

Typologies of Youth with Psychopathic Traits

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A thesis submitted to

The faculty of Graduate Studies and Research

in partial fulfillment of the requirement for the degree of

Master of Arts

Department of Psychology

Carleton University

Ottawa, Ontario

September, 2006

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Your file *Votre référence*
ISBN: 978-0-494-18252-9
Our file *Notre référence*
ISBN: 978-0-494-18252-9

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Abstract

The present study examined the ability to differentiate subtypes of youth on psychopathic traits. Two samples of youth were assessed, those with a high number of psychopathic traits ($n = 458$) and those who varied across the full range of psychopathic traits ($n = 858$). Cluster analysis techniques were employed using the factor scores of the Psychopathy Checklist: Youth Version (PCL:YV; Forth, Kosson, & Hare, 2003). The high traits sample yielded 3 clusters that were similar to results from Hervé (2003) who clustered adults, a *classic* cluster that score high on all factors of the PCL:YV (Forth et al., 2003), a *macho* cluster that scored low on the interpersonal factor and high across remaining factors, and a *pseudo* cluster that scored moderately on the interpersonal factor, low on the affective factor and high across remaining factors. The full range sample also yielded 3 clusters that replicated earlier results with youth (Vincent, Vitacco, Grisso, & Corrado, 2003), a *high traits* cluster that scored high across all factors, an *impulsive* cluster that scored low on the interpersonal factor and high across remaining factors, and a *low traits* cluster that scored low across factors. The validity of the cluster solutions found in the high traits sample was explored with further analysis. The full traits cluster solution replicated in an independent sample of non incarcerated offenders, however failed to replicate with a sample from the United Kingdom. The ability of clusters to differentiate on external variables was assessed on a subgroup of the original sample. External variables included response to treatment, recidivism, antisocial and aggressive history, and family background variables. Clusters initially differed on some external variables, however once age and PCL:YV score were accounted for these differences disappeared. The implications of these results are discussed in relation to theory and future research.

Acknowledgements

There are many people whom I would like to thank for their support in helping me through this thesis and throughout my graduate studies. First, and foremost I would like to thank my advisor, Dr. Adelle Forth. It is easy to see how you win the admiration of your students with your contribution, knowledge, and enthusiasm for research in this area. Your support and guidance have made me a more critical thinker and a better researcher. Second, I would also like to my committee Dr's Craig Benell, Ralph Serin, and Robynne Neugebauer for their helpful comments. I would also like to thank my partner for keeping me grounded through my studies and in life. You listened to me when I needed to talk and laughed with me when I needed it most. Your unwavering support and love have enabled me to reach this point. Similarly, I am grateful for the support and encouragement of my family, especially my parents and my grandmother. Grandma, the courage that you showed when you returned to school and switched careers when retirement as a teacher neared was an inspiration to me. A special thank you to my friends, who made sure I went out and stayed in contact with the outside world. Finally, I would like to thank my pets Lemieux, Criminal, Sukhi, and Bryn for making sure I was not lonely when working late nights.

Table of Contents

Introduction	1
Literature Review	4
Assessment of Psychopathy in Adults	4
Assessment of Psychopathic Traits in Youth	5
Factor Structure of The PCL:YV	7
Subtypes of Psychopaths	10
Clinical Distinctions	10
Limitations of using psychiatric disorders	13
Primary and Secondary Psychopathy Distinction	15
Development of psychopathy	19
Etiology of psychopathy	22
Manifestation of primary and secondary subtypes	25
Subtypes of Psychopathy: Cluster Analysis	26
Types of cluster analysis	26
Clusters from Personality Measures	30
Cluster Analysis and the PCL-R	32
Primary and Secondary Psychopathy: Distinct Subtypes?	38
Manifestation of Psychopathy in Youth	39
PCL:YV and Criminal Behaviour	41
PCL:YV and Recidivism	43
PCL:YV and Treatment	44
Differential Associations with Factor Scores	45
Manifestation of Psychopathy in Females	46
Subtypes of Psychopathy in Youth	48
Purpose of Present Study	51
Method	52
Studies 1 and 2: Determining Cluster Membership	52
Participants	52
Measures	56
Selecting Cluster Analytic Methods	56
Study 1	60
Hypothesis	60
Procedure	60
Results	62
Discussion	72
Study 2	77
Hypothesis	77
Procedure	77
Results	79
North American Incarcerated Sample	79
North American Non Incarcerated Sample	86

United Kingdom Incarcerated Sample	89
Discussion	93
Studies 3, 4, and 5: Validating Clusters on External Variables	95
Study 3: Validating High Traits Clusters	97
Hypotheses	97
Participants	97
Measures	98
Procedure	98
Results	99
Discussion	102
Study 4: Recidivism and Treatment of Total Group	106
Hypotheses	106
Procedure	106
Results	106
Discussion	112
Study 5: Family Background and Aggressive History of Total Group	113
Hypotheses	113
Participants	114
Measures	114
Family background variables	114
Risk and protective factors	115
Antisocial behaviour	116
Aggression	116
Procedure	117
Results	118
Family Background Variables	120
Risk and protective factors	123
Antisocial behaviour	125
Aggression	126
Discussion	128
General Discussion	134
Limitations and Directions for Future Research	141
References	144

List of Tables

Table 1: Diagnostic Criteria for Conduct Disorder	6
Table 2: PCL-R Factor Loadings	9
Table 3: Similarity among clinical subtypes of psychopathy	14
Table 4: Description of samples	53
Table 5: Descriptive statistics of sub-samples for study 1	63
Table 6: Number of clusters indicated by hierarchical analyses (Study 1)	65
Table 7: Kappa agreement from study 1: 70% sub-sample (4 Factor Model)	66
Table 8: Kappa agreement from study 1: 70% sub-sample (3 Factor Model)	67
Table 9: Mean factor scores and ANOVA results from K Means analysis: 3 Cluster solution	69
Table 10: Mean factor scores and ANOVA results from K Means analysis: 2 Cluster solution	70
Table 11: Profile of clusters from study 1	73
Table 12: Description of sub-samples from North American incarcerated sample	80
Table 13: Number of clusters indicated by hierarchical analyses (Study 2)	82
Table 14: Kappa agreement from Study 2: 70% sub-sample (4 Factor Model)	83
Table 15: Kappa agreement from Study 2: 70% sub-sample (3 Factor Model)	84
Table 16: Profile of clusters from North American incarcerated sample	85
Table 17: Profile of clusters from North American non incarcerated sample	87
Table 18: Profile of clusters in United Kingdom incarcerated sample	90
Table 19: Correlation of factor scores from study 2	91
Table 20: Distribution of factor scores	103
Table 21: Profile of clusters in study 4	107
Table 22: Summary of logistic regression analysis for variables predicting recidivism	110
Table 23: Profile of Clusters from Study 5	121
Table 24: Family background differences among clusters	122
Table 25: Differences among clusters on SAVRY scales	124
Table 26: Antisocial variables across clusters	127
Table 27: Aggressive variables across clusters	129

List of Figures

Figure 1: Profile of Hervé (2003)	36
Figure 2: Profile of Vincent et al. (2003)	50
Figure 3: Hypothesized clusters for study 1	61
Figure 4: Profile of 3 cluster solution from study 1	71
Figure 5: Comparison between Hervé (2003) and 4 cluster model	76
Figure 6: Hypothesized clusters for Study 2	78
Figure 7: Comparison of Cluster Solutions in North American incarcerated sample	88
Figure 8: Cluster replications across samples study 2	92
Figure 9: Comparison of 4 cluster solution with Vincent et al. (2003)	94
Figure 10: Profile characteristics from study 1 and initial solution from study 3 ($n = 106$)	100
Figure 11: Profile characteristics from study 1 and study 3 ($n = 53$)	101
Figure 12: Profile characteristics from study 1 and re-clustered solution from study 3 ($n = 106$)	104
Figure 13: Profile characteristics from study 2 (70% sub-sample) and study 4	108
Figure 14: Profile characteristics from study 2 (70% sub-sample) and study 5	119
Figure 15: Profile characteristics from studies 1 and 2 (70% sub-sample)	137

Appendices

Appendix A: Family background variables	160
Appendix B: EMBU items	161
Appendix C: SAVRY Items	165

Introduction

The ability to classify offenders into homogeneous subgroups has greatly enhanced our understanding of criminal behaviour. These classifications parse heterogeneity in the broad group of offenders and help provide clarity when assessing etiology, background characteristics, and risk of future violence. Classification is also a useful tool in understanding young offenders. Adolescence is a time of increased antisocial and even criminal behaviour (Farrington, 1995; Loeber & Stouthamer-Loeber, 1997; Moffit, 1993). Yet, for some youth, this behaviour is not a temporary stage in development, but an entrenched pattern of behaviour that continues throughout the life course (Farrington, 1995; Loeber & Stouthamer-Loeber, 1997; Moffit, 1993). The ability to identify, understand, and provide appropriate intervention to these youth can potentially truncate their criminal career.

A variety of methods have been applied to youth in order to identify this group. Two methods applied more recently are the diagnosis of Conduct Disorder (CD; American Psychiatric Association, 2000) and assessment of psychopathic traits in youth (Forth, Kosson, & Hare, 2003). Conduct Disorder is a behavioural disorder diagnosed in adolescents characterized by violation of age appropriate norms or the rights of others. Psychopathy in youth and adults is defined by a constellation of interpersonal, affective, lifestyle, and behavioural traits (Forth, Kosson, & Hare, 2003). Over the last two decades the Psychopathy Checklist-Revised (PCL-R; Hare, 2003) has been used to assess psychopathy in adults. The PCL-R (Hare, 2003) is based on Cleckley's (1976) clinical conceptualization of the psychopath and is considered the gold standard of assessing

psychopathy (Barone, 2004). The construct of psychopathy has been very useful in understanding a high risk group of offenders in adults.

Research with adults indicates psychopaths are persistent in their offending, offend at high rates, commit a diverse range in offences, are more calculating in their offending, are likely to offend after incarceration, and demonstrate low amenability to treatment (Blackburn & Coid, 1998; Glover, Nicholson, Hemmati, Bernfeld, & Quinsey, 2002; Harris & Rice, 2006; Kroner & Mills, 2001; Ogloff, Wong, & Greenwood, 1990; Porter, Birt, & Boer, 2001; Woodworth & Porter, 2002).

As research provided a better comprehension of the disorder in the adult forensic population researchers began to examine psychopathy in youth. This was prompted by knowledge that psychopaths begin their antisocial lifestyle and criminal career at an early age. Therefore, it was believed it might be possible to observe some manifestation of the disorder at a young age (Forth et al., 2003). In addition, one of the prominent concerns with adult psychopaths is there is no intervention that has empirically demonstrated the ability to reduce the offending of psychopathic offenders (Harris & Rice, 2006; Salekin, 2002). Identification of psychopathic traits at an early age may lead to interventions that can prevent the youth from continuing their antisocial lifestyle and the long term offending pattern often associated with this group (Blackburn & Coid, 1998; Porter et al., 2001). In addition, as personality is believed more malleable in youth and therefore it may be possible to alter some of psychopathic traits in youth (Caspi & Bem, 1990; Forness, Kavale, MacMillan, & Asarnow, 1996).

Currently, adults who receive a score of 30 or more on the PCL-R are labeled a psychopath and inferred to be similar in etiology, offending pattern, risk for offending,

and treatment amenability. However, this is not consistent with research (Hemphill, Hare, & Wong, 1998) or clinical observations (Murphy & Vess, 2003) which report heterogeneity in the disorder. Heterogeneity should be expected considering the multiple patterns of scores that can lead to a diagnosis of psychopathy (Murphy & Vess, 2003). For example, two offenders may obtain a score of 33, however one offender may have scored 0 on most items measuring the affective dimension while receiving a 2 on all other items whereas the other offender may receive a score of 2 on all items in the affective dimension and moderate to high scores in all other areas. These two offenders are likely to present different treatment challenges and potentially different risks illustrating the benefit a typology of these offenders can provide. The assessment of subtypes in this group is not new, but most efforts have focused on adults.

Assessing psychopathic traits in youth measures the number of psychopathic traits present rather than diagnosing psychopathy. The Psychopathy Checklist: Youth Version (PCL:YV; Forth et al., 2003) is a downward extension of the PCL-R. Items were modified to better represent adolescence and their life experiences including the larger roles of peers, school, and family. The PCL:YV contains 20 items which measure interpersonal, affective, behavioural, and lifestyle features of psychopathy. Although the manual does not supply a cut score to diagnose psychopathy, those who score high are still at risk of being treated as a homogeneous group.

Uncovering subtypes in youth with psychopathic traits may lead to a greater understanding of etiology, more refined predictions of risk, and potentially inform treatment and prevention. As the focus on youth with psychopathic traits is more recent, there has been limited attention to using the PCL:YV to uncover subtypes. In addition,

there is no consensus regarding the number and description of clusters present in adults. Moreover, little is known regarding whether these clusters would be present in youth. The purpose of this study is to apply empirical methods to assess clusters of youth with psychopathic traits using the PCL:YV.

Literature Review

This literature review will begin with a discussion regarding the importance of a common measure of psychopathic traits. Second, theory and research on subtypes of psychopathy will be reviewed. Much of the theory and research is drawn from the adult literature as this area has only recently been examined in youth. Next, a review of research assessing the factor structure of the PCL:YV will be conducted followed by a review of the manifestation of the disorder in youth. This will provide a background for the next section which will discuss proposed subtypes of psychopathy. These subtypes will be analyzed based on research on the development and etiology of psychopathy. Next, cluster analysis methods will be covered followed by research utilizing cluster analysis to assess subtypes. Finally, proposed subtypes of psychopathic traits that have employed samples of youth will be analyzed.

Assessment of Psychopathy in Adults

A paramount issue when conducting research is that an agreed upon measure and definition of psychopathy is used. Interest in psychopathy and its subtypes has spanned nearly a century and when discussing early subtypes of the disorder it is important to be aware of the evolution of the construct over this time. Prior to publication of the Psychopathy Checklist (PCL; Hare, 1980) there had been no widely agreed upon reliable and valid diagnostic criteria to diagnose psychopathy. Psychopathy was often diagnosed

through clinical judgment or through diagnostic criteria such as the Diagnostic and Statistical Manual of Mental Disorders (DSM; American Psychiatric Association, 1952; 1968; 1980; 1994; 2000).

Although the PCL-R is now widely used, there are still some issues of diagnostic confusion. The DSM-IV (APA, 1994) posited Antisocial Personality Disorder (APD) as a diagnosis synonymous with psychopathy. However, the diagnostic criteria are largely behavioural and therefore missing the core affective and interpersonal features of psychopathy (Hare, 1996). As a result, research demonstrates that the PCL-R is able to target a subgroup of offenders, with a base rate of about 15-25% in offending populations whereas APD was more a measure of general criminality with a much higher base rate (50-80%; Hart & Hare, 1997).

Assessment of Psychopathic Traits in Youth

The issue of the ability to target a subgroup of offenders is mirrored in the DSM diagnosis of Conduct Disorder (CD) and the PCL:YV. CD is a behavioural disorder characterized by violation of age appropriate norms or the rights of others. There are 15 criteria which divide aggressive behaviour, destruction of property, and serious violation of rules (see Table 1 for full list of symptoms). To receive a diagnosis of CD an adolescent must display at least three of the criteria during the past year with one present in the last six months and the symptoms need to cause impairment in functioning. There are two subtypes of CD, childhood onset and adolescent onset. Childhood onset is defined by the onset of one of the criterion before age 10. The adolescent subtype is defined by the absence of any criteria characteristic of CD prior to age 10. The childhood

Table 1
Conduct Disorder Symptoms

Aggression to people and animals

1. Often bullies, threatens, or intimidates others
2. Often initiates physical fights
3. Has used a weapon that can cause serious physical harm to others
4. Has been physically cruel to people
5. Has been physically cruel to animals
6. Has stolen while confronting a victim
7. Has forced someone into sexual activity

Destruction of property

8. Has broken into someone else's house, building, or car
9. Has stolen items of nontrivial value without confronting victim

Deceitfulness or theft

10. Has broken into someone else's house, building, or car
11. Often lies to obtain goods or favors or to avoid obligations (i.e., "cons" others)
12. Has stolen items of nontrivial value without confronting a victim (e.g., shoplifting, but without breaking and entering; forgery)

Serious violation of rules

13. Often stays out at night despite parental prohibitions, beginning before age 13
 14. Has run away from home overnight at least twice while living in parental or parental surrogate home (or once without returning for a lengthy period)
 15. Is often truant from school, beginning before age 13
-

onset group is more likely to develop APD as an adult than the adolescent onset type (APA, 2000).

However, a diagnosis of CD does not identify a homogenous group likely to display long term behavioural problems into adulthood (Frick & Loney, 1999; Lahey et al., 1995). Moreover, research demonstrates questionable stability of the disorder at a one year follow up (Lahey et al., 1995). Finally, relying on the diagnosis of CD will overestimate the proportion of youth at risk for long term offending (Frick & Loney, 1999). Alternately, research on the stability of psychopathic traits has demonstrated good stability both in childhood from age 10 to 14 (Frick, Kimonis, Dandreax, & Farell, 2004) and in adolescence from 17 to 24 (Blonigen, Hicks, Kruger, Partrick, & Iacono, 2006). Furthermore, it is possible to identify a group of offenders within youth diagnosed with CD who display psychopathic traits (Forth, Hart, & Hare, 1990).

This issue of assessment is an important consideration as the ability to develop a typology of psychopaths into meaningful groups that are reliable and valid requires researchers to agree on the construct they are sub-typing. Therefore, researchers should use similar assessment and cut-offs where applicable when developing typologies.

Factor Structure of The PCL:YV

The factor structure of the PCL:YV is analogous to the PCL-R with items assessing interpersonal, affective, behavioural, and lifestyle features of psychopathy. Originally, factor analysis of the PCL-R yielded a two factor solution, Factor 1 measured interpersonal/affective aspects of the disorder and Factor 2 measured behavioural features (Hare, 1991). However, there has recently been debate regarding the appropriate factor structure of the PCL-R and PCL:YV. This began with Cooke and Michie's (2001) study

which analyzed the factor structure of the PCL-R. They reported a three factor model produced a better fit than the traditional two factor model. The model split Factor 1 into two factors, Arrogant and Deceitful Interpersonal Style and Deficient Affective Experience. The third factor measured Impulsive and Irresponsible Behavioural Style. However, the three factor model only used 13 items of the PCL-R.

Further analysis of the factor structure was conducted with the second edition of the PCL-R manual and a 4 factor model was established (Hare, 2003). The 4 factor model is analogous to the three factor model except five of the items omitted in the Cooke and Michie (2001) model are included in a fourth factor which measures Antisocial Lifestyle (See Table 2 for comparison of factor models).

These are important considerations as the PCL:YV maintains the factor structure of the PCL-R. Due to the debate regarding the factor structure of the PCL-R, analysis has been done regarding which model is a superior fit with the PCL:YV. Neumann, Kosson, Forth, and Hare (2006) assessed the three and four factor model of the PCL:YV. First, a sample from North America ($N = 505$) was examined, followed by confirmation on an independent sample from the United Kingdom ($N = 233$). Results demonstrated good fit for both models with neither distinguished as superior.

Similar results were reported by Salekin, Brannen, Zalot, Leistico, and Neumann (2006) who examined the factor structure from two to 4 factors with a sample of court referred youth ($N = 130$). Both the three and 4 factor model demonstrated a good fit with the data with both models performing superior to the two factor model. Analogous to prior research, results did not distinguish the three or 4 factor model as superior to one another.

Table 2
PCL-R Factor Loading

Psychopathy				
PCL-R ¹	Factor 1		Factor 2	
PCL-R (2 nd ed.) ¹	Facet 1	Facet 2	Facet 3	Facet 4
PCL: 3F ²	Facet 1	Facet 2	Facet 3	-----
	Interpersonal	Affective	Lifestyle	Antisocial
	Glib/Superficial	Shallow Affect	Gets Bored	Poor Controls
	Grandiose	Callous	Impulsive	Early Problems
	Lying	Lacks Guilt	Irresponsible	Juvenile Crime
	Conning	Not Responsible	Parasitic	Revocations
			No Realistic Goals	Versatility

¹ Two items (sexual promiscuity and many marital relationships), although included in these 20-item scales, do not load on any one Factor or Facet.

² All 13 items from this scale are included.

Due to similar empirical results the debate has focused on theoretical reasons for distinguishing the models. Specifically, if antisocial lifestyle is conceptualized as a part of the construct of psychopathy then the 4 factor model should be selected. Alternately if antisocial lifestyle is deemed a consequence of the disorder, the three factor model should be selected.

Subtypes of Psychopaths

Attempts to distinguish psychopaths into subgroups have occurred since the disorder has been defined. Cleckley (1976) did not describe a group of homogeneous psychopaths, but people who displayed key features of the disorder such as lack of empathy and differed in the manifestation of the disorder such as their behaviour. Currently, it is generally accepted that psychopaths are a heterogeneous group, however there is some disagreement regarding how to best understand this heterogeneity. Some researchers advocate using differences in etiology (Porter, 1996) whereas others focus on traits such as anxiety (Blackburn, 1975; Newman, MacCoon, Vaughn, & Sadeh, 2005). Currently, there is no one accepted method for grouping psychopaths. This section will review the different subtypes proposed by clinicians and researchers. Attempts will be made to find some consistency across these typologies as emergence of similar subtypes may indicate validity for the existence of these subtypes.

Clinical Distinctions

Early clinicians were motivated to subtype psychopathy due to dissatisfaction with the diagnosis. They felt the diagnosis of psychopathy was over inclusive and should be refined, however they differed regarding how to accomplish this (Arieti, 1967; Karpman, 1948). Arieti (1967) used psychiatric disorders while Karpman (1941; 1945;

1948; 1950) used neurotic anxiety. The concept of neurotic anxiety has psychodynamic roots and is not explicitly defined. However, it appears to be an inclusive term to describe internal conflict related to early childhood experience (Karpman, 1949). More recent subtypes are heavily influenced by these clinicians and these similar distinctions are found in typologies today.

Arieti (1967) used psychiatric disorders to distinguish true psychopaths, termed Idiopathic psychopaths, from a secondary group termed Pseudo-psychopaths. Both idiopathic and pseudo-psychopaths engaged in aggressive behaviour, yet were distinguished in the underlying mechanism that drove the behaviour patterns. Pseudo-psychopaths consisted of disturbed individuals who suffered from either psychotic or personality based psychiatric disorders. These disorders caused unconscious conflict which drove the aggressive behaviour of this group and displayed features which resembled psychopathy generating diagnostic confusion.

In contrast, idiopathic psychopaths were free from any psychiatric disorder and their actions could not be explained through conflict. Within this grouping Arieti (1967) proposed four subtypes: simple, complex, dyssocial, and paranoidic. The simple psychopath acts impulsively to obtain needs including food, sex, and hedonistic pursuits. The methods used are often aggressive as they lack the ability to delay gratification and the intellect to consider other methods for attaining their goal. Complex psychopaths have a higher intellect and are more grandiose than simple psychopaths. This propensity influences their goals and they tend to seek power and notoriety. Their intellect allows them to assess a variety of methods for attaining goals. This leads them to be manipulative and deceitful rather than aggressive as these methods tend to result in least

negative consequences. Dyssocial psychopaths often belong to an antisocial group with a shared desire to act against society and paranoid psychopaths are characterized by paranoid ideations that drive their aggressive psychopathic behaviour.

Recent conceptualizations of clinical subtypes appear to be influenced by Arieti's (1967) work and the Diagnostic and Statistical Manual (DSM; APA, 2000). However, Arieti (1967) believed only pseudo psychopaths could be distinguished using psychiatric criteria. Therefore, the following subtypes may reflect subtyping of secondary psychopathy under Arieti's (1969) definition.

Millon and Davis (1998) proposed differences between ten subgroups of psychopathy: unprincipled, disingenuous, risk taking, covetous, spineless, explosive, abrasive, malevolent, tyrannical, and malignant. This large number of subtypes is not consistent with other typologies. However, psychopathy is defined primarily from behaviour likely resulting in an over inclusive group. Therefore, some of these subtypes may be subtypes of psychopaths whereas others refer to non psychopaths. This is supported by the resemblance between unprincipled, disingenuous, malevolent, tyrannical, explosive, and covetous subtypes with prior subtypes.

Murphy and Vess (2003) also developed a typology of psychopaths influenced by DSM-IV personality disorders. They distinguished subgroups based on clinical observations of psychopathic patients defined by the PCL-R at a maximum security forensic psychiatric hospital. Their subtypes are labeled narcissistic, borderline, sadistic, and antisocial.

The narcissistic group is characterized by high levels of narcissism including grandiosity, entitlement, and callous disregard for others. Borderline psychopaths display

features of affectivity and self destruction. Sadistic psychopaths are characterized by sadism (i.e., obtaining pleasure from the pain of others). Finally, antisocial psychopaths are characterized by greater criminal behaviour than the other groups. These subtypes are not described in great detail although they share features with other typologies (see Table 3 for a comparison of clinical subtypes).

There are some important limitations of this typology. First, the boundaries between these groups are not clear. For example, how would this typology classify a highly grandiose psychopath with an extensive criminal history? In addition, there is overlap in the diagnostic categories of personality disorders used to distinguish between these categories. Finally, the typology was based on observations of a specific sample of forensic psychiatric patients and may not generalize. However, clinical observations such as these do provide descriptions and a framework from which to understand more empirical investigations.

Limitations of using psychiatric disorders.

There is little agreement across theorists about the characteristics that characterize subtypes (see Table 3 for a comparison of clinical subtypes). Therefore, this is an issue that research needs to address. The use of a secondary disorder to classify groups is a common method used in developing a typology. Some argue against this method due to questions of stability and validity (Hervé, 2003). Subtypes that take this approach would only be as stable as the co-morbid disorder, once it is treated the subtype would disappear. However, personality disorders appear to be a fairly common method for subtyping psychopaths and some purport they are useful for understanding the heterogeneity of this group. Specific personality disorders suggested for subtypes include Borderline

Table 3
Similarity Among Clinical Subtypes of Psychopathy

	Characteristics of Psychopathic Subtypes			
	Calculating	Impulsive	Aggressive	Criminal
Karpman (1948)	Aggressive	Passive parasitic	Aggressive	N/A
Arieti (1967)	Complex	Simple	Simple	Dyssocial, Paranoidic
Millon & Davis (1998)	Unprincipled, Disingenuous	Disingenuous	Tyrannical, Explosive, Malevolent, Spineless	Covetous
Murphy & Vess (2003)	N/A	N/A	Sadistic	Antisocial

Personality Disorder (BPD) and Narcissism (Skeem, Poythress, Edens, Lilienfeld, & Cale, 2003). However, until clinical distinctions demonstrate stable and valid groups of psychopathy other methods should be looked to.

Primary and Secondary Psychopathy Distinction

The primary and secondary psychopathy distinction is the most well developed theoretical and researched typology of psychopathy. The theory is largely rooted in Karpman's (1948) theory, however the specific definitions of primary and secondary psychopathy vary across theorists and have changed over time as have the criteria for diagnosing psychopathy. This section will review the development of the primary and secondary typology and evidence for the proposed differing etiologies and manifestations.

The primary and secondary psychopathy distinction was originally made by Karpman (1941; 1945; 1948; 1950) who believed idiopathic psychopaths were primarily psychopathic whereas symptomatic psychopaths were primarily neurotic and only secondarily psychopathic. Subtypes were distinguished in etiology, entrenchment, and persistence of the disorder. According to Karpman (1941; 1945; 1948; 1950) idiopathic psychopaths were born with the disorder. It manifests from an early age throughout the life course regardless of environmental factors. Alternately, symptomatic psychopaths were exposed to negative environmental factors such as parental neglect and harsh punishment that lead to the development of internal neurosis. This neurosis motivates this group to engage in psychopathic behaviours such as lying, conning, and aggression. Additionally, groups differed in how calculating their behaviour was. Only symptomatic psychopaths were engaged in impulsive behaviour. Although the idiopathic psychopath

may appear impulsive, further examination would indicate their actions are a calculated measure to quickly obtain what they want.

In addition, idiopathic psychopaths lacked a conscience where as symptomatic psychopaths possessed a disturbed conscience. That is they demonstrated remorse for their actions, although it was often intermittent. Karpman (1948) believed this difference was crucial as it meant symptomatic psychopaths could be treated with psychotherapy. Conversely, he believed idiopathic psychopaths were not amenable to psychotherapy and therefore should be institutionalized for an indefinite period.

One limitation with this typology is the absence of a clear method to distinguish groups. Distinctions were based on clinical assessments. If psychopathic behaviour could be attributed to neurosis the person was considered a secondary psychopath. Alternately, in the absence of neurosis the person was considered a primary psychopath. Neuroses were usually caused by early life events such as early separation from parents and lack of affection or love (Karpman, 1949), however these were not operationalized.

Karpman (1941; 1945; 1948; 1950) further distinguished two subgroups within the idiopathic psychopath, passive parasitic type and aggressive. Passive parasitic psychopaths are characterized by weakness, living a parasitic life following the path of least resistance. This distinguishes them from aggressive psychopaths who engage in a large degree of calculation regarding their behaviour and are willing to engage in dangerous behaviour to get what they want. Therefore, aggressive psychopaths were more instrumental in their behaviour.

Recent developments in theory regarding the primary-secondary psychopathy typology have retained many of the ideas put forward by Karpman (1941; 1945; 1948;

1950). There are two common threads in theories of primary and secondary psychopathy. First, the idea that primary psychopathy results from a genetic predisposition and manifests from an early age and persists regardless of environmental contingencies. Second, the idea that secondary psychopathy is developed through exposure to negative environmental contingencies (Karpman, 1941; 1945; 1948; 1950; Lykken, 1995; Mealey, 1995; Porter, 1996).

Mealey (1995) proposed primary psychopathy develops from a genotype for a specific temperament and a high baseline of autonomic arousal. This combination results in a difficult to manage child with reduced responsiveness to cues that foster normal moral and social development. This type of psychopath was believed to come from all walks of life and across cultures as it is genetically determined. In contrast secondary psychopathy results from exposure to negative environmental experiences which lead the person to engage in an antisocial lifestyle. Environmental contingencies include a competitive disadvantage for resources resulting from low socioeconomic status (SES). However, this group is described as engaging in “frequent, but not necessarily emotionless cheating” (Mealey, 1995, p.537). Therefore, if it is only the behaviour these groups share, secondary psychopaths may not reflect psychopathy as conceptualized by the PCL-R.

Lykken (1995) proposed a primary-secondary psychopathy distinction, referring to groups as psychopathic (primary psychopathy) and sociopathic (secondary psychopathy). These groups engage in similar types of behaviour, however are distinguished by etiology. The psychopath has a genetic disposition to fearlessness that leads to difficulties in learning from punishment and delaying gratification. In contrast, it

is the social environment, specifically bad parenting (e.g., neglect) that leads to the development of sociopathy. Bad parenting is believed to lead to feelings of rejection from society and gravitation toward an antisocial lifestyle.

Porter (1996) also revisited etiological differences between primary and secondary psychopathy. Porter (1996) postulates primary psychopaths are genetically predisposed to affective deficits including the inability to develop warm intimate bonds with others. The manifestation of the disorder, whether they develop into aggressive criminals or manipulative professionals is impacted by environmental factors. Alternately, the secondary psychopath develops affective deficits through a process of disassociation resulting from early trauma (e.g., extreme abuse). This disassociation leads to a detachment from emotions and the affective detachment which characterizes psychopathy.

Although these theories are similar, there are differences regarding what deficits are inherited that characterizes the disorder. In addition, the etiological experiences that lead to secondary psychopathy are somewhat distinct. Mealey (1995) proposed low SES, Lykken (1995) posits poor parenting, and Porter (1996) requires a trauma.

Lykken (1995) and Porter (1996) are generally consistent with prior theoretical work (Karpman, 1941; 1945; 1948; 1950; McCord & McCord, 1964). There is a large degree of consistency regarding etiological theories of psychopathy. Generally, two different etiologies are suggested, one with biological underpinnings where aspects of the disorder are present at birth and another socially created. This usually occurs through early childhood experience which leads the child to develop either affective deficits or an antisocial lifestyle as a coping mechanism. Distinct etiologies are believed to lead to two

different subtypes of psychopaths, primary and secondary. However, none of the theories have been directly empirical tested. Furthermore, they fail to outline why some children with similar experiences do not develop psychopathy.

All of these theories focus on psychopathy as a disorder. Quinsey (2002) has proposed an alternate theory, that psychopathy can be viewed as an adaptation developing through the evolutionary process. Although this theory does not discuss subtypes of psychopathy directly, psychopathy is viewed as the development of separate evolutionary survival strategies such as cheating and “probe-retaliation” which involves experimental escalation of aggression (Book & Quinsey, 2004). Therefore, it is possible that some psychopaths have inherited different evolutionary strategies that may map onto subtypes of this group or suggest a different typology.

Development of psychopathy.

Theories regarding differing etiologies to psychopathy have not been directly tested, however support for these theories can be found in related research. This includes research and theories regarding the development of psychopathy, and research on the etiology of psychopathy.

Etiological differences posited by Lykken (1995) and Porter (1996) are similar to Lynam’s (1996) developmental theory of psychopathy. Lynam (1996) asserts some youth inherit a psychopathic deficit that results in evocative interactions between the child and their environment. This may manifest as difficult to manage toddler with a lack of response to punishment and an inability to learn from negative consequences of behaviour. As the toddler grows into a child co-occurring hyperactive-impulsivity-and attention (HIA) problems and conduct problems will emerge. This pattern continues and

as the child develops so does their antisocial behaviour. Specific manifestation of conduct problems depends on environmental circumstances.

It is recognized several other variables may result in the development of HIA and conduct problems, however the psychopathic deficit is considered the sole factor in developing psychopathy in adulthood. Therefore, only children who develop HIA and conduct problems due to the psychopathic deficit will develop psychopathy later in life.

Some support for this theory and etiological pathways is found in research assessing the genetic contribution to psychopathic personality and behaviour. Blonigen, Hicks, Kruger, Partrick and Iacono (2005) assessed associations between psychopathic personality traits and psychopathology with 626 pairs of same sex twins from the Minnesota Twin Family Study. They used the Multidimensional Personality Questionnaire (MPQ; Tellegen, in press) to measure the two factors of the Psychopathic Personality Inventory (PPI; Lilienfeld & Andrews, 1996). The PPI is a self-report measure of psychopathy used for non criminal populations. The factor structure of the PPI parallels the PCL-R, Factor 1 of the PPI, fearless-dominance, is related to Factor 1 of the PCL-R, and Factor 2 of the PPI, Impulsive antisociality, is related to Factor 2 of the PCL-R.

Results indicated a moderate negative relationship between fearless-dominance and internalizing disorders such as depression and phobias. Furthermore, impulsive antisociality was moderately correlated with externalizing behaviours such as antisocial behaviour and substance abuse. Analysis revealed that a high degree of variance associated with this relationship was due to genetic contribution (66-76%). This sample was further assessed by Blonigen and colleagues (2006) who directly assessed the genetic

contribution to psychopathic traits. Results demonstrated genetic effects accounted for about half the variance in these traits at both age 17 and 24 (.43-.49).

Research in a sample of 7 year olds ($N = 459$) replicated this pattern of results. Viding, Blair, Moffit, and Plomin (2005) assessed same sex twins from the twins early development study who scored high on CU traits. CU traits are a factor of the Antisocial Psychopathy Screening Device (APSD; Frick & Hare, 2001). The APSD is a parent/teacher rating scale comprised of two factors, callous unemotional (CU) and impulsivity (IM). These are believed to be similar to the two factor model of the PCL-R with CU related to Factor 1 and IM related to Factor 2. However, for this study proximate measures of CU were used based on the information available from the study. Results indicated genetic factors explained about 67% of the variance in CU traits.

Although these results are supportive of different etiological pathways and a genetic contribution to the development of psychopathy, these studies are limited by the truncated age range that is assessed. Genetic and environmental contributions to traits and behaviour vary over time and therefore, results may differ when assessing different age groups.

In general research supports the assertion that there is a genetic component to traits in childhood that are associated with psychopathic traits, including fearless dominance, impulsive antisociality, and CU traits. However, these factors are composites or proximate measures of items rather than direct measures. Moreover, this research does not address the different environmental factors posited to impact the development of psychopathy.

Etiology of psychopathy.

This research addresses different environmental experiences that may impact the development of psychopathy. There is very little published literature examining the etiology in psychopathy and much of the research uses a retrospective design. Additionally, this research attempts to distinguish developmental factors that may contribute to the development of psychopathy by comparing those who score high on the PCL-R to those who scored low. This design does not speak to different trajectories that lead to the development of psychopathy. In fact, different trajectories may actually create error in this research and mask differences between groups.

Weiler and Widom (1996) assessed the relationship between abuse, psychopathy, and violence. Participants were selected from a larger prospective study in the United States. Abused and neglected youth ($n = 652$) were identified and matched with a control group ($n = 489$) of youth who did not experience abuse. Cases of physical abuse, sexual abuse, or neglect were substantiated and processed through court. Outcome measures of violence included arrest records and self-reported violence. These groups were compared on modified PCL-R score to assess if early childhood victimization is related to psychopathy. Items related to violence and antisocial behaviour were removed to avoid criterion contamination (Items 6, 8, 10, 12, 18, and 20).

Results indicated the abused and neglected group had higher modified PCL-R scores ($M = 9.2$) than the control group ($M = 6.8$). Furthermore, regression analysis indicated this association was significant after variables such as age, ethnicity, and criminal history were included. Analyses were further conducted to assess which variables predicted violence. Although initially early childhood victimization was

significantly related to both arrest and self-reported violence once modified PCL-R score was entered this significance disappeared. This indicates that psychopathy may mediate the relationship between victimization and violence.

McBride (1998) conducted two studies assessing the relationship between family background variables and psychopathy. The first study found significant associations between a modified PCL-R score and parental deviance, physical abuse, and sexual abuse in a sample of adolescent sex offenders ($N = 233$). No significant association was found with emotional abuse. Results from regression analysis indicated physical abuse was an important predictor of modified PCL-R score. It was the only family background variable to uniquely predict Factor 1 score and was also incrementally predictive of Factor 2 and total score.

The second study assessed family background in a more representative group of young offenders ($n = 74$). Results indicated negative parenting was significantly correlated with total score and both factor scores. In addition, positive parenting demonstrated a negative relationship with factor scores and total score, however this relationship was not significant. Regression analyses were again conducted to assess the incremental predictability of variables with factor scores and total score. Consistent with the prior analysis physical abuse was the only independent predictor of Factor 1 and was also predictive of Factor 2 and total score. Negative parenting and a measure of impulsive-hyperactivity were predictive of Factor 2 and maternal psychopathy was predictive of total score.

Marshall and Cooke (1999) assessed differences in family background of 50 psychopathic and 55 non-psychopathic adult Scottish inmates. Participants were asked to

retrospectively answer a questionnaire on childhood abuse and collateral information was obtained when available. Results indicated a number of differences in family factors between groups. These included parental discipline, parental antipathy, child antipathy toward parents, neglect, parental supervision, and psychological abuse. No differences were found between groups in sexual abuse or physical abuse. This is distinct from the findings reported by McBride (1998) who found sexual and physical abuse were associated with modified PCL-R score, but neglect was not. Physical abuse was a fairly robust predictor of abuse in McBride (1998), replicating across samples and independently predicting modified PCL-R score. These differences may be attributed to the different sources of information used for assessing abuse. McBride (1998) used file information whereas Marshall and Cooke (1999) used self-report and validated it when possible with collateral information.

Campbell et al. (2004) assessed 226 adolescents from detention centers in Nova Scotia. A 19 item PCL:YV was scored using file information. There were some significant results with family history including history of placement in foster care, number of abusive experiences, and history of abuse ($r = .19-.28$). In addition, PCL:YV was associated with behaviour problems at school ($r = -.25$), but not academic achievement ($r = .09$).

The majority of this research focuses on negative familial experiences and abuse. However, it has also been suggested that parental attachment may be an important antecedent to psychopathy (Saltaris, 2002). Kosson et al. (2002) investigated the association between PCL:YV and attachment in a sample of 88 adolescents who were accompanied with a parent for their study on young offenders in the community. They

assessed child-parent attachment in these youth. A negative correlation between PCL:YV score and a rating of closeness to family was obtained for both youth and parental ratings ($r = -.23$; $r = -.24$), however while parental ratings approached significance, only youth ratings achieved significance.

Research assessing family background and psychopathy indicates an adverse family background may be related to the development of psychopathic traits. However, results assessing the specific measures of adversity are not consistent across research. It is important to recognize that most people who experience early family adversity do not develop a high degree of psychopathic traits. Therefore, taken together this research indicates that early experience of abuse or family adversity may impact the development of psychopathy. However, the specifics about the importance of different types of adversity or other factors that impact this development are unclear.

Manifestation of primary and secondary subtypes.

Research examining the heritability of psychopathic traits and the family background of those with psychopathic traits provides support for the theory that differing etiologies lead to development of psychopathic traits. Researchers have attempted to distinguish subtypes of psychopathy in adults using variables that correspond to the theoretical concepts of primary and secondary psychopathy. For example, related to Karpman's (1948) theory, researchers attempted to distinguish among psychopaths on neurotic anxiety, measured using self report measures of anxiety and impulsivity (Newman & Brinkley, 1997; Newman et al., 2005). Primary psychopaths are believed to be characterized by low levels of anxiety and impulsivity whereas secondary psychopaths are characterized by higher levels of anxiety and impulsivity (Karpman,

1941; 1945; 1948; 1950; Newman & Brinkley, 1997; Newman et al., 2005). Measures of anxiety and impulsivity are often employed in cluster analysis assessing subtypes of psychopaths.

Subtypes of Psychopathy: Cluster Analysis

Cluster analysis is an empirical technique for objectively assessing the presence of underlying homogeneous groups in a dataset (Gore, 2000). Cluster analysis techniques have been employed to uncover classification in a variety of fields including biology (Gower, 1967), geology (Parks, 1966), and economics (Fisher, 1969). Psychologists have been using cluster analysis techniques for over 50 years (Tryon, 1939), employing it most frequently for developing a typology (Tonidandel & Overall, 2004).

There are no agreed upon guidelines for selecting the procedure, variables, and distance measure to employ in cluster analysis. Therefore, it is important to be explicit about the reasons for selecting the cluster analytic methods. This section will describe two types of clustering algorithms commonly applied in psychology, hierarchical agglomerative and iterative. This section will review the different cluster analysis methods that were selected for this study and their strengths and limitations.

Types of Cluster Analysis

Hierarchical and iterative methods differ in the method used to form clusters. As a result they are often used for different purposes. Hierarchical methods provide information regarding the number of clusters that exist in a dataset whereas iterative methods require the number of clusters to be entered prior to analysis. However, hierarchical methods only make one pass through the data and therefore if classification of an object is flawed, it is unable to correct this at a later stage (Gower, 1967).

Alternately, iterative methods make several passes through the data and are able to correct poor categorizations. Therefore, hierarchical methods can be used for initial analysis to provide information regarding the number of clusters and this information can be applied to iterative methods.

Hierarchical agglomerative methods begin with all objects as different clusters. A similarity or distance matrix is constructed which displays similarities or distances between profiles of individuals. The matrix forms the basis for combining objects into clusters. The matrix is searched for the most similar pair of clusters which are merged into a new cluster. This is repeated until there is only one cluster that contains all objects (Blashfield & Aldenderfer, 1988; Gore, 2000; Johnson & Wishern, 1998; Sneath & Sokal, 1973; Tonidandel & Overall, 2004; van der Kloot et al., 2005). Resulting clusters are nested so at any level clusters are a part of a smaller number of more inclusive clusters at higher levels. These are commonly displayed in a tree diagram called a dendogram. The length of branches indicates the degree of similarity among clusters, with shorter branches indicating greater similarity (Blashfield & Aldenderfer, 1988; Gore, 2000; Johnson & Wishern, 1998).

One major issue with hierarchical methods is when a data set is analyzed, these methods will produce a cluster solution regardless if the dataset had valid clusters. The challenge is how to determine if the clusters that emerge are valid. One method for addressing this issue is to apply different types of hierarchical methods and assess if similar results are found across methods. There are several types of hierarchical agglomerative methods, each with a different set of rules for determining similarity (Blashfield & Aldenderfer, 1988; Gore, 2000; Milligan & Cooper, 1987). Although this

method may lend support for a cluster solution, the absence of a similar solution across different methods does not mean a cluster solution is not valid. Different cluster methods make assumptions regarding the resulting clusters. When these assumptions do not hold in a data set, then the cluster solution may not replicate across methods. Additional validity measures are needed to assess validity (Blashfield & Aldenderfer, 1988).

For the purpose of this review, only methods used in this study will be covered. These include: Complete Linkage (CL; Horn, 1943), Ward's Method (WL; Ward, 1963), and three measures of Average Linkage, specifically Between Groups (BG), Within Groups (WG), and Median Linkage (ML; Sokal & Michener, 1958). These methods were chosen as Monte Carlo simulations suggest they demonstrate a good ability to determine the natural cluster structure of data (Milligan, 1980; 1981; Milligan & Cooper, 1987).

Complete Linkage begins by clustering the two most similar objects. Next, the distance matrix is recalculated and a new cluster is formed rather than adding to the original cluster. Clusters that emerge tend to be compact and hyperspherical (Blashfield & Aldenderfer, 1988; Gore, 2000; Sokal & Michener, 1958). Average Linkage joins clusters based on the similarity or differences of the cluster average. Average linkage is an umbrella term which includes many different measures of the average in addition to BW linkage and WG linkage. WG clusters items based on similarity of averages of all pairs of clusters within a cluster whereas BG measures the differences of cluster centers between groups (Norusis, 1994). WL uses sum of squares variance in forming clusters. Clusters that result in the minimum increase in error sums of squares are joined (Blashfield & Aldenderfer, 1988; Gore, 2000; Johnson & Wishern, 1998; Ward, 1963).

There are three important limitations that impact all hierarchical agglomerative methods: unstable clusters, selecting the true number of clusters in a dataset, and lack of cluster reassignment. The issue regarding cluster stability results from dependency on data order (Blashfield & Aldenderfer, 1988; Gore, 2000; van der Kloot et al., 2005). Instability results from ties between data that occur when the smallest distance between objects is shared by more than one pair of objects (van der Kloot et al., 2005). There is no agreed upon set of rules for dealing with data ties and therefore when they arise arbitrary decisions are made and this results in instability due to data order (van der Kloot et al., 2005; Sneath & Sokal, 1973).

The problem of dependency on data order undermines the validity of clusters as the goal of cluster analysis is to uncover natural homogeneous groups in a dataset and clusters that depend on data order do not accomplish this goal and are of very limited utility (Blashfield & Aldenderfer, 1988). Recently, van der Kloot and colleagues (2005) proposed a goodness of fit test to help mitigate cluster instability. In their method an SPSS add in program (PERMUCcluster) is employed to analyze several random orderings of the dataset. The sum of squared distances measure proposed by Hartigan (1967) is generated indicating the solution that provides the best fit to the dataset. This measure compares original differences from the proximity matrix to differences in the dendrogram.

The second limitation refers to determining the number of clusters in a dataset. This is conducted using either objective stopping rules, or heuristic decisions (Milligan & Cooper, 1985). Stopping rules apply a mathematical rule to determine the correct number of clusters. There is no universally accepted stopping rule, however Tonidandel and Overall (2004) have recently developed stopping rules which performs well with

simulation data. This method involves both split sample replication (Overall & Magee, 1992) and bootstrapping (Efron, 1982). Split sample replication involves cluster analyzing random sub-samples of data. The distribution of solutions is presented with the percentages each solution occurs. The highest level where cluster separation is consistent that is the highest percentage, is used to determine the true number of clusters.

The third limitation of hierarchical methods is they only pass through the data once and cluster reassignment does not occur even when the initial assignment was flawed (Gower, 1967). To offset this limitation, researchers often use iterative methods such as K-Means analysis. As a sole clustering method K-Means analysis does not demonstrate a good ability to uncover valid clusters in simulation studies (Milligan, 1980; 1981). However, when results from hierarchical analysis are used as a starting point, this method often performs superior to hierarchical analyses alone (Milligan, 1980; 1981).

The following section will review subtypes of psychopathy that have been formed using cluster analytic methods. It is hoped research using cluster analysis method will compliment the more theoretical subtypes and provide clarity regarding the profile of psychopathic subtypes.

Clusters from Personality Measures

One method of clustering psychopaths is to use personality measures to assess if clusters emerge and if they differ on traits theoretically meaningful to subtypes of psychopathy. This method has been used extensively by Blackburn (1975; 1996). Blackburn and Maybury (1985) conceptualized psychopathy as extremes of normal personality to root psychopathy in the framework of personality theory. As a result, the

majority of this research uses self-report personality scales to assess psychopathy and subgroups of psychopathy are based on these measures.

Blackburn (1975) conducted the first study in this line of research. Cluster analysis was employed assessing 79 males in a forensic psychiatric hospital using scales from the Minnesota Multiphasic Personality Inventory (MMPI; Dahlstrom & Walsh, 1960). Results indicated a four cluster solution, two psychopathic and two non psychopathic. The two psychopathic clusters differed on their personality profiles in a manner consistent with theory regarding primary and secondary psychopathy. Primary psychopaths were characterized by low anxiety whereas secondary psychopaths were likely to be guilt prone and socially anxious. However, contrary to theory, both groups were characterized by impulsivity. Additional personality characteristics of primary psychopathy cluster included extraversion, confidence, and hostility and secondary psychopaths were also moody.

These subtypes have been replicated across samples, cluster analysis procedures, and measures of personality (Blackburn, 1975; 1996; Blackburn & Maybury, 1985). Although results from cluster analysis do not always suggest the same number of groups, the primary and secondary groups always emerge (Blackburn, 1975; 1996; Blackburn & Maybury, 1985).

A limitation of Blackburn's (1975; 1996) research is the use of self-report scales such as the MMPI (Dahlstrom & Walsh, 1960) to assess psychopathy. Self-report measures of personality only correlate weakly to moderately with the PCL-R (Hare, 2003). Therefore, although this research is informative, it is not clear to what degree the

psychopathic groups described by Blackburn related to the PCL-R definition of psychopathy.

Alternately, Hicks and colleagues (2004) used model based clustering to analyze 96 psychopathic incarcerated adult offenders. Offenders were diagnosed as psychopathic based on a cut-off of 30 on the PCL-R. A sample of 125 offenders who scored low (i.e. 20 or under) on the PCL-R were used as a control group. Scores on the Multidimensional Personality Questionnaire (MPQ-BF; Patrick, Curtin, & Tellegen, 2002) were used as profile measures to form clusters. Two distinct clusters of psychopathy emerged. The first cluster was labeled emotionally stable psychopaths as this was their primary distinction. They were also characterized by a lack of impulsivity, low harm avoidance, low stress reaction, low social closeness, and high control. This is similar to characterizations of primary psychopathy. Alternately, the second group scored high on stress reaction similar to the conceptualization of secondary psychopathy. They were also characterized by high levels of aggression and low control.

This research provides evidence for the primary and secondary subtypes with regards to anxiety, however it is not as consistent regarding impulsivity, Blackburn (1975; 1996) found high impulsivity characterized both groups whereas Hicks et al. (2004) found their primary group scored low on impulsivity. It is clear more research is needed on this distinction.

Cluster Analysis and the PCL-R

This section will review research that employed cluster analytic techniques with the PCL-R. These studies differ in their use of clustering variables including item scores (Haapasalo & Pulkkinen, 1992), factor scores (Hervé, 2003; Vassileva, Kosson,

Abramowitz, & Conrod, 2005), and use of external variables (Alterman et al., 1998; Vassileva et al., 2005). However, there are some similarities in the results among these methods.

Haapasalo and Pulkkinen (1992) assessed the relationship between personality and psychopathy in 92 incarcerated non-violent offenders. They were interested in assessing if clusters could be grouped based on differential factor scores. Data were clustered using 17 item scores from the Psychopathy Checklist (PCL; Hare, 1980). Short-term marital relations, promiscuous sexual behaviour, and impulsivity were dropped from PCL due mainly to missing data.

Three clusters that differed based on PCL score emerged. Cluster 1 constituted offenders who scored higher on Factor 1, cluster 2 consisted of offenders with higher scores on Factor 2, and cluster 3 had the lowest scores across both factors. These groups were differentiated on criminal variables including age of criminal involvement, number of offences, and versatility of offending. In addition, they differentiated on personality variables including extraversion, sensation seeking, and socialization.

This is consistent with research showing differential criminal and personality correlations between Factor's 1 and 2 of the PCL-R (Hare, 2003), however it may not be providing much information regarding psychopathic clusters. The authors were interested in assessing differences between patterns of correlations across factors of the PCL not whether different patterns of responses across the factors differentiated clusters.

Alterman et al. (1998) applied cluster analysis to 252 methadone patients. Participants were clustered on childhood CD, adult APD, psychopathy, and the socialization scale of the California Personality Inventory (CPI; Gough, 1994). Cluster

analysis employed K-Means analysis with information from Ward's method used as a starting point.

Clusters were validated using external variables important to drug dependent individuals including medical, employment, social, and psychiatric. Results indicated a six cluster solution was the best fit for the data. Only the three clusters with the highest PCL-R scores will be reviewed here. Group one was labeled early onset and high antisociality, this group was characterized by significant criminal involvement, serious substance problems, family-social problems, and high anxiety and depression. Group two was labeled late onset high antisociality, this is very similar to group one, however this group had the highest PCL-R score. Group five was called psychopathic criminal moderate antisociality, similar to the other two groups they have a significant criminal history, however they are distinguished in their low substance abuse problems, family-social problems, and anxiety and depression. Groups one and two may represent secondary psychopathy characterized by high anxiety whereas group five may represent primary psychopathy characterized by low anxiety.

Although this research used the PCL-R to define psychopathy, the base rate of psychopathy in this group is not reported. Furthermore, the mean score on the PCL-R is fairly low for all clusters, 23.1 was the highest mean score on the PCL-R across clusters. Therefore, these subtypes may be assessing antisocial subtypes rather than psychopathic subtypes.

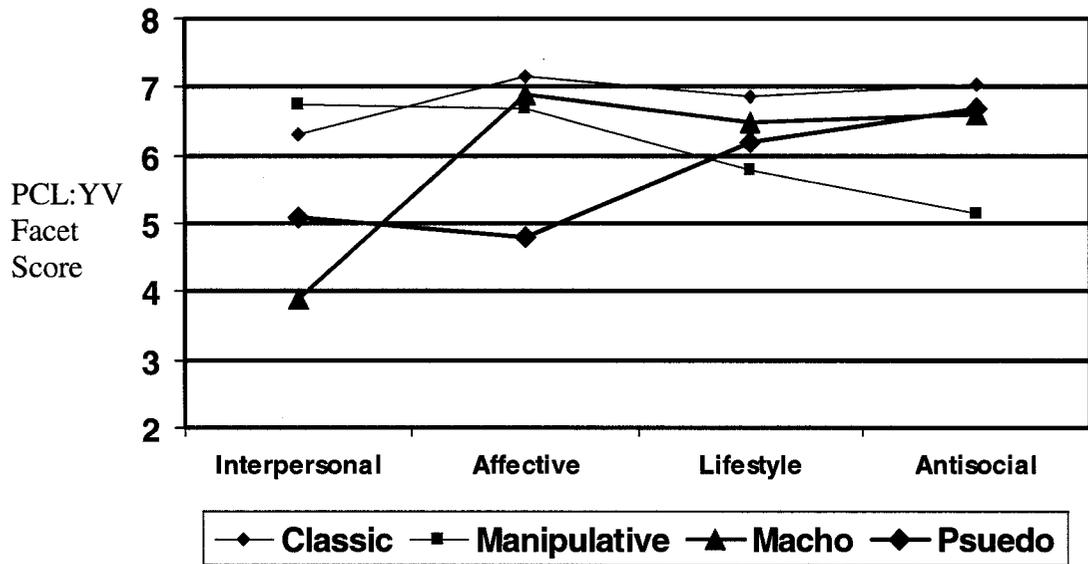
Hervé (2003) employed both the 3 factor and 4 factor model of the PCL-R to a variety of cluster analytic procedures. Only participants who scored 27 or greater on the PCL-R were clustered. This cutoff was selected since the Standard Error of Measurement

for the PCL-R is 3.0. It was acknowledged non psychopaths would also be included, but it was expected these would end up in a separate cluster. Several samples were assessed including inmates from North America ($n = 883$), female inmates ($n = 292$), the United Kingdom ($n = 167$), and psychiatric patients ($n = 142$). Exploratory cluster analyses were conducted to use as a starting point for K-Means analysis.

Hierarchical analysis indicated a 4 factor solution and K-Means analysis was run to determine the profile of the clusters. Clusters were named classic psychopaths, manipulative psychopaths, macho psychopaths, and pseudo psychopaths. Classic psychopaths were characterized by offenders who scored high on all 4 factors and were thought to resemble the primary psychopath. Manipulative psychopaths were characterized by low scores on the affective factor, but high on the other three factors. Macho psychopaths were characterized by elevated interpersonal and affective factors, moderate scores on lifestyle factor, and low on the behavioural factor. Finally, Pseudo psychopaths were named as they were sub clinical psychopaths characterized by moderate scores on affective and interpersonal factors, and high scores in lifestyle and behavioural factors (see Figure 1 for a graph of these results). The percentages that were reported in these clusters varied widely across samples with a range. For example, the range of the classic psychopath ranged in prevalence of 11% to 44% depending on the sample.

These clusters replicated across different samples indicating the clusters were indicative of natural clusters that underlie the disorder, however clusters were not validated on external variables. This limits these results as external validation is an

Figure 1
Profile of Hervé (2003)



important measure of validity and determines how useful clusters are (Blashfield & Aldenderfer, 1988).

The most recent study conducted by Vassileva et al. (2005) was an assessment of 200 incarcerated offenders convicted of a felony. The two factor model of the PCL-R was employed and these factors were clustered, along with a separate measure of interpersonal behaviour, anxiety, and alcohol and drug abuse. Assessment of the cluster solution was conducted on split halves of the sample. Separate analyses were conducted on both halves to assess if the number of clusters replicated. In addition, the cluster centers from Ward's Method were used as seed points for K-means analysis.

A four cluster solution was found to be the best fit for the data with two of these clusters considered psychopathic. These were named primary and secondary psychopathy. These clusters were similar to clinical conceptualizations of the typology. Primary psychopaths had higher scores on Factor 1, lower levels of anxiety, and the highest number of violent charges. Alternately, the secondary psychopathic cluster scored high on Factor 2 and anxiety.

Results from research with cluster analysis compliments theoretical subtypes. Most cluster analysis indicates two psychopathic subtypes often described in terms of primary and secondary psychopathy. However, specific profiles and descriptions of primary and secondary psychopathy are less consistent. Some research indicates impulsivity is a distinguishing feature (Hicks et al., 2004) whereas others found it in both primary and secondary psychopaths (Blackburn, 1975; 1996). Although, anxiety and an interpersonal behaviour appear to characterize groups, much of this research is limited by employing these variables with the PCL-R factors in the cluster analysis.

Moreover, although the primary-secondary typology was originally conceptualized to distinguish psychopaths, more recently interest has focused on using these variables to differentiate within psychopaths (Newman & Brinkley, 1997; Newman et al., 2005). In order to assess subtypes of psychopathy it is essential to also conduct research on those with high psychopathic traits. Preliminary work on this group has been conducted by Hervé (2003), however much of the research has employed antisocial samples that vary in their degree of psychopathy.

Primary and Secondary Psychopathy: Distinct Subtypes?

Although there is a large degree of consistency in the theory regarding the primary-secondary psychopathy distinction, there is less evidence for the traits that are proposed to characterize the subtypes. Furthermore, there are some important issues that have not been appropriately addressed. The main issues include whether these distinctions are assessing differences in degree of psychopathy or type and using external variables in cluster analysis to distinguish groups.

One of the potential goals in uncovering clusters is to find differences in offending patterns between groups. However, research currently demonstrates those who obtain a higher score on the PCL-R are more likely to engage in criminal and violent behaviour (Hare, 2003). Therefore, for clusters to be useful they need to provide information that is incremental to PCL-R score alone. Many of the variables used to distinguish primary and secondary subtypes characterize psychopaths as a group. Differences in these variables may be assessing degree of psychopathy rather than different types. For subtypes to contribute an added value to this area, they should provide information beyond what the total score gives. Therefore, PCL-R score should be

controlled for when testing differences in subtypes that emerge, yet no research has done this analysis. Therefore, the value added of these subtypes is still in question.

Moreover, if primary and secondary subtypes exist, they may not be a sufficient typology. Karpman (1941; 1945; 1948; 1950) proposed additional primary psychopathic subtypes and Arieti (1967) proposed additional secondary psychopathic subtypes. In addition, cluster analysis research often results in more than two clusters (Alterman et al., 1998; Hervé, 2003; Vassileva et al., 2005). Further research is needed to assess the optimal number of subtypes and their practical utility.

Furthermore, the use of external variables in cluster analysis will result in differences on these variables due to including them in the cluster analysis. This method makes assumptions regarding significant variables that comprise psychopathic clusters rather than using external variables as a method of validating clusters. For example, inclusion of an anxiety measure assumes anxiety is a meaningful variable that distinguishes psychopathic subtypes. However, if this assumption is incorrect then validity of the clusters is questioned. Therefore, the approach taken by Hervé (2003) may be superior as no assumptions are made regarding what external variables should distinguish within psychopaths.

Manifestation of Psychopathy in Youth

All of the subtypes discussed to this point have employed adult samples as the assessment of psychopathic traits in youth is a new area. However, there are important considerations that need to be addressed when assessing youth. In addition, there are limitations associated with applying subtypes of adult psychopathy to youth. The issues

associated with this downward extension are mirrored in the concerns of measuring psychopathic traits in youth through a downward extension.

An important consideration when conducting research assessing the criminal behaviour of adolescent samples is the increased base rate of offending in this age group. Many youth engage in antisocial activity and as a result some argue it is a normal part of development (Moffit, 1993). Therefore, it can be difficult to make distinctions between youth who are persistent offenders and youth who will desist in offending early in adulthood on the basis of criminal behaviour.

In addition, some specific concerns regarding the downward extension of assessing psychopathic traits include, the potential for labeling the youth a psychopath, the stability of the disorder and the traits associated with the disorder, and the degree to which some of the PCL:YV items measure developmental differences rather than psychopathic traits. The apprehension is if some of these items are measuring developmental differences this could lead to inaccurate assumptions of risk (Edens, Skeem, Cruise, & Cauffman, 2001; Hart, Watt, & Vincent, 2002; Seagrave & Grisso, 2002).

The concern regarding labeling is not exclusive to youth (Hare, 2003); however it is especially important in this group due to the negative and long standing consequences associated with the label including increased sanctions from the criminal justice system (Edens, 2001; Zinger & Forth, 1998). The PCL:YV does not provide a cut-off for a diagnosis of psychopathy due to the lack of prospective research assessing the traits into adulthood. It is recommended that the score be used as a part of a comprehensive assessment of the youth (Forth et al., 2003). In addition, research assessing these traits

has demonstrated a high level of stability (Blonigen et al., 2006), and the items of the PCL:YV have good validity (Forth et al., 2003).

Additional support for the ability to assess psychopathic traits in this group is found in the similar manifestation of the disorder between youth and adults. Research with young offenders indicates the disorder has a similar manifestation regarding antisocial and criminal behaviour. Youth with many psychopathic traits are more violent than those who score low, they commit more severe acts of violence, and are more versatile in their offending (Forth et al., 1990; Kosson, Cytterski, Steuerwald, Newmann, & Walker-Matthews, 2002; Murrie, Cornell, Kaplan, McConville, & Levy-Elkon, 2004).

Prior to the publication of the PCL:YV a modified version of the PCL-R developed by Forth and colleagues (1990) was employed for research. This version of the PCL-R omitted the parasitic lifestyle and many short term marital relationships due to the truncated life experiences of adolescents. In addition, modifications were made in the scoring of juvenile delinquency and criminal versatility. For juvenile delinquency a 2 is scored for violent crimes and 1 for non-violent crimes. For criminal versatility a 2 is scored when the youth has committed four or more types of offences.

PCL:YV and Criminal Behaviour

The first study to address psychopathy in youth was conducted by Forth et al. (1990). They assessed 75 male adolescents in maximum security using a modified version of the PCL-R. The relationship between criminal behaviour and modified PCL-R score was examined using criminal history variables recorded from official records. PCL-R score was related to age at first arrest ($r = -.25$) and number of non-violent offences ($r = .12$) although these associations were not significant. Conversely, there was a

significant association regarding number of prior violent offences ($r = .27$) and number of institutional charges for violent or aggressive behaviour ($r = .46$).

This pattern of results has been replicated several times in more recent research. Although the association between modified PCL-R score and age at first arrest was not significant in this study, the direction of the relationship was in the predicted direction and later research has reported a significant relation (Brandt, Kennedy, Patrick, & Curtin, 1997). This relationship is consistent with research with adults indicting psychopaths begin their criminal careers earlier than non psychopaths (Blackburn & Coid, 1998; Hare, 2003; Porter et al., 2001).

Further research indicates youth who score high on the PCL:YV are more likely to engage in both non-violent and violent criminal behaviour (Kosson et al., 2002; Murrie et al., 2004). In addition, the violence committed by this group is of a more serious nature demonstrated by indicators such as weapon use and hospitalized victim (Kosson et al., 2002; Murrie et al., 2004).

Alternately, Campbell et al. (2004) did not find a correlation between PCL:YV score and number of violent and total charges. The absence of a relationship was suggested to result from the low base rate of violence in the sample (15%). Moreover, most participants scored in the low range of PCL:YV scores (1-19; 71%) potentially making it difficult to find significant differences. In addition, significant differences were found in the type of offences committed measured by criminal career profiles. Criminal career profiles included primarily non-violent, violent, or versatile criminal. Those with non-violent profile had significantly lower mean scores ($M = 14.36$), than adolescents with a violent ($M = 17.31$), or versatile profile ($M = 18.8$). These results are consistent

with the pattern of results from prior research, youth with higher PCL:YV score tend to be more violent in their offending.

PCL:YV and Recidivism

Research assessing recidivism often employs two types of analysis, regression and survival curves. Regression analysis allows for indication of the predictive validity of the PCL:YV when other variables are controlled for and survival curves control for time at risk and assess time to re-offence after release.

Results from regression analysis indicate PCL:YV score is incrementally predictive of recidivism after demographic variables (Brandt et al., 1997; Corrado, Vincent, Hart, & Cohen, 2004), criminal history (Brandt et al., 1997; Corrado et al., 2005; Gretton, Hare, & Catchpole, 2004), and other instruments associated with criminal behaviour and recidivism were controlled for (Catchpole & Gretton, 2003; Gretton et al., 2004). However, this relationship is more consistent with violent re-offending than non-violent re-offending. Although some research indicates high PCL:YV scores are predictive of non-violent offending (Catchpole & Gretton, 2003) other research has failed to find significant results (Brandt et al., 1997). This inconsistency in results may be the result of the increased base rate of criminal behaviour in youth (Farrington, 1995; Loeber & Stouthamer-Loeber, 1997; Moffit, 1993), which would limit the ability to find significant differences between groups.

Survival analysis indicates youth who score high on the PCL:YV have shorter survival times than youth who receive low scores on the PCL:YV (Brandt et al., 1997; Corrado et al., 2005; Catchpole & Gretton, 2003; Gretton et al., 2004). Therefore,

adolescents who score high on the PCL:YV are more likely to offend, especially in a violent manner, and commit offences sooner than those who score low on the PCL:YV.

PCL:YV and Treatment

One of the motivations for assessing psychopathic traits in youth is to develop interventions that can potentially modify the negative traits and behaviour that characterize this group. However, very few published studies have examined this area and therefore, there are still many gaps in knowledge regarding this relationship.

O'Neill, Lidz, and Heilbrun (2003) assessed treatment response of youth who differ on the PCL:YV in a substance abuse treatment program ($N = 64$). The PCL:YV was scored using two independent raters who conducted file reviews. Higher PCL:YV scores were related to poor attendance, low quality of participation, fewer clean urine samples, fewer consecutively clean urine screens, and reduced clinical improvement. In addition, outcome evaluation indicated PCL:YV score was significantly related to recidivism measured by number of arrests after 12 months.

Spain, Douglass, Poythress, and Epstein (2004) assessed the relationship between treatment progress and psychopathic traits in 85 adolescents in a treatment program for sexual offenders ($n = 42$) and non sexual offenders ($n = 43$). Results indicated PCL:YV score was related to physical and verbal aggression, however it was not significantly related to administrative infractions such as not listening to staff.

Caldwell, Skeem, Salekin, and vanRybroek (in press) compared two groups of youth who scored high on psychopathic traits (PCL:YV greater than 27), those who were placed in the Mendota Juvenile Treatment Center (MJTC; $n = 56$) and those in a traditional correctional institution ($n = 85$). The MJTC provides a greater staff to youth

ratio than traditional institutions and the environment is set up so the youth can gain privileges for behaviour. MJTC houses a high risk group of youth who have had problems in traditional institutions. Results indicated that youth treated at MJTC were significantly less likely to recidivate both non-violently and violently, even when correlates such as PCL:YV score were controlled for.

Although these results indicate a significant impact of treatment on this group of youth, there is little information regarding what causing this significant effect. The impact of specific treatment programming is not measured, nor is the behaviour while in the institution. For this research to advance the area and inform other programming these issues need to be addressed.

Differential Associations with Factor Scores

Similar to research with adults, research with adolescents reports a differential association between factor scores and criminal behaviour. Unfortunately, much of this research only applied the two factor model. However, as the two factor model is hierarchically related to the 4 factor model, this research does speak to the 4 factor model.

In general, both Factor 1 and Factor 2 are related to criminal behaviour, however Factor 2 demonstrates a more robust relationship (Brandt et al., 1997; Gretton et al., 2004). Examination with the three factor model by Dolan and Rennie (2006) indicated antisocial lifestyle (Factor 3) was significantly related to non-violent criminal behaviour ($r = .25$) whereas Factors 1 and 2 were not. Alternately, the interpersonal factor (Factor 1) demonstrated the strongest relationship with violent behaviour ($r = .35$) compared to Factors 2 and 3 ($r = .17- .19$).

A similar relationship has been found with institutional misconduct, Factor 2 is a more robust predictor of institutional misconduct than Factor 1. Brandt et al. (1997) reported Factor 2 was moderately related to all measures of institutional behaviour ($r = .27-.35$) whereas Factor 1 demonstrated a weaker relationship with outcome variables ($r = .23-.25$) and was not significantly related to total number of infractions ($r = .19$).

Differences in factor scores are more apparent in research assessing recidivism. Stronger correlations have been reported between violent offending with Factor 2 ($r = .42$) than Factor 1 ($r = .24$; Gretton et al., 2004). However, regression analysis indicates both Factor 1 and Factor 2 are important predictors of recidivism (Brandt et al., 1997; Gretton et al., 2004). Spain and colleagues (2004) assessed treatment behaviour with the 4 factor model. Results indicated Factors 3 and 4 were associated with physically aggressive behaviour ($r = .29-.26$) and Factor 1 was associated with verbal aggression ($r = .24$).

Although research assessing differential relationships with factor scores is not as extensive in adolescents as adults the research that has been conducted demonstrates a similar relationship. In addition, the similarities in the manifestation of the disorder between youth and adults further suggests a similar relationship with criminal behaviour and factors scores would be expected.

Manifestation of Psychopathy in Females

The vast majority of research assessing psychopathic traits in youth has focused on male samples. Psychopathy in adult females is also an area that is under researched, although it has been gaining prominence in recent years. The little research that has examined psychopathic traits in female youth have only examined small sample sizes and

report varying results regarding the similarity of the manifestation of psychopathic traits in males and females.

Odgers, Reppucci, and Moretti (2005) studied the relationship between psychopathic traits, aggression, and recidivism in 125 adolescent female offenders. Measures of both physical and relational aggression were employed. Results indicated that Factor 2 (Affective) was significantly associated with physical aggression, but not relational aggression. However, once the effects of victimization were accounted for this relationship disappeared. Recidivism was assessed through arrest data and PCL:YV score did not predict recidivism.

Alternately, other research has been more supportive of similarities between males and females. Schrum and Selekin (2006) used item response theory to examine the applicability of PCL:YV items in female adolescent offenders. Results indicated that callous lack empathy and conning and manipulation were the most discriminant items similar to research with adolescent males (Vincent, 2002). In addition, the interpersonal factor provided the greatest amount of information in this sample followed by the affective factor. This is contrary to results with males which reported the affective factor was the most important then interpersonal (Vincent, 2002) and also different from Odgers et al. (2005) which indicated the affective factor was the only PCL:YV factor related to aggression. This research suggests differences in the manifestation of psychopathic traits in males and females and illustrates the need for research assessing females rather than imposing the findings of research on males on this group.

Subtypes of Psychopathy in Youth

Although many of the theories on subtypes of psychopathy focus on youth and developmental experiences, there is very little research assessing subtypes of psychopathic traits in youth. Presumably, research assessing subtypes with adults may apply to youth, especially considering the similarity in the manifestation of the disorder. However, developmental differences likely impact the progression of the disorder and therefore, differences in subtypes may change as the result of life experiences. Therefore, interventions that are aimed at this high risk group of youth should reflect diversity of the disorder in youth rather than adults. Moreover, different subtypes could inform research on the etiology of psychopathy.

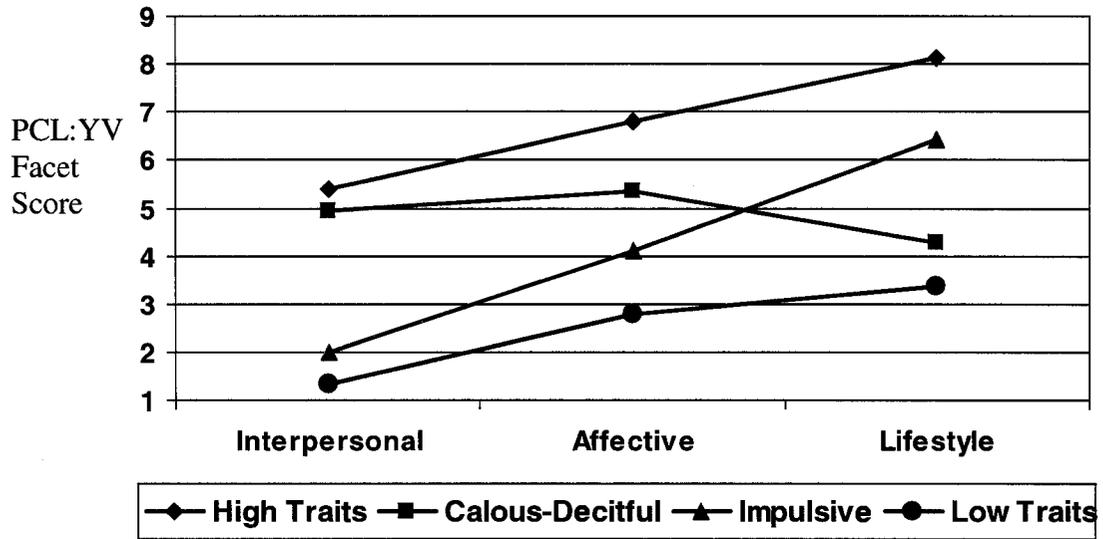
Christian, Frick, Hill, Tyler, and Frazer (1997) clustered the two factors of the APSD (Frick & Hare, 2001) and number of conduct problems. The sample consisted of 120 children aged 6 to 13 referred to a diagnostic and referral service. Four clusters emerged from the data, the first scored below the mean on all variables (low traits group), the second scored above the mean on CU and below the mean on IM (CU group), the third scored below mean on CU and high on IM and conduct problems (IM group), the fourth scored high across all measures (high traits group).

Moreover, clusters differentiated in their antisocial behaviour, the high traits group showed a greater number of aggressive behaviours and covert property destruction than the IM cluster. However, these results do not provide much support regarding the validity of these clusters as conduct problems was employed in the cluster analysis. Consequently, further analysis was conducted using number of prior arrests. The high traits group had a greater number of arrests than the low traits group and CU group.

Vincent, Vitacco, Grisso, and Corrado (2003) attempted to replicate these results using the 3 factor model of PCL:YV ($N = 259$). However, they began with K means analysis and entered in 4 clusters based on prior research rather than using hierarchical results to determine the number of clusters in the dataset. The four clusters that emerged differentiated on the 3 factors of the PCL:YV, one cluster scored low across all three factors (Low traits), another cluster was high in interpersonal and affective factors and low in antisocial (Callous-deceitful), a third cluster scored low in interpersonal and affective factors and high in antisocial (Impulsive), and the final cluster scored high across all three factors (High traits; see Figure 2 for graph of results).

These clusters were tested for differences on the fourth factor of the PCL:YV which was not used in cluster analysis. The low traits cluster was the least deviant receiving the lowest score on Factor 4 whereas the high traits cluster was most deviant. Regarding past convictions, impulsive and high traits clusters had more prior convictions than the other two clusters for both non-violent and violent convictions. Data were available for a subgroup of boys at a 2 year follow up ($n = 173$). The high traits and impulsive cluster were more likely to commit any re-offence (89.5% and 81.3%) than either of the other clusters (56.4% and 66.7%). Similar results were found with non-violent offences with high traits and impulsive clusters recidivating at higher rates (76.3% and 60.4%) than the other clusters (43.6% and 54.2%). Furthermore, the high traits cluster was the most likely to violently re-offend (50%) compared to other groups (23.1% - 27.1%). Similarly, survival analysis indicated the psychopathic cluster recidivated faster than clusters for non-violent and any recidivism. Likewise, for violent

Figure 2
Profile of Vincent et al. (2003)



recidivism the high traits cluster recidivated at a faster rate than all clusters, however this difference was not significant with the impulsive cluster.

There are some limitations with this research. First, K-means cluster analysis was used without first conducted hierarchical analysis to provide information about the number of clusters and cluster centers. This clustering method has not demonstrated good support or demonstrated high validity in simulation studies (Milligan, 1980; 1981). In addition, clusters differed in their PCL:YV scores, however this was not controlled for when assessing if clusters differed on external variables. Therefore, the differences found among cluster may be explained by differences in PCL:YV scores. It is not clear to what extent these clusters are providing incremental information over PCL:YV score alone.

This research provides evidence that there are clusters of youth with psychopathic traits. However, there is little research regarding number of clusters and the specific profiles of these clusters. In addition, it is not clear if clusters in youth are similar to those found in adults. This is highly important due to the potential implications different cluster solutions in youth and adults would have in adults.

Purpose of Present Study

One of the motivations that prompted researchers to examine psychopathy in youth was the potential to develop successful interventions for this group. However as youth with psychopathic traits are a heterogeneous group more refined homogeneous subgroups with different profiles of affective, interpersonal, lifestyle, and antisocial features may provide guidance on the interventions best suited to these youth. The purpose of this study is to take the first step in this direction.

Prior attempts at distinguishing subgroups have been limited by either the absence of a reliable and valid measure of psychopathy, inclusion of external variables, or assessing small sample sizes. Furthermore, there is paucity in research assessing subtypes of psychopathic traits in youth samples. Only one study was conducted to date using the PCL:YV and it used cluster analysis techniques that were less than ideal with only limited external validation of the clusters.

The present study will address this paucity through applying rigorous cluster analysis procedures to the factors of the PCL:YV. Two types of analysis will be conducted, those on a group of offenders with high psychopathic traits and analysis with all offenders. If subtypes emerge from these analysis, an attempt will be made to validate clusters on external variables including family background, offending patterns, recidivism, and treatment response.

Method

Studies 1 and 2 will involve analyzing the factors of the PCL:YV to assess if reliable clusters emerge across different samples of incarcerated offenders. Study 1 uses only a subgroup of youth who score high on the PCL:YV whereas study 2 employs the full range of PCL:YV scores for clustering. Studies 3, 4, and 5 assess the ability of clusters to differentiate on variables not used in the cluster analysis.

Studies 1 and 2: Determining Cluster Membership

Participants

The data used in these studies were generously donated by several researchers across a variety of settings (see Table 4 for a description of samples). These groups were divided into three samples, incarcerated males in North America, incarcerated males in

Table 4
Description of Samples

Studies 1 and 2: North American Incarcerated Samples

1. 106 Male adolescent offenders incarcerated in two secure custody facilities in Ontario, Canada. Ages ranged from 15-19 ($M = 17.5$ $SD = .89$); 80% were Caucasian. Most were serving dispositions for violent offences. Assessments were based on interview and collateral file information.
2. 106 Male adolescent offenders incarcerated in a secure institution in Quebec. Their ages ranged from 14 to 18 ($M = 16.2$, $SD = 1.1$); 43% were Caucasian, 45% African American. All were convicted of a violent offence in the past year. Assessments were based on interview and collateral file information.
3. 180 Male adolescent offenders charged with an offence and incarcerated in B.C. Their ages ranged from 12 to 19 ($M = 15.6$, $SD = 1.4$); 81% were Caucasian. Assessments were based on interview and collateral file review.
4. 205 Male adolescent offenders incarcerated in a secure custody treatment facility in Wisconsin. Their ages ranged from 11 to 18 ($M = 15.6$, $SD = 1.3$); 42% were Caucasian, 48% were African American. The majority of these offenders had extensive criminal histories. Assessments were based on interview and collateral file review.
5. 126 Male adolescent offenders incarcerated in a secure custody facility in California. Their ages ranged from 15 to 17 ($M = 16.2$, $SD = .7$); 39% were African American. Most

were serving disposition of violent offences. Assessments were based on interview and collateral file review.

6. 112 Male adolescent offenders incarcerated in a secure custody facility in British Columbia. Their ages ranged from 12 to 19 ($M = 16.2$, $SD = 1.3$). Information on ethnicity was not available.

7. 51 Adolescent males incarcerated in Ontario. Participants ranged from 16-20 ($M = 1.10$, $SD = .88$). The majority of participants were Caucasian (69%), African-Americans (12%), Hispanic (7%), and Aboriginal (2%) also make up the sample. Assessments were based on interview and collateral file review.

8. 101 Male youth serving secure sentences in Ontario. Ages ranged from 12 to 20 years ($M = 17.1$, $SD = 1.0$); the majority of youth were Caucasian (72%), with the remainder of the sample comprised of African Americans (10%), Native Americans (10%) and other ethnicity (8%). Assessment was based on interview and collateral file review.

Study 2: North American Non Incarcerated Samples

1. 115 Male adjudicated young offenders in North Carolina. Their ages ranged from 12 to 16 ($M = 14.5$, $SD = 1.1$); 70% were African American and 28% were Caucasian.

Assessments were based on interview and collateral review.

2. 26 Male young offenders in an open custody facility in Ontario. Their ages ranged from 15 to 19 ($M = 16.2$, $SD = .73$). Information on ethnicity was not available.

Assessments were based exclusively on collateral file review.

Study 2: United Kingdom Sample

1. 100 Male adolescent offenders incarcerated in a secure custody facility in England. Their ages ranged from 15 to 18 ($M = 16.6$, $SD = .8$); 93% were Caucasian. Assessments were based on interview and collateral review.
 2. 105 Male adolescent offenders incarcerated in a secure custody facility in England. Their ages ranged from 11 to 18 ($M = 15.2$, $SD = 1.3$); 75% were Caucasian and 25% were African American. Assessments were based on interview and collateral review.
-

the United Kingdom, and non incarcerated males in North America. In all samples PCL:YV was scored through the structured interview and file review. Sample 1 consists of 866 male adolescent offenders aged 11-20 from across Canada and the U.S.. Sample 2 consists of 205 male adolescent offenders aged 11-18 incarcerated in two secure facilities in London, England. Sample 3 consists of 189 male adolescent offenders aged 12-19 in the community either on probation or open custody from Canada and the U.S..

Measures

Psychopathy Checklist: Youth Version (PCL:YV; Forth et al., 2003). The PCL:YV contains 20 items which measure the degree to which adolescents manifest psychopathic traits. These items measure four distinct factors of psychopathy: interpersonal, affective, behavioural, and lifestyle. There is strong evidence for both the reliability and validity of the PCL:YV with interclass correlations for item scores averaged across raters varies from about .77 to .92 and alpha co-efficients ranging from .85-.92 (Campbell et al., 2004; Campbell, Pulos, Hogan, & Murry, 2005; Forth et al., 2003; Murrie et al., 2004 0063). Evidence for reliability and validity have been found in non incarcerated samples (Kosson et al., 2002), and samples from the UK (Dolan & Rennie, 2006).

Selecting Cluster Analytic Methods

Cluster analysis methods employed in this study are heavily based on literature assessing the utilities and limitations of different clustering methods (Blashfield & Aldenderfer, 1988; Gore, 2000; Johnson & Wishern, 1998; Sneath & Sokal, 1973; Tonidandel & Overall, 2004; van der Kloot et al., 2005). Furthermore, past research using

cluster analysis was also examined in order to derive the most reliable and stringent methods for analyses.

Cluster analysis is not concerned with testing significance but measuring similarity among objects to best classify them into homogeneous groups. The definition of items as similar or different is fundamental to cluster analysis as it is the basis for the formation of groups. Similarity in a multivariate space is composed of three components shape, scatter, and elevation (Cronbach & Gleser, 1953). Two similarity measures commonly used in cluster analysis are correlation co-efficients and squared Euclidean distance. Correlation only measures shape and is not sensitive to differences of magnitude. Therefore two profiles can have a correlation of 1 but not pass through the same points (Gore, 2000; Johnson & Wishern, 1998). As all three aspects of similarity are of interest, this study employed Squared Euclidian distance for interval measures.

Hierarchical agglomerative analyses were conducted using the factor scores of the PCL:YV. Both the 3 and 4 factor model of the PCL:YV were employed for cluster analysis. The three factor model excludes behavioural items related to criminal behaviour allowing for clusters to be compared on their offending patterns without criterion contamination. The 4 factor model provides a more complete picture of each of the clusters. In addition, both models are found to be equally valid factor structures (Neumann et al., 2006; Salekin et al., 2006). Data were rescaled so all factors run on a scale of 0 to 8 as differences in scale may impact cluster solutions. Rescaling was selected over standardization as standardizing data eliminates elevation (Gore, 2000). No additional variables were included as it was desired to avoid assumptions regarding what variables should differentiate clusters.

The goodness of fit test proposed by van der Kloot and colleagues (2005) was employed with each hierarchical analysis and the most stable solution (i.e. The one with the lowest SS difference) was selected for further analysis. In addition, Kappa Co-efficient will be used to measure the level of agreement in clustering membership across methods similar to prior research (Hervé, 2003; Vasseleva et al., 2005). Cohen's Kappa provides a measure of the proportion of agreement with significant results meaning better than chance agreement. The magnitude of effects is divided into poor (0-.19), fair (.20-.39), moderate (.40-.59), substantial (.60-.79), and almost perfect (.80-1.0; Landis & Koch, 1977). However, different agglomerative methods apply different rules for similarity and have different assumptions regarding the shapes of clusters. Therefore it is possible the different methods will lead to different solutions with only moderate agreement (Blashfield & Aldenderfer, 1988). As a result, an additional measure of within cluster stability similar to the split half analysis conducted by Vassileva et al. (2005) will be employed. First, hierarchical analysis will be run on a random subset of the sample. This sample will need to be large enough for clusters that emerge to produce a stable solution. Analysis will be repeated on the remaining sample to assess if similar cluster solutions are found. Data were divided into two random sub-samples. The initial sub-sample was selected so that it was large enough to produce stable clusters. This allows for the results to be confirmed on the larger remainder sample.

To determine the number of clusters in this sample Tonidandel and Overall's (2004) split sample replication stopping rule was employed. However, due to the lack of agreement regarding the best method for stopping rules, the dendrogram and change in the distance co-efficients was also assessed. Distance co-efficients are given at each level a

cluster is merged and large differences from one merger to the next indicate a greater difference in the clusters that were merged. Dendograms are just a visual presentation of the same results with larger arms indicating greater distances between clusters. This method has been employed in prior research (Hervé, 2003; Vassileva et al., 2005).

It is hoped these methods will converge and lead to the same number of clusters. However, if these methods do not agree the most consistent method will be selected. That is, across the five different hierarchical methods if the stopping rules suggest several different clusters in the dataset (e.g., 3, 6, 5, 2, 4) whereas dendograms and distance coefficients produce more stable solutions (e.g., 4, 3, 4, 4, 2) then the more consistent measure will be chosen. In addition, the clusters themselves were examined for interpretability. Furthermore, if a couple cases do not join with the other clusters then these may be discarded as outliers and the analyses redone.

Once information regarding the number of clusters in the data set and the starting points for cluster centers are obtained from hierarchical analysis on the sub-sample, K means analysis were employed. Factor scores were averaged across hierarchical methods and these were entered as the initial cluster centers as this method often performs superior to hierarchical analyses (Milligan, 1980; 1981). Through the iterations of K means analysis the cluster centers change as cases are reclassified until the optimal centers are found. The cluster centers reported from K means analysis were used as the starting point when analyzing the remaining sample to assess if results replicate. The validity of the K means analysis was assessed through the ability of the clusters to replicate across samples. Factor scores were averaged across hierarchical methods and these were entered as the initial cluster centers.

Similar validity procedures conducted with hierarchical analysis were applied to determine the stability of clusters and provide support for the validity of clusters. Initial analyses were conducted using the random sub-samples from hierarchical analysis. Next, analysis was repeated on the remainder of the sample. Finally, analysis was repeated with the full sample.

Study 1

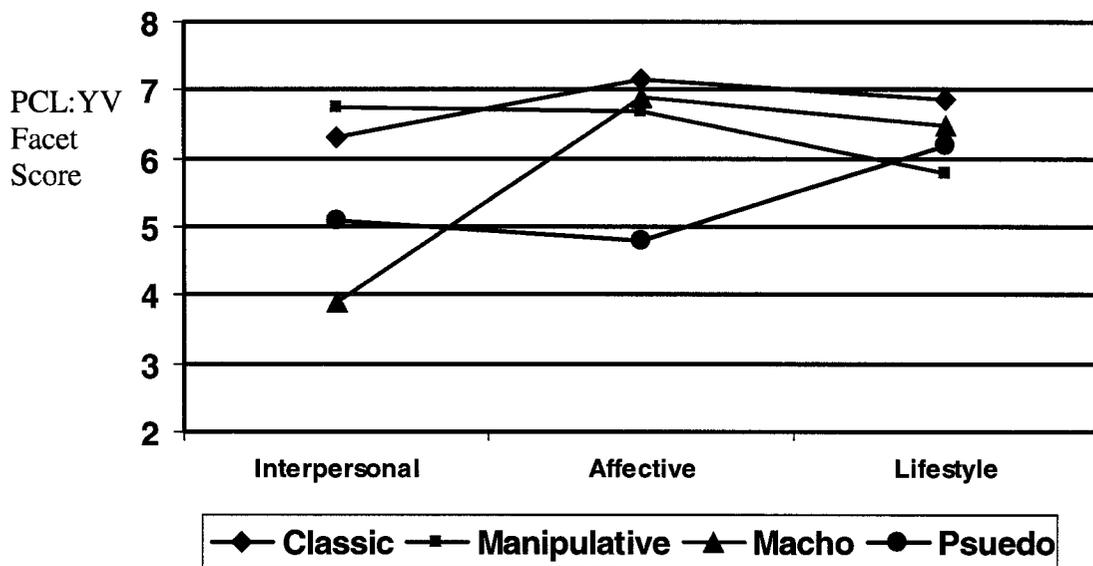
Hypothesis

Based on prior research employing cluster analysis four clusters are expected. One cluster is expected to score high across all factors of the PCL:YV (classic group), a second cluster is expected to score lower than other clusters on interpersonal and affective factors and about average on lifestyle factors (pseudo group), a third cluster is expected to score high on interpersonal and affective factors and lower on the lifestyle factor (manipulative group), the remaining cluster is expected to score lower than other clusters in the interpersonal factor and high across the other factors (macho group; see Figure 3 for a graph of the hypothesis).

Procedure

This study will focus on offenders with a high degree of psychopathic traits. Researchers occasionally divide groups into low traits, moderate traits, and high traits groups and a score of 30 is often used to define the high traits group (Forth et al., 2003). For the purpose of this study the less stringent criteria that incorporates the standard error of measurement employed by Hervé (2003) was used. This means only offenders with a score of 27 and up in sample 1 were clustered, resulting in a sample of 469 for cluster analysis. Although this method may include those who do not belong to the high traits

Figure 3
Hypothesized Clusters for Study 1



group, it is expected that this would either express itself as a distinct cluster such as the pseudo psychopaths found in Hervé (2003) or the low traits group found in Vincent et al. (2003). There is no reason to believe they would introduce enough error to change the interpretation of clusters.

Results

Six participants with a missing factor score were excluded from analysis. In addition, initial hierarchical analysis indicated 3 outliers. Therefore in line with recommendations from Blashfield and Aldenderfer (1988) these cases were excluded and analysis rerun with a final sample size for of 458. The average age of this sample is 16.2 ($SD = 1.38$) with Caucasian ethnicity comprising the majority of the sample (56%), followed by African American (30%), Latino (4.5%), Aboriginal (3.6%) and other ethnicity (6.3%). The average PCL:YV score is 32.4 ($SD = 3.10$) with a minimum of 27 and a maximum of 40.

The sample was randomly divided into 30% ($n = 148$) and 70% ($n = 311$) subsets for analysis. These subsets did not significantly differ in their age, ethnicity, factor scores, or PCL:YV score (see Table 5 for a comparison of sub-samples). Due to small sample sizes Latino, Aboriginal, and other categories were combined for analysis. Analysis proceeded analogously for the 3 and 4 factor model. The 4 factor model was used mainly for descriptive purposes in order to provide a more complete picture of the cluster profiles. Therefore, results will focus on the 3 factor model.

Hierarchical analysis indicated either a 2 or a 3 cluster solution was the best fit for the data. Assessing the dendograms and distance co-efficients from 30% of the sub-sample indicated a 3 cluster solution for WG and ML. Alternately BG, CL, and WL

Table 5
Descriptive Statistics (Mean, Standard Deviation) of Sub-samples for Study 1

Characteristics	30% Sub-sample	70% Sub-sample
<u>Demographics</u>		
Age	16.05 (1.46)	16.19 (1.34)
Ethnicity		
Caucasian	54.1%	56.3%
Black	30.4%	30.0%
Other	15.5%	13.7%
<u>PCL:YV Score</u>		
Total Score	32.24 (3.29)	32.46 (3.01)
Factor 1: Interpersonal	5.12 (1.73)	5.35 (1.74)
Factor 2: Affective	7.02 (1.03)	6.94 (1.18)
Factor 3: Lifestyle	6.41 (1.10)	6.48 (1.12)
Factor 4: Antisocial	7.18 (.87)	7.08 (1.03)

indicated 2 or 4 cluster solutions. The split sample replication stopping rule indicated a 2 cluster solution was the best fit for the data. This solution was found about 53% of the time compared to the 3 cluster solution which was only found 24% of the time.

Therefore, these analysis indicated a 2 cluster solution. However, analysis with the 4 factor model suggested a 3 cluster solution may be a better fit for the data (see Table 6 for a comparison of the number clusters across methods).

Analysis was conducted on the remaining 70% of the sample for guidance. These analyses resulted in the same issue with difficulty in differentiating between a 2 or a 3 cluster solution. Results from the dendograms and distance co-efficients were more supportive of a 3 cluster model with BG, ML, and WL all supporting a 3 factor model. Alternately, WG and CL indicated either a 2 or a 4 factor model. Results with split sample replication indicated a 3 cluster was best for the data with it appearing in 46% of the replications compared to the 2 factor model which occurred in 36% of the replications. Analysis using the 4 factor model also indicated a 3 cluster solution, however there was some evidence for a potential 2 cluster solution (see Table 6 for a comparison of the number clusters across methods).

Examining the Kappa co-efficients of agreement with 2 and 3 cluster solutions indicates greater agreement and consistency with a 2 cluster solution. Agreement among hierarchical methods with the 3 cluster solution ranged from .04 to .71 with the majority of associations in the poor to fair range. Agreement with the 2 cluster solution ranged from .13 to .84 with the majority of associations being fair to substantial (see Tables 7 and 8 for the level of agreement across methods). However, further analysis is required in order select the best solution. Both the 2 and 3 cluster solutions were analyzed with K

Table 6
Number of Clusters Indicated by Hierarchical Analyses (Study 1)

Method	Number of Clusters	
	3 Factor Model	4 Factor Model
	30% Sub-sample	
BG	2, 4	3
WG	3	2, 4
CL	2, 4	2, 4
ML	3	3
WL	2, 4	3
SR	2	3, 2*
	70% Sub-sample	
BG	3	3
WG	2, 4	2, 4
CL	2, 4	2, 4
ML	3	3
WL	3	3
SR	3	3, 2*

*The difference between these solutions was marginal (under 3%) and therefore both are presented.

Note: BG: Between Groups, WG: Within Groups, CL: Complete Linkage, ML: Median Linkage, WL: Ward's Linkage

Table 7
Kappa agreement from Study 1: 70% Sub-Sample (4 Factor Model)

	BG	WG	CL	ML	WL
2 Cluster Solution					
BG	-----				
WG	-.13**	-----			
CL	.13**	.81**	-----		
ML	-.12**	-.74**	-.70**	-----	
WL	-.13**	.76**	.81**	-.61**	-----
3 Cluster Solution					
BG	-----				
WG	-.04	-----			
CL	.12**	.21**	-----		
ML	-.12**	-.40**	-.40**	-----	
WL	-.13**	.71**	.17**	-.28**	-----

* $p < .01$ ** $p < .001$

Note: BG: Between Groups, WG: Within Groups, CL: Complete Linkage,
ML: Median Linkage, WL: Ward's Linkage

Table 8
Kappa Agreement from Study 1: 70% Sub-Sample (3 Factor Model)

	BG	WG	CL	ML	WL
2 Cluster Solution					
BG	-----				
WG	.72**	-----			
CL	.77**	.78**	-----		
ML	-.40**	-.35**	-.23**	-----	
WL	.84**	.80**	-.39**	-.39**	-----
3 Cluster Solution					
BG	-----				
WG	.10*	-----			
CL	.62**	.27**	-----		
ML	-.15**	-.49**	-.23**	-----	
WL	.03	.26**	.16**	-.23**	-----

* $p < .01$ ** $p < .001$

Note: BG: Between Groups, WG: Within Groups, CL: Complete Linkage,
ML: Median Linkage, WL: Ward's Linkage

Means analysis in order to determine the number of clusters that best fits the dataset. The cluster centers resulting from hierarchical methods were averaged and entered as the initial cluster centers and running means were used to allow for updates of the cluster centers. K Means analysis generates an ANOVA table to assess whether the clusters differentiated on all the variables they were clustered on. If they do not differ significantly, there is a problem with the solution and analysis needs to be redone. Hence, both results were assessed using K means clustering to assess if the analysis will indicate the best cluster solution.

Results clearly showed the 3 cluster solution to be the superior solution. The ANOVA with the 3 cluster solution was significant across 3 of the 4 PCL:YV factors with the 30% subset and all factors with the 70% subset whereas the 2 cluster solution only differentiated on the Interpersonal Factor (see Tables 9 and 10 for a comparison of the descriptions across cluster solutions). In both sub-samples of the data cluster 1 scored high across all factors and cluster 2 scored low in interpersonal and high across other factors. These clusters were named classic and macho respectively. The third cluster demonstrated a different profile across the factor scores in the two sub-samples. In the initial 30% sub-sample the affective factor was elevated compared to the other factors whereas in the 70% sub-sample the affective factor was lower than the other factors. The pattern of results for this cluster in the 30% sub-sample has not been found in prior research whereas examination of the 70% sub-sample demonstrates this cluster is similar to the pseudo cluster reported in Hervé (2003). These results are graphed in Figure 4 along with results with the 4 factor model. Further analysis were conducted on the 70%

Table 9
Mean Factor Scores and ANOVA results from K Means Analysis: 3 Cluster Solution

	Cluster Membership			<i>F</i>
	Cluster 1: Classic	Cluster 2: Macho	Cluster 3: Pseudo	
30% Dataset				
Factor 1: Interpersonal	6.80	3.70	4.20	$F(2, 145) = 51.45^{**}$
Factor 2: Affective	7.40	7.20	6.50	$F(2, 145) = 12.47^{**}$
Factor 3: Lifestyle	6.82	7.16	5.39	$F(2, 145) = 56.34^{**}$
Factor 4: Antisocial	7.17	7.24	7.24	$F(2, 145) < 1$
70% Dataset				
Factor 1: Interpersonal	6.90	3.80	6.10	$F(2, 456) = 439.98^{**}$
Factor 2: Affective	7.60	7.20	5.20	$F(2, 456) = 285.30^{**}$
Factor 3: Lifestyle	6.75	6.48	6.03	$F(2, 456) = 23.01^{**}$
Factor 4: Antisocial	6.70	7.47	6.70	$F(2, 456) = 7.17^{**}$

* $p < .05$, ** $p < .01$

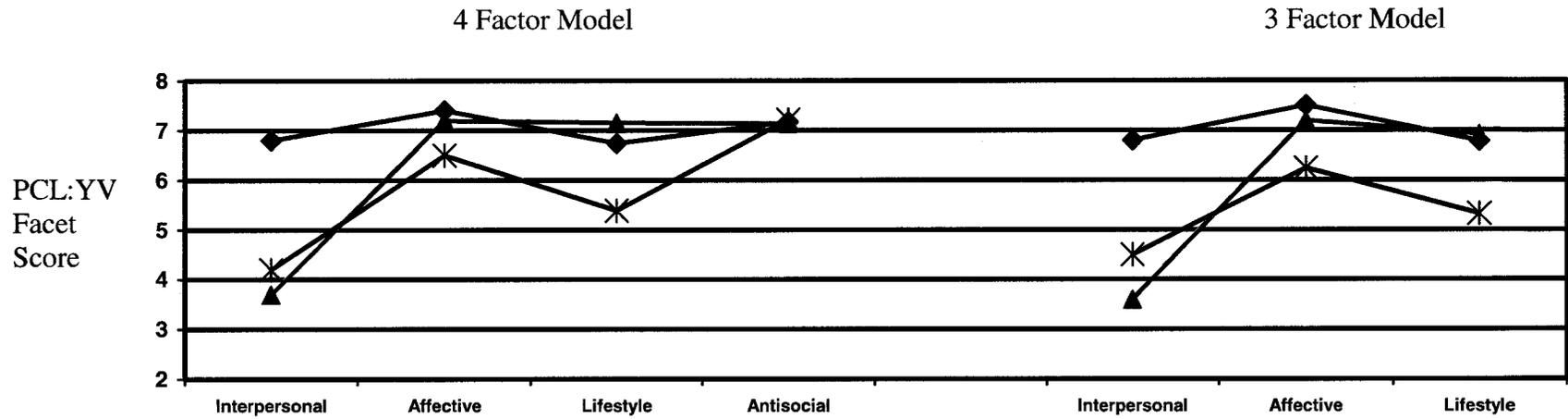
Table 10
Mean Factor Scores and ANOVA results from K Means Analysis: 2 Cluster Solution

	Cluster Membership		<i>F</i>
	Cluster 1 High Traits	Cluster 2 Low Traits	
	30% Dataset		
Factor 1: Interpersonal	3.60	6.50	$F(1, 146) = 305.146^{**}$
Factor 2: Affective	6.90	7.20	$F(1, 146) = 3.81$
Factor 3: Lifestyle	6.34	6.48	$F(1, 146) < 1$
Factor 4: Antisocial	7.35	7.03	$F(1, 146) = 5.09^*$
	70% Dataset		
Factor 1: Interpersonal	3.90	6.80	$F(1, 457) = 999.81^{**}$
Factor 2: Affective	7.00	6.90	$F(1, 457) < 1$
Factor 3: Lifestyle	6.46	6.50	$F(1, 457) = 1.13$
Factor 4: Antisocial	7.25 [*]	6.92 [*]	$F(1, 457) = 6.85$

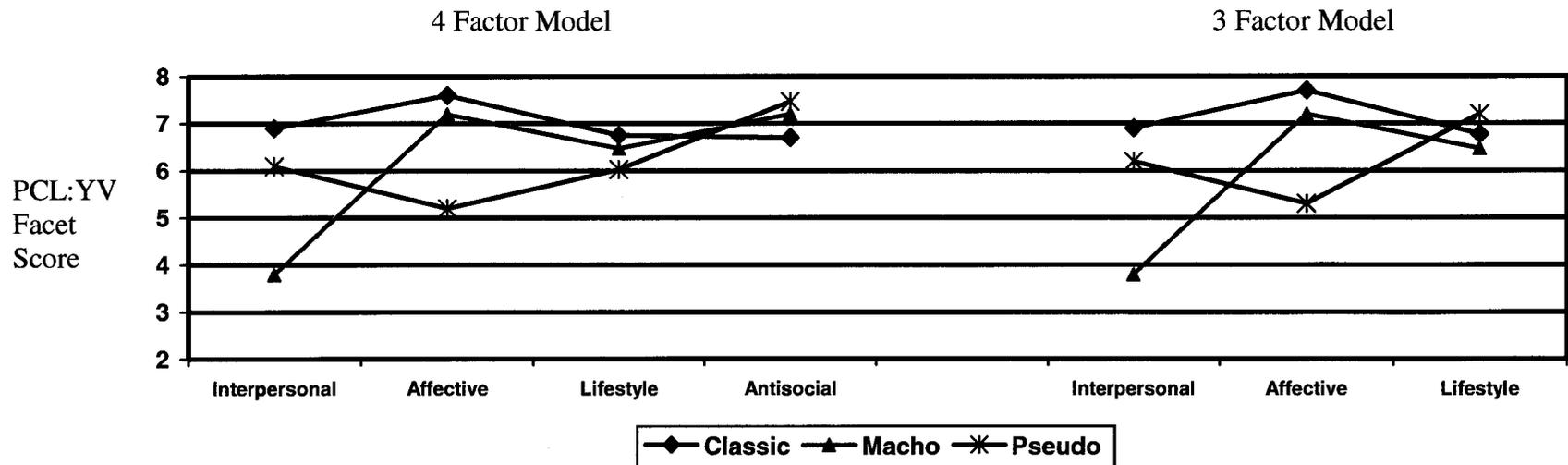
* $p < .05$, ** $p < .01$

Figure 4
Profile of 3 Cluster Solution from Study 1

30 % Dataset



70% Dataset



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sub-sample as combining the sub-samples would change the shape and pattern of the pseudo cluster to one not found in either sample or prior research.

Clusters did not differ in ethnicity ($\chi^2(4, 300) = 3.00, n.s.$), however there was a trend towards significance among clusters regarding age ($F(2, 298) = 2.39, p < .10$). Games-Howell *post hoc* analysis was employed to assess differences between clusters as cluster sizes were unequal. Results indicated this difference was due to differences between the pseudo cluster with the highest age ($M = 16.49, SD = 1.16$) and macho cluster with lowest age ($M = 16.05, SD = 1.34; p = .076$). In addition, clusters differed in PCL:YV score ($F(2, 307) = 59.65, p < .001$). Games-Howell *post hoc* analysis reported the classic cluster ($M = 34.65, SD = 2.60$) scored significantly higher than the pseudo cluster ($M = 31.15, SD = 1.93$), and the macho cluster ($M = 31.34, SD = 2.80$; see Table 11 for a description of the cluster profiles).

Discussion

The purpose of this study was to assess if subtypes would emerge in a high traits group of young offenders. A four cluster solution was predicted with a classic group that scored high across all PCL:YV factors, a manipulative group that scored high across Interpersonal and Affective factors and low on remaining factors, a macho cluster with a low interpersonal factor and high scores across remaining factors, and a pseudo group that scores moderately on the interpersonal factor, low on the affective factor and high on the remaining factors.

A 3 cluster solution was found to be the best fit for the data. Although the 3 cluster solution differs from the hypothesis, this is the first study that assessed the number of clusters in youth with the PCL:YV factors. Vincent et al. (2003) used results from

Table 11
Profile of Clusters from Study 1 (Mean, Standard Deviation, Percentage)

	Cluster Membership		
	Cluster 1: Classic	Cluster 2: Macho	Cluster 3: Pseudo
Percentage in Cluster	34.4%	44.1%	21.5%
<u>Demographics</u>			
Age	16.18 (1.34)	16.05 (1.40)	16.49 (1.16)
Ethnicity			
Caucasian	30.2%	40.0%	36.6%
Black	23.7%	17.8%	19.5%
Other	46.2%	42.2%	43.9%
<u>PCL:YV Score</u>			
Total Score	34.74 (2.60)	30.46 (2.80)	31.15 (1.93)
Factor 1: Interpersonal	6.85 (.86)	3.77 (1.17)	6.16 (.88)
Factor 2: Affective	7.68 (.52)	7.18 (.82)	5.28 (.89)
Factor 3: Lifestyle	6.77 (1.04)	6.63 (1.11)	6.04 (.94)
Factor 4: Antisocial	6.74 (1.30)	7.19 (.84)	7.32 (.82)

research with children and entered a 4 cluster solution rather than assessing the number of clusters in the sample. Furthermore, prior research with youth has not assessed a high traits group, the only other study to look at this group assessed adults (Hervé, 2003).

Although the number of clusters differed from the hypothesis, the PCL:YV factor profiles of clusters that emerged were consistent with hypotheses, with the exclusion of the manipulative cluster. The classic group scored high across all factors of the PCL:YV and the macho group scored low in the interpersonal factor and high across the remaining factors. The pseudo cluster scored moderately on Factor 1, low on Factor 2 and high on the remaining factors, however this only occurred with the 70% sub-sample. In the 30% sub-sample the pseudo group had an elevated score.

The divergent number of clusters between studies may reflect disparities in the methods and judgments used for determining the number of clusters. Employing a heuristic such as assessing dendograms and distance co-efficients to determine the number of clusters may result in different judgments regarding the appropriate number of clusters. In order to address the possibility that differences in the number of clusters results more from differences in judgments and methods, a 4 cluster solution was analyzed with K means analysis. Cluster centers were entered from hierarchical analysis, however for this analysis a 4 cluster model was selected for K means analysis.

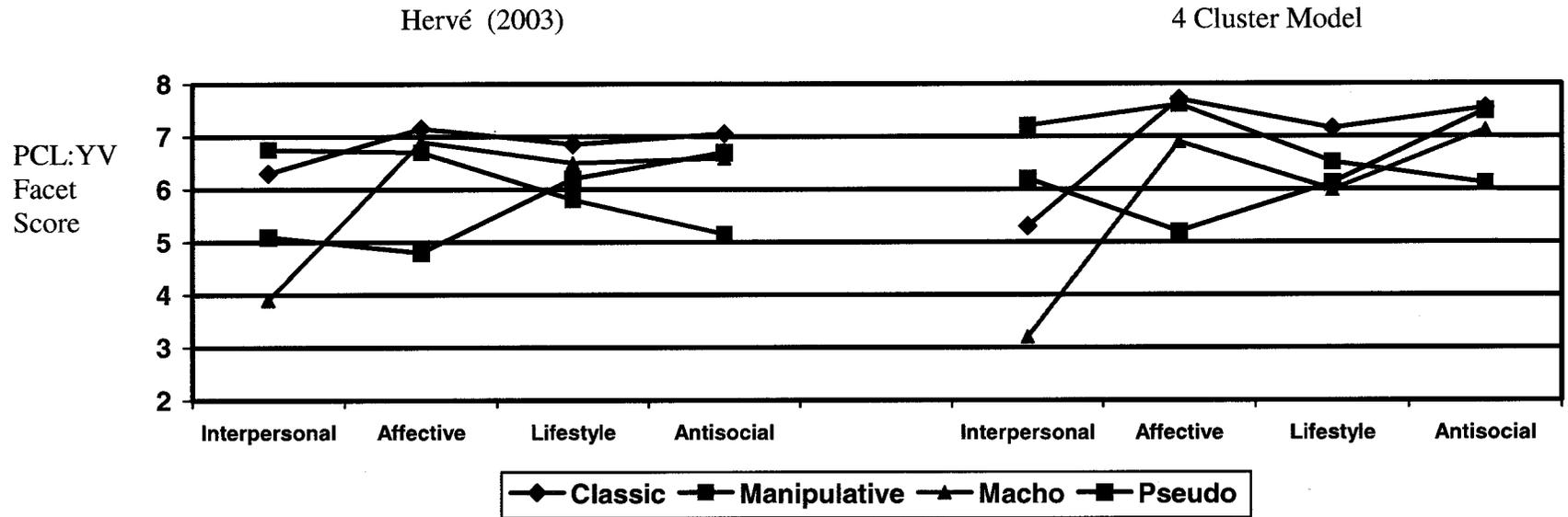
The pattern of results from the 4 cluster solution is nearly identical to Hervé (2003), however there were slight differences in the elevations of the PCL:YV interpersonal factor. The pseudo cluster from this study had an elevated Factor 1 score and the classic cluster had a reduced Factor 1 score. The resulting clusters from the 70% sub-sample are displayed on a line graph and compared to results from Hervé (2003; see

Figure 5). The similarity between these clusters and Hervé (2003) indicates these results replicate results with adults and there may potentially be similar manifestation of subtypes in youth and adults. However caution is needed in interpreting these results. First, although this research indicates a 4 cluster solution is similar to adults, it does not address the difference in the number of clusters. It is possible that a 3 cluster solution is best with youth and a 4 cluster solution is best with adults. Specifically, the manipulative cluster that was not found in this sample may not develop until adulthood. Furthermore, it is not clear if clusters would remain static into adulthood, or if a youth classified into one cluster could shift into a different cluster throughout the transition to adulthood. These issues can only be addressed through prospective research.

If the number of clusters varies depending on the decisions of individual researchers, the validity of the cluster solution is undermined. This is why this study employed an objective stopping rule, to provide a greater level of confidence in the cluster selection. However, even the use of this stopping rule did not provide a clear solution. This highlights the need for rigorous analysis in determining the cluster solution that best fits the data.

The similarity of these clusters to Hervé (2003) provides support for the use of cluster analysis to distinguish subtypes within this group. However, there was an issue with the ability of the pseudo group to replicate in both sub-samples of the data. Due to the change in this cluster in the 30% to 70% percent sub-sample, further research should be employed to assess the stability of the pseudo cluster. In addition, the manipulative cluster that was to score high on Factor's 1 and 2 and low on 3 did not emerge and future research assessing clusters should assess the stability of this cluster.

Figure 5
Comparison Between Hervé (2003) and 4 Cluster Model



In addition, in order to validate this solution replication should be conducted in independent samples and the ability of clusters to differentiate on external variables should be assessed. Unfortunately, the sample size in the other samples is too small to assess replication with the high traits group. The validity of the clusters will be examined by assessing their ability to differentiate on external variables in study 3.

Study 2

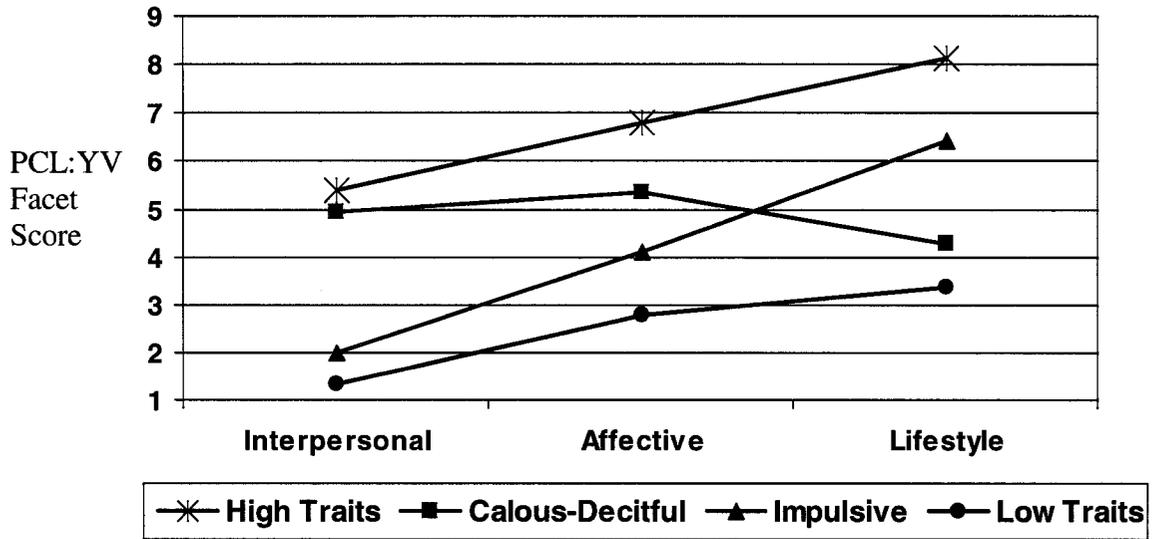
Hypothesis

Based on prior research employing cluster analysis with youth samples 4 clusters are expected to emerge. One of these clusters is expected to have high scores across the first 3 factors of the PCL:YV (interpersonal, affective, lifestyle; high traits group), a second cluster is expected to score low across these factors (low traits group), another cluster is expected to score low on the interpersonal high across the other factors (impulsive group), and the final cluster is expected to score above the mean on the interpersonal factor and affective factors and lower on the lifestyle factor (callous-deceitful group; see Figure 6 for a graph of these hypotheses).

Procedure

Employing cluster analysis to only a high psychopathic traits subgroup results in a drastic reduction in sample size and loss of power for further analysis. In addition, prior research has focused on the full range of PCL:YV scores. Therefore, analysis were conducted across the full range of PCL:YV scores. All 3 samples of offenders were clustered separately in order to assess the ability of clusters to replicate across groups. First, hierarchical and K means analysis were employed with sample 1 (North American Incarcerated). Next, in order to attempt to replicate the clusters on independent samples K

Figure 6
Hypothesized Clusters for Study 2



means analysis were conducted on samples 2 (North American Non-Incarcerated) and 3 (United Kingdom Incarcerated) using the number of clusters and cluster centers from study 1 in order to assess if the solutions replicate.

Results

North American Incarcerated Sample

Due to missing factor scores 8 participants were excluded resulting in a final sample of 858. The demographics of this sample are similar to study 1, the average age was 16.3 ($SD = 1.34$) and Caucasian ethnicity comprising the majority of the sample (60%), followed by African American (25%), Latino (4.7%), Aboriginal (3.2%) and other (7.4%). The average PCL:YV score is 26.6 (7.63) with a range from 5 to 40. The relatively high average is due to a couple samples of high risk repeat offenders in this group. Similar to study 1 the sample was randomly divided into 30% ($n = 258$) and 70% ($n = 600$) subsets for analysis. There were no significant differences between age, ethnicity, factor scores, or PCL:YV score (see Table 12 for a comparison of sub-samples).

Hierarchical analysis indicated either a 2 or a 3 cluster solution was the best fit for the data. Both the 2 and the 3 cluster solution were supported by 2 different hierarchical analysis (WG & WL and CL & ML respectively) with the remaining method indicating a 4 cluster model (BG). Split sample replication was slightly more supportive of a 2 cluster solution with this occurring in 40% of the replications compared to 32% of the 3 cluster model. Although these analyses suggest a 2 cluster solution, the 3 cluster solution did receive support. Furthermore, the 4 factor model indicated a 3 cluster solution (see Table

Table 12

Description of Sub-samples from North American Incarcerated Sample (Mean, Standard Deviation)

Characteristics	30% Sub-sample	70% Sub-sample
<u>Demographics</u>		
Age	16.28 (1.34)	16.26 (1.35)
Ethnicity		
Caucasian	58.1%	60.3%
Black	24.6%	25.3%
Other	17.3%	14.5%
<u>PCL:YV Score</u>		
Total Score	26.57 (7.68)	26.59 (7.61)
Factor 1: Interpersonal	4.22 (2.23)	4.12 (2.19)
Factor 2: Affective	5.71 (2.10)	5.68 (2.03)
Factor 3: Lifestyle	5.41 (1.73)	5.48 (1.69)
Factor 4: Antisocial	6.01 (1.82)	6.04 (1.96)

13 for a comparison of the number clusters across methods). Therefore, the 70% sub-sample was assessed to aid in determining the number of clusters in the data.

Unfortunately these analyses did not clarify the number of clusters. Both 2 and 3 cluster solutions received support with a 4 cluster solution also appearing. Two methods indicated a 3 cluster solution (BG & ML), where as WL indicated a 2 cluster solution and WG and CL indicated either a 2 or 4 cluster solution. Moreover, split sample replication did not indicate much of a difference between these methods with a 3 cluster solution occurring 30% of the time, a 2 cluster solution 29%, and a 4 cluster solution 27%. Examining the Kappa co-efficients of agreement with a 2 cluster and 3 cluster solutions indicates greater agreement and consistency with a 2 cluster solution. There was a wide range of agreement among methods in both solutions, however the 2 cluster solution attained more moderate to substantial associations (see Tables 14 and 15 for the level of agreement across methods). However, as demonstrated in study 1, agreement among methods is not necessarily predictive of the best cluster solution. Therefore, both models were tested with K Means analysis in the same manner as study 1.

Both cluster models were significant across PCL:YV factors and replicated in both sub-samples. In the 3 cluster solution there was a cluster that scored high across all factors of the PCL:YV (high traits) and a cluster that scored low across all factors (low traits). The remaining cluster scored low on factor 1 and high in the remaining factors similar to the macho group from study 1 (impulsive; see Table 16 for a description of the clusters).

The profiles of the 2 cluster solution were very similar to each other, both clusters had elevated scores in factor 2 compared to other factors. However, cluster 1 scored

Table 13
Number of Clusters Indicated by Hierarchical Analyses (Study 2)

Method	Number of Clusters	
	3 Factor model	4 Factor Model
	30% Sub-sample	
BG	4	4
WG	2	3
CL	3	2
ML	3	3
WL	2	3
SR	2	3
	70% Sub-sample	
BG	3	4
WG	2, 4	2
CL	2, 4	4
ML	3	3
WL	2	2
SR	3, 2, 4*	3, 2*

*The difference between these solutions was marginal (under 3%) and therefore both are presented.

Note: BG: Between Groups, WG: Within Groups, CL: Complete Linkage, ML: Median Linkage, WL: Ward's Linkage

Table 14
Kappa Agreement from Study 2: 70% Sub-Sample (4 Factor Model)

	BG	WG	CL	ML	WL
2 Cluster Solution					
BG	----				
WG	-.13**	----			
CL	.13**	.81**	----		
ML	-.12**	-.74**	-.70**	----	
WL	-.13**	.76**	.81**	-.61**	----
3 Cluster Solution					
BG	----				
WG	-.04	----			
CL	.12**	.21**	----		
ML	-.12**	-.40**	-.40**	----	
WL	-.13**	.71**	.17**	-.28**	----

* $p < .01$ ** $p < .001$

Note: BG: Between Groups, WG: Within Groups, CL: Complete Linkage,
ML: Median Linkage, WL: Ward's Linkage

Table 15

Kappa Agreement from Study 2: 70% Sub-Sample (3 Factor Model)

	BG	WG	CL	ML	WL
2 Cluster Solution					
BG	-----				
WG	.72**	-----			
CL	.77**	.78**	-----		
ML	-.40**	-.35**	-.23**	-----	
WL	.84**	.80**	-.39**	-.39**	-----
3 Cluster Solution					
BG	-----				
WG	.10*	-----			
CL	.62**	.27**	-----		
ML	-.15**	-.49**	-.23**	-----	
WL	.03	.26**	.16**	-.23**	-----

* $p < .01$ ** $p < .001$

Note: BG: Between Groups, WG: Within Groups, CL: Complete Linkage,
ML: Median Linkage, WL: Ward's Linkage

Table 16
 Profile of Clusters from North American Incarcerated Sample (Mean, Standard Deviation, Percentages)

	Cluster Membership		
	Cluster 1: High Traits	Cluster 2: Impulsive	Cluster 3: Low Traits
Percentage in Cluster	38.9%	30.5%	30.5%
<u>Demographics</u>			
Age	16.18 (1.30)	16.18 (1.43)	16.47 (1.30)
Ethnicity			
Caucasian	56.4%	65.1%	58.2%
Black	29.3%	19.8%	24.1%
Other	14.3%	13.7%	17.7%
<u>PCL:YV Score</u>			
Total Score	31.09 (4.70)	24.31 (6.43)	23.12 (8.85)
Factor 1: Interpersonal	5.30 (1.86)	2.94 (1.44)	3.87 (2.48)
Factor 2: Affective	6.77 (1.32)	5.44 (1.84)	4.57 (2.31)
Factor 3: Lifestyle	6.16 (1.36)	5.14 (1.59)	4.89 (1.89)
Factor 4: Antisocial	6.73 (1.41)	5.84 (1.94)	5.34 (2.15)

much higher across factors than cluster 2. Examination of these cluster profiles indicates the 2 cluster solution does not provide much information beyond the PCL:YV score. The two clusters have exactly the same pattern of responses, except that one group scores high across all factors whereas the other scores low (see Figure 7 for a comparison of the cluster solutions). Alternately, the 3 cluster model demonstrates differences in the pattern of responses across PCL:YV factors. Therefore, the 3 cluster solution was selected and examined in the North American non incarcerated sample and the United Kingdom incarcerated sample. One of the requirements for a good cluster solution is reliability and its ability to replicate in independent samples (Blashfield & Aldenderfer, 1988; Gore, 2000; Johnson & Wishern, 1998).

North American Non Incarcerated Sample

This sample was comprised of younger participants with an age range of 12 to 16 and an average of 14.42 ($SD = 1.09$). There is too much missing information to allow for an accurate picture of the ethnicity of the sample. The average PCL:YV score is 22.54 ($SD = 7.56$) with a range of 5 to 35.

Results indicated that the pattern of results replicated well in this sample (see Figures 8 for the replications of the cluster solution across samples). There were no significant differences between clusters on age ($F(2, 133) = .926, n.s.$). This is not surprising considering the mean age among clusters varied from 14.27 to 14.44. There was a high prevalence of the low traits group in this sample compared to the incarcerated samples (see Table 17 for a description of the clusters). In addition, these clusters were

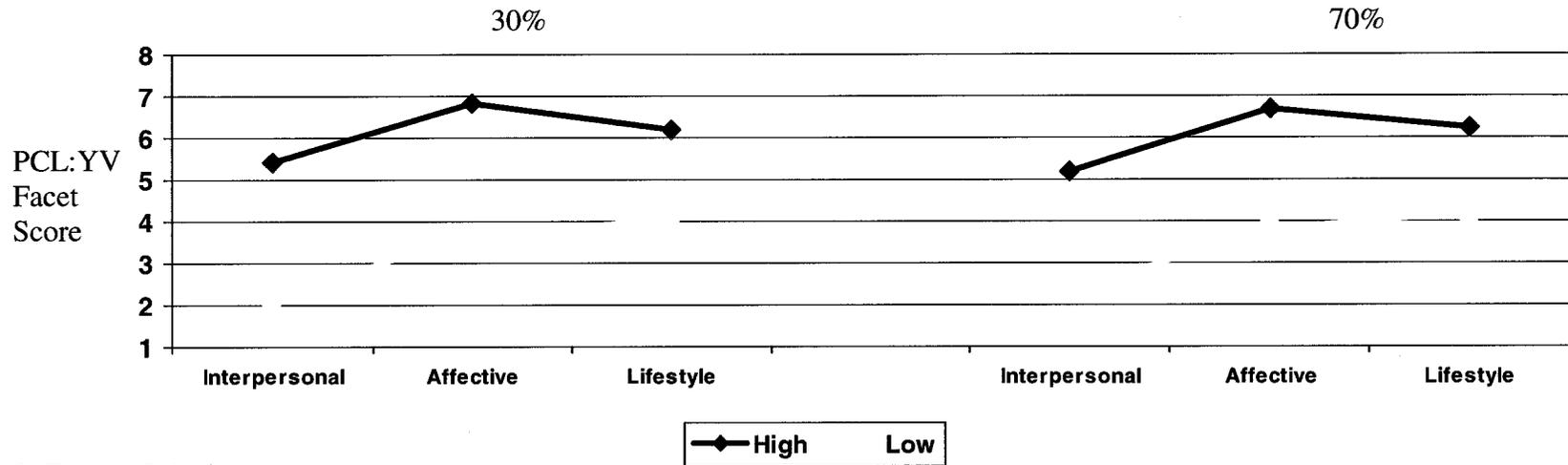
Table 17

Profile of Clusters from North American Non Incarcerated Sample (Mean, Standard Deviation, Percentages)

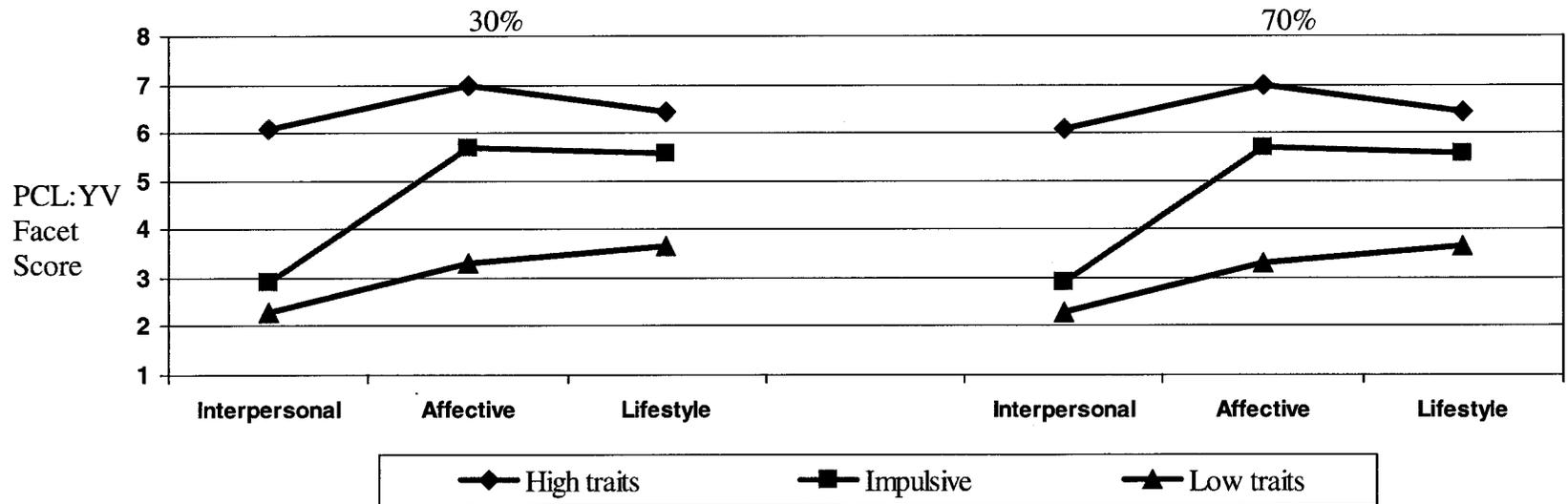
	Cluster Membership		
	Cluster 1: High Traits	Cluster 2: Impulsive	Cluster 3: Low Traits
Percentage in Cluster	27.7%	42.6%	29.8%
<u>Demographics</u>			
Age	14.44 (1.13)	14.27 (1.07)	14.60 (1.09)
<u>PCL:YV Score</u>			
Total Score	29.96 (3.64)	24.04 (3.96)	13.53 (4.66)
Factor 1 Interpersonal	6.46 (1.07)	3.97 (1.06)	2.10 (1.45)
Factor 2 Affective	6.28 (1.28)	5.67 (1.22)	2.27 (1.26)
Factor 3 Lifestyle	6.24 (.99)	4.67 (1.18)	3.13 (1.57)
Factor 4 Antisocial	5.71 (1.75)	4.86 (1.56)	3.22 (1.44)

Figure 7
Comparison of Cluster Solutions in North American Incarcerated Sample

2 Cluster Solution



3 Cluster Solution



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significantly different in their PCL:YV scores ($F(2, 138) = 169.57, p < .001$). Games-Howell *post hoc* analysis indicated significant differences across all clusters. The high traits group had the highest PCL:YV score ($M = 29.96, SD = 3.64$), followed by the impulsive group ($M = 24.04, SD = 3.96$), and the low traits group ($M = 13.53, SD = 4.66$).

United Kingdom Incarcerated Sample

The average age of the sample was 15.85 ($SD = 1.34$) which falls between the North American incarcerated samples and the non incarcerated samples. The ethnic composition of the sample cannot be determined due to the large amount of missing information. There is a wide range of PCL:YV scores from 1 to 39 and an average of 22.17 ($SD = 8.13$).

The pattern of results did not replicate well in this sample (see Figure 8 for the replications of the cluster solution across samples and Table 18 for a description of the clusters). Two different types of analyses were conducted to investigate the reason for this discrepancy, examining the correlations across factor scores and assessing the distribution of factors across different samples. When variables that are employed for cluster analysis are highly correlated (i.e., $> .80$) this can differentially weight some variables as more important in the analysis and impact results (Blashfield & Aldenderfer, 1988). Correlation matrices did not suggest a problem with the correlations of the factors and similar associates among factors were found across samples (see Table 19 for the correlation matrices across samples). In addition, examination of differences in the distribution of factor scores found similar results across samples, however the UK sample did appear to have higher standard error.

Table 18
 Profile of Clusters in United Kingdom Incarcerated Sample (Mean, Standard Deviation, Percentages)

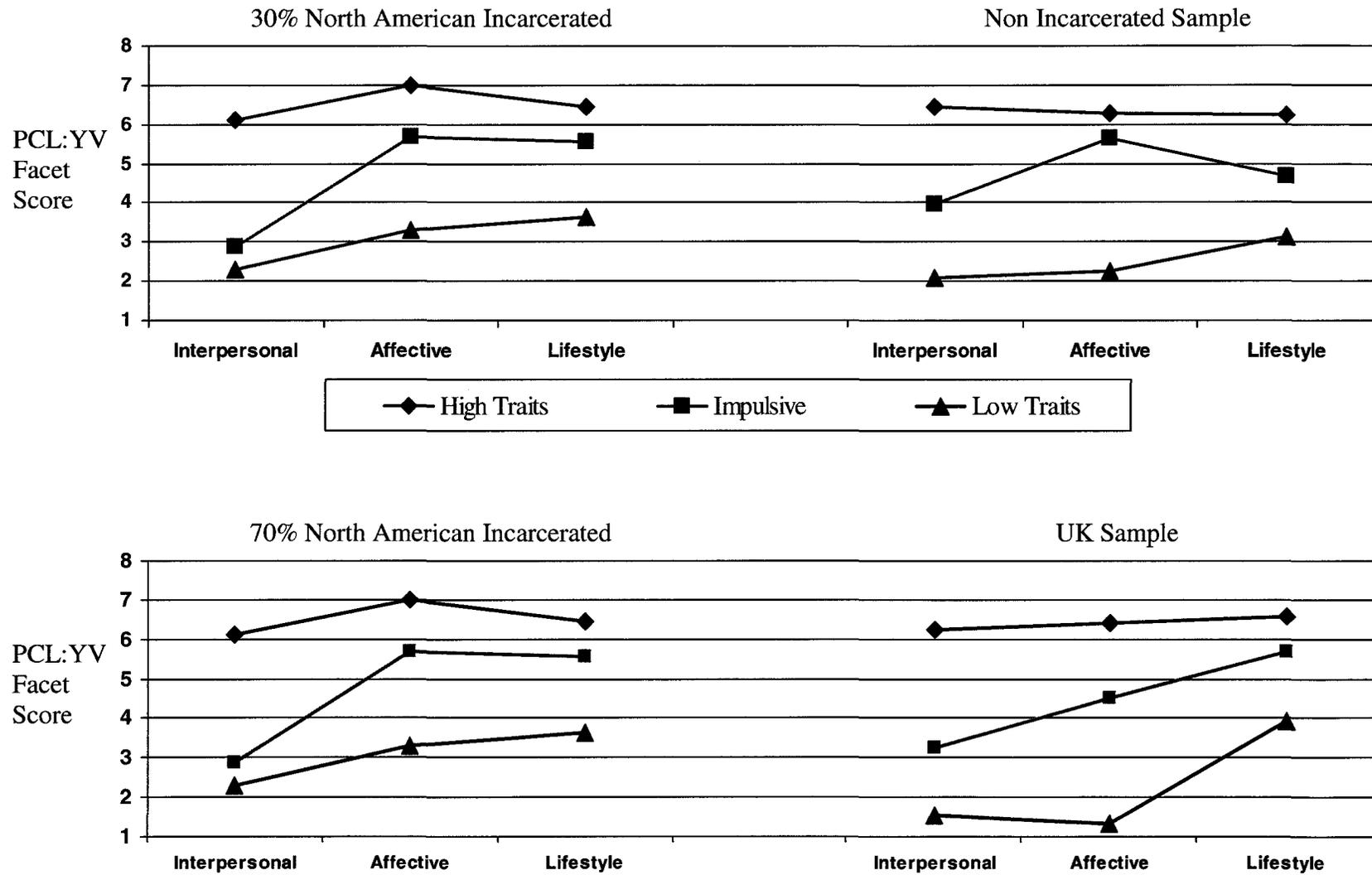
	Cluster Membership		
	Cluster 1	Cluster 2	Cluster 3
Number in Cluster (%)	31.7%	41.6%	28.3%
<u>Demographics</u>			
Age	15.46 (1.31)	15.92 (1.35)	16.08 (1.28)
<u>PCL:YV Score</u>			
Total Score	30.34 (3.92)	22.48 (3.94)	12.57 (5.21)
Factor 1: Interpersonal	6.21 (1.14)	3.26 (1.24)	1.55 (1.49)
Factor 2: Affective	6.40 (1.39)	4.52 (1.29)	1.27 (1.12)
Factor 3: Lifestyle	6.56 (1.06)	5.65 (1.39)	3.94 (1.69)
Factor 4: Antisocial	5.92 (1.73)	4.79 (1.80)	3.24 (2.09)

Table 19
Correlation of Factor Scores from Study 2

	PCL:YV Factor Score		
	Factor 1: Interpersonal	Factor 2: Affective	Factor 3: Lifestyle
30% Sub-sample			
Factor 1	---		
Factor 2	.50**	---	
Factor 3	.44**	.61**	---
70 % Sub-sample			
Factor 1	---		
Factor 2	.51**	---	
Factor 3	.37**	.51**	---
Non Incarcerated			
Factor 1	---		
Factor 2	.55**	---	
Factor 3	.61**	.53**	---
UK sample			
Factor 1	---		
Factor 2	.60**	---	
Factor 3	.48**	.49**	---

** $p < .01$

Figure 8
Cluster Replications Across Samples Study 2



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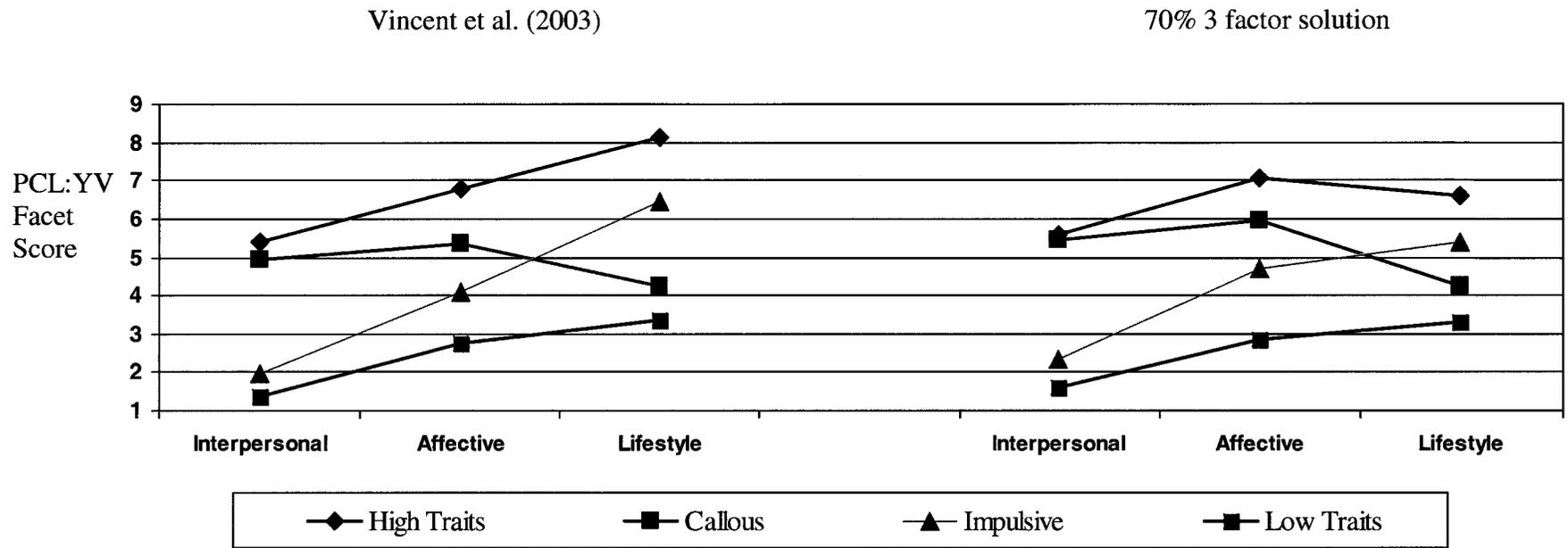
Discussion

This study was conducted in order to assess if subtypes of youth on psychopathic traits emerged in a sample that included the full range of PCL:YV scores. It was hypothesized that 4 clusters would emerge, a high traits cluster that scored high across all PCL:YV factors. Contrary to hypothesis a 3 cluster solution was the best fit for the data, however the clusters that emerged were consistent with the hypotheses. A high traits group emerged that scored high across PCL:YV factors, a low traits group emerged that scored low across these factors, and an impulsive cluster that scored low on the interpersonal factor but high on the others emerged.

These clusters are analogous to Vincent et al. (2003) with the absence of the callous-deceitful cluster. As demonstrated in study 1 the difference in number of clusters between studies may result from different methods and judgments used in determining the number of clusters. To evaluate this possibility a 4 cluster solution was assessed using cluster centers from hierarchical analysis and selecting a 4 cluster solution with K Means analysis. Only results from the 70% sub-sample are reported for this analysis as they were identical to the 30% sub-sample. The 4 cluster solution was analogous to Vincent et al. (2003) with the callous-deceitful cluster emerging. However, there is a difference in the lifestyle factors in the high traits and impulsive clusters (see Figure 9 for a comparison of between these results). In this study these clusters scored slightly lower on the lifestyle factor of the PCL:YV compared to Vincent et al. (2005).

The similar finding between studies with the 4 cluster solution does not change the confidence of the 3 cluster solution found in this study. Rigorous analyses were conducted in order to make the most informed decision regarding the number of clusters,

Figure 9
Comparison of 4 Cluster Solution with Vincent et al. (2003)



also, this solution replicated in three of four samples. The only sample it did not replicate in was the UK sample. This sample did not pose any obvious challenges regarding correlated cluster variables. However, this sample did have a higher degree of error regarding PCL:YV factor scores. Therefore, this error may have impacted the solution. It is also possible that these clusters do not generalize across cultures. However, the PCL:YV appears to have good cross cultural generalizability (Dolan & Rennie, 2006). Therefore, further research is required to investigate this finding.

Initially, both the 2 and 3 cluster solution appeared to be good solutions for the data. However, the 2 cluster solution was dropped when profiles of the clusters across PCL:YV factors indicated the 2 cluster solution had exactly the same pattern of responses and therefore failed to provide information beyond PCL:YV score. Alternately, the 3 cluster model demonstrated differences in the pattern of responses across PCL:YV factors and therefore, may provide information beyond total PCL:YV score.

These results indicated evidence for the validity of the clusters that emerged in this study. The cluster solution was stable across samples, although there may be some issues with cross cultural application. The most robust clusters appear to be the high traits cluster and the macho/impulsive cluster as these were found across all analysis in both studies. However, validation of these clusters on external variables is required in order to determine their validity. This will be addressed in the following studies.

Studies 3, 4, and 5: Validating Clusters on External Variables

A paramount test of the validity and applied value of clusters is validation on external variables (Blashfield & Aldenderfer, 1988). That is, assessing if clusters differentiate on relevant variables that were not used as clustering variables. Study 3 will

assess the high traits group and studies 4 and 5 will assess clusters derived from the full range of psychopathic traits. Studies 3 and 4 will assess if groups differentiate on measures of recidivism and amenability to treatment. These measures were selected as they have important implications for the practical utility of these clusters.

Clusters that differ on likelihood of re-offence, time to re-offence, and type of re-offence could result in more refined predictions of risk. In addition, if differences are found regarding amenability to treatment, cluster membership could provide important information regarding treatment planning. Specifically, if a treatment is more likely to be effective with one type of cluster this could inform treatment with this cluster and indicate that different approaches may be needed with other clusters.

The validity of the full range group will be further assessed by assessing background variables in study 5. These include risk and protective factors, antisocial history, history of aggression, and family background variables. Similar to studies 3 and 4, assessing risk and protective factors along with history of antisocial behaviour and aggression was conducted to assess if groups differentiate in their pattern of behaviour in order to assess the ability to make more refined predictions of risk based on cluster membership. In addition, prior research assessing clusters of youth with psychopathic traits have used similar variables in order to distinguish subtypes (Christian et al., 1997; Vincent et al., 2003). The inclusion of protective factors in this study could also suggest some specific areas of prevention and intervention with clusters.

Family background variables were selected as this is an area of research that has implications for theory regarding the development of psychopathy (Karpman, 1948; Lykken, 1995; Porter, 1996). In addition, prior research has found inconsistent results

regarding the relationship between family background variables and psychopathic traits (Campbell et al., 2004; McBride, 1998; Marshall & Cooke, 1999). Applying sub-types to this relationship may provide further understanding to this area.

Study 3: Validating High Trait Clusters

Hypotheses

Based on prior research it is expected the classic and macho clusters will have higher rates of both non-violent and violent recidivism and the shortest survival time before offending. Research assessing the treatment amenability of youth with psychopathic traits indicates Factors 1, 3, and 4 are associated with negative treatment behaviour (Spain et al., 2004). Therefore, clusters with elevated scores on Factor's 1, 3, and 4 (e.g. high traits and callous-deceitful group) will demonstrate lower amenability to treatment than other clusters.

Participants

A sub-sample of participants from Study 1 consisting of male adolescent offenders aged 11-18 incarcerated in a secure custody treatment facility in Wisconsin was assessed. Unfortunately, follow up data was only available for 124 participants who scored in the high traits of the PCL:YV. This is due to missing data and problems with matching follow up data with PCL:YV scores.

This sample represents a high risk group of youth with an extensive criminal history, therefore when the high traits group is selected the sample size is not greatly reduced ($n = 106$). The average age of the sub-sample was 15.53 ($SD = 1.29$) and the ethnic composition is predominantly African American (50%) followed by Caucasian

(35.5%), Latino (7.3%), Aboriginal (3.2%), and other (4%). The majority of these youth had extensive criminal histories.

Measures

Recidivism was defined by number and type of charges filed in the court system. Offences were divided into any offence, non-violent offence, felonies, and violent felonies. In the American system felonies are considered more serious offences and are punishable by more than 1 year in prison. Time to fail was also measured based on date of release to follow up with any charges during that time recorded. These were also divided into any failure, violent failure, and felony charges. Furthermore, number of days in treatment was measured.

Treatment was assessed using the number of days in a treatment institution. The institution is structured so youth experience consequences to their behaviour, either positive or negative. For example, privileges can be earned and negative behaviour is sanctioned. The institution has a higher staff to youth ratio than traditional institutions and youth met with a professional assigned to their case on a daily basis. There are additional treatment services available to youth including counseling, however information about these programs was not available.

Procedure

This sample examined the validity of the high traits cluster solution. First, analysis of the cluster solution in the present sample was assessed to ensure the clusters replicate. Differences in recidivism among clusters will be measured by regression and survival analysis. Logistic regression will be used as it is appropriate for binary outcomes, for example, re-offence and no re-offence. Survival curves control for time at

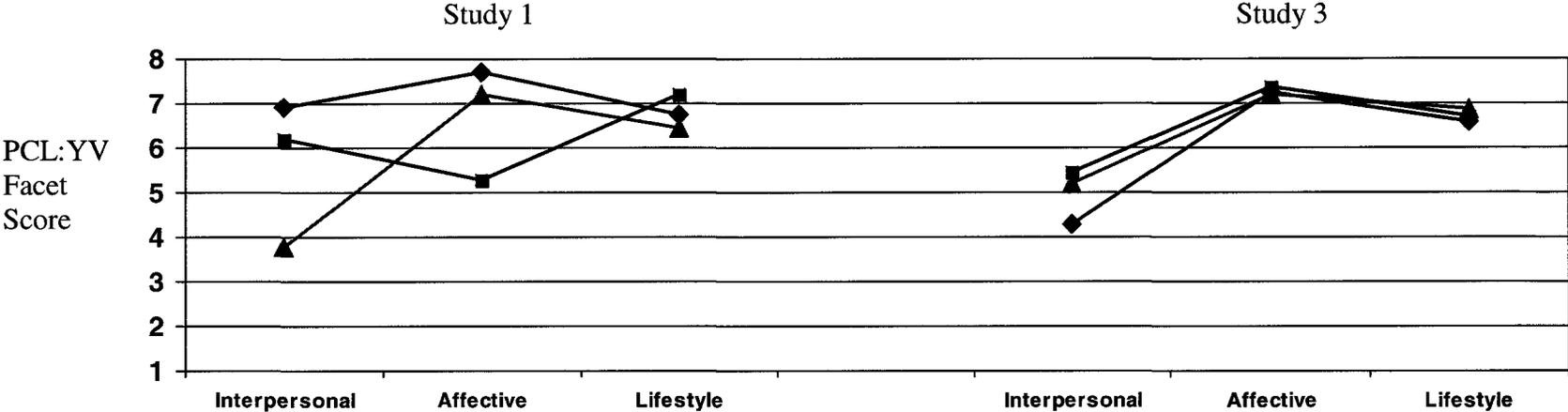
risk and assess time to re-offence after release. Separate analysis was conducted for any failure, violent failure, felony failure, and violent felony failure. Age and PCL:YV score were entered as covariates to ensure results are not confounded by age related differences or the number of psychopathic traits.

Results

The purpose of this study was to analyze the validity of clusters found in study 1 by assessing differences among clusters regarding recidivism and response to treatment. Similar to prior results, average age did not differ between clusters ($F(2, 118) = 1.26, n.s.$). It was not possible to compare ethnicity due to the small sample sizes in some cells. Average PCL:YV score was 33.78 ($SD = 2.92$) and significant differences were found across clusters ($F(2; 103) = 3.21, p < .05$). Games-Howell *post hoc* analysis indicated that this was due to differences between the pseudo group with the lowest mean ($M = 32.8, SD = 3.18$) with the classic group ($M = 34.27, SD = 2.62$). The macho cluster ($M = 34.23, SD = 2.85$) did not differ from the others.

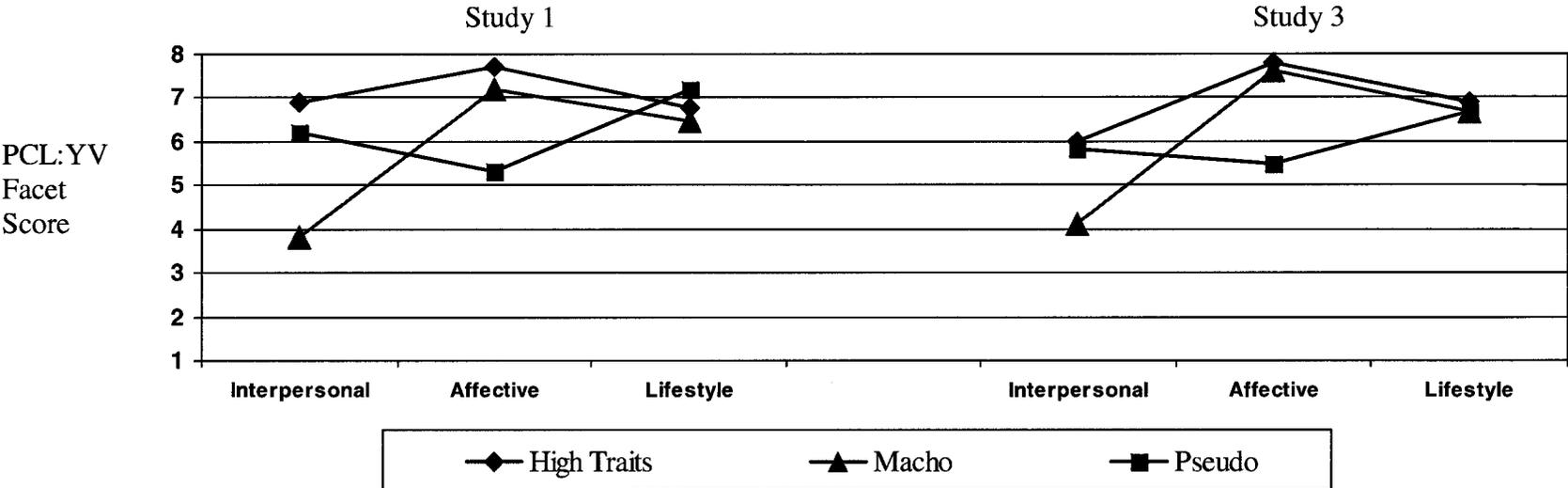
The profile of clusters was examined to assess if the cluster solution remained stable in the reduced sub-sample. Unfortunately, this did not occur, the profile of the clusters did not replicate results from study 1. In fact the clusters that emerged in this group do not appear to differentiate across PCL:YV factors, except potentially Factor 1 (see Figure 10 for a comparison of the clusters from study 1). This is likely due to the different cluster results found in the 30% sub-sample and the 70% sub-sample. Therefore, only clusters that emerged in the 70% sub-sample were examined. Results indicated the profile characteristics did replicate (see Figure 11 for a comparison of the clusters from

Figure 10
Profile Characteristics From Study 1 and Initial Solution From Study 3 (*n* = 106)



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Figure 11
Profile Characteristics From Study 1 and Study 3 (*n* = 53)



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study 1), however this involved further reducing the sample size to 57. K Means analyses were employed to re-cluster participants in order to include all available participants. The cluster solution that emerged from this analysis did not replicate the findings of Study 1 (see Figure 12 for a comparison of the clusters from study 1).

Examining differences between the clusters in this sample would not generalize to the original cluster solution, therefore analyzing differences between these clusters did not proceed. The distribution of the factor scores of the PCL:YV were examined in order to determine whether differences in the factor scores can explain these divergent results. There does not appear to be any notable differences between the means of the factor scores across samples. However, examination of the range of factor scores may speak to this issue. The 70% sub-sample from study 1 has a wider range of factor scores compared to the 30% sub-sample and the average of the participants available for this study (see Table 20 for a comparison of the distribution of factor scores).

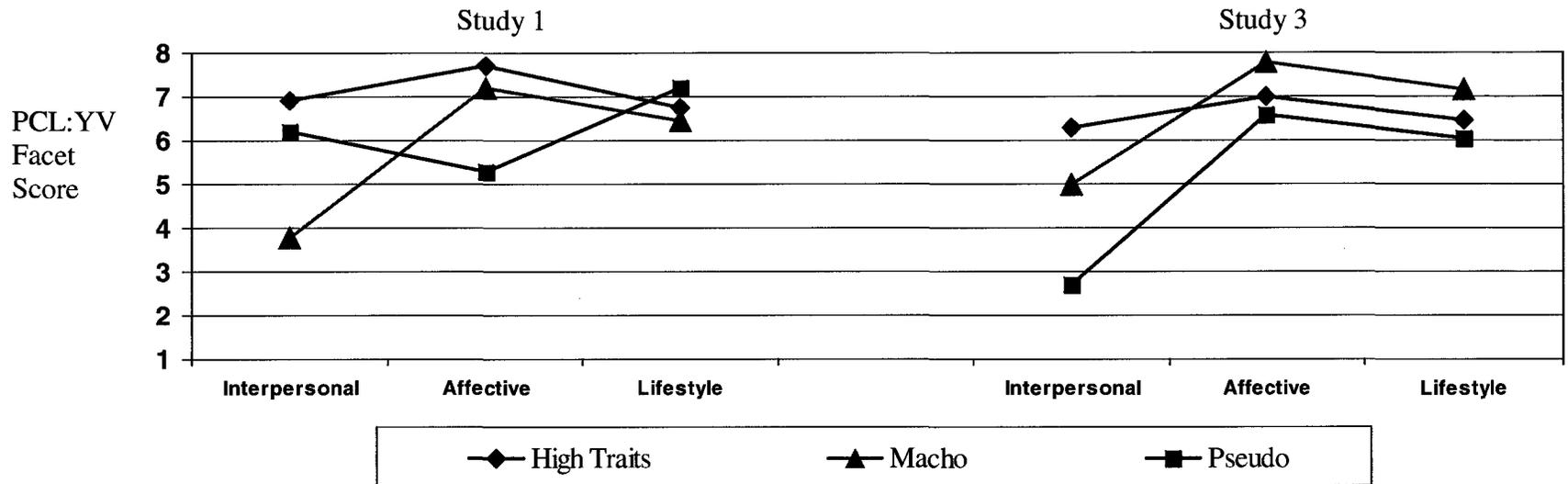
Discussion

The inability to replicate the cluster solution in this data calls into question the validity of the clusters reported in study 1. The reason clusters did not replicate appears due to the restricted range of factor scores that the clusters were developed on compared to the sample that the clusters were replicated on. The restricted range of factor scores should be expected as these offenders all obtained high scores on the PCL:YV. However, the inability of the solution to replicate presents a challenge when assessing all the different patterns of results that are possible in a high traits group. If a typology is based on a group with a restricted range of factor scores it may not apply to those with a wider

Table 20
Distribution of Factor Scores

	Factor 1: Interpersonal	Factor 2: Affective	Factor 3: Lifestyle
Study 3: <i>n</i> = 106			
Mean (SD)	5.02 (1.59)	7.27 (1.02)	6.69 (.98)
Range	1 to 8	4 to 8	4 to 8
Study 1: 30% Sub-sample			
Mean (SD)	5.35 (1.74)	6.94 (1.18)	6.48 (1.18)
Range	1 to 8	4 to 8	4 to 8
Study 1: 70% Sub-sample			
Mean (SD)	5.35 (1.74)	6.94 (1.18)	6.48 (1.12)
Range	1 to 8	3 to 8	3.2 to 8

Figure 12
 Profile Characteristics From Study 1 and Re-clustered Solution From Study 3 (*n* = 106)



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range of factor scores. This presents a challenge as developing a typology of youth with psychopathic traits using this method may not be able to classify all high traits youth.

The goal of this research is to work towards a typology that would allow for classification of youth into subtypes based on their profile scores. In order to reach this point with a high traits group, a sample that varies across the full range of factor scores is needed. Although this is theoretically possible, it may not be found in practice. Therefore, a different approach may be needed in sub-typing the high traits group.

One such method could involve selecting a high traits sample by using PCL:YV factor scores rather than total score. This would provide the ability to control the restricted range on factor scores and provide clear distinctions about what youth could be classified. However, this would involve attempting to subtype a group that there is limited theory or research about. The subtypes would not reflect subtypes of a high traits group as this method would likely exclude those with a low score on a factor but a high score overall.

Another method could be to select a high traits sample and use external variables to cluster groups. This method was successfully applied to adults by Hicks et al. (2004). However, this method has its own limitations including assumptions regarding what variables those high on PCL:YV score should differentiate on and how they are related to other external variables. Therefore, external variables should be theoretically meaningful to subtypes, such as measures of anxiety and impulsivity. These are questions and issues that further research needs to address in order to develop a reliable and valid classification of the high traits group.

Study 4: Recidivism and Treatment of Total Group

Hypotheses

Based on prior research it is expected the high psychopathic traits and impulsive clusters will have higher rates of both non-violent and violent recidivism and the shortest survival time before offending. Based on research assessing the relationship between psychopathic traits and treatment amenability, youth in the high traits and the callous-deceitful group are expected to demonstrate lower amenability to treatment than other clusters as they have elevated scores on Factor's 1, 3, and 4.

Procedure

The sample from study 3 was employed for analysis, however the total sample with a full range of scores on the PCL:YV was assessed. Analysis will proceed analogously to study 3.

Results

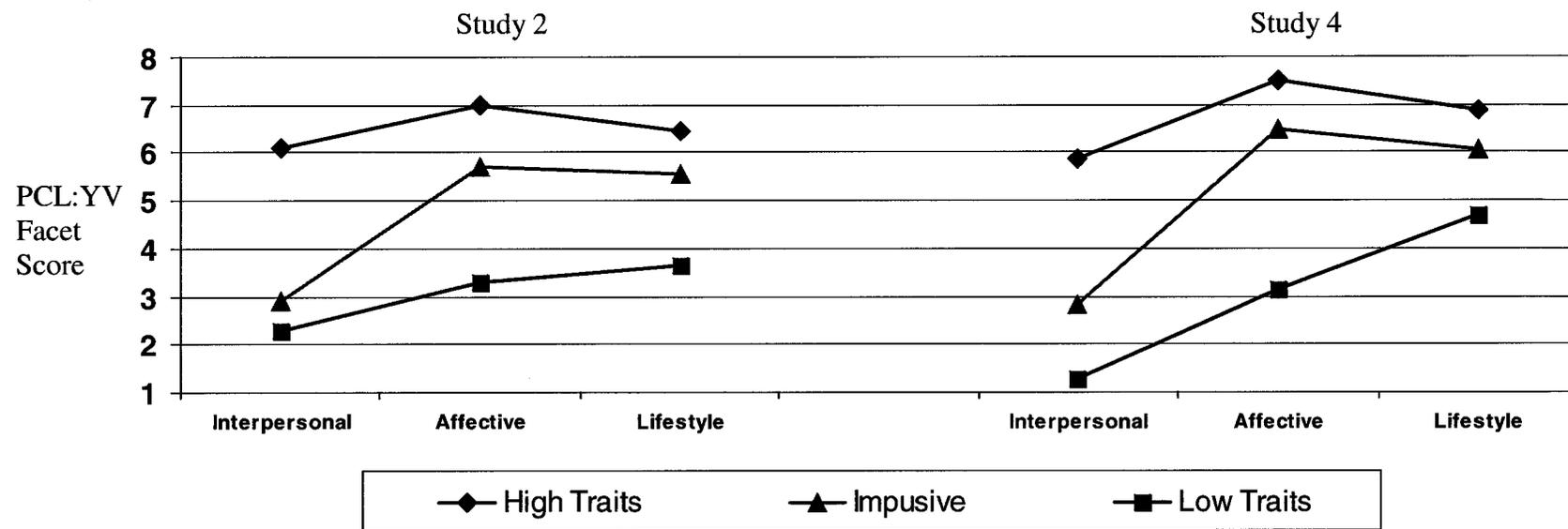
Follow up data were available for 124 participants for the full traits group. The profile characteristics from study 2 replicated in this sample (see Figure 13 for a comparison of cluster profiles from this study to study 2), however only 7 participants were in the low traits group. Therefore, these participants were excluded from analysis and only differences between the high traits group and the impulsive group were assessed.

This sample represents a high risk group of youth. The minimum number of days that a youth from this sample spent in an institution was 143 days (about 4.5 months) to a maximum of 1649 days (about 4.5 years) with a mean of 669 days (about 2 years). Average age was 15.62 ($SD = 1.27$) and there were no age differences among clusters

Table 21
Profile of Clusters in Study 4 (Mean, Standard Deviation, Percentages)

	Cluster Membership		
	Cluster 1: High Traits	Cluster 2: Impulsive	Cluster 3: Low Traits
Number in Cluster (%)	58.9%	35.5%	5.6%
<u>Demographics</u>			
Age	15.6 (1.36)	15.6 (1.10)	15.86 (1.46)
Ethnicity			
Caucasian	32.9%	36.4%	-----
Black	56.2%	45.5%	-----
Other	11.0%	18.2%	-----
<u>PCL:YV Score</u>			
Total Score	35.04 (2.12)	29.41 (3.57)	19.17 (4.37)
Factor 1: Interpersonal	5.85 (.91)	2.84 (1.31)	1.29 (1.11)
Factor 2: Affective	7.49 (.80)	6.50 (1.30)	3.14 (1.22)
Factor 3: Lifestyle	6.86 (.89)	6.04 (1.22)	4.67 (1.08)
Factor 4: Antisocial	7.57 (.69)	7.27 (1.14)	6.06 (1.59)
<u>Offending</u>			
Any	75.4%	65.9%	71.4%
Violent	24.6%	39.0%	14.3%
Felony	60.7%	61.0%	42.9%
Violent Felony	42.6%	34.1%	14.3%

Figure 13
 Profile Characteristics From Study 2 (70% Sub-sample) and Study 4



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$F(2, 118) = 1.26, n.s.$. Differences in days spent in an institution did not differ across clusters $t(114) = .515, n.s.$ (see Table 21 for a description of these clusters).

Half the sample were African American (50%) followed by Caucasian (35.5%), Latino (7.3%), Aboriginal (3.2%), and other (4.0%). It was not possible to assess differences in ethnic composition due to the small number of participants in the other category. Youth who offended in the institution were coded as having negative days to re-offence, these were excluded from analysis and time to recidivism varied from 1 day to 2158 days (about 6 years). Once the youth who offended prior to release ($n = 9$) and the low traits group ($n = 7$) were omitted there were 105 participants available for analysis.

Days in treatment varied from 21 days to 1247 days (about 3 years and 3 months) with a median of 192 days. Clusters did not differ in their time in treatment $t(66.8) = -.947, n.s.$. The base rate of re-offending was 71.6% ($n = 78$) for any offence, 44.0% ($n = 48$) for violent recidivism, 59.6% ($n = 65$) for nonviolent felony, and 39.2% ($n = 41$) for violent felony (see Table 22 for the summary of logistic regression analysis for variables predicting recidivism).

Logistic regression was employed to predict recidivism with cluster membership, total PCL:YV score, age, and number of days in treatment. Cluster membership did not significantly predict any recidivism, violent recidivism, or felony recidivism. The only significant variables were days in treatment and age. Conversely, different results were found when assessing time to violent felony, age and PCL:YV score were the only significant predictors. However, these analyses are impacted by the time available to

Table 22
 Summary of Logistic Regression Analysis for Variables Predicting Recidivism

	B	S.E.	Wald	Exp(B)	Significance
Any Recidivism					
Cluster Membership	.08	.35	.06	1.09	<i>n.s.</i>
PCL:YV Score	.01	.05	.08	1.01	<i>n.s.</i>
Age	.19	.10	3.65	1.21	.008
Days in Treatment	-.002	.001	6.89	1.00	.009
Violent Recidivism					
Cluster Membership	-0.03	.61	.002	.98	<i>n.s.</i>
PCL:YV Score	.11	.82	1.66	1.11	<i>n.s.</i>
Age	.52	.20	6.93	1.67	.008
Days in Treatment	-.003	.001	3.87	1.00	.05
Felony Recidivism					
Cluster Membership	-.53	.63	.72	.586	<i>n.s.</i>
PCL:YV Score	.09	.08	1.3	1.10	<i>n.s.</i>
Age	.50	.19	6.90	1.65	.009
Days in Treatment	-.002	.001	2.87	1.00	.09
Violent Felony Recidivism					
Cluster Membership	-.54	.61	.77	.58	<i>n.s.</i>
PCL:YV Score	.16	.08	3.53	1.17	.06
Age	.45	.20	5.09	1.56	.02
Days in Treatment	-.002	.001	2.32	1.00	<i>n.s.</i>

offend. In order to account for the impact of time at risk survival analyses were conducted.

Cox regression survival analysis was employed to allow the testing of variables such as age and PCL:YV score. Three blocks were used in the analysis, cluster membership was entered into the model first followed by age and PCL:YV score, and finally days in treatment was entered. This model was selected as it first tests the association between cluster membership and survival time and the next block tests whether the association to age or PCL:YV score. Finally, the impact of days in treatment should provide an indication of whether treatment impacts likelihood of recidivism or time to re-offence. Therefore, if a significant association is found between cluster membership and time to recidivate this model will allow us to see if the relationship is explained through the association with PCL:YV score and age, and finally whether days in treatment impacts this relationship.

Cluster membership did not significantly predict any recidivism χ^2 change (1, $N = 102$) = .545, *n.s.*. Moreover, inclusion of the covariates did not significantly predict recidivism χ^2 change (1, $N = 102$) = 2.01, *n.s.*. Alternately, days in treatment resulted in a significant effect χ^2 change (1, $N = 102$) = 8.26, $p < .01$. Furthermore, the model was not significant until days in treatment was entered, the impact of age approached significance ($B = .19$, $SE = .10$, $p = .06$). Similar results were obtained when assessing violent offending and any felony. Neither cluster membership nor PCL:YV score predicted violent or felony recidivism. Alternately, days in treatment was significantly predictive and age at release approached significance.

Assessing violent felony recidivism produced slightly different results. Cluster membership still did not predict recidivism when entered at the first block χ^2 change (1, $N = 102$) = .46, *n.s.*. However, age and PCL:YV score covariates approached significance χ^2 change (1, $N = 102$) = 5.67, $p = .06$). This was due to the significant effect of age ($B = .31$, $SE = .16$, $p < .05$). Similar to prior results days in treatment significantly predicted violent felony recidivism ($B = -.002$, $SE = .01$, $p < .05$). However, contrary to prior results, when all variables were entered into the model, PCL:YV score approached significance ($B = .109$, $SE = .06$, $p = .07$).

Discussion

The purpose of this study was to assess the validity of the clusters from study 2 by measuring differences among clusters in recidivism and treatment response. It was hypothesized that the high traits and impulsive clusters would be more likely to engage in all types of recidivism compared to other clusters. Contrary to predictions and Vincent et al. (2003) no significant differences were found between cluster membership and recidivism. The only significant difference was between the covariates and violent felony recidivism.

Divergence of results may be due to the impact of treatment on recidivism. The sample from this study was placed into a treatment facility and results indicated days in treatment had the largest and most consistent impact on recidivism and time to recidivism. Therefore, days in treatment may have washed out differences that would have been found with untreated youth. Caldwell et al. (in press) reported youth who spent at least 2 months in treatment were significantly less likely to offend than youth in traditional correctional institutions. This relationship was significant even when

covariates including PCL:YV score were accounted for. Unfortunately, similar analysis cannot be conducted with this study as the whole sample was treated and there was no comparison sample available.

The measure of days in treatment employed in this study was a rough measure of treatment impact and therefore future research should employ more comprehensive and sophisticated measures to better understand what is occurring. In addition, days in treatment referred to days in the treatment institution. This means the measure is confounded with sentence length as time in treatment is impacted more by length of sentence treatment progress. Unfortunately, information regarding sentence length was not provided.

These issues indicate that the inability to differentiate clusters is likely impacted by issues with the measures and sample size available. Therefore, although these results did not provide evidence for the validity of clusters, they also do not discount the validity of the clusters due to the limitations associated with the data and analysis. First and foremost, the reduced sample size means caution is needed in interpreting the results. In addition, due to the small size of the low traits group it was not possible to assess differences between all three clusters.

Study 5: Family Background and Aggressive History of Total Group

Hypotheses

Based on research assessing family background and modified PCL-R score, it is expected youth in the high psychopathic traits cluster will be more likely to have experienced a negative family history including negative parental practices and less likely to have experienced parental warmth.

Based on research examining differential factor scores and clusters of youth with psychopathic traits it is expected the high psychopathic traits and impulsive clusters will have a more extensive antisocial and criminal history and display higher levels of aggression followed by the callous-deceitful group and low traits group. In addition, due to the more extensive criminal history found in the high traits group and to a lesser degree the callous-deceitful group it is expected these clusters will obtain higher scores on risk factors and lower scores on protective factors.

Participants

Another sub-sample of participants from Study 1 was assessed. This sample consists of 106 male adolescent offenders aged 15-19 incarcerated in two secure custody facilities in Ontario. The majority of the sample (80%) was Caucasian and most were serving dispositions for violent offences.

Measures

Family Background Variables

A semi-structured interview assessing family background experiences was developed by Forth and Burke (1998) to assess family background information. The items from the interview were subjected to factor analysis and a four factor solution emerged, parental apathy, parental deviance, marital discord, and neglect and sexual abuse. Parental apathy includes items such as physical abuse and emotional abuse, parental deviance consists of items such as parental criminal behavior and inconsistent discipline, marital discord includes items such as parental verbal discord and alcohol discord, and neglect and sexual abuse include neglect and sexual abuse (see Appendix C). Each item is scored as present or absent and summed within the factor. In addition, items

were summed across factors in order to produce a global score. All factor scores and the global score were employed to assess family background in this study.

Egna Minnen Beträffande Uppfostran (EMBU; Perris, Jaccodsson, Lindstron, von Knorring, & Perris, 1980). The EMBU, or Early Memories on Parental Rearing, is a Swedish scale that has been adapted for use in over 25 countries (Gerlsma, Emmelkamp, & Arrindell, 1990). It is a self-report measure assessing retrospective recollections of the type of parenting experienced by participants. Participants were asked to retrospectively rate each parent's behaviours on a 4 point Likert scale (1 "no or never" to 4 "yes, most of the time"). These items load onto 4 factors: Rejection, Emotional Warmth, Overprotection, and Favouring subject. This study will focus on the rejection and emotional warmth factors of the study. The rejection subscale is comprised of 27 items which measure if the parent engaged in hostile or abusive behaviours. The emotional warmth subscale consists of 17 items which measure the degree of warmth and involvement of the parent. Both factors report good alpha coefficients. For example Chandler & Dawn (1999) reported alpha coefficients for Emotional Warmth ranged from .90 - .94 for the father and the mother and .93 for Rejection. These results are comparable to other research applying the EMBU to adolescents (Dekovic et al., 2006; Gerlsma, Arrindell, Van-der-Veen, & Emmelkamp, 1991; Lundberg, Perris, Schlette, & Adolfsson, 2000). The EMBU and has been used with young offenders (Richter, Krecklow, & Eisemann, 2002).

Risk and Protective Factors

Structured Assessment of Violence Risk in Youth (SAVRY; Borum, Bartel, & Forth, 2003): The SAVRY assesses historical risk factors, social risk factors, individual risk

factors, and protective factors through a structured interview. Ten historical items measure static background factors such as history of criminal behaviour. Fourteen social and individual factors include dynamic risk factors such as poor coping and anger management problems. Finally, six protective factors are measured that buffer risk factors such as strong attachment and bonds (see Appendix E). Although there is little data on the psychometric properties of the SAVRY, the results are supportive of the instrument with reliability ratings measured through intraclass correlations of .81 and good convergent and predictive validity of the instrument in young offender samples (Catchpole & Gretton, 2003).

Antisocial Behaviour

Conduct Disorder (CD; APA, 2000). Conduct disorder symptoms were rated based on a semi-structured interview and file review. Criteria were coded dichotomously as present or absent and diagnosis was made based on the presence of 3 symptoms in past 12 months with at least 1 present in last 6 months. Two measures were used to analyze differences in antisocial behaviour, CD diagnosis and total number of symptoms. Furthermore, both the number of prior non-violent offences and the age of onset for non-violent offending were assessed.

Aggression

Finally, several measures of aggression and violence were measured in this sample. These include, number of aggressive CD symptoms, age of onset for violent offending, number of violent offences, history of aggression in offences, engaging in family violence, and aggression in dating relationships. Aggression in past offences (including current offence) was coded on a four point scale 1 = *None/little*, 2 = *Some*, 3 =

Moderate, 4 = *Lots*. Due to the small number of participants who engaged in a high level of aggression in past and current offences moderate and lots were combined into a moderate/high category. Engaging in family violence was measured in the early experience interview conducted by Forth and Burke (1998) and included items such as threatened family with weapon, attacked family with knife or gun, hit parent, seriously beat siblings, and hit siblings with an object. These items were coded dichotomously and summed.

Conflict Tactics Scale (CTS; Straus, 1979). The CTS is the most common measure of intimate partner violence (Newton, Connelly, & Landsverk, 2001) and a common measure of intimate violence in adolescents (Caulfield & Riggs, 1992). Research with the CTS indicates self-reports of intimate partner violence indicates strong agreement with partner reports (Moffit, Caspi, Krueger, & Magdol, 1997). In addition, it has been employed with adolescent samples and demonstrates good validity (Cascardi, Avery-Leaf, O'Leary, & Smith Slep, 1999). It consists of 18 items that assess methods for handling relationship conflict ranging from verbal aggression to types of physical aggression. Specific items include a range of behaviours such as threw object at partner, pushed, grabbed, or shoved, slapped, kicked, bit or hit with fist, hit with object, beat up, threatened with weapon, and used gun or knife. The frequency of using each method in most recent relationship and in general across relationships was measured. These items were summed to indicate degree of violence in intimate relationships in adolescents.

Procedure

Analysis comparing clusters along a continuous variable employed Analysis of Variance and Analysis of Covariance (ANCOVA) with age and PCL:YV score entered as

concomitant variables. Age and PCL:YV score were controlled for to ensure results are not confounded by age related differences or the number of psychopathic traits. ANOVA were conducted first to assess the relationship between cluster membership and the external variable. Next, the ANCOVA were conducted in order to assess a significant relationship can be explained by covariates. Alternately, when variables were ordinal analysis was undertaken with Cramer's V to assess the relationship between cluster membership and the variable.

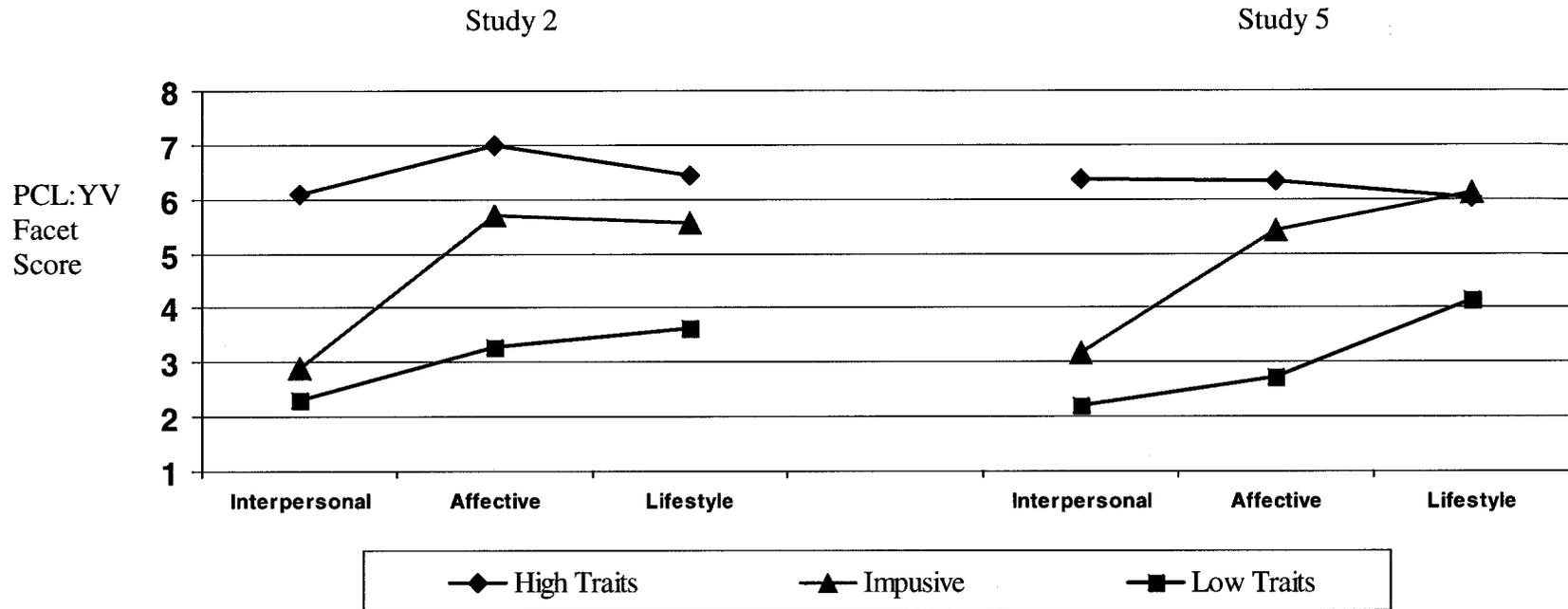
Results

First, the cluster profiles across PCL:YV factors were examined in order to assess whether the cluster solution from study 2 replicated in this sample. The cluster solution is very similar, however the high traits cluster and impulsive cluster did not differentiate on factor 3 in this sample compared to study 2 (see Figure 14 for a comparison of these results). This means interpretation of the differences between clusters should proceed with caution. Sample sizes among clusters were not equal across groups, and therefore Games-Howell *post hoc* analyses was employed to assess significant pairwise differences between clusters. In addition, the divergence of results in study 2 from hypotheses meant hypotheses relating to the callous-deceitful cluster could not be tested in this study.

The mean age of the sample was 17.54 and this did not differ among clusters $F(2, 100) = 2.23, n.s.$. The majority of the sample was Caucasian (80.4%), followed by Aboriginals (13.4%), African American (4.0%), and Asian (2.1%). Unfortunately, it was not possible to assess ethnic differences across samples due to small sample size.

Similar to study 2 clusters significantly differentiated on PCL:YV scores with the high traits group obtaining the highest score ($M = 30.82, SD = 3.81$) followed by the

Figure 14
 Profile Characteristics From Study 2 (70% Sub-sample) and Study 5



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impulsive clusters ($M = 27.10$, $SD = 3.23$) and the low traits cluster ($M = 17.41$, $SD = 3.23$; $F(2, 98) = 104.65$, $p < .002$). Games-Howell *post hoc* analysis indicated that differences were significant across all clusters (see Table 23 for a description of these clusters).

Family Background Variables

The early experiences global score produced a total score that ranged from 1 to 10 with a mean of 4.52 ($SD = 2.12$). ANOVA results indicated a significant difference among clusters $F(2, 98) = 3.45$, $p < .05$. Games-Howell *post hoc* indicated significant differences between the low traits cluster and the high traits cluster with differences between the low traits cluster and the impulsive cluster approaching significance (see Table 24 for a description of clusters across family background variables). However, analysis of the relationship between cluster membership and total score with age and PCL:YV score covariates is not significant $F(4, 96) < 1$, *n.s.*

Analysis with the different factors of the early experiences questionnaire employed Cramer's V in order to assess the relationship between cluster membership and factors from the early experiences questionnaire. No significant associations were found between cluster membership and early experiences factors.

The rejection scale of the EMBU ranged from 27 to 102 for father ($M = 48.98$, $SD = 17.82$) and from 27 to 98 for mother ($M = 42.54$, $SD = 13.64$). There were no significant differences between clusters in paternal or maternal rejection ($F(2, 90) < 1$, *n.s.*; $F(2, 96) > 1$, *n.s.*). The warmth scale of the EMBU ranged from 17 to 65 ($M = 44.10$, $SD = 13.78$) for father and from 20 to 68 for mother ($M = 50.96$, $SD = 11.01$). ANOVA did not indicate significant differences between clusters in either paternal

Table 23
Profile of Clusters from Study 5 (Mean, Standard Deviation, Percentages)

	Cluster Membership		
	Cluster 1 High Traits	Cluster 2 Impulsive	Cluster 3 Low Traits
Number in Cluster (%)	38.6%	39.6%	21.8%
<u>Demographics</u>			
Age	19 (1.77)	17.45 (0.96)	17.32 (0.94)
<u>PCL:YV Score</u>			
Total Score	30.82 (3.81)	27.10 (3.23)	17.41 (3.39)
Factor 1 Interpersonal	6.38 (1.04)	3.17 (1.48)	2.23 (1.90)
Factor 2 Affective	6.33 (1.30)	5.42 (1.73)	2.73 (1.23)
Factor 3 Lifestyle	6.01 (1.33)	6.14 (1.08)	4.14 (1.34)
Factor 4 Antisocial	6.53 (1.30)	6.46 (1.01)	4.64 (1.70)

Table 24
Family Background Differences among Clusters (Mean, Standard Deviation)

Family Background Measure	Cluster Membership		
	Cluster 1 High Traits	Cluster 2 Impulsive	Cluster 3 Low Traits
<u>Early Experiences</u>			
Global Score Mean (SD)	4.85 (1.90) ^a	4.78 (2.25) ^b	3.50 (2.04) ^{a, b}
<u>EMBU Factors</u>			
Maternal Warmth	52.38 (10.87)	51.36 (11.47)	47.82 (10.26)
Maternal Rejection	42.47 (13.22)	41.85 (13.87)	43.87 (14.31)
Paternal Warmth	45.07 (13.98)	42.86 (15.28)	44.77 (10.51)
Paternal Rejection	48.65 (51.33)	51.53 (21.07)	44.70 (11.25)
Parental Warmth	93.89 (23.93)	90.79 (25.62)	84.51 (21.73)
Parental Rejection	87.28 (27.16)	89.76 (31.62)	88.52 (20.61)

^a $p < .05$ Indicates a significant difference measured by Games-Howell *post hoc*

^b $p < .10$ Indicates a difference approaching significance measured by Games-Howell *post hoc*

warmth $F(2, 90) < 1, n.s.$ or maternal warmth $F(2, 96) = 1.24, n.s.$. Scores from both parents were summed in order to provide a measure of parental rejection and warmth. Similar to analyzing scores by individual parent, no significant differences were found between clusters in parental rejection $F(2, 97) < 1, n.s.$ or warmth $F(2, 97) < 1, n.s.$. However, this may be impacted by the high degree of error found in these scales.

Risk and Protective Factors

The average score in the different SAVRY scales were 8.75 ($SD = 3.47$) for historical items, 4.45 ($SD = 1.84$) for social/contextual risk factors and 8.84 ($SD = 3.20$) for individual risk factors. Significant differences were found between clusters in the historical risk scale ($F(2, 96) = 4.38, p < .05$) and the individual risk scale ($F(2, 96) = 15.41, p < .001$), but not the social/contextual risk scale ($F(2, 96) < 1, n.s.$). Games-Howell *post hoc* indicated both the high traits cluster and the impulsive cluster scored significantly higher than the low traits cluster in both historical and individual risk factors. However, analysis with the ANCOVA with age and PCL:YV entered as covariates factors did not find a significant difference between clusters on any of the risk scales. The only significant relationship was between PCL:YV score and cluster membership.

Similar results were obtained when assessing protective factors. The average number of protective factors was 1.44 ($SD = 1.11$) across groups. ANOVA results indicated significant differences were present across clusters ($F(2, 96) = 4.06, p < .05$). Games-Howell *post hoc* indicated this difference was explained by the higher number of protective factors in the low traits group compared to other clusters (see Table 25 for differences among cluster on the SAVRY scales). When the ANCOVA was analyzed

Table 25
Differences among Clusters on SAVRY Scales (Mean, Standard Deviation)

SAVRY Scales	Cluster Membership		
	Cluster 1 High Traits	Cluster 2 Impulsive	Cluster 3 Low Traits
Historical	9.39 (3.28) ^a	9.15 (3.38) ^a	6.81 (3.66) ^{b*}
Social/Contextual	4.61 (1.90)	4.48 (1.85)	4.09 (1.92)
Individual	9.68 (3.10) ^a	9.53 (2.40) ^a	5.76 (3.01) ^{b**}
Protective	1.29 (1.16) ^a	1.27 (1.09) ^a	2.05 (.97) ^{b*}

^{a,b} Indicates a significant differences measured by Games-Howell *post hoc*
* $p < .05$, ** $p < .001$

with the age and PCL:YV covariates, these differences were no longer significant. The only significant association was between PCL:YV score and cluster membership.

Antisocial Behaviour

The base rate for conduct disorder in this sample was extremely high (98.0%). Therefore, it is not surprising that no significant differences between clusters in conduct disorder diagnosis, $V(100) = .074, n.s.$. Number of CD symptoms was significantly associated with cluster membership ($F(2, 97) = 6.14, p < .01$). Games-Howell *post hoc* indicated both the high traits group ($M = 8.10, SD = 3.02$) and the impulsive group ($M = 7.53, SD = 2.46$) differed significantly from the low traits group ($M = 4.76, SD = 2.53$). However, no relationship between cluster membership and CD symptoms was found when age and PCL:YV score were controlled for.

The majority of youth in this sample committed a non-violent crime (93.7%) with an average of 9.07 ($SD = 6.74$) non-violent offences. Number of past non-violent offences was compared across clusters. The initial ANOVA was significant $F(2, 92) = 3.34, p < .05$. Games-Howell *post hoc* indicated both the high traits group ($M = 9.47, SD = 6.24$) and the impulsive group ($M = 10.43, SD = 7.50$) had significantly more offences compared to the low traits cluster ($M = 5.8, SD = 5.19$). Alternate results were found with the ANCOVA when age and PCL:YV score were entered as covariates. The only variable that was significantly related to non-violent offences was PCL:YV score.

Similar results were found in assessing the age of first offence. Age of first non-violent offence was significantly different across clusters $F(2, 71) = 3.14, p < .05$. Games-Howell *post hoc* indicated this was due to differences between the high traits group and the low traits group. The high traits group had a significantly earlier age of

onset ($M = 14.19$, $SD = 1.67$) compared to the low traits group ($M = 15.5$, $SD = 1.67$). The age of onset for the high traits group fell between the other clusters ($M = 14.66$, $SD = 1.59$), this cluster did not differ from the others (see Table 26 for a comparison of clusters on antisocial behaviour). Furthermore, similar to analysis with the number of non-violent offences, cluster membership was no longer significantly associated with age of first non-violent offence once covariates were entered into the model.

Aggression

There appears to be a lower base rate for aggression in this sample compared to antisocial behaviour. The base rate for violent offending was 64.9% and the average number of offences was 1.05 ($SD = 1.07$). There were no significant differences among clusters in number of prior violent convictions ($F(2, 94) < 1$, *n.s.*), however age of first violent offence approached significance ($F(2, 46) = 2.88$, $p < .10$). The inability to attain significance may result from missing information regarding this variable. Data were available for 48 people, however this was not evenly distributed across clusters. Information regarding age of first violent offence was only available for 7 participants in the low traits group. The pattern of results is similar to the relationship between cluster membership and age of onset for non-violent offending. The high traits group ($M = 15.8$, $SD = 1.59$) and the impulsive group ($M = 15.8$, $SD = 2.09$) began offending earlier than the low traits group ($M = 16.86$, $SD = 1.07$). Results from the ANCOVA indicated once the age and PCL:YV covariates were accounted for, only the relationship between age of onset for violent offending and age approached significance.

Initial results assessing CD aggressive symptoms supported the hypothesis. There were significant differences between clusters and number of aggressive CD symptoms F

Table 26
 Antisocial Variables across Clusters (Mean, Standard Deviation, Percent)

Measure of Antisocial Behavior	Cluster Membership		
	Cluster 1 High Traits	Cluster 2 Impulsive	Cluster 3 Low Traits
CD Diagnosis	97.4%	97.5%	95.5%
Number of CD symptoms	8.10 (3.02) ^a	7.53 (2.46) ^a	4.76 (2.53) ^b
Number of Non-violent convictions	10.43 (7.50) ^a	9.47 (6.24) ^a	5.80 (5.19) ^b
Age of first offence	14.19 (1.67) ^a	14.66 (1.59)	15.50 (1.67) ^b

^{a, b} Indicates a significant differences measured by Games-Howell *post hoc*, $p < .05$

(2, 97) = 10.96, $p < .001$. Similar to analysis with total number of CD symptoms, Games-Howell *post hoc* indicates this results is due to significant differences between the high traits ($M = 3.20$, $SD = 1.64$) and impulsive clusters ($M = 2.70$, $SD = 1.45$) with the low traits cluster ($M = 1.76$, $SD = 1.41$).

Alternately, no significant association was found among clusters and aggression in current offence, past offences, or engaging in family violence (see Table 27 for a comparison among clusters on aggressive variables). Analysis examining the CTS score from both the most recent relationship and average across relationships did not find a significant association with cluster membership ($F(2, 97) = 1.56$, *n.s.*; $F(2, 97) < 1$, *n.s.*).

Discussion

The purpose of study 5 was to validate clusters from Study 2 by assessing if they differentiated in background variables. In general, hypotheses were supported in the initial analysis, however, once PCL:YV score and age were controlled differences disappeared. Therefore, there is support for the validity of the clusters found in Study 2, however they do not appear to provide information beyond age and PCL:YV score.

The only significant difference found among clusters in family background variables was the global score from the early experiences questionnaire. There were no significant associations between parental warmth or rejection and cluster membership. Although no prior research has assessed family background with subtypes of youth, differences were expected based on prior studies that reported a negative relationship between psychopathic traits and parental attachment (Kosson et al., 2002). In addition, theories of development of psychopathy (Lykken, 1995; Porter, 1996) also suggest early childhood experiences can impact the development of psychopathy.

Table 27
Aggressive Variables across Clusters (Mean, Standard Deviation, Percent)

Measure of Aggressive Behavior	Cluster Membership		
	Cluster 1 High Traits	Cluster 2 Impulsive	Cluster 3 Low Traits
Number of CD Aggressive symptoms	3.20 (1.64) ^a	2.70 (1.45) ^a	1.76 (1.41) ^b
Number of Violent convictions	1.71 (1.96) ^a	1.47 (1.39) ^a	1.38 (1.99) ^b
Age of first violent Offence	15.80 (1.59) ^a	15.80 (2.09) ^a	16.86 (1.07) ^b
Engaging in family violence	7.02 (2.25)	7.12 (2.67)	6.09 (1.34)
<u>Level of aggression in Offences</u>			
Current Offence *			
No Aggression	50.0%	51.3%	61.9%
Aggression	50.0%	48.7%	38.1%
Past Offences *			
No Aggression	45.2%	45.7%	62.5%
Aggression	54.8%	54.3%	37.5%
<u>CTS Score</u>			
Most recent relationship	9.56 (7.53)	11.00 (9.26)	8.67 (6.94)
Average across relationships	15.46 (9.52)	17.18 (12.11)	12.19 (8.53)

* Only the percentage of no aggression and aggression reported due to small sample size across groups

^{a, b} Indicates a significant differences measured by Games-Howell *post hoc*, $p < .05$

The absence of a relationship between cluster membership with parental warmth and rejection may potentially be attributed to a variety of factors. First, the measures of parental warmth and rejection employed in this study may not correspond to the measure of attachment utilized by Kosson et al. (2002). Secondly, the clusters that are found in this study may not represent the theoretical clusters of Lykken (1995) and Porter (1996).

As discussed, both Lykken (1995) and Porter (1996) posit two different trajectories towards developing psychopathic traits. The first trajectory is impacted by genetics that increase the likelihood of developing the disorder. The second group begins to develop the disorder due to early childhood experiences or trauma. These trajectories are thought to represent primary and secondary psychopathy. However, the clusters in this study may not correspond to primary and secondary psychopathy. First, this sample represents the full range of scores and not differences in the high psychopathic traits group. Second, the early experiences discussed in these theories include neglect from a young age and trauma at an early age. Although early age is not defined, experiences as young as 2 to 4 are discussed. Assessing experiences during these ages requires measures other than self report.

The only significant result between cluster membership and family background was a global score of negative early experiences. This relationship disappeared when PCL:YV score and age were entered as covariates and only PCL:YV score came out significant. Therefore, cluster membership did not provide any incremental information over psychopathic traits regarding family background characteristics. Although these results do not demonstrate a robust association between family background and cluster membership, prior research has only found inconsistent results when assessing family

background characteristics and psychopathic traits (Campbell et al., 2004; McBride, 1998; Marshall & Cooke, 1999).

Results assessing the relationship between cluster membership and the risk and protective scales of the SAVRY demonstrated a significant association between all scales except the social contextual risk scale. In line with predictions both the high traits group and the impulsive group scored significantly higher than the low traits group regarding risk. They obtained higher scores on the historical and individual risk scales of the SAVRY and lower scores on the protective scale. However, once the PCL:YV age covariates were entered, this association disappeared and only PCL:YV was associated with the SAVRY scales. In addition, there were no significant differences in the social/contextual risk factors which contain items such as delinquent peers, poor coping, and poor parental management (see Appendix C for a complete list). It is unclear why clusters did not differentiate on this particular risk scale, this is an area the future research could explore.

Clusters differentiated on antisocial variables, supporting the hypotheses.

Although contrary to predictions there were no differences between clusters on CD diagnosis this was likely due to the high base rate in this sample. In addition, significant differences were found between clusters on number of total CD symptoms and number of CD aggressive symptoms. In line with predictions the high traits group and impulsive group had a greater number of CD symptoms compared to the low traits group.

Furthermore, there were significant differences in age of onset for non-violent offending and number of non-violent offences in their offending history. The high traits cluster and the impulsive cluster began their offending earlier than the low traits cluster and had

significantly more non-violent. However, when age and PCL:YV score were accounted for, cluster membership was no longer associated with antisocial behaviour.

Regardless of the lack of relationship between cluster membership and antisocial variables when covariates are controlled for, these results replicate prior research. Vincent et al. (2003) reported analogous results with differences between the high traits and impulsive clusters compared to the low traits clusters on age of first conviction, and number of prior non-violent convictions. In addition, these results are similar to research with cluster analyzed children. Christian et al. (1997) reported the high traits group was more likely to report antisocial behavior such as property destruction and have a greater number of arrests. Neither of these prior studies controlled for the influence of number of psychopathic traits between clusters.

The relationship between cluster membership and aggressive behaviour is less consistent and therefore, only partially supports hypotheses. Contrary to predictions there were no significant differences among clusters in number of violent offences. It is unclear why differences were found with non-violent offences but not violent offences since research tends to show that PCL:YV is a more robust predictor of violent offending than non-violent offending (Campbell et al., 2004; Murrie et al., 2004). In addition, Vincent et al. (2003) reported significant differences between cluster in past number of both non-violent and violent offences with high traits and impulsive clusters scoring higher than the low traits group.

The association between cluster membership and number of CD aggressive symptoms was significant, in line with predictions. The high traits and impulsive group are more aggressive than the low traits group. However, these results are due to the

impact of the PCL:YV covariate and therefore, cluster membership is not providing any new information. This pattern replicated in age of onset for violent offending, the high traits group began offending earlier than the low traits group. However, due to missing data, these differences only approached significance.

No significant differences were found in level of aggression among clusters in aggression in current or past offences, engaging in family violence, or CTS score. Differences in results between studies may be due in part to the differences in cluster solutions between studies. This study does not have the callous-deceitful cluster and this may impact results as those who would have been classified as callous-deceitful were placed into other clusters. Furthermore, there was a lower base rate of aggression in this sample and this may have impacted the ability to differentiate between clusters on these variables.

Although clusters differentiated on many background variables, the high traits cluster and the impulsive cluster did not significantly differentiate from each other. However, the high traits cluster did tend to have more extreme scores on external variables. Moreover, the inability of these clusters to distinguish on external variables was potentially limited by the lack of differentiation on the lifestyle factor of the PCL:YV between the high traits cluster and the impulsive cluster.

Due to some of the limitations associated with this data, further research should be conducted to assess the utility of these clusters. First, the sample size available for analysis was reduced and missing information on some variables such as age of first violent offence further reduced sample size. In addition, all of the variables assessing family background employed self report measures and therefore there may be some

issues with reliability of recall. However, these results indicate that prior research with clusters should be interpreted with caution as PCL:YV score may be accounting for the significant differences that were reported.

General Discussion

A paucity of research exists in the examination of subtypes of youth with psychopathic traits. This study endeavored to act as a starting point towards identification of a reliable and valid typology of this group. A valid and reliable typology could provide a greater understanding of these youth, inform theory and research on the development of psychopathic traits, and result in effective prevention and treatment efforts. In addition, if subtypes relate to the antisocial behaviour of this group they may enable more refined predictions of risk. The purpose of this research was to add to the growing body of knowledge concerning subtypes within adolescent offenders. This goal was attained as results provide numerous jumping points for future research and also highlight some of the challenges ahead.

This study attempted to replicate results from prior cluster analysis with both the high traits groups and full range groups. Unfortunately, the only prior research to assess a high traits group employed adults (Hervé, 2003). This research was used as the basis for predictions in Study 1 as research suggests there is a similar manifestation of psychopathy in youth and adults. However, applying research with psychopathic adults to youth with high psychopathic traits may be misconstrued as support for labeling youth with high psychopathic traits as psychopathic. Future research in this area should be aware of this potential and attempt to mitigate it by engaging in more research with

adolescent samples and stating the inability to generalize these subtypes to adulthood and visa versa.

This issue highlights the need for prospective longitudinal research to provide information about the developmental progression of these subtypes. This type of research is needed for both the high traits clusters and the full range cluster. Research conducted by Frick and colleagues (2003) indicates subtypes may have different levels of stability. They assessed the stability of psychopathic traits using the ASPD and found stability of traits varied depending on the pattern of scores. Specifically, children with a higher number of conduct problems had most stable CU traits (similar to interpersonal and affective factors). This finding may also help understand why the missing cluster in both groups involved a cluster high in PCL:YV Factors 1 and 2 (interpersonal and affective) and low in Factors 3 and 4 (lifestyle and antisocial). However, it is unclear if these results from the ASPD would generalize to this group. If this cluster emerges in future research, analysis should be conducted on the stability of this cluster.

Analyses were conducted with both the high traits group and the full range group as only a limited sample size was available for the high traits group and prior attempts to subgroup psychopathic traits have used the full range group (Christian et al., 1997; Vincent et al., 2003). Research has not assessed the similarity between subtypes of a high traits group and the full range group so it is unclear how offender subtypes correspond to psychopathic subtypes. The similarities between the high psychopathic traits sample and the full range sample were assessed to help inform this area.

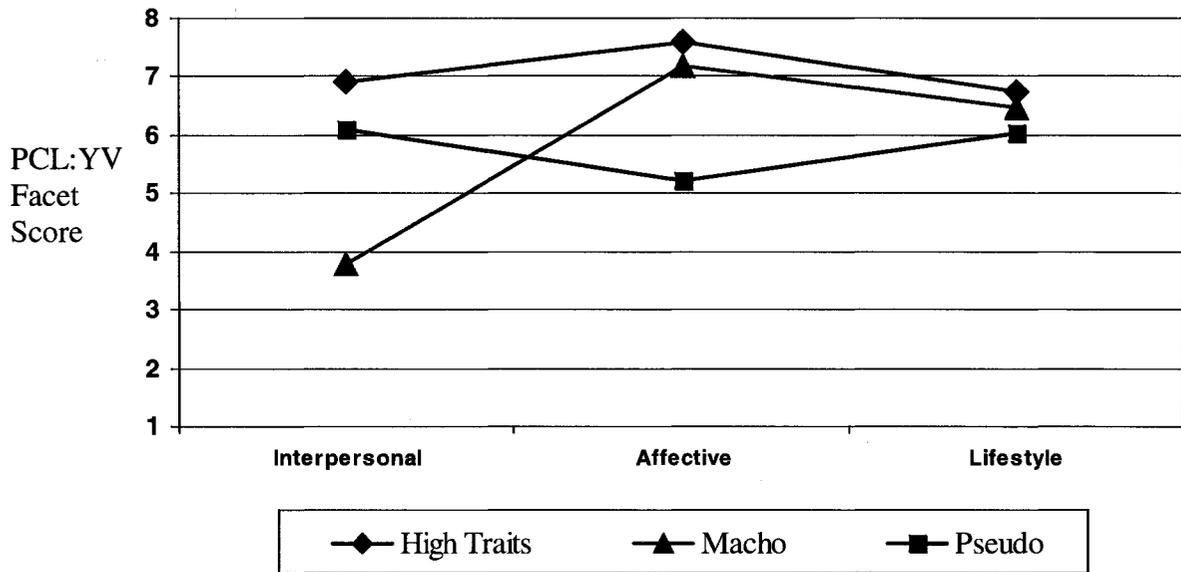
First, both studies 1 and 2 found a 3 cluster solution and similarities were found between some of the clusters. The classic cluster from study 1 corresponds to the high

traits cluster from study 2. This is also true for the macho cluster from study 1 and the impulsive group from study 2. However, there are some potentially important distinctions between samples as well. First, the high traits and impulsive group from study 2 appear to differentiate on the affective and lifestyle factors of the PCL:YV whereas the classic and macho group from study 1 have similar scores on these factors. Second, there is a different pattern of results found in the pseudo group of study 1 and the low traits group of study 2. The pseudo group scored lower on the affective factor and comparable to other clusters on the lifestyle factor of the PCL:YV. Alternately, those in the low traits group scored low on the affective factor of the PCL:YV with increasing scores across factors while remaining well below other clusters on all factors (see Figure 15 for a graphic comparison of these results).

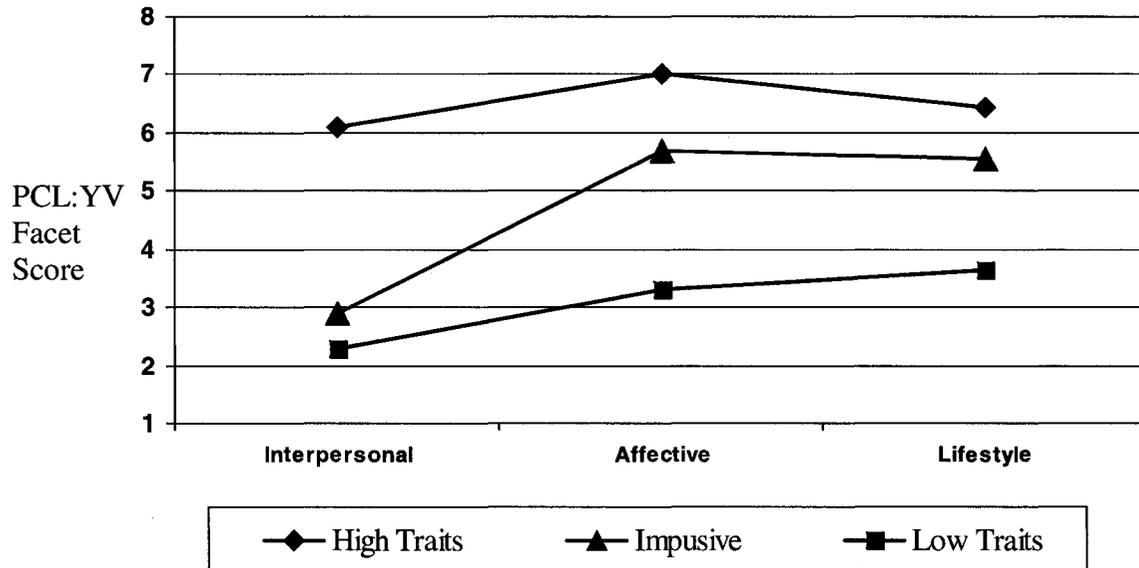
The similarity in the pattern of results between studies 1 and 2 does not infer these clusters are the same and would demonstrate a similar relationship with external variables. Results from studies 4 and 5 indicate many of the differences found between clusters may be attributed to differences in their PCL:YV score. Moreover, the average PCL:YV score varied across studies with all clusters in the high traits group scoring above their similar cluster in the full range group. Further research is needed to provide a more thorough understanding of the similarities and differences between clusters in the high traits and full range group. Until research is able to address these issues, typologies that are based on offender groups that vary across the full range of psychopathic traits should not be generalized to the high traits group.

Figure 15
Profile Characteristics from Studies 1 and 2 (70% Sub-sample)

Study 1



Study 2



Effort was made to extend the results of prior research by assessing if the clusters differentiated on recidivism and a variety of background variables, while controlling for age related differences and degree of psychopathy. This involved assessing sub-samples from studies 1 and 2. The first step was to ensure the cluster solutions remained stable in the sub-sample so results would apply to the clusters that emerged in studies 1 and 2.

There were two issues that were encountered with this analysis. The first is the inability of the cluster solution from study 1 to replicate and the second was the change in the elevation of the factor scores when assessing the clusters in study 2. The inability of the solution from cluster 1 to replicate appears to result from the restricted range of factor scores and the tendency for the range to vary from sample to sample. This is an important issue as it limits the ability to classify those outside of the sample that was clustered. However, a valid and reliable typology should be informed by a comprehensive body of research that includes various methods that converge to inform the typology. As discussed, future research should employ other methods when attempting to subgroup this sample such as clustering based on external variables and selecting samples based on factor scores.

Although the clusters from study 2 replicated in most samples, there were slight changes in the elevation of factor scores across samples. This may impact the ability to differentiate clusters on external variables. In addition, as research with these clusters is new, it may not be clear whether the initial solution which found differences on a factor is correct or if the replication is correct. The large sample size employed in the development of these cluster solutions provides confidence that clusters that emerged in that sample are superior to the sub-samples they were replicated with. Future research could work

towards development of standardized profile scores that can be applied to make appropriate classification decisions. For example, if an adolescent were to score from 3 to 5 on the interpersonal factor and from 8 to 10 on factors 2 and 3 they may be classified as macho. However, before we reach this point the utility of these clusters should be demonstrated.

Due to the inability of the cluster solution from study 1 to replicate, it was only possible to assess the validity of the clusters of the full range group from study 2. Validity of this cluster solution received partial support from studies 4 and 5. As predicted, clusters differentiated on some measures of recidivism, family background, antisocial history, and aggression. However, these results were not robust as clusters did not differentiate on all measures. No relationships were found between non-violent recidivism, violent recidivism, or non-violent felony recidivism and cluster membership. This is in direct contrast to Vincent et al. (2003) and prior research that indicates psychopathic traits are predictive of recidivism and shorter survival times, especially violent recidivism (Brandt et al., 1997; Catchpole & Gretton, 2003; Corrado et al., 2005; Gretton et al., 2004). This divergence may be due to the impact of days in treatment which potentially washed out differences between clusters on recidivism. The absence of a relationship between cluster membership and days in treatment also suggested that clusters membership is not related to treatment response. However, this should be interpreted with caution as prior research has found psychopathic traits to be an important consideration in treatment amenability (O'Neill et al., 2003; Spain et al., 2004). In addition, days in treatment only provides a rough indication of the relationship and more

research with a more sensitive measure of treatment response is needed in order to understand this important relationship.

Alternately, results from study 5 were more supportive of results from Vincent et al. (2003). Groups differentiated on antisocial variables and some aggressive variables. In addition, study 5 reported a significant relationship between negative early experiences and cluster membership. However once PCL:YV score and age were accounted for the relationship disappeared. In addition, the factors of the early experiences and EMBU tests were not significant. Therefore, this study has failed to provide further understanding to the relationship between psychopathic traits and family background. Future research should employ other measures beyond youth self reports. Especially since many of the early childhood experiences that are theoretically relevant to the primary and secondary typology occur at a very young age. In addition, research that has employed different measures reported different results (McBride, 1998; Marshal & Cooke, 1999). Therefore, these studies provide some support for the validity of the cluster solution from study 2, however these differences did not appear to provide any incremental information beyond total PCL:YV score.

There were two issues that were encountered with this analysis. The inability to differentiate clusters on external variables when PCL:YV score was accounted for indicates that differences between clusters reflect the number of psychopathic traits rather than different subtypes of the disorder. This finding is relevant to research and theory on subtypes of psychopathic traits. One of the issues in reviewing the literature on subtypes of psychopathy, especially the primary and secondary group, was that degree rather than type of psychopathy was being sub-typed. Although these clusters may not generalize to

research with adults and the primary and secondary typology, they do support the concern that differences among subtypes may result from differences in the degree or number of traits. However, due to the limitations associated with these studies, these results should not be taken as definitive evidence that these clusters are not potentially useful. x

Limitations and Directions for Future Research

One of the limitations associated with this study was the inability to choose the measures that were employed. Therefore, certain variables of theoretical importance such as anxiety could not be assessed. Research in the past 20 years has greatly enhanced our knowledge regarding the construct of psychopathy, however when assessing subtypes research largely employs variables that were suggested by early clinicians. Due to the lack of certainty regarding the type of variable that is best used to differentiate subtypes on further research should employ a wider range of measures that have been found to be related to psychopathic traits. These include passive avoidance deficits, cognitive-affective reasoning, and lexical decision tasks (Arnett, Howland, Smith, & Newman, 1993; Blair, 2005; Kosson, 1996; Kosson, 1998; Lorenz, & Newman, 2002). Although the majority of this research has employed adult samples, there is evidence for a lack of responsiveness to distress cues and cognitive-affective reasoning in children with psychopathic traits (Blair, 1999; Fisher & Blair, 1998; Pardini, Lochman, & Frick, 2003).

Additionally, some of the measures included could be improved upon. For example, response to treatment was measured by days in treatment which was defined as days in a treatment institution. Although this may provide some indication of a relationship between psychopathic traits and this treatment institution, the relationship is confounded with other factors such as sentence length that further research is needed to

understand this relationship. In addition, it does not provide information regarding behaviour during treatment or any additional treatment programs that the youth may have participated in.

Another limitation encountered in both studies 1 and 2 that has not been addressed in prior research is the impact of external variables on cluster profiles. For example, the low score on the interpersonal factor found in the macho and impulsive cluster may reflect developmental delays experienced within this group. This is an important area for research as it would have direct implications for treatment planning.

As discussed there was only a limited ability to assess the validity of the cluster solutions reported in studies 1 and 2. Due to issues with the ability of the clusters from study 1 to replicate the ability of these clusters to differentiate on external variables could not be assessed. In addition, the small samples sizes in studies 4 and 5 along with the lack of sophistication of some of the measures available limited the ability to assess the validity of the clusters from study 2.

Finally, this study only assessed males and the majority of analysis focused on North American males. The manifestation of youth with psychopathic traits in populations other than North American males deserves a great deal of attention. This is illustrated in the inability of these samples to replicate in the UK incarcerated sample. In addition, research with females indicates different variables may be important for understanding subtypes in females. For example, the interpersonal and affective factors may have a heightened importance in this group (Odgers et al., 2005; Schrum & Selekin, 2006). However, in spite of these limitations, this research has provided an important contribution to the under researched area of subtypes of youth with psychopathic traits.

Research on subtypes of youth with psychopathic traits is in its infancy with the potential of having a large impact on our understanding of this group and their behaviour. Subtypes may distinguish youth on type of offending, leading to more refined predictions of risk and more effective treatment programs. The impact of these subtypes cannot be fully understood until we have more knowledge regarding what variables differentiate subtypes. However, there is still a long way to go before we arrive at a reliable and valid typology of youth. There are areas in the PCL:YV literature that need to be developed such as the relationship between PCL:YV score and treatment and differential impacts of factor scores on recidivism. This research does not need to progress independently of a typology of this group, in fact if researchers assess potential subtypes when conducting research it may help explain some results that would otherwise be difficult to interpret.

The true test of any typology lies in its ability to have a practical application for professionals. A typology of youth with psychopathic traits should potentially inform theory regarding the development of psychopathy, allow for more refined predictions of risk, and promote the development of successful intervention programs that will truncate the negative outcomes associated with the disorder in adulthood.

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Appendix A

Family Background Variables

Parental Apathy

Childhood physical abuse
Physical punishment
Childhood emotional abuse
Lack of supervision

Total Mother ____

Total Father ____

Total Both ____

Parental Deviance

Parental criminal behaviour
Parental drug use
Childhood separation
Broken home
Inconsistent discipline

Total Mother ____

Total Father ____

Total Both ____

Parental Verbal & Physical Discord

Parental verbal discord
Parental alcohol abuse
Parental physical discord

Total Mother ____

Total Father ____

Total Both ____

Neglect and Sexual Abuse

Childhood physical abuse
Childhood neglect

Total Mother ____

Total Father ____

Total Both ____

Appendix B
EMBU Items

[Note: Fathers version is identical except for substitution of 'father' for 'mother' and gender appropriate pronouns]

Please answer the following questions based on how your mother usually acts towards you. If you have more than one mother figure, please answer the questions based on the person you feel has played the most important role in your upbringing. Rate each question on a scale from 1 to 4; 1=No, never, 2=Yes, but seldom, 3=Yes, often, 4=Yes, most of the time. Below, please indicate which parent you are answering the questions about.

I am answering these questions about my:

1. ___ biological mother
2. ___ adopted mother
3. ___ foster mother
4. ___ step-mother
5. ___ grandmother
6. ___ other, please specify _____

	No, Never	Yes, but seldom	Yes, often	Yes, most of the time
1 Does your mother interfere in everything you do?	1	2	3	4
2 Does your mother show that she loves you?	1	2	3	4
3 Compared to your brother(s) and sister(s), are you spoiled by your mother?	1	2	3	4
4 Would your mother like you to be different?	1	2	3	4
5 Does your mother ever refuse to speak to you for a while after you have done something wrong?	1	2	3	4
6 Does your mother punish you for little things?	1	2	3	4
7 Does your mother think that you have to really make something of yourself?	1	2	3	4
8 Do you think that your mother would like you to be different?	1	2	3	4
9 Do you get things from your mother that your brother(s) and sister(s) don't get?	1	2	3	4
10 If you do something stupid, can you later make it up to your mother?	1	2	3	4
11 Does your mother ever tell you which clothes you should wear and what you should look like?	1	2	3	4
12 Does your mother ever give you a hug?	1	2	3	4
13 Do you get the feeling that your mother likes your brother(s) and sister(s) more than of you?	1	2	3	4
14 Is your mother more unfair to you than to your brother(s) and sister(s)?	1	2	3	4
15 Does your mother forbid you to do things that your friends are allowed to do because she is afraid that something will happen to you?	1	2	3	4

16.	Does your mother ever tell you off in front of other people?	1	2	3	4
17.	Does your mother worry about what you are doing after school is over?	1	2	3	4
18.	If things aren't going well for you, does your mother try to help you or make you feel better?	1	2	3	4
19.	Does your mother hit you more than you deserve?	1	2	3	4
20.	If you have done something which isn't allowed, does your mother act so unhappy that you start to feel guilty?	1	2	3	4
21.	Do you feel that your mother loves you more than your brother(s) and sister(s)?	1	2	3	4
22.	Is your mother interested in your school grades?	1	2	3	4
23.	Do you feel that your mother minds helping you if you have to do something difficult?	1	2	3	4
24.	Does your mother treat you like the "black sheep" or the "scapegoat" of the family?	1	2	3	4
25.	Do you feel that your mother loves you?	1	2	3	4
26.	Does your mother think that you have to be the best at everything?	1	2	3	4
27.	Does your mother make it clear that she loves you?	1	2	3	4
28.	Do you think that your mother takes your opinion into account?	1	2	3	4
29.	Do you feel that your mother likes being with you?	1	2	3	4
30.	Do you ever get the feeling that your mother doesn't have time for you?	1	2	3	4
31.	Do you have to tell your mother what you have been doing when you get home?	1	2	3	4
32.	Do you feel that your mother tries to give you a happy childhood during which you could learn about all sorts of different things (for example, through books and special trips and so on)?	1	2	3	4
33.	Does your mother ever pay you compliments?	1	2	3	4
34.	Do you ever feel guilty because you behaved in a way that your mother didn't approve of?	1	2	3	4
35.	Do you feel that your mother expects a lot from you in terms of grades, sporting achievements and so on?	1	2	3	4
36.	Can you count on help and understanding from your mother if you are unhappy?	1	2	3	4
37.	Do you ever get punished by your mother when you haven't done anything wrong?	1	2	3	4
38.	Does your mother say unpleasant things about you to other people, for example that you are lazy or difficult?	1	2	3	4
39.	When something happens, does your mother usually blame you the most?	1	2	3	4
40.	Does your mother accept you just the way you are?	1	2	3	4

41.	Does your mother ever act in a harsh and unfriendly way towards you?	1	2	3	4
42.	Does your mother punish you a lot, even for little things?	1	2	3	4
43.	Does your mother ever slap you for no reason?	1	2	3	4
44.	Is your mother interested in your hobbies and what you like doing?	1	2	3	4
45.	Did your mother ever strike/hit you?	1	2	3	4
46.	Does your mother ever treat you in a way that makes you feel small?	1	2	3	4
47.	Is your mother ever overly scared that something would happen to you?	1	2	3	4
48.	Do you feel that you and your mother like each other?	1	2	3	4
49.	Does your mother allow you to have opinions that are different from hers?	1	2	3	4
50.	Did your mother ever send you to bed without any food?	1	2	3	4
51.	Do you feel that your mother is proud of you if you do something really well?	1	2	3	4
52.	Does your mother give you preferential treatment compared to your brother(s) and sister(s)?	1	2	3	4
53.	Does your mother blame your brother(s) and sister(s) when it is actually your fault?	1	2	3	4
54.	Does your mother show that she loves you, for example by giving you a hug?	1	2	3	4

Appendix C

SAVRY Items

Historical Risk Factors

1. History of violence
2. History of non-violent offending
3. Early indication of violence
4. Past supervision/Intervention failures
5. History of self-harm or suicide attempts
6. Exposure to violence in the home
7. Childhood history of maltreatment
8. Parental/Caregiver criminality
9. Early caregiver disruption
10. Poor school achievement

Social/Contextual items

11. Peer delinquency
12. Peer rejection
13. Stress and poor coping
14. Poor parental management
15. Lack of personal/social support
16. Community disorganization

Individual Risk Factors

17. Low interest/commitment to school
18. Negative Attitudes
19. Risk taking/Impulsivity
20. Substance use difficulties
21. Anger management problems
22. Low empathy/remorse
23. Attention deficit/Hyperactivity difficulties
24. Poor compliance

Protective Factors

25. Pro-social involvement
26. Strong social support
27. Strong attachments and bonds
28. Positive attitudes towards intervention and authority
29. Strong commitment to school
30. Resilient personality traits