus inclining them to minimize problems, although perhaps not to the extent of invalidating their profiles. It is also worth noting that a review of previous studies with MMPI-A Clinical and Content scales found that mean T scores for psychiatric samples were often within normal limits and that only about half of MMPI-A items can adequately distinguish normative from clinical samples (Archer, Handel, & Lynch, 2001). These authors attribute the relatively low efficiency of MMPI-A items to high rates of item endorsement in the MMPI-A normative sample.

Ethnicity. As reviewed above, the bulk of research examining ethnic differences in MMPI and MMPI-2 profile elevations has focussed on African-American – Caucasian differences, and generally failed to find any (Greene, 1987; Hall et al., 1999). Findings from the few studies that have examined Native-American – Caucasian differences on the MMPI/MMPI-2 have varied such that Native-Americans from non-clinical samples had more elevated scores (Arthur, 1944; Herried & Herried, 1966; Robin et al., 2003), whereas conflicting evidence suggested the reverse was true for clinical samples (Butcher et al., 1983; Greene, 2000). The present study was the first to examine First Nation – Caucasian differences in MMPI-A profile elevation.

First Nations youth had scores indicating more distress than Caucasian youth on all Structural Summary dimensions except Health Concerns and Familial Alienation. Of these, General Maladjustment, Immaturity, Naivete, and Psychoticism met Greene's (1987) criterion for clinical significance. These results are consistent with previous findings from non-clinical samples showing more elevated scores among Native-Americans than Caucasians.

That First Nations youth reported more distress than Caucasian youth is perhaps not surprising. High rates of mental health irritants such as family disturbance, unresolved grief, depression, alcohol abuse and unemployment have been reported among Aboriginal peoples, which comprise First Nations, Inuit and Metis (Kirmayer, 1994; Kirmayer, Brass, & Tait, 2000). Suicide is

a very significant concern and the rate among adolescent Aboriginal Canadians is five to six times the national average (Royal Commission on Aboriginal Peoples, 1995). Regional and even local variability in prevalence is noteworthy though (Bagley, Wood, & Khumar, 1990; Chandler & Lalonde, 1998) as Aboriginal peoples are diverse in terms of language, culture, social structure, and values (Kirmayer et al., 2000).

Several factors may account for the elevated Structural Summary scores observed among First Nations youth in the present study. Government policies of assimilation from the time of colonization through the middle of the last century have resulted in loss of land, erosion of belief systems and spirituality, weakened social institutions and racial discrimination (Royal Commission on Aboriginal Peoples, 1995). Kirmayer et al (2000) argue that attempts to assimilate Aboriginal peoples were at the heart of policies such as forced attendance at residential schools, out-of-community adoptions by non-Aboriginal parents, and child welfare measures where children were removed from their parents' home rather than being given the support available to non-Aboriginal families. Several authors have attributed unresolved grief over these experiences as the root of present-day psychological problems such as substance abuse (Oetting, Edwards, & Beauvais, 1988), child abuse (Hurejsi, Craig, & Pablo, 1992), and suicide (Kirmayer, 1994).

The current socio-economic status of Aboriginal Canadians is quite low. For instance, in 1991, the average Aboriginal income was 60% of non-Aboriginal incomes (Kirmayer et al., 2000). Aboriginal people contend with low levels of education, few employment opportunities, lack of adequate housing, and poor water quality at a higher rate than the national average (Royal Commission on Aboriginal Peoples, 1995). Low socio-economic status has been associated with increased psychopathology, under-utilization of mental health services, and less successful treatment outcomes (Aponte & Barnes, 1995). Compounding these challenges is an erosion of family-based social support offering care and a sense of attachment, which has been linked to physical and

psychological resilience (Sarason, Sarason, & Pierce, 1990). Further, there is a relative scarcity of available Aboriginal psychological service providers (LaFramboise, 1988) and an underutilization of available services (Dinges & Cherry, 1995). The unique historical, socio-economic and mental health challenges faced by Aboriginal peoples may account for the higher levels of psychological distress found within First Nations youth in the current sample.

Gender. As reviewed above, previous studies of adult offenders have yielded conflicting results with respect to gender differences in terms of the elevation of the overall profile and specific scales (Megargee et al., 1999). The precise reason for these discrepant findings is not clear, although differences may reflect variations in sample age and setting, version of the MMPI under study, cohort effects, or changing referral patterns in the criminal justice and mental health systems over time.

Gender differences in mean elevation were expected on Health Concerns and Disinhibition/Excitatory Potential based on Krishnamurthy and Archer's (1999) finding that the former was more frequently elevated in females and the latter in males. Based on recent data showing that the overall level of scale elevation is higher among female prisoners as compared to male prisoners (Megargee et al., 1999), General Maladjustment was expected to have a higher mean elevation for females than for males.

Findings from the current study demonstrated no statistically or clinically significant gender differences in mean elevations on any scale (see Table 20). Unfortunately, Krishnamurthy and Archer did not report mean scores for each gender so it is not possible to discern whether gender differences in means in their sample were statistically or clinically significant. As such, the current data are not directly comparable to Archer and Krishnamurthy's. Nonetheless, the current study suggests considerable stability in Structural Summary profile elevations across gender.

Age. As reviewed above, adolescent profiles have been reported to be more elevated than those of adults on the MMPI and MMPI-2 (Butcher & Williams, 1992; Hathaway & Monachesi, 1963). However, MMPI-A studies with adolescent psychiatric inpatients have failed to find age differences in mean scores on Structural Summary dimensions (Krishnamurthy & Archer, 1999; Pogge et al., 2002) or on Validity, Clinical, Content, or Supplemental scales (Janus et al., 1998). In these studies, age groups compared were 13- versus 14-year-olds (Janus et al., 1998) and 13- and 14-year-olds versus 15-18-year-olds (Krishnamurthy & Archer, 1999). Consistent with these investigations, the current study did not find age differences in mean elevations on any Structural Summary dimension when 13- and 14-year-olds were compared with 15-18-year-olds. The current data did not support the hypothesis that younger adolescents have higher scores on Structural Summary dimensions reflecting psychopathic-type traits. Possibly, no Structural Summary dimensions reflect those types of personality traits.

A post hoc observation found statistically significant higher scores on General Maladjustment and Health Concerns when 13-16-year-olds were compared to 17- and 18-year olds, although the difference was only clinically meaningful (Greene, 1987) for General Maladjustment. Higher overall levels of distress in older adolescents may reflect developmental challenges associated with entering adulthood such as finding suitable employment and housing. This finding might also be associated with older adolescents' longer exposure to adverse conditions such as family disruption, substance abuse, or incarceration. Future research could explore these and other potential explanations for this finding.

Strengths and limitations in examining group differences in dimension elevations. The current study followed many of the methodological suggestions offered by Greene's (1987) review of group differences in MMPI performance. First, invalid MMPI-A profiles were excluded from analyses. Second, effort to control for inflated risk of type I error rate associated with multiple tests

was made by using MANOVA and repeated measures ANOVA to test for multivariate effects before proceeding to univariate tests. Type I error was also controlled within univariate tests by using the Hochberg (1988) method. Third, the clinical importance of statistically significant tests was assessed using Greene's (1987) criterion of 5 T score points or greater.

Despite these strengths, the current study of group differences in dimension elevations was subject to three primary limitations. First, as shown in Table 21, Structural Summary dimensions are highly inter-correlated. This high degree of inter-correlation presented a problem in choosing a strategy to control for type I error when conducting univariate t-tests of group differences within individual Structural Summary dimensions. Not employing a correction would have been too liberal and may have resulted in type I errors. The Hochberg (1988) procedure may have been too conservative as it assumes independence of tests, which was not the case given dimensions' inter-relatedness. It was decided to err on the side of being overly conservative as it could be argued that the burden of proof lies with demonstrating the presence of group differences, rather than their absence. It is unlikely that selecting a more liberal control for type I error, and thus increasing power, would have altered the most compelling finding of group differences in the current study – that First Nations youth had statistically significant higher scores than Caucasian youth on six of eight (although only four differences were clinically meaningful) Structural Summary dimensions. The conservative approach taken for controlling type I error in the current study instils greater confidence in this finding.

Second, the current study considered ethnicity as a categorical variable (i.e., First Nation versus Caucasian) and therefore did not account for within group heterogeneity in cultural identification, the true variable of interest (Greene, 1987). Cultural differences may be obscured by aggregating ethnically similar individuals who differ substantially in their cultural beliefs, customs, and behaviours (Dinges & Cherry, 1995). Attenuating this concern are the substantial ethnic group

differences in Structural Summary scores found in the current study, suggesting that variability in cultural identification did not adversely impact results. As well, although Canadian data could not be located, limited data from the U.S. suggest that Native Americans have lower rates of assimilation than other minority groups, with rates ranging from 9-15% (French, 1989; Johnson & Lashley, 1989). Dana (1995) recommends researchers use tribe-specific measures of Native acculturation for reservation settings and global measures of acculturation for urban residents (e.g., Brown, 1982, May; Hoffman, Dana, & Bolton, 1985). Caution in generalizing findings from the current sample to areas beyond coastal British Columbia is warranted as Canada's Aboriginal population is exceptionally diverse, encompassing 596 bands residing on 2284 reserves, speaking 11 major languages and 58 dialects (Kirmayer et al., 2000).

Third, ethnic differences may be confounded by socio-economic status, which is typically measured in studies of ethnicity with indicators of parental education, occupation, or income (Aponte & Barnes, 1995). Unfortunately, due to the archival nature of the current investigation, reliable socio-economic status data could not be obtained. As described above, Aboriginal Canadians experience a lower standard of living than their non-Aboriginal counterparts in terms of rates of poverty, levels of education, sub-standard housing, and inadequate sanitation and water quality (Royal Commission on Aboriginal Peoples, 1995). Further, previous studies have demonstrated a strong link between lower socio-economic status and levels of psychopathology (Aponte & Barnes, 1995). As such, it is possible, and perhaps even likely, that observed ethnic differences in Structural Summary dimension elevations could at least partially be attributed lower socio-economic status.

In the MMPI literature, there is some suggestion that moderator variables such as socio-economic status drive observed ethnic group differences (Greene, 1987, 2000). For instance, Penk (1981, 1982) failed to find Black-White differences among male substance abusers on the MMPI when socio-economic status was controlled. Another study of the MMPI found that Blacks with less

than 12 years of education were more likely to be assigned to the wrong diagnostic group than Blacks with more than 12 years of education or Whites (who did not differ from each other), suggesting that education, rather than ethnicity was responsible for misclassifications (Cowan, Watkins, & Davis, 1975). In a study of the normative sample of the MMPI-2, fewer Black-White differences were noted when subjects were matched by education and income than when they were not matched (Timbrook & Graham, 1994). A similar effect was found with a community sample of Native Americans on the MMPI-2, where differences between two tribes sampled and the MMPI-2 normative group were attenuated, although not eliminated, when socio-economic status was controlled (Robin et al., 2003). Future investigations should attempt to measure socio-economic status and separate its effects on Structural Summary elevations from those of ethnicity per se.

Although the above findings suggest that socio-economic status is a confound to be controlled, some authors assert that matching groups by socio-economic status is inappropriate unless the difference results from sampling procedures (Butcher, Graham, & Ben-Porath, 1995). These authors argue that if groups actually differ on a variable (e.g., socioeconomic status), then the matched sample will no longer be representative of the population of interest. Applying this rationale to the current study, if the population of First Nations youth had a lower socio-economic status than the population of Caucasian youth, then matching the two groups on socio-economic status may well eliminate the observed ethnic differences, but the samples being compared may no longer adequately represent the population to whom they are to be generalized. Statistical control for socioeconomic status, in which the entire sample is used, would permit future research to disentangle the effects of socioeconomic status and ethnicity.

Summary. In addition to evaluating the MMPI-A Structural Summary's criterion validity, a second major purpose of the present investigation was to examine dimension elevations as a function of ethnicity, gender, and age. In the overall sample, Family Alienation was the most elevated

dimension, consistent with results from prior psychiatric samples. Clinically and statistically significant elevations on four of eight Structural Summary dimensions were found for First Nation youth which may be attributable to unresolved grief over historical government policies of assimilation and adverse present-day social conditions. No gender differences in dimension elevations were found. Comparisons between those under fifteen years of age and those older did not reveal any age differences in dimension elevations, consistent with previous investigations. However, a post hoc observation found those aged seventeen years and older to evidence higher levels of overall maladjustment. Methodological strengths and limitations are noted.

Conclusion

Data from the current study can be used to comment on whether the MMPI-A Structural Summary shows evidence of bias with respect to ethnicity, gender, or age. To conclude that the MMPI-A Structural Summary is biased, two criteria must be met. First, groups must differ in their scores on dimensions. Second, groups must differ in the meaning of their scores (Greene, 1987; Greene et al., 2003; Hall et al., 1999).

Evaluation of the first criterion can be accomplished, as was the case in the current study, by comparing mean scores across groups on each Structural Summary dimension. In this regard, the data showed statistically significant and clinically meaningful differences between First Nation and Caucasian youth on four of eight Structural Summary dimensions, and between older and younger adolescents on General Maladjustment.

Evaluation of the second criterion is achieved by comparing the correlates of Structural Summary dimensions across groups. This particular method is appropriate because suggested interpretive statements for Structural Summary dimensions are based exclusively on dimensions' associations with external correlates (Archer & Krishnamurthy, 1994; Archer, Krishnamurthy et al., 1994). As such, evaluating group differences in the meaning of scale elevations requires group

comparisons in the relationship between dimensions scores and external correlates. In the present investigation, very few group differences in the strength of correlations between Structural Summary dimension scores and criterion variables were noted. As reported above, across all the dimensions, 6.8% of correlations were significantly different for ethnic groups, 6.8% for genders, and 1.9% for age groups.

The general congruence in correlations across groups suggests that the MMPI-A Structural Summary is measuring the same types of psychopathology irrespective of ethnicity, gender, or age. Therefore, the observed group differences in dimension elevations can be attributed to substantive elevations in psychological distress, rather than as an artefact of test bias.

Future Research

Future investigations may wish to evaluate the extent to which the MMPI-A Structural Summary shows evidence of other forms of validity. Although generally considered a comprehensive measure of psychopathology, the Structural Summary's content validity should be evaluated as it may not adequately represent the full range of disorders as represented by DSM-IV, such as eating, sleep, and impulse control disorders (American Psychiatric Association, 1994). Studies of criterion-based validity could build on the current investigation by examining the congruence between Structural Summary scores and current diagnoses. Concurrent validity studies could further examine the extent to which group differences in Structural Summary dimension scores are reflected by group differences in criterion variables. It might be expected, for instance, that if ethnic groups differ on Familial Alienation, they should also differ on family variables such as child abuse, parental incarceration, or number of foster placements. Support for predictive validity could be garnered from Structural Summary dimensions' associations with treatment seeking, adherence and outcome. In a forensic context, it would be especially useful to learn to what extent dimensions could predict recidivism or post-incarceration community adjustment. Examinations of construct

validity could assess the Structural Summary's ability to distinguish clinical from non-clinical samples, and between diagnostic groups within clinical samples. This last point is particularly important given the high inter-correlations between Structural Summary dimensions found in the current study (see Table 21) which suggest the Structural Summary may best distinguish between the presence and absence of psychopathology rather than between specific types of disorders. Incremental validity could be examined by comparing the classification accuracy of Structural Summary dimensions and traditional MMPI-A Clinical scales in terms of distinguishing clinical from non-clinical samples, and for distinguishing between types of disorders within clinical samples.

A second line of inquiry could address questions about how to best utilize Structural Summary results clinically. Archer (1997a) suggested that a configural approach could be used to interpret patterns of elevations on the Structural Summary, similar to that used for interpreting the MMPI-A's clinical scales. This could be a fruitful way of identifying diagnostic categories. For instance, Generalized Anxiety Disorder might be best represented by elevations on General Maladjustment, Social Discomfort and Health Concerns. Establishing the validity of such an approach would require examining the relationship between multi-point elevations and criterion variables from adequately sized clinical and non-clinical samples where ethnic, gender, and age comparisons were conducted.

A final direction for future research could be to empirically derive psychopathology-based groupings of adolescent offenders using cluster analytic techniques. Although theorists differ in their nomenclature, the criminological literature consistently posits the existence of two distinct types of juvenile delinquents (Moffitt, 1993; Patterson, Forgatch, Yoerger, & Stoolmiller, 1998; Patterson & Yoerger, 1997; Sampson & Laub, 1992). The life-course persistent type is characterized by early behavioural problems that endure through adolescence and adulthood whereas the adolescent-limited type begins and ends in adolescence. In contrast to the adolescent-limited type, life-course persistent

adolescents are hypothesized to demonstrate more problems in cognitive abilities, academic achievement, family relations, school functioning, and violent behaviour. Further, they are hypothesized to present with more psychopathology and personality disturbances in the form of weak bonds to family, callousness, alienation, impulsivity, and emotional instability. Psychopathology-based grouping could identify life-course persistent individuals on the basis of elevated scores on dimensions such as Immaturity, Disinhibition/Excitatory Potential, and Familial Alienation. These early starters are estimated to comprise only 5 or 6% of offenders and yet commit 50% of known crimes (Aguilar, Sroufe, Egeland, & Carlson, 2000). Psychopathology-based profiles may help clinicians more accurately identify this group and may assist in risk assessment and need-based treatment planning.

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Appendix A

Millon Adolescent Clinical Inventory Scale Descriptions

Personality

- Introversive: similar too DSM schizoid, lacks the capacity to experience life as painful or pleasurable
- Inhibited: unusual sensitivity to and anticipation of psychic pain and diminished psychic pleasure
- Doleful: significant loss, a sense of giving up, similar to depressive personality type
- Dramatizing: similar to DSM histrionic personality
- Egotistic: similar to DSM narcissistic personality
- Unruly: similar to DSM antisocial personality
- Forceful: pleasure in behaviour that humiliates and violates the rights and feelings of others, similar to sadistic
- Conforming: similar to DSM obsessive-compulsive personality disorder
- Oppositional: similar to DSM passive-aggressive
- Self-demeaning: purposeful self-denial and acceptance of blame
- Borderline: similar to DSM borderline

Expressed Concerns

- Identity diffusion: uncertainty about identity, values, and future goals
- Self-devaluation: disparity between the ideal and actual selves
- Body disapproval: dissatisfaction with level of physical attractiveness and social appeal
- Sexual discomfort: sexual thoughts and feelings are confusing and disagreeable
- Peer insecurity: sadness about being rejected by peers
- Social insensitivity: generalized indifference to the feelings and reactions of others, a casual indifference rather than hostility.

- Family discord: significant tension or conflict within the family reflecting parental rejection or adolescent rebellion.
- Childhood abuse: shame and disgust about having been exposed to emotional, physical, or sexual abuse

Clinical Syndromes

- Eating dysfunctions
- Substance abuse proneness
- Delinquent predisposition
- Impulsive propensity: the excesses in manner by which adolescents assert their growing autonomy
- Anxious feelings: measures anxiety that is frequent, persistent, cannot be fully explained by realistic stressors, and affects the individual's ability to relate socially or to function adequately. This scale includes somatic complaints.
- Depressive affect: feelings of guilt, lack of initiative, apathy, low self-esteem, futility, self-deprecation, vegetative symptoms
- Suicidal tendency: ideation, behaviour, and attempts