Ryerson University
Digital Commons @ Ryerson

Theses and dissertations

1-1-2011

Psychopathic features, paired-associate learning, and lexical decision-making in children

Nicole Susann Cormier
Ryerson University

Follow this and additional works at: http://digitalcommons.ryerson.ca/dissertations

Recommended Citation
Cormier, Nicole Susann, "Psychopathic features, paired-associate learning, and lexical decision-making in children" (2011). *Theses and dissertations.* Paper 685.

This Thesis is brought to you for free and open access by Digital Commons @ Ryerson. It has been accepted for inclusion in Theses and dissertations by an authorized administrator of Digital Commons @ Ryerson. For more information, please contact bcameron@ryerson.ca.

PSYCHOPATHIC FEATURES, PAIRED-ASSOCIATE LEARNING, AND LEXICAL DECISION-MAKING IN CHILDREN

by

Nicole Susann Cormier

Bachelor of Arts in Psychology, University of British Columbia – Okanagan,

Kelowna, British Columbia, 2007

A thesis

presented to Ryerson University

In partial fulfillment of the requirements for the degree of

Master of Arts

in the program of Psychology

Toronto, Ontario, Canada 2011

© Nicole S. Cormier 2011

Author's Declaration

I hereby declare that I am the sole author of this thesis.

I authorize Ryerson University to lend this thesis to other institutions or individuals for the purpose of scholarly research.

Author's signature:_____

I further authorize Ryerson University to reproduce this thesis by photocopying or by other means, in total or part, at the request of other institutions or individuals for the purpose of scholarly research.

Author's signature:_____

Abstract

Psychopathic Features, Paired-Associate Learning, and Lexical Decision-Making in Children

Nicole S. Cormier

Master of Arts in the Program of Psychology, 2011

Ryerson University

This thesis explored potential links between psychopathic features and difficulties with abstract semantic processing in a clinical convenience sample of children aged 6 through 11. Correlational analyses investigated relationships between parent-reported Antisocial Process Screening Device (APSD) and Inventory of Callous-Unemotional (ICU) scores, and differences in children's concrete versus abstract performance on paired-associate (PA) and lexical decision (LD) tasks. The expected positive correlations with callous-unemotional traits were not found. However, parent-reported APSD impulsivity, APSD total, and ICU total scores were negatively correlated with differences in LD accuracy. APSD narcissism scores were also positively correlated with concrete and abstract LD accuracy. The analyses failed to reveal anticipated differences between concrete and abstract task performance. While the null findings suggest numerous issues with the study protocol, several solutions are proposed, and the importance of measuring the sub-factors of psychopathy (impulsivity, narcissism, CU traits) in future investigations of child cognitive functioning was emphasized.

Acknowledgements

There are a number of individuals without whom this thesis would not have been possible. I would like to thank my supervisor, Dr. David Day, for his unrelenting support, patience, and perseverance in supervising a very challenging project (and student). I offer additional thanks to Dr. Todd Girard for his invaluable assistance with the cognitive elements of the present study, and with design of the computerized cognitive tasks.

I would like to acknowledge Dr. Leena Augimeri, Dr. Margaret Walsh, Abdi Mohamud, and Karen Sewell at CDI for their considerable assistance in recruitment and data collection, and for an amazing summer research experience. I also thank the entire staff at Camp Wimodausis for assistance with organizing data collection with the children, and for politely tolerating the disruptions to their scheduled activities. Much gratitude is extended to Sandy Oziel for her essential role in contacting the study families to obtain permission to solicit recruitment, to Jeanette Cohen for her help with data collection throughout the summer, and to my friend, Dazhao "Joe" Xie, for his crucial support with interpretation.

To my dear friends Ashley Ward, Ava Agar, Megan Pearson, Sonya Wanklyn, Brent Lottering, and Yan Zhang, for their unwavering support, and for believing in me even when I couldn't – you guys are my solid anchors in a sea of chaos. I am beyond gratitude, beyond adoration.

Finally, to James Randell, my untitled life- and team-mate, without whom I would certainly not have been here to complete this work: "We'll be eating *food* tonight!"

Dedication

I wish to dedicate this work to the memory of my father. I miss you, Dad.

High Flight

Oh! I have slipped the surly bonds of earth
And danced the skies on laughter-silvered wings;
Sunward I've climbed, and joined the tumbling mirth
Of sun-split clouds - and done a hundred things
You have not dreamed of - wheeled and soared and swung
High in the sunlit silence. Hov'ring there
I've chased the shouting wind along, and flung
My eager craft through footless halls of air.
Up, up the long delirious, burning blue,
I've topped the windswept heights with easy grace
Where never lark, or even eagle flew -
And, while with silent lifting mind I've trod
The high untresspassed sanctity of space,
Put out my hand and touched the face of God.

~ Pilot Officer Gillespie Magee

Table of Contents

Author's Declaration…….……. ii

Abstract…….……..... iii

Acknowledgements……... iv

Dedication…….……. v

Table of Contents…….. vi

List of Tables……. ix

List of Appendices…….…… xi

Introduction……... 1

1.1 The History of Psychopathy and its Measurement……... 1

1.2 Measurement of Psychopathic Traits in Children……. 3

1.3. Potential for Negative Outcomes…….. 4

1.4 Stability of Psychopathy from Childhood to Adulthood…….. 5

1.5 Neurological Features of Psychopathy……. 7

1.6 Emotional Processing Difficulties…… 8

1.7 Potential Impairment of Abstract Semantic Processing…… 9

1.8 Emotional and Abstract Processing in Children……... 13

1.9 Hypotheses…… 14

Method……... 16

2.1 Participants…… 16

2.2 Measures…… 17

2.3 Antisocial Process Screening Device…… 17

2.4 Inventory of Callous Unemotional Traits…….. 18

2.5 Cognitive Tasks……. 21

2.5.1 Word lists and attributes……... 21

2.5.2 Paired-associate learning task……. 24

2.5.3 Lexical decision task……..... 25

2.6 Procedure……. 28

Results…….. 31

3.1 Data Entry and Coding……..... 31

3.2 Missing Values and Outliers……..... 33

3.3 Statistical Analyses……... 33

3.4 Properties of the Data…… 34

3.4.1 APSD and ICU: Descriptive statistics, normality, and inter-item correlations…… 34

3.4.2 PA and LD outcome variables: Normality…… 36

3.5 Tests for Associations between Study Variables and Demographic Factors… 37

3.5.1 APSD and ICU: Demographic factors…….. 37

3.5.2 PA and LD outcome variables: Demographic factors…….. 38

3.6 Tests for Sequence Effects…… 39

3.6.1 PA task……. 39

3.6.2 LD task……. 40

3.7 Hypothesis I…….. 40

3.7.1 PA task…….. 41

3.7.2 LD task…….. 41

3.7.2.1 Block 1……... 42

3.7.2.2 Block 2……... 43

3.8 Hypothesis II……. 44

Discussion…….. 47

4.1 Summary of Support for Hypothesis I……... 47

4.2 Theoretical Interpretations of Hypothesis I……... 48

4.2.1 CU Traits……... 48

4.2.2 Impulsivity……. 50

4.2.3 Narcissism……. 51

4.3 Caveats and Conclusions for Hypothesis I…… 52

4.4 Summary of Support for Hypothesis II……. 53

4.5 Limitations……. 54

4.5.1 Sample limitations…… 54

4.5.2 Cognitive task limitations…… 57

4.5.3 APSD/ICU limitations……... 58

4.5.4 Statistical limitations……. 59

4.6 Strengths…… 60

4.7 Future Directions……... 61

4.8 Conclusions……... 63

References……. 64

List of Tables

Table 2.1: Internal Reliability Data for Parent-Reported (PR) and Child-Reported (CR) Antisocial Process Screening Device (APSD) Subscales, APSD Total, and Inventory of Callous-Unemotional Traits (ICU) Total……... 19

Table 2.2: Scale Level Inter-Item Correlation Matrix for Parent-Reported APSD Subscales, APSD Total, and ICU Total Scores…….. 20

Table 2.3: Scale Level Inter-Item Correlation Matrix for Child-Reported APSD Subscales, APSD Total, and ICU Total Scores…….. 21

Table 2.4: Correlation Matrix for Child-Reported (CR) versus Parent-Reported (PR) APSD Subscales, APSD Total, and ICU Total Scores…….. 22

Table 2.5: Comparison of Word Norms for Stimulus Adjectives Used in the Concrete versus Abstract Conditions of the Paired-Associate Task……..... 25

Table 2.6: Comparison of Concrete and Abstract Response Noun Word Norms for the Paired-Associate Task…… 26

Table 2.7: Concrete and Abstract Response Noun Subjective Word Ratings for the Lexical Decision Task……..... 28

Table 3.1: Descriptive and Normality Statistics for Parent-Reported APSD and ICU Scores…….. 35

Table 3.2: Descriptive and Normality Statistics for Child-Reported APSD and ICU Scores…….. 35

Table 3.3: Clinical Descripitors of Parent-Reported APSD Subscale and Total Scores: Percentages by Subscale…… 36

Table 3.4: Mann-Whitney U Tests for Differences in Parent-Reported APSD Subscale, APSD Total, and ICU Total Scores, by Known Diagnosis Dichotomized…… 38

Table 3.5: Kendall's Tau-B Correlations between the Parent-Reported APSD Subscales, APSD Total, ICU Total, and Paired-Associate Task Accuracy for Concrete Response Words, Abstract Response Words, and the Difference Between Them……..... 41

Table 3.6: Kendall's Tau-B Correlations between the Parent-Reported APSD Subscales, APSD Total, ICU Total, and Concrete versus Abstract (Block 1) Lexical Decision Accuracy and Response Time……..... 42

Table 3.7: Kendall's Tau-B Correlations between the Parent-Reported APSD Subscales,

APSD Total, ICU Total, and Block 1 Lexical Decision Accuracy and Response Time for the Separate Concrete and Abstract Task Conditions……. 43

Table 3.8: Kendall's Tau-B Correlations between the Parent-Reported APSD Scales, APSD Total, and Concrete versus Abstract (Block 2) Lexical Decision Accuracy and Response Time……. 44

Table 3.9: Kendall’s Tau-B Correlations between the Parent-Reported APSD Subscales, APSD Total, ICU Total, and Block 1 Lexical Decision Accuracy and Response Time for the Separate Concrete and Abstract Task Conditions……. 45

Table 3.10: Results of Paired-Sample t Tests for Differences between Concrete and Abstract Task Conditions for the Paired-Associate and Lexical Decision Tasks……... 46

List of Appendices

Appendix A: Antisocial Process Screening Device – Parent Report Modified……... 73

Appendix B: Antisocial Process Screening Device – Self Report Modified……... 75

Appendix C: Inventory of Callous-Unemotional Traits – Parent Report Modified……. 77

Appendix D: Inventory of Callous-Unemotional Traits – Self Report Modified…… 79

Appendix E: Rating form & Instructions for Emotionality Norms……. 81

Appendix F: Word Lists for PA task…….. 82

Appendix G: Word Lists for LD Task……. 83

Appendix H: Parental Informed Consent Form……... 84

Appendix I: Child Assent Form……... 88

Psychopathic Features, Paired-Associate Learning, and Lexical Decision-Making in Children

Psychopathic individuals comprise an estimated 1% of the total population, but are responsible for a disproportionate level of criminal activity in Canada, particularly violent and sexual offenses (Hare, 1996). Given the risk and financial burden these behaviours present for the public, law enforcement, and the criminal justice system, social scientists have raced to understand psychopathy's neurological and cognitive features in order to explain and potentially prevent the disorder (Hare, 1996; Kiehl et al., 2004). The present study seeks to identify potential cognitive precursors of psychopathy, a devastating, pervasive personality disturbance wherein affected individuals remorselessly employ superficial charm, manipulation, threats, or even violence to achieve personal ends, with no concept of their negative impact upon others or society (Hare, 1996).

The introduction to this thesis will provide a background in the construct of psychopathy and its measurement in adults and children. Literature on the disorder's negative outcomes and longitudinal stability from childhood through adulthood will be presented. Following this, research evaluating potential neurological abnormalities and cognitive impairments in adults with psychopathy will be reviewed. Finally, the application of cognitive research to child populations at risk of manifesting psychopathic features in adulthood will be discussed, and the research hypotheses will be presented.

The History of Psychopathy and its Measurement

As it is the central psychopathological construct of interest, it would seem prudent to begin with an introduction to psychopathy. Although psychopathy is a popular topic today, it is by no means a recent phenomenon. Psychopathic personality traits have been evident in literature

and documents throughout history (Andrade, 2008; Cleckley, 1988; Hare, 1996). However, the originator of the concept we now recognize as psychopathy was Hervey Cleckley, whose definitive work *The Mask of Sanity* (1988) describes psychopathy as involving traits such as shallow affect, superficial charm, deceptiveness, lack of remorse, poor judgement, failure to learn from experience, unmotivated antisocial behaviour, egocentricity, and failure to follow any life plans. Cleckley explained that this constellation of characteristics typically occurred in the absence of intellectual deficits, nervousness, or psychosis.

Although Cleckley's (1988) detailed case descriptions were very illustrative, they provided clinicians with little means of reliably and validly identifying the disorder. Recognizing the need for a psychometrically sound measure, Robert Hare set out to codify the construct of psychopathy. Consistent with Cleckley's descriptions, Hare has defined psychopathy as a "socially devastating disorder defined by a constellation of affective, interpersonal, and behavioural characteristics, including egocentricity; impulsivity; irresponsibility; shallow emotions; lack of empathy, guilt, or remorse; pathological lying; manipulative behaviours; and the persistent violation of social norms and expectations" (Hare, 1996, p. 25). To develop his psychopathy checklist (PCL), Hare searched the relevant literature for 100 descriptions associated with "psychopathy," and collapsed these into a 22-item measure. He used this original PCL to assess a normative sample of 1626 Canadian male inmates, most of whom were Caucasian, which unfortunately limits the generalizability of the measure to non-Caucasian populations. Based on Hare's results, the scale's language was refined, and two problematic items were discarded (Andrade, 2008; Hare, 1996; Harpur et al., 1988). The product was the PCL-R, which has become "the gold standard" assessment tool for psychopathy in the research literature (Andrade, 2008; Ellen & Kelley, 2002; Hare, 1996). A considerable body of research

has established that the PCL-R is a highly reliable and valid assessment tool for psychopathy (Andrade, 2008). Of particular importance is the PCL-R's strong predictive validity for both violent and non-violent re-offending in forensic populations (Andrade, 2008; Hare, 1996). This has established the PCL-R as a widely popular forensic risk assessment tool.

Measurement of Psychopathic Traits in Children

Given that individuals with psychopathy exhibit impulsive, antisocial, and violent behaviours posing considerable risk to the public as well as themselves, there has been great interest in identifying the causal mechanisms and developmental origins of the disorder (Frick & Hare, 2001; Frick & White, 2008). The Antisocial Process Screening Device (APSD) (Frick & Hare, 2001) was developed as a downward extension of the PCL-R, to facilitate the assessment of psychopathic characteristics in children. The original PCL-R items were altered (or removed) to make the measure applicable to children ages 6 through 13 (Ellen & Kelley, 2002; Frick & Hare, 2001). Similar to Cooke and Michie's (2001) adult model of psychopathy, the APSD is best characterized by a three-factor structure, with callous-unemotional (CU), narcissistic, and impulsive traits all forming unique sub-indices according to a number of studies (Dadds, Fraser, Frost, & Hawes, 2005; Ellen & Kelley, 2002; Frick & Hare, 2001).

Understandably, attempting to identify childhood manifestations of a disorder with psychopathy's pervasive life-course and devastating implications is a highly controversial undertaking. Seagrave and Grisso (2002) outlined numerous caveats pertaining to the measurement of psychopathy in children, with the high potential for false positives a particularly sobering concern given psychopathy's stigma and presumed treatment resistance. Seagrave and Grisso noted that, as personality is still forming during childhood and adolescence, and as frontal lobe development remains incomplete, a certain amount of defiance, irresponsibility, and lack of

empathy is developmentally normative at these stages. Many, including the scale's developers, have thus advised against the exclusive use of the APSD for child clinical or diagnostic purposes – at least until far more research has been conducted (Dadds et al., 2005; Frick & Hare, 2001; Sharp & Kine, 2008; Seagrave & Grisso, 2002). Conversely, the very malleability of child and adolescent personality has fostered a surge of interest in researching the precursors of psychopathy in children, particularly by those hoping to develop effective intervention strategies targeting individuals at a life stage where personality traits are relatively permeable, and where successful identification and intervention could forestall a lifetime of harmful, antisocial, and violent behaviours (Frick & Hare, 2001; Frick & White, 2008; Munoz & Frick, 2007).

Potential for Negative Outcomes

Early manifestations of psychopathic characteristics are associated with a wide variety of risks and problem behaviours occurring well before adulthood. The APSD, and particularly its CU subscale, identifies a subset of conduct disordered children with stronger histories of police contact, familial antisocial personality disorder, and more serious, varied antisocial behaviours (Frick & Hare, 2001). A number of researchers have discovered that psychopathic features in children are predictive of later conduct problems and antisociality, even once initial conduct disorder severity is controlled (Dadds et al., 2005; Loeber, Burke, & Pardini, 2009; Munoz & Frick, 2007). Campbell, Porter, and Santor (2004) found that a number of adverse outcomes were correlated with psychopathy in adolescent offenders. These included greater variety and severity of antisocial behaviours (such as injury-causing assaults, stealing, vandalism, and intentional killing of animals), higher risk of substance use, greater variety of abused substances, higher risk of institutional misbehaviour and aggression, higher escape rates, violation of conditional release, and higher risk of violent recidivism.

Stability of Psychopathy from Childhood to Adulthood

Although children and youth possess notably permeable personalities, early manifestations of aggression and antisocial behaviour can be remarkably persistent. Olweus (1979) noted that aggression is a very stable construct across the lifespan, on the same order as intelligence. Childhood psychopathic traits have also proven to be relatively stable, though not immutable, constructs (Frick & White, 2008). Forsman, Lichtenstein, Andershed, and Larsson (2008) conducted a longitudinal study of 1480 Swedish monozygotic (MZ) and dizygotic (DZ) twin pairs between ages 16 and 19, and found that the CU, grandiose/manipulative, and impulsive/irresponsible dimensions of psychopathy all remained highly stable from mid to late adolescence. Their analyses of differences between the MZ and DZ twin concordance rates indicated that the stability appeared more attributable to genetic rather than shared environmental factors. These findings implicated genetic influences in the stability of Factor 1 (affective/interpersonal) traits of psychopathy across the lifespan. Complimentary evidence of this stability was presented by Lynam, Caspi, Moffitt, Loeber, and Stouthamer-Loeber (2007), whose study of 250 individuals from Pittsburg uncovered evidence of moderate stability (r = .31) of psychopathy from ages 13 through 24, despite the considerable age span covered, and variations in both informant source and collection methods.

Longitudinal research in elementary school children also has indicated that psychopathic traits remain fairly stable across childhood (Burke, Loeber, and Lahey, 2007; Dadds et al., 2005; Frick and White, 2008). However, due to potential overlap between the impulsive and narcissistic sub-indices of the APSD and the impulsivity and conduct problems often seen in children with attention deficit-hyperactive disorder (ADHD), oppositional defiant disorder, and conduct disorder, research with younger child populations has focused intensely upon the CU

trait (e.g. Dadds et al., 2005; Frick & White, 2008; Munoz & Frick, 2007; Viding, Frick, & Plomin, 2007). The CU trait is suspected to differentiate children with early signs of psychopathy from non-psychopathic (but behaviourally disordered) children, while the impulsive and narcissistic factors of the APSD often correlate with other behavioural problems such as ADHD, oppositional defiant disorder, or conduct disorder (Frick & White, 2008; Munoz & Frick, 2007). Viding and colleages (2007) conducted a large study of 7-year-old male and female twin pairs. Their results strongly suggested that CU traits were not only heritable, but appeared to share a common genetic etiology with conduct problems. Given this robust genetic influence, it is not surprising that CU traits are quite stable longitudinally. Frick and White (2008) reported that CU traits have moderate stability over time when self-reported by older children and adolescents, and even stronger stability when assessed through parent reports. For example, Frick, Kimonis, Dandreaux, and Farrell (2003; as cited in Frick & White, 2008) found parent-rated interclass correlations of .71 for CU traits measured over 4 years of childhood. Dadds and associates (2005) discovered that parent-reported CU traits in a community sample of Australian boys and girls aged 4 through 9 were significantly stable at a one-year follow-up interval, and that CU traits were uniquely predictive of future antisocial behaviour, even after controlling for previous impulsive, narcissistic, and antisocial conduct problems. Finally, there is one study to date following CU traits from childhood to adulthood. Burke, Loeber, and Lahey (2007) found that teacher-reported interpersonal callousness scores at ages 7 to 12 were predictive of adult Factor 1 ($ß = .04$, $p < .001$) and Factor 2 ($ß = .05$, $p < .001$) PCL-R scores in 18-19 year old males, even after controlling for conduct problems and numerous other psychosocial risk factors.

Neurological Features of Psychopathy

Efforts to trace the developmental and genetic roots of psychopathy have occurred alongside attempts to uncover the cognitive and neurological correlates of this devastating and chronic disorder. Researchers using positron emission tomography (PET), single photon emission computed tomography (SPECT), and functional magnetic resonance imaging (fMRI) have unearthed functional abnormalities in the temporal, prefrontal, and anterior cingulate cortices of individuals with psychopathy as well as functional and structural anomalies in the orbitofrontal cortex, right superior temporal gyrus, corpus callosum, amygdala, and hippocampus (Baslogu et al., 2008; Guay, Ruscio, Knight, & Hare, 2007; Hare, 1996; Müller et al., 2008). Recent studies have also employed more novel techniques to explore the neurology of psychopathy. Baslogu and colleagues (2008) examined the brain metabolites of Turkish military conscripts with histories of violence and psychopathic features using magnetic resonance spectroscopy (MRS). They discovered that levels of *N* – acetyl aspartate and creatine in the anterior cingulate cortex are negatively correlated with PCL-R scores, and specifically with PCL-R Factor 1 scores. Another study conducted by Kiehl, Bates, Laurens, Hare, and Liddle (2006) found that the modulations of event-related potentials (ERPs) in psychopaths completing an auditory oddball task (requiring participants to identify a target tone among other random and standard tones) were consistent with those found in patients with damage to the amygdala and temporal lobe. The authors concluded that this impairment in the functioning of the paralimbic system may be associated with abnormalities in the attention and orienting abilities of psychopaths.

Emotional Processing Difficulties

The neurological differences observed in psychopathy are suspected to underpin a number of cognitive phenomena exhibited by affected individuals. As deficits in emotional capacity have been noted in psychopathy, researchers have sought to explore potential differences in how emotion functions in the context of the disorder. Müller and associates (2008) used a Simon paradigm to study emotional cognition in psychopaths versus non-psychopathic controls. Participants were shown images from the International Affective Picture Set (IAPS) while fMRI data were obtained. The researchers found evidence that, unlike normal controls, psychopaths did not suffer from an interference effect between negative emotional induction and cognitive task error rate. This lack of interference was associated with disruptions in the activation and integrative functioning of the prefrontal and temporal brain regions. Müller et al.'s findings suggested dissociation between emotion and cognition potentially linked to disrupted fronto-temporal integration processes in psychopathy. Mitchell, Richell, Leonard, and Blair (2006) found results consistent with this using the IAPS with an emotional interrupt task. Mitchell and his colleagues' non-psychopathic comparison group exhibited significantly poorer reaction times when presented with both positive and negative emotional distractors during the emotional interrupt task, but psychopaths did not. These findings were interpreted to suggest that psychopaths have impaired emotional modulation of attention.

Clinical observers also have noted subtle anomalies in the language usage of psychopaths; while typically proficient with the technical aspects of language, their comprehension of its connotative and affective implications appears to be impaired (Cleckley, 1988; Hare, 1996; Williamson, Harpur, & Hare, 1991). Researchers have investigated these differences, with particular focus on the affective components of language (Hare, 1996; Hervé,

Hayes, & Hare, 2003; Williamson et al., 1991). Williamson and her associates (1991) used a lexical decision (LD) task to explore differences in affective semantic processing between criminal psychopaths and non-psychopathic controls. Participants were shown lists of affective words, neutral words, and nonwords, and asked to decide "is this a word?" while electrodes measured their electrocortical ERPs. Williamson and her colleagues found that non-psychopathic participants had faster reaction times to both positive and negative affective words than to nonwords, while psychopaths did not. In fact, the psychopathic participants had slower reaction times to both types of affective words, although this difference was not tested statistically. Moreover, there were marked differences in ERP activity for non-psychopaths when processing affective versus neutral words, but for psychopathic individuals, this was not the case.

To expand upon evidence involving single words and images, Hervé et al. (2003) decided to investigate whether psychopathy was associated with difficulties processing the emotional content of entire sentences. They used a Q-sort task requiring individuals with and without psychopathy to categorize metaphorical statements on the basis of their emotional polarity (positive vs. negative) and intensity (most to least positive or negative). Hervé and his collaborators found that, while there was no difference in literal understanding of the metaphors between psychopaths and nonpsychopaths, the psychopaths made significantly more sorting errors according to emotional valence, especially for emotionally unambiguous metaphors.

Potential Impairment of Abstract Semantic Processing

Although the majority of the research investigating language in adult psychopathy has focused on the affective content of words, a couple of studies exist suggesting that the difficulties extend to other aspects of semantic processing. Decades of studies have established differences in how healthy individuals process and learn certain kinds of words. Concrete words, or those for

which direct physical referents are readily available in our natural surroundings, are handled much more readily than abstract words, whose meanings are not easily anchored to observable phenomena (Altarriba & Bauer, 2004; Paivio, 1991). Emotional words form a subset of abstract words (i.e., direct physical referents may be less readily available for affective words as well, though there is some variation in emotional vs. abstract processing – see Altarriba & Bauer, 2004). The relative advantage of concrete words over abstract words led to the development of Paivio's (1991) dual-coding theory. This theory posits, in part, that concrete and abstract words are handled by related but separate neurological processes. Although competing theories exist (e.g. Schwanenflugel's context-availability theory – see Binder, Westbury, McKiernan, Possing, & Medler, 2005), behavioural and neuroimaging studies have supported the contention that concrete and abstract processing involve different neural substrates (Binder et al., 2005; Crutch & Warrington, 2005; Kiehl, Liddle, Smith, Mendrek, Forster, & Hare, 1999; Papagno, Fogliata, Catricalà, & Miniussi, 2009; Pexman, Hargreaves, Edwards, Henry, & Goodyear, 2007).

Neuropsychological studies have suggested that the areas implicated in abstract semantic processing and memory may occur in the same neural regions affected by psychopathy. Binder et al. (2005) used fMRI scans to examine neural activation during a concrete and abstract LD task. They found that the abstract lexical decisions were associated with left posterior inferior frontal activation. Pexman and her colleagues (2007) found that participation in an abstract semantic categorization task triggered widespread activation of the temporal, parietal, and frontal cortices. Another recent study using repetitive transcranial magnetic stimulation (rTMS) found that stimulation applied to the left temporal and left inferior frontal gyrus interfered with the processing of abstract, but not concrete, words (Papagno et al., 2009). Dhond, Witzel, Dale, and Halgren (2007) used whole-head anatomically constrained magnetoencephalography (aMEG) to

examine brain responses during a semantic categorization task. The results suggested that, while abstract and concrete words both initially utilize a frontotemporal verbal-linguistic system, concrete words show an advantage because the right parietal and medial occipital neural regions supplement concrete processing. These findings are somewhat at odds with an earlier study by Kiehl and his colleagues (1999), that used fMRI data to examine neurological functioning during an LD task using abstract, concrete, and nonwords. This study determined that, while the LD task generally stimulated activation in the anterior cingulate, and the bilateral fusiform, left middle temporal, right posterior superior temporal, and left and right inferior frontal gyrii, only abstract words were associated with activation in the right anterior temporal cortex. Clearly, there are still ambiguities regarding the precise neurological mechanisms involved in semantic processing. However, it does appear that the temporal cortex and frontal lobe are implicated in the majority of studies.

A very small number of studies have directly compared abstract and concrete semantic processing in adult psychopathic populations. Hare and Jutai (1988) examined the performance of three groups of 13 right-handed incarcerated men exhibiting high, medium, or low levels of psychopathy, as well as 13 non-incarcerated controls, in a divided visual field procedure involving concrete and abstract semantic categorization. The task presented concrete nouns in either the right or left visual field of the participants, who were instructed to decide whether each target was a member of a specific concrete category, or of an abstract category. Hare and Jutai found that the high psychopathy group made significantly more errors than the medium psychopathy and control groups when attempting to determine membership in an abstract category. Additionally, the high psychopathy group made more right visual-field errors than left visual-field errors (the opposite to what was observed in the medium and low psychopathy

groups). These patterns were not found for the concrete categorization condition. Hare and Jutai (1988) theorized that their results suggested abnormalities in left hemispheric resources for semantic processing.

A more recent study by Kiehl and his colleagues (2004) utilized fMRI scans to compare brain functioning between concrete and abstract conditions of an LD task in individuals with psychopathy and non-psychopathic controls. Partially consistent with Hare and Jutai's (1988) findings, the participants with psychopathy had significantly longer reaction times than controls when responding to the abstract word condition of the LD task, with no differences on the concrete and nonword conditions. However, Kiehl et al.'s (2004) fMRI data additionally indicated that, compared with controls, psychopathic individuals lacked neural differentiation between concrete and abstract words in *right* anterior temporal cortex. This was somewhat at odds with Hare and Jutai's (1988) postulation that the left hemisphere was implicated in the observed deficit. Although the neurological substrates implicated in such processing deficits are still unclear, taken together, these studies begin to suggest that abstract processing difficulties and psychopathy may both be associated with disrupted functioning in the temporal region – although far more research is needed to clearly establish the specific mechanisms involved.

A study by Blair and colleagues (2006) attempted to disambiguate between affective and semantic processing in psychopathy using a series of semantic priming tasks. They found that incarcerated male Category B offenders with PCL-R scores over 30 exhibited lower affective priming effects compared to incarcerated male controls (PCL-R < 20), but evinced no differences in semantic priming effects. However, the words used in the semantic priming task were all animals, vegetables, or fruits – all of which are concrete words. Thus, Blair and his colleagues

did not demonstrate that abstract semantic processing is consistent across psychopathic and non-psychopathic participants.

Emotional and Abstract Processing in Children

Given the potential difficulties abstract processing deficits could create in social and academic learning contexts, it is surprising that few studies have investigated emotional and abstract linguistic processing in children with early signs of psychopathic features. Some researchers have begun to explore emotional processing in these children. However, the initial findings have been mixed. Indeed, Salekin, Rosenbaum, Lee, and Lester (2009) cautioned that the child and youth literature on psychopathy and cognitive functioning is not yet well-developed, and that existing studies are not fully consistent with adult findings. Similar to patterns seen in the adult literature on psychopathy, Kimonis, Frick, Fazekas, and Loney (2006) found that boys and girls exhibiting proactive aggressive tendencies were less responsive to visually presented, distressing emotional stimuli in a dot probe task. However, this pattern was only related to psychopathic traits in children with high aggression. Woodworth and Waschbusch (2008) found that children with high CU traits were less able to identify sad facial emotions, even after controlling for conduct problems. However, they also found that children with high CU traits were better at identifying fearful expressions than children with low CU traits (although this finding was only marginally significant), and that CU traits and conduct problems in general were not associated with emotional recognition of vignettes. These results are not fully consistent with the adult literature, but do give some indication that CU traits may be associated with differences in emotional processing.

Only one study was located examining youths' performance on a task examining processing of affective words. Loney, Frick, Clements, Ellis, and Kerlin (2003) used an

emotional LD task similar to Williamson et al.'s (1991) on a sample of antisocial youth. Consistent with adult psychopathic individuals, Loney and colleagues found that youths with high CU traits (as measured by the APSD) exhibited delayed reaction times to words with negative affective valence. Additionally, Loney et al. discovered that the impulsivity factor of the APSD was associated with faster responses to negatively valenced words. They suggested that these differences in emotional cognitive performance underscored the importance of measuring the different sub-factors underlying the overarching construct of psychopathy (i.e. impulsivity, narcissism, and CU traits), as each factor may involve a unique set of underlying cognitive and neurological phenomena.

Although these results begin to suggest that children and youths may experience difficulties with emotional and semantic processing, much more research is needed to clarify whether children with psychopathic traits are also vulnerable to disruptions in semantic processing. The present researcher was unable to locate any studies directly examining abstract semantic processing in children with psychopathic features. However, studying such a deficit could yield important insights into the learning and functioning of young children at risk of developing adult psychopathy and perhaps provide clues for the development of effective early intervention strategies. The present inquiry thus seeks to rectify this gap in the literature by pilot-testing a research protocol designed to explore abstract semantic processing and learning in children exhibiting psychopathic characteristics.

Hypotheses

Based on the existing literature and corresponding theories, the following hypotheses were proposed:

1. Parent-reported measures of child psychopathic features will be positively correlated with the magnitude of difference in performance between concrete and abstract words across two cognitive tasks. More specifically, these factors will be positively correlated with greater (positive) differences in concrete minus abstract paired-associate (PA) task accuracy, LD task accuracy, and LD task response time. In other words, children with high scores on measures of psychopathic features (and particularly CU traits) are expected to perform worse in the abstract conditions of the cognitive tasks, as reflected in the differences between concrete and abstract performance.

2. Children's performance in the concrete conditions of the PA and LD tasks should be significantly better (in terms of response time and/or accuracy) than in the abstract conditions for both tasks. This finding would be consistent with Paivio's (1991) dual-coding theory, and with the considerable body of research that led to its development.

In addition, relationships between the measures of child psychopathic features, cognitive task performance scores, and demographic variables will be explored to determine whether additional relationships exist and whether the demographic characteristics of the present sample might present difficulties in interpreting and generalizing the results of the research.

Method

Participants

The participants were recruited from a pool of 50 families participating in the Toronto Child Development Institute (CDI)'s Camp Wimodausis program. Camp Wimodausis is a high supervision, clinical day camp program that utilizes the Stop Now and Plan (SNAP™) child cognitive-behavioural modification protocol presented in the context of engaging physical activity, music, dance, and creative expression. Children attending Camp Wimodausis are referred as the result of serious antisocial and disruptive behaviour problems. As the children admitted to these programs rank in the 98th percentile or higher on the Child Behaviour Checklist (Achenbach et al., 2003) in terms of antisocial behaviour, it is expected that they may possess higher levels of CU, narcissistic, and/or impulsive behavioural characteristics than the general population.

A total of 12 families were recruited for the present study. The participating children included 10 boys and 2 girls between the ages of 6 and 11 years (M = 8.50, SD = 1.51), enrolled in grades 1 through 7 (M = 3.58, SD = 1.68). With regard to ethnicity, 41.5% of the children were identified by their parents/guardians as Caucasian, 16.7% as African-Canadian, 16.7% as Asian-Canadian, 16.7% as of "mixed descent, " and 8.3% as Latin-Canadian. The participating parents and guardians included 1 man and 11 women aged 34-49 years (M = 41.75, SD = 4.35). Of these, 83.3% were biological parents and 16.7% were step-parents. Married parents comprised 33.3% of the sample, followed by 33.3% in common-law marriages, 16.7% who were divorced, and 16.7% who were single (never married). Parental ethnicity was similar to child ethnicity, with 50% identifying as Caucasian, 16.7% as African-Canadian, 16.7% as Asian-Canadian, 8.3% as Latin-Canadian, and 8.3% as "other."

In order to participate in the study, the children required normal or corrected-to-normal vision and hearing and fluency in spoken and written English. Children were also required to demonstrate capability to complete the practice trials of both of the cognitive tasks presented in this study. All participating children were right-handed. Children were not excluded on the basis of any learning, attention, developmental, or other Axis I disorder (unless these difficulties precluded the capacity for the child to complete the tasks). Although information about diagnosis was not directly collected for the present study, 33% of the parents voluntarily reported their child had a known ADHD diagnosis, and 8.7% reported a known learning disability. This may be an underestimate of the diagnostic status of the children in the sample, as not all parents volunteered such information. Children were not excluded for use of prescription medications (including stimulant medications for ADHD); however, this information was collected for analysis. Half of the children were reportedly medication-free, while 25% were taking stimulants, 8.7% were taking stimulants plus additional medications, 8.7% were taking anticonvulsants or mood stabilizers, and 8.7% were taking multiple non-stimulant medications.

Measures

Antisocial Process Screening Device. The Antisocial Process Screening Device (APSD) is a 20-item subscale used to measure antisocial and conduct problems in children aged 6-13. Developed to tap the same underlying constructs as the adult PCL-R, the measure is fully manualized, and is typically completed by parents (see Appendix A) or teachers when used for clinical assessment purposes. However, a self-report version of the APSD has also been developed for use in research settings (see Appendix B). Although normative data are not available for APSD self-reports, the measure has been used successfully with children aged 6 through 13 (Kimonis et al., 2006; Munoz & Frick, 2007). Munoz and Frick (2007) found that

youth self-reports on the APSD for children in grades three through seven remained moderately stable at one- and two-year follow-up intervals, while Kimonis et al. (2006) found children's APSD self-reports were positively correlated with parent-reported APSD scores (r = 0.54) (Kimonis et al., 2006). The ASPD measures three factors of personality and behavioural issues in children: CU traits, narcissism, and impulsivity. This factor structure is supported by analysis of data drawn from large clinical and community samples of children (N > 1000). Internal reliability values for the three factors range from .64. to .89. Interrater reliability between parent and teacher reports on the APSD was moderate (r = .43 for the full scale APSD), and one-week test-retest reliability coefficients were r = .73 and r = .87 for the CU and impulsivity factors, resepectively.

Cronbach's α was utilized to test the internal consistency reliability of the parent and child-reported APSD subscales (Impulsivity, Narcissism, and CU) and APSD Total scores for the present study. Values ranged from low (α = .440) to high (α = .885), with the majority of items falling above the "acceptable" (.700) cutoff. Please see Table 2.1 for all the α values.

With regard to convergent validity, a number of studies have established that the APSD is associated with measures of fearlessness, sensation-seeking, difficulty learning from past experiences, and potential for cruelty (see Frick & Hare, 2001, for a review). The APSD has also demonstrated the capability to identify a homogenous subset of severely conduct disordered youth (Ellen & Kelley, 2002).

Inventory of Callous Unemotional Traits. The Inventory of Callous Unemotional Traits (ICU) is an instrument currently under development by Frick (2004). The ICU is an expansion of the CU factor measured by the APSD, and is intended to increase the reliability and validity of that factor's measurement. The ICU is a 24-item inventory, with versions for parents

Table 2.1. Internal Reliability Data for Parent-Reported (PR) and Child-Reported (CR) Antisocial Process Screening Device (APSD) Subscales, APSD Total, and Inventory of Callous-Unemotional traits (ICU) Total.

Scale	Cronbach's α	Cronbach's α based on standardized items	*N* of Items in Scale or Subscale	*N* of respondents
APSD: IMP[1] (PR)	.733	.748	5	12
APSD: IMP (CR)	.615	.662	5	11
APSD: NAR[2] (PR)	.790	.790	7	12
APSD: NAR (CR)	.624	.539	7	11
APSD: CU[3] (PR)	.440	.494	6	12
APSD: CU (CR)	.713	.718	6	11
APSD: TOT[4] (PR)	.885	.888	20	12
APSD: TOT (CR)	.750	.740	20	11
ICU: TOT[5] (PR)	.955	.953	24	12
ICU: TOT (CR)	.831	.848	24	9

Note: [1]Antisocial Process Screening Device: Impulsivity Subscale
[2]Antisocial Process Screening Device: Narcissism Subscale
[3]Antisocial Process Screening Device: Callous-Unemotional Subscale
[4]Antisocial Process Screening Device: Total Score
[5]Inventory of Callous-Unemotional traits: Total Score

(see Appendix C), teachers, or children/adolescents (see Appendix D). The respondent rates each item on a 4-point scale, with 0 being "Not at all true" and 3 being "Definitely True." While this tool is still under development, and not manualized for use in clinical risk assessments, two studies with large samples have provided early support for its psychometric soundness (Essau, Sasagawa, & Frick, 2006; Kimonis et al., 2008).

Table 2.2. Scale Level Inter-Item Correlation Matrix for Parent-Reported APSD Subscales, APSD Total, and ICU Total Scores.

	APSD: IMP	APSD: NAR	APSD: CU	APSD: TOT	ICU: TOT
APSD : IMP[1]	1.00				
APSD: NAR[2]	.796	1.00			
APSD: CU[3]	.671	.647	1.00		
APSD: TOT[4]	.923	.926	.826	1.00	
ICU: TOT[5]	.807	.738	.832	.870	1.00

[1]Antisocial Process Screening Device: Impulsivity Subscale
[2]Antisocial Process Screening Device: Narcissism Subscale
[3]Antisocial Process Screening Device: Callous-Unemotional Subscale
[4]Antisocial Process Screening Device: Total Score
[5]Inventory of Callous-Unemotional traits: Total Score

Cronbach's α was again used to test the internal reliability of the parent and child-reported ICU Total scores obtained in the present study. Alpha values for the ICU were in the high range. Please refer once again to Table 2.1 for the α values.

Inter-item correlations were also examined for the subscales and totals of the APSD and ICU parent- and child-report measures. First, correlations between the parent-reported APSD subscales, APSD Total Score, and the ICU Total Score were calculated for the present sample. The correlations ranged from moderate (r = .647) to high (r = .926) between the APSD Total and APSD subscales. Additionally, correlations between the various APSD scores and the ICU Total Score were in the high range (r = .738 to r = .870). Please refer to Table 2.2 for a summary of the results. Next, correlations between the child-reported APSD subscales, APSD Total Score, and ICU Total Score were conducted. Eleven children completed the APSD, while nine

Table 2.3. Scale Level Inter-Item Correlation Matrix for Child-Reported APSD Subscales, APSD Total, and ICU Total Scores.

Subscale	APSD: IMP	APSD: NAR	APSD: CU	APSD: TOT	ICU: TOT
APSD: IMP[1]	1.000				
APSD: NAR[2]	-.122	1.000			
APSD: CU[3]	.530	.356	1.000		
APSD: TOT[4]	.681	.533	.894	1.000	
ICU: TOT[5]	.073	.732	.872	.897	1.000

[1]Antisocial Process Screening Device: Impulsivity Subscale
[2]Antisocial Process Screening Device: Narcissism Subscale
[3]Antisocial Process Screening Device: Callous-Unemotional Subscale
[4]Antisocial Process Screening Device: Total Score
[5]Inventory of Callous-Unemotional traits: Total Score

completed the ICU. The correlations ranged from low (r = .073) to high (r = .897), and the correlation between the APSD Impulsivity and Narcissism scales was negative (r = -.122). Please refer to Table 2.3 for a summary. Finally, the correlations between the parent and child APSD and ICU subscales and totals was examined. Correlations were generally low, and ranged from r = .024 to r = . 554. Please consult Table 2.4 for the complete results.

Cognitive Tasks

Word lists and attributes. Lists of concrete and abstract words for use in the cognitive tasks were generated using the University of Western Australia's MRC Psycholinguistics Database. This database is a web interface allowing users to select from a bank of 150837 words with data on 26 different linguistic properties (Wilson, 1988). The data on these properties were drawn from various large-scale research projects gathering normative data on specific word properties (e.g., Gilhooly & Logie, 1980; Paivio, Yuille, & Madigan, 1968). Subjective ratings of word attributes such as familiarity, concreteness, imagery, and meaningfulness were quantified

Table 2.4. Correlation Matrix for Child-Reported (CR) versus Parent-Reported (PR) APSD Subscales, APSD Total, and ICU Total Scores.

Subscale	APSD: IMP[1] (CR)	APSD: NAR[2] (CR)	APSD: CU[3] (CR)	APSD: TOT[4] (CR)	ICU: TOT[5] (CR)
APSD: IMP[1] (PR)	.107	.197	-.038	.053	.067
APSD: NAR[2] (PR)	.024	.045	.075	.040	.278
APSD: CU[3] (PR)	.554	.161	.427	.530	.228
APSD:TOT[4] (PR)	.217	.123	.155	.195	.206
ICU: TOT[5] (PR)	.493	.073	.367	.389	.149

Note: None of the above correlations were significant at p = .05.
[1]Antisocial Process Screening Device: Impulsivity Subscale
[2]Antisocial Process Screening Device: Narcissism Subscale
[3]Antisocial Process Screening Device: Callous-Unemotional Subscale
[4]Antisocial Process Screening Device: Total Score
[5]Inventory of Callous-Unemotional traits: Total Score

by compiling the findings of several large-scale linguistics studies. This procedure, as described by Wilson (1988), produced familiarity, concreteness, imagery, and meaningfulness scores ranging from 100 ("low") to 700 ("high"). Age of acquisition ratings were derived from research by Gilhooly & Logie (1980). Gilhooly and Logie originally used ratings from 1 (0-2 years old) to 7 (13 years or older), with 2-year increments represented by each "point" in the 7-point scale. Wilson (1988) explained that the age of acquisition ratings for the MRC Psycholinguistics

database were derived by multiplying Gilhooly and Logie's (1980) ratings by 100, which also puts age of acquisition scores on a scale of 100-700.

For the present study, concrete words were defined as those ranking between 500-700 on the MRC Psycholinguistics database's subjective "concreteness" ratings, whereas abstract words were defined as those ranking between 100-400 on "concreteness." The words were controlled for a number of other attributes as well, including: 1) age of acquisition, which was selected to rank between 100-400, meaning words selected for the study are typically learned prior to age 8 (this was to accommodate the youngest children anticipated in the sample); 2) familiarity, which was set between 450 and 650, or moderate to high familiarity; 3) length, set at no more than seven letters; and 4) meaningfulness, set between 400 and 500, or moderately meaningful. Using this selection method, the MRC Psycholinguistics database produced 37 abstract words with the desired properties. An equal number of concrete words that matched the abstract words on length were selected at random from the larger concrete list. Each word's concreteness, imageability (a property related to concreteness), age of acquisition, familiarity, and meaningfulness values were obtained for comparison purposes.

As emotionality norms were not available through the MRC Psycholinguistics database, preliminary norms were collected from a small sample of 11 university students (2 men, and 9 women) aged 20 – 41 years, and 3 children (2 girls, and 1 boy) aged 10 to 12 years. These participants were presented with all 74 of the concrete and abstract words used in the study, and instructed to rate their emotionality on a 5-point scale, with 1 being "not at all emotional" and 5 being "extremely emotional" (see Appendix E for the rating form and instructions given to the raters). Mean emotionality ratings were calculated for each word and added to an SPSS data file along with each word's normative data from the psycholinguistics database.

Paired-associate learning task. A paired-associate (PA) learning task was designed to measure participants' ability to recall concrete and abstract words. The PA task utilized word pairs consisting of a stimulus word (in this study, a random adjective controlled for meaningfulness, concreteness, and length – e.g. "Junior," "Magic") and a response word (either a concrete or abstract noun – e.g. "Kitten," "Trouble"). Please refer to Appendix F for the entire list of word pairs used in this task.The random adjectives, as well as the concrete and abstract stimulus words, were obtained in the same manner as the words used in the LD task, with the stimulus words randomly drawn from the larger list of concrete and abstract nouns. The children were shown three trials consisting of 7 pairs of words each, at a rate of 10 s per pair. They were instructed to memorize the pairs, so that when the "stimulus" word was shown again, the "response" word would be remembered. After a 60-s distractor task (during which the child and experimenter played Tic Tac Toe), participants were shown the same list of 7 stimulus words, but with the response word missing. The children's task was to then recall the response word. The children in our study first completed a practice trial acquainting them with the PA task. This trial utilized simple, age-appropriate adjective-noun pairs, such as "red-ball," "happy-planet," to ensure the child's reading abilities and memory were sufficient to complete the experimental trials. After the practice trial was completed, children completed the concrete and abstract trials of the PA task in alternating order. Presentation order of the word-pairs was also counterbalanced by alternating three different orders of presentation between participants.

The stimulus adjectives and response nouns used in the concrete and abstract conditions of the PA task were analyzed using Mann-Whitney *U* tests. The aim was twofold: 1) to ensure that the stimulus adjectives assigned to the concrete versus abstract conditions did not differ systematically on any word attribute; and 2) to ensure that the concrete and abstract response

Table 2.5. Comparison of Word Norms for Stimulus Adjectives Used in the Concrete versus Abstract Conditions of the Paired-Associate Task.

Word Norms	Concrete	Abstract	Statistics			
	Mdn.	*Mdn.*	*U*	*Z*	*r*	*Sig.*
Age of Acquisition†	289.00	359.00	13.00	-1.47	-.39	.141
Concreteness†	368.00	377.00	22.50	-.26	-.07	.798
Emotionality‡	1.64	1.89	23.50	-.13	-.03	.898
Familiarity†	551.00	575.50	17.00	-.96	-.26	.338
Imageability†	463.00	378.50	12.00	-1.60	-.43	.109
Length[§]	5.00	5.00	24.50	.00	0.00	1.000
Meaningfulness†	397.00	425.00	5.00	.00	0.00	1.000

† Norms based on obtained word attribute ratings ranging from 100-700. Source: University of Western Australia's MRC Linguistics Database.
‡ Norms based on collected ratings of emotionality, 5-point scale.
[§] Based on number of letters per word.

nouns were significantly different on concreteness and imageability (with the concrete nouns significantly higher on both than the abstract nouns), but not on age of acquisition, familiarity, length, meaningfulness, or emotionality. The results are summarized in Tables 2.5 and 2.6. The expected results were all obtained in this case, with the exception of word length. The length of the concrete stimulus words was significantly greater than the length of the abstract stimulus words. This difference was likely an unintended consequence of a small number of nouns being randomly drawn from the larger database for use in the PA task.

Lexical decision task. Many researchers have previously used a lexical decision (LD) task to examine semantic processing of different categories of words on a basic level (e.g. Kiehl et al., 2004; Loney et al. 2003; Williamson et al., 1991). LD tasks involve the correct

Table 2.6. Comparison of Concrete and Abstract Response Noun Word Norms for the Paired-Associate Task.

Word Norms	Concrete	Abstract	Statistics			
	Mdn.	*Mdn.*	*U*	*Z*	*r*	*Sig.*
Age of Acquisition†	258.00	322.00	12.50	-1.54	-.44	.125
Concreteness†	606.00	352.00	.00	-3.13	-.84	.002
Emotionality‡	2.79	2.64	21.00	-.45	-.12	.654
Imageability†	623.00	397.00	.00	-3.13	-.84	.002
Familiarity†	529.00	565.21	12.00	-1.60	-.43	.110
Length[§]	6.00	4.00	7.50	-2.25	-.60	.024
Meaningfulness†	470.00	447.00	11.50	-1.66	-.44	.096

† Norms based on obtained word attribute ratings ranging from 100-700. Source: University of Western Australia's MRC Linguistics Database.
‡ Norms based on collected ratings of emotionality, 5-point scale.
[§] Based on number of letters per word.

identification of real words, when presented with a series of actual words and pseudowords (i.e. strings of letters that appear similar to known words, but are not actual words). The current study utilized the same paradigm, albeit in a shorter format than the LD tasks used in research with adult participants. An LD task was created using E-Prime, a software platform designed to host various computerized experimental tasks. A 14-item practice trial comprised of simple words and pseudowords (e.g. "grape," "grapu") was created to train the children to perform the task correctly. Feedback was given for correct responses during the practice trial. Experimental trials including 15 concrete words, 15 abstract words, and 30 corresponding pseudowords were programmed to appear in random order in two blocks (120 trials – see Appendix G). The pseudowords were created by selectively substituting one vowel for another in

each of the concrete and abstract words. Due to difficulties with the software, the word conditions could only be randomized within the two blocks, but not between.

Children were instructed at the outset of the task to decide “Is this a word?” If they believed it to be a word, they were instructed to press the assigned key for “Yes” on the computer keyboard (the appropriate key was alternated between “1” and “0” across participants, to control for potential advantages of righthanded vs. lefthanded responding). If the presented stimulus was NOT a word, the children were to press the assigned key for “No.” Words were displayed horizontally, and one by one, on a computer monitor, in a large, white, serif font against a black background. A child-controlled break screen was programmed between the two experimental blocks to prevent fatigue. Accuracy and reaction time (in ms.) for children’s responses were both recorded.

Attributes for the concrete and abstract words used in the LD task were analyzed using independent samples *t* tests. This was to ensure the words differed significantly on concreteness and imageability, but not on age of acquisition, emotionality, familiarity, length, or meaningfulness. The results of these analyses are summarized in Table 2.7. The concrete and abstract word conditions were significantly different in subjective ratings of concreteness, imageability, and age of acquisition (as obtained from the MRC Psycholinguistics database). While the age of acquisition rating difference is not ideal, it is likely a reflection of the fact that children tend to acquire abstract cognitive abilities slightly later than concrete abilities (Shatz, Tare, Nguyen, & Young, 2010). Both types of words had means below 350, indicating that the stimulus words were generally acquired by 7 years of age (see Gilhooly & Logie, 1980; Stadthagen-Gonzalez & Davis, 2006). The maximum age of acquisition rating of 400 ensured that no words were included that are typically acquired past age 8. Thus, despite the concrete

Table 2.7. Concrete and Abstract Response Noun Subjective Word Ratings for the Lexical Decision Task.

Word Norms	Concrete		Abstract		Statistics		
	M	*SD*	*M*	*SD*	*t*	*df*	*Sig.*
Age of Acquisition†	276.83	57.09	323.03	54.82	-3.20	58.00	.002
Concreteness†	586.63	28.82	349.23	39.22	26.71	53.25	<.001
Emotionality‡	2.07	.66	2.30	1.04	-.99	49.23	.329
Familiarity†	541.67	50.60	560.67	35.39	-1.69	51.90	.100
Imageability†	582.60	30.23	422.73	48.35	15.36	48.67	<.001
Length[§]	4.50	1.11	4.80	1.19	-1.01	58.00	.315
Meaningfulness†	449.47	26.72	447.17	30.48	.31	58.00	.757

† Values are norms based on obtained word attribute ratings ranging from 100-700. Source: University of Western Australia's MRC Psycholinguistics Database.
‡ Values based on collected ratings of emotionality, 5-point scale.
[§] Based on number of letters per word.

words' being learned slightly earlier than the abstract words, none of the words included in the study was beyond the anticipated minimum age of the children. The words did not differ significantly on emotionality, familiarity, length, or meaningfulness.

Procedure

The present study was conducted with the approval of the institutional ethical review boards at both Ryerson University and Child Development Institute (CDI). It was required by both review boards that participating families be contacted initially by a third party who was both uninvolved with the present study and not engaged in clinical contact with the families at Camp Wimodausis. Thus, a research assistant employed by CDI coordinated with this author to implement the study's recruitment procedure. CDI additionally stipulated that only those families

who had already provided CDI with the clinic's own internal research consent forms could be approached for the present study. This meant that 32 of the 50 families were eligible to be contacted. The CDI research assistant requested permission from these families to be contacted by this author with regard to the present study. Seventeen parents/guardians agreed to be contacted. The remaining parents either declined participation at this point, or could not be contacted by telephone. The research assistant forwarded the contact information for the consenting families to the present researcher for recruitment. Of the 17 families agreeing to be contacted, 12 agreed to participate and were successfully scheduled for data collection. Three families could not be reached by telephone after repeated attempts; one family failed to arrive for the scheduled appointment; and one family declined participation due to family crisis. Thus, the participation rate for the families contacted by this researcher was 70.6% (12/17), while the response rate for the total families eligible for initial contact was 37.5% (12/32). Unfortunately, this response rate may limit the generalizability of the results, as it is possible the children and families who opted to participate significantly differed on the features under study.

Parents agreeing to participate were given a brief explanation of the study over the telephone, including information about confidentiality, voluntary participation, expected duration of testing, and the study's incentives (a $10.00 gift certificate for the parents/guardians, and choice of a small toy for the children). Appointments were then arranged with the parents for data collection at CDI. It was ensured that testing occurred during dates and times that did not interfere unduly with the children's Camp activities. Each parent/guardian met with this researcher in the morning, after dropping off his or her child at the Camp. Each parent read and signed the full informed consent form (see Appendix H), and completed the parent-report versions of the APSD and ICU. All these data were gathered on-site at CDI, in a quiet, private

meeting room. Once the parents/guardians completed their portion of the study, they were provided with the gift certificate (regardless of their child's decision to participate in data collection). Parents typically completed their portion of the study in 15-20 minutes.

Children participated in the morning, shortly after the measures were completed by their parents/guardians. The children were read the assent form (Appendix I), and encouraged to ask any questions they had about the study. Verbal assent was obtained from each child. Once assent was provided by the child, he or she completed the PA and LD tasks in counterbalanced order, using a laptop computer adjusted for their eye-level and reach. Children were permitted to take breaks between tasks, if needed. Following administration of the cognitive tasks, children were read the APSD and ICU subscales (to ensure comprehension), and asked to circle the appropriate responses. At the end of each child's participation, he or she was permitted to choose a toy, regardless of whether all portions of the study were completed (one child was unable to complete the LD task, one refused to complete the PA task, one was unable to complete the APSD, and three were unable to complete the ICU). Children typically required 45-60 minutes to complete all of the required study materials.

Results

All results were analyzed using SPSS version 17, and all significance tests were evaluated using an α level of .05. As the present study is a pilot project, α values were not adjusted to compensate for multiple comparisons. While this limits the generalizability of the results and increases the chances of Type I error, it also improves our ability to identify potential variables of interest to guide future research. Additionally, it has been argued that inclusion of measures of effect size is preferable for stringent control of α levels (see Nakagawa, 2004; Perneger, 1998). As such, effect size values have been calculated for all statistical procedures except Kendall's Tau-B (whose correlation coefficient gives an indication of strength of relationship).

Data Entry and Coding

Data from the parent- and child-reported APSD and ICU, the demographics questionnaire, and the PA task were entered manually into an SPSS database. Summary variables for both the parent- and child-reported APSD scores were created according to Frick and Hare's (2001) guidelines. Three subscale totals were created for the APSD: Impulsivity (items 1, 4, 9, 13, and 17); Narcissism (items 5, 8, 10, 11, 14, 15, and 16); and CU (items 3, 7, 12, 18, 19, and 20) factors, respectively, and APSD Total scores were calculated by summing all APSD items. As standardized information on factors within the ICU were not yet available, simple ICU Total scores were created by summing all the items in the ICU. It should be noted that, although the child-reported APSD and ICU data did show some reliability advantages over the parent-reported data (e.g. higher Cronbach's α for the APSD CU factor, some stronger inter-item correlations), they also exhibited some problematic inter-item correlations, as well as lower numbers of respondents. As such, the parent-reported measures were relied upon for analytical

purposes. As the present sample is quite small, dichotomized variables reflecting child's ethnicity (Caucasian vs. Non-Caucasian), medication use (Yes vs. No) and known diagnoses (Yes vs. No) were also created to allow for exploration of potential relationships between demographic factors and the study variables.

Data collected from E-Prime for the LD task were imported into separate SPSS files. Accuracy and response time data were then aggregated for each participant. Specifically, correct responses on the concrete and abstract trials were summed into total accuracy variables, and 5% trimmed mean response times were calculated for the concrete and abstract task conditions. Separate sets of these outcome variables were created for Block 1 and Block 2 of the LD task (as concrete and abstract word lists could not be counterbalanced across these two blocks). Finally, these four variables were manually entered into the main SPSS database, to be evaluated along with data from the APSD, ICU, demographic questionnaire, and PA task.

As the main study hypothesis predicted differences in concrete versus abstract task performance according to scores on the APSD and ICU, difference scores for the PA and LD tasks were created by calculating the difference between the appropriate concrete and abstract outcome variables. Five sets of difference scores were thus created, one for the accuracy scores on the PA task, two for Block 1 and 2 accuracy for the LD task, and two for Block 1 and 2 response time for the LD task.

Due to concerns regarding reliability, discriminant validity, spurious correlations, and variance restriction when using difference scores in statistical analyses (e.g. Peter, Churchill, & Brown, 1993), the difference scores were centered by subtracting the mean from each score. This procedure is often used to reduce bias in complex statistical procedures (such as ANCOVA) that utilize difference scores or interaction terms (see Field, 2009). However, using these centered

variables did not improve the normality of the data or the results obtained. Therefore, it was decided the analyses would be reported using the non-centered variables to simplify interpretation.

Missing Values and Outliers

In cases where missing data constituted less than 10% of a participant's responses for a given measure, the group mean was inserted to replace missing values. However, if more than 10% of the data were missing from a given measure, the participant was excluded from analyses involving that particular measure. As the present sample was extremely small, extreme scores were not removed from the data set. Instead, to control for extreme scores on the LD response time measures (which were expected to be most vulnerable to extreme high and low scores due to lapses in attention), 5% trimmed mean values were utilized. This ensured that extreme high and low scores did not unduly bias the participants' mean response times.

Statistical Analyses

The main statistical analyses conducted for this study utilized Kendall-s Tau-B correlations, Mann-Whitney *U*, Kruskal-Wallis, and paired-samples *t* tests. Although the data were essentially normal, and perhaps justified use of Pearson product-moment correlations, Field (2009) has stated that the Kendall's Tau-B is more representative of correlations in the general population in samples with smaller *N*'s. Additionally, the small cell-sizes in a number of the analyses made Mann-Whitney *U* and Kruskal-Wallis preferable to independent-samples *t* tests or ANOVAs. Finally, paired-samples *t* tests were used to test within-subjects differences, as this test is more powerful with small samples than its independent *t* counterpart.

Prior to conducting the main analyses, descriptive and normality statistics, histograms, and normal P-P plots were produced to evaluate whether the main study variables (Parent-

reported APSD and ICU scores, PA and LD outcome variables) were normally distributed. Next, Kendall's Tau-B and Mann-Whitney *U* analyses were used to explore whether the children's demographic characteristics (age, grade, sex, ethnicity, medication use, and known diagnosis) were significantly associated with any of the study's main variables of interest. Following this, Kruskal-Wallis and Mann-Whitney *U* tests were used to rule out sequence and order of presentation effects for the PA and LD outcome variables.

Finally, analyses were conducted to explore the study hypotheses. To evaluate Hypothesis I, Kendall's Tau-B correlational analyses were used to examine potential relations between the APSD subscales, APSD Total, and ICU Total, and the PA and LD outcome variables for concrete performance, abstract performance, and the differences between the two. To evaluate Hypothesis II, paired-samples *t* tests were utilized to test for expected differences between concrete and abstract performance across the PA accuracy, LD accuracy, and LD response time variables.

Properties of the Data

APSD and ICU: Descriptive statistics, normality, and inter-item correlations. Descriptive and normality statistics for the parent-reported APSD and ICU scores were generated, and *z* scores for the skewness and kurtosis values of the APSD and ICU scores were calculated to numerically quantify normality. The results are presented in Table 3.1. None of the *z* scores for the skewness or kurtosis of the difference distributions exceeded a *z* cutoff of 1.96 (and thus, did not demonstrate a non-normal distribution at $\alpha = .05$, as per Field, 2009). Parent-reported scores showed a good range of variability in responses to each subscale, and all the subscales were normally distributed. Descriptive and normality statistics were also calculated for

Table 3.1. Descriptive and Normality Statistics for Parent-Reported APSD and ICU Scores (N = 12).

Subscale	Descriptive Statistics					Normality			
	M	*Mdn*	*SD*	*Min*	*Max*	*Skew*†	Z_{Skew*}	*Kt*‡	Z_{Kt*}
APSD: Impulsivity	5.75	5.00	2.30	2.00	10.00	.21	.32	-.39	-.32
APSD: Narcissism	5.33	5.50	3.47	1.00	12.00	.35	.55	-.59	-.48
APSD: Callous-Unemotional	4.58	5.00	1.93	2.00	9.00	.90	1.41	1.19	.97
APSD: Total	16.75	16.50	7.46	6.00	33.00	.68	1.07	.63	.51
ICU: Total	28.75	29.75	16.71	0.00	59.00	.19	.30	-.19	-.16

†Skewness; APSD & ICU *SE* Skewness = .64
‡Kurtosis; APSD & ICU *SE* Kurtosis = 1.23
**Z* values exceeding ±1.96 indicate a significantly non-normal distribution at α = .05

Table 3.2. Descriptive and Normality Statistics for Child-Reported APSD (N = 11) and ICU Scores (N = 9).

Subscale	Descriptive Statistics					Normality			
	M	*Mdn*	*SD*	*Min*	*Max*	*Skew*†	Z_{Skew*}	*Kt*‡	Z_{Kt*}
APSD: Impulsivity	5.23	5.00	2.11	2.00	9.00	-.03	-.04	-.09	-.07
APSD: Narcissism	4.16	3.00	2.44	2.00	10.50	2.00	**3.02**	4.41	**3.45**
APSD: Callous-Unemotional	2.91	2.00	2.39	0.00	8.00	1.00	1.51	.99	.77
APSD: Total	13.53	13.50	5.33	4.80	22.50	.38	.58	-.07	-.06
ICU: Total	23.25	23.87	10.65	11.00	43.50	.73	1.01	-.06	-.04

†Skewness; APSD *SE* Skewness = .66; ICU *SE* Skewness = .72
‡Kurtosis; APSD *SE* Kurtosis = .1.28; ICU *SE* Kurtosis = 1.40
**Z* values exceeding ±1.96 indicate a significantly non-normal distribution at α = .05

Table 3.3. Clinical Descripitors of Parent-Reported APSD Subscale and Total Scores: Percentages by Subscale.

Clinical Descriptor	APSD: IMP	APSD: NAR	APSD: CU	APSD: Total
Below Average	16.7%	25.0%	8.3%	8.3%
Average	41.7%	16.7%	33.3%	33.3%
Slightly Atypical	0.0%	8.3%	0.0%	8.3%
Mildly Atypical	8.3%	25.0%	41.7%	8.3%
Moderately Atypical	25.0%	0.0%	8.3%	16.7%
Markedly Atypical	8.3%	25.0%	8.3%	25.0%

the child-reported APSD and ICU (please refer to Table 3.2). These scores demonstrated an excellent range of variability in clinical presentation of psychopathic features, especially considering the small sample size. Children's scores ranged from "Below Average" to "Markedly Atypical" on the APSD subscale and Total scores, with slightly over half the children falling into an "atypical" ("slightly," "mildly," "moderately," or "markedly") category on each factor. The child-reported APSD scores showed slightly less variability and were significantly non-normal for the Narcissism subscale. Please see Table 3.3 for details.

PA and LD outcome variables: Normality. The normality of the difference scores for the PA and LD tasks was also evaluated quantitatively by generating skewness and kurtosis values, and calculating *z* scores for these values. None of the *z* scores for the skewness or kurtosis of the difference distributions exceeded the *z* cutoff of 1.96. In addition, normality was evaulated visually by generating histograms and P-P plots. Each of these plots indicated that the variables were fairly normally distributed. Thus, the assumption of normality for using paired-samples *t* tests for Hypothesis II was supported. Descriptive statistics for the concrete and

abstract conditions of the cognitive tasks are provided further on, along with the results for Hypothesis II.

Tests for Associations Between Study Variables and Demographic Factors

APSD and ICU: Demographic factors. Kendall's Tau-B correlational analyses were used to examine potential relationships between parent-reported APSD and ICU subscales, children's age, and children's grade in school. These analyses indicated that APSD Impulsivity scores were positively correlated with children's age (τ = .567, p = .020), and with children's grade (τ = .509, p = .035). This relationship will have implications for interpreting the results of Hypothesis I, which will be discussed further on. None of the other correlations was statistically significant.

Mann-Whitney *U* tests were performed to test whether APSD and ICU scores differed according to the dichotomized demographic variables. Significant differences in APSD CU, APSD Total, and ICU Total scores were found between children with versus without known diagnoses (please see Table 3.4 for results). Specifically, children whose parents reported a diagnosis had significantly lower median scores on all three subscales than children whose parents did not report a diagnosis. However, these results must be interpreted with caution, as parents were not systematically queried about their children's diagnostic status. Information about specific diagnoses were only recorded when parents volunteered the information. The results for the remaining Mann-Whitney *U* tests were not significant.

Additional Mann-Whitney *U* analyses were used to investigate whether children who did not complete the entire protocol differed significantly from those who did on any of the parent-reported demographic variables, APSD scores, or ICU scores. The only significant difference

Table 3.4. Mann-Whitney U Tests for Differences in Parent-Reported APSD Subscale, APSD Total, and ICU Total Scores, by Known Diagnosis Dichotomized.

Subscale	Diagnosis (Yes, *N* = 6)	Diagnosis (No, *N* = 6)	Statistics			
	Mdn	*Mdn*	*U*	*Z*	*Sig.*	*r*
APSD: Impulsivity	5.00	7.50	7.00	-1.80	.072	-.52
APSD: Narcissism	3.00	7.50	8.00	-1.61	.107	-.47
APSD: Callous-Unemotional	3.00	5.50	5.50	-2.08	**.038**	-.60
APSD: Total	12.00	21.00	5.00	-2.09	**.037**	-.60
ICU: Total	19.00	37.50	5.00	-2.08	**.037**	-.60

found was children's age, with the completers (*Mdn* = 9.00 years) being marginally significantly older than the non-completers (*Mdn* = 7.50 years), $U = 5.00$, $z = -1.92$, $p = .055$, $r = -.55$.

PA and LD outcome variables: Demographic factors. Kendall's Tau-B correlational analyses were used to explore potential relationships between the PA and LD difference scores, children's age, and children's grade in school. A significant negative correlation was found between children's age and the LD accuracy difference score for Block 1 ($\tau = -.542$, $p = .033$). This indicated that the older children (whose difference scores were typically negative) tended to get higher scores in the abstract than concrete conditions, while the younger children (whose difference scores tended to be positive) generally scored higher in the concrete than abstract conditions. This negative association between age and differences in concrete versus abstract accuracy in the first block of the LD task also has implications for the interpretation of Hypothesis I.

Additionally, a set of Mann-Whitney *U* tests investigated whether children under the originally intended age limit (i.e. 6 or 7 years old) had performance that significantly differed from the children in the appropriate age range (i.e. 8-11 years old). In general, it was observed that these younger children had higher response times in the LD task than the older children. For the concrete condition in Block 1 of the LD task, younger children's 5% trimmed mean response times (*Mdn* = 2086.65 ms.) were marginally significantly longer than the older children's (*Mdn* = 1201.80 ms.), $U = 3.00$, $z = -1.84$, $p = .066$, $r = -.56$. Additionally, for the abstract condition in Block 2 of the LD task, younger children's 5% trimmed mean response times (*Mdn* = 1793.39 ms.) were significantly longer than older children's (*Mdn* = 1347.33 ms.), $U = 2.00$, $z = -2.04$, $p = .041$, $r = -.62$. The importance of this distinction will be discussed further on.

Mann-Whitney *U* tests were utilized to determine whether the PA and LD difference scores varied significantly according to children's biological sex, ethnicity, medication use, or known diagnoses. There was a significant difference in the LD accuracy difference score for Block 2, between children with and without known diagnoses. Specifically, children with no reported diagnosis (*Mdn* = 3.00) had significantly higher median difference scores than children with reported diagnoses (*Mdn* = 0.00), $U = 4.00$, $z = -2.03$, $p = .042$, $r = .-.61$. In other words, children with no diagnosis performed better in the concrete condition than the abstract condition, while children with reported diagnoses showed fewer differences in performance across the two conditions. No other significant differences in PA or LD difference scores were found according to demographic factors.

Tests for Sequence Effects

PA task. A number of checks were performed to explore whether order of presentation had a significant impact on the cognitive outcome measures. First, Mann-Whitney *U* tests were

used to determine whether the PA and LD difference scores varied according to the order of PA versus LD presentation (PA first vs. LD first). None of the differences were significant.

Second, Kruskal-Wallis and Mann-Whitney *U* tests were used to determine whether order of presentation affected the difference scores quantifying concrete versus abstract accuracy for the PA task. The Kruskal-Wallis test indicated that the three presentation orders for the individual word pairs did not produce significantly different results, $\chi^2(2, N = 11) = 1.89$, $p = .389$. Similarly, the Mann-Whitney *U* test suggested that condition order (concrete first vs. abstract first) did not significantly affect differences in children's performance between the two conditions, $U = 8.50$, $Z = -1.20$, $p = .222$, $r = -.36$.

LD task. Mann-Whitney *U* tests were utilized to explore whether the LD difference variables varied according to key counterbalance order (1=Yes/0=No vs. 0=Yes/1=No). No significant differences in the LD outcome measures were found according to whether "1" or "0" was pressed to indicate "Yes" versus "No."

Hypothesis I

Hypothesis I predicted that APSD and ICU scores would be positively associated with differences in children's performance in the concrete versus abstract conditions of the PA and LD tasks. Specifically, it was expected that the APSD CU subscale, APSD Total Score, and ICU Total Score would be positively correlated with the PA and LD variables quantifying the difference between concrete and abstract performance. As these outcome measures were created by calculating the differences between concrete and abstract scores, positive difference scores denoted greater performance in the concrete conditions, while negative difference scores denoted performance advantages in the abstract conditions.

Table 3.5. Kendall's Tau-B Correlations between the Parent-Reported APSD Subscales, APSD Total, ICU Total, and Paired-Associate Task Accuracy for Concrete Response Words, Abstract Response Words, and the Difference Between Them.

Subscale	Concrete Accuracy		Abstract Accuracy		Difference Accuracy	
	τ	*Sig.*	τ	*Sig.*	τ	*Sig.*
APSD: Impulsivity	.245	.328	.061	.807	.189	.456
APSD: Narcissism	.333	.174	.137	.576	.121	.626
APSD: Callous-Unemotional	.129	.616	.000	1.00	.000	1.00
APSD: Total	.369	.130	.117	.633	.180	.466
ICU: Total	.153	.526	.076	.751	.098	.687

Separate sets of correlations between the APSD and ICU scores and the concrete and abstract outcome variables were also conducted, to explore simple relationships between APSD and ICU scores, and the individual word conditions of the cognitive tasks.

PA task. Kendall's Tau-B correlational analyses were used to explore correlations between APSD and ICU scores, and differences in concrete versus abstract PA task accuracy. Kendall's Tau-B correlations between APSD and ICU scores, concrete accuracy, and abstract accuracy were run separately to further explore potential associations. The results are presented in Table 3.5. No significant correlations were found between APSD and ICU scores, and any of the PA task accuracy variables.

LD task. Kendall's Tau-B correlations were also used to explore relationships between APSD and ICU scores, and differences in concrete versus abstract LD task accuracy and 5% trimmed mean response time. Correlations were examined separately for Block 1 and Block 2 of the LD task. The concrete and abstract word lists could not be randomized between the two

Table 3.6. Kendall's Tau-B Correlations between the Parent-Reported APSD Subscales, APSD Total, ICU Total, and Concrete versus Abstract (Block 1) Lexical Decision Accuracy and Response Time.

Subscale	LD: Concrete-Abstract Accuracy		LD: Concrete-Abstract Response Time†	
	τ	*Sig.*	τ	*Sig.*
APSD: Impulsivity	**-.720**	**.004**	.229	.342
APSD: Narcissism	.451	.066	.150	.530
APSD: Callous-Unemotional	-.443	.083	.060	.808
APSD: Total	**-.583**	**.017**	.167	.481
ICU: Total	**-.496**	**.039**	-.055	.815

† 5% Trimmed Mean Response Time.

blocks; thus, aggregating the Block 1 and 2 concrete and abstract scores would be inappropriate as children's performance may not be comparable between the two blocks.

Block 1. Kendall's Tau-B correlations between APSD and ICU scores, and the difference scores for concrete versus abstract LD task accuracy and 5% trimmed mean response time were calculated. The results are presented in Table 3.6. Significant negative correlations were discovered between differences in LD task accuracy, and the APSD Impulsivity (p = .004), APSD Total (p = .017), and ICU Total (p = .039) subscales. This indicated that children with higher APSD Impulsivity, APSD Total, and ICU Total scores tended toward higher accuracy when identifying the *abstract* versus concrete words in Block 1 of the LD task (as indicated by negative difference scores). There were no additional significant correlations.

Kendall's Tau-B correlations were also generated for APSD and ICU scores, and the separate measures for concrete and abstract accuracy and 5% trimmed mean response time. The

Table 3.7. Kendall's Tau-B Correlations between the Parent-Reported APSD Subscales, APSD Total, ICU Total, and Block 1 Lexical Decision Accuracy and Response Time for the Separate Concrete and Abstract Task Conditions.

Subscale	Concrete Condition				Abstract Condition			
	Accuracy		Response Time†		Accuracy		Response Time†	
	τ	*Sig.*	τ	*Sig.*	τ	*Sig.*	τ	*Sig.*
APSD: Impulsivity	-.216	.379	-.191	.428	.340	.172	-.076	.751
APSD: Narcissism	.135	.579	-.037	.875	**.608**	**.013**	.000	1.000
APSD: Callous-Unemotional	-.124	.623	.060	.808	.148	.564	.101	.685
APSD: Total	.000	1.000	-.167	.481	**.505**	**.039**	-.056	.814
ICU: Total	.000	1.000	.018	.938	.343	.155	.164	.484

† 5% Trimmed Mean Response Time.

results are presented in Table 3.7. Abstract LD task accuracy was found to be positively correlated with APSD Narcissism (p = .013) and APSD Total (p = .039) scores. This means that children with higher parent-reported Narcissism and Total APSD characteristics tended to achieve higher accuracy scores when identifying abstract words in Block 1 of the LD task. No other significant correlations were discovered.

Block 2. Once again, Kendall's Tau-B correlations between APSD and ICU scores, and the difference scores for concrete versus abstract LD task accuracy and 5% trimmed mean response time were calculated, this time to examine children's performance in Block 2 of the LD task. Please refer to Table 3.8 for a summary of the results. No significant correlations were found with this set of analyses.

Table 3.8. Kendall's Tau-B Correlations between the Parent-Reported APSD Subscales, APSD Total, ICU Total, and Concrete versus Abstract (Block 2) Lexical Decision Accuracy and Response Time.

Subscale	LD: Concrete-Abstract Accuracy		LD: Concrete-Abstract Response Time†	
	τ	*Sig.*	τ	*Sig.*
APSD: Impulsivity	.337	.172	.038	.874
APSD: Narcissism	.117	.633	.337	.157
APSD: Callous-Unemotional	.292	.249	-.060	.808
APSD: Total	.289	.233	.130	.583
ICU: Total	.397	.097	-.018	.938

† 5% Trimmed Mean Response Time.

Finally, Kendall's Tau-B correlations were generated for APSD and ICU scores, and the separate measures for concrete and abstract accuracy and 5% trimmed mean response time (see Table 3.9 the for results). LD task accuracy was again positively correlated with both APSD Narcissism (p = .009) and APSD Total scores (p = .018), but this time in the concrete condition. Additionally, the correlation between APSD Narcissism and abstract LD task accuracy (p = .068) approached significance. No other significant correlations were found.

Hypothesis II

Hypothesis two predicted that children would perform significantly better in the concrete conditions of the cognitive tasks than in the abstract conditions. To test this hypothesis, paired-samples t tests were conducted to contrast the concrete and abstract conditions of the PA and LD tasks, and r values were calculated to determine effect size. For the PA task, the difference in total accuracy (number correct) for the concrete and abstract conditions was evaluated. For the

Table 3.9. Kendall's Tau-B Correlations between the Parent-Reported APSD Subscales, APSD Total, ICU Total, and Block 2 Lexical Decision Accuracy and Response Time for the Separate Concrete and Abstract Task Conditions.

Subscale	Concrete Condition				Abstract Condition			
	Accuracy		Response Time†		Accuracy		Response Time†	
	τ	*Sig.*	τ	*Sig.*	τ	*Sig.*	τ	*Sig.*
APSD: Impulsivity	.412	.093	.076	.751	.107	.676	-.076	.751
APSD: Narcissism	**.635**	**.009**	.075	.753	*.460*	*.068*	-.187	.432
APSD: Callous-Unemotional	.124	.623	-.020	.935	-.045	.864	-.020	.935
APSD: Total	**.571**	**.018**	.056	.814	.248	.320	-.093	.695
ICU: Total	.374	.116	.164	.484	.163	.510	.055	.815

† 5% Trimmed Mean Response Time.

LD task, the differences in total accuracy and 5% trimmed mean response time were again examined separately for Block 1 and Block 2.

The means, standard deviations, results of the paired-samples *t* tests, and *r* effect size values are presented in Table 3.10. None of the differences was significant. The implications of these null results will be examined further in the discussion section.

Table 3.10. Results of Paired-Sample t Tests for Differences between Concrete and Abstract Task Conditions for the Paired-Associate and Lexical Decision Tasks.

	Concrete Condition		Abstract Condition		Test Statistics			
Outcome Variable	*M*	*SD*	*M*	*SD*	*t*	*df*	*p*	*r*
PA C-A Total Accuracy	3.72	2.20	3.18	1.99	.76	10	.465	.23
LD Block 1 C-A Total Accuracy	10.55	2.95	11.18	3.06	-.76	10	.463	.23
LD Block 1 C-A 5% Mean RT* (ms.)	1605.57	665.51	1572.12	710.96	.15	10	.883	.04
LD Block 2 C-A Total Accuracy	11.18	3.31	10.45	3.53	.89	10	.397	.27
LD Block 2 C-A 5% Mean RT* (ms.)	1390.85	435.59	1437.17	417.56	-.45	10	.665	.14

*5% trimmed mean of participants' response time.

Discussion

The purpose of the present thesis was to offer a preliminary investigation of potential relationships between childhood psychopathic features and abstract versus concrete performance in paired-associate (PA) and lexical decision (LD) cognitive tasks. The results of the pilot analyses were generally not consistent with the study hypotheses. However, the analyses revealed several potential variables of interest, and provided valuable information regarding the study measures and materials. This information may be used to guide improvements to the present research protocol and improve future research initiatives.

Summary of Support for Hypothesis I

Hypothesis I predicted that measures of psychopathic characteristics and particularly the CU factor would be significantly and positively associated with the magnitude of difference between concrete and abstract performance on the cognitive tasks. Unfortunately, this prediction was not borne out by the data. There were no associations between measures of psychopathic characteristics and PA task performance – and this null pattern of findings held for accuracy in the concrete condition, the abstract condition, and the difference between the two conditions. Even more unexpectedly, the CU trait showed zero correlations with abstract PA accuracy, and with the difference between concrete and abstract PA accuracy. This implies that, at least for this sample of children, no relationship exists between CU traits and abstract PA performance, or CU traits and the magnitude of difference between concrete and abstract PA learning. Consistent with the results of the PA task, no significant positive associations were found between CU traits and differences in concrete versus abstract LD accuracy or response time. This was again surprising, as the CU traits were theorized to be the factor potentially underpinning differences in performance.

Moreover, the significant results that were obtained for the LD task were complex, and unanticipated. Interestingly, the only significant results involving the magnitude of difference between concrete and abstract performance were that APSD Impulsivity, APSD Total, and ICU Total scores were *negatively* associated with the difference score for LD accuracy in Block 1 of the task. Thus, not only did the results run in the opposite direction as hypothesized, but the strongest negative correlation was with impulsivity, not CU traits. It is important to note that the significant negative association between the APSD Total and the difference in concrete versus abstract LD accuracy for Block 1 may be largely driven by the correlation with impulsivity.

When the correlations were conducted separately for concrete and abstract accuracy and response time, significant (and near-significant) positive correlations were found between narcissism and accuracy in both the abstract *and* concrete conditions. This raises some interesting notions about possible relationships between narcissism, motivation, and performance.

Theoretical Interpretations of Hypothesis I

CU traits. It is difficult to interpret the extremely low (or zero) correlations between CU scores and the cognitive outcome measures seen in the PA task, as well as the negative association between ICU scores and the magnitude of the difference between concrete and abstract accuracy observed in Block 1 of the LD task. The former result suggests the absence of any relationship between the two variables, while the latter result suggests the children with higher levels of parent-reported CU traits performed *more* accurately in the abstract than the concrete condition of the LD task, at least initially. These observations are quite inconsistent with what was predicted based on adult research and theory. For example, Hare and Jutai (1988) discovered that men with scores above 32 on the original Psychopathy Checklist were

significantly worse in the abstract condition of a semantic sorting task. Additionaly, Kiehl et al. (2004) found significant response time deficits in abstract lexical decision-making in men with psychopathy compared to men without psychopathy, as well as associated functional anomalies in the right anterior temporal cortex.

It is notable, however, that Kiehl and his associates (2004) also failed to find expected differences in abstract LD task accuracy (i.e. number correct) between participants with low versus high levels of psychopathy. Thus, the lack of association between CU traits and abstract accuracy scores is not entirely inconsistent with previous research. Additionally, the present study's low observed correlations may not be so surprising in light of the somewhat poor correspondence between adult and childhood cognitive correlates of psychopathic features. For example, adults with high levels of psychopathy have demonstrated deficits in emotional cognition across a number of studies (e.g. Hervé et al., 2003; Mitchell et al., 2006; Müller et al., 2008; Williamson et al., 1991). However, the child findings have not consistently mirrored this effect (Kimonis et al., 2006; Loney et al., 2003; Salekin et al., 2009; Woodworth & Waschbusch, 2007). Although Loney et al. (2003) and Kimonis et al. (2006) have found some indications that CU traits are associated with impaired emotional processing, Woodworth and Waschbusch's (2007) results were less supportive. While they did find deficits in identification of sad faces among children with high CU traits, they failed to find many other associations typically seen in adults with psychopathy, including interpretation of emotional vignettes. Indeed, the children with high CU traits performed marginally *better* than the low CU control group at identification of fearful facial expressions. These inconsistencies may be due to neurodevelopmental factors distinguishing children with CU traits from adults with psychopathy. Indeed, Seagrave and Grisso (2002) warned that frontal lobe development is not yet complete in children and youth,

and that child psychopathic features should consequently not be emphasized as direct predictors of adult outcomes. Salekin et al. (2009) supported this argument, noting that, despite some overlap in emotional cognition findings, children and youth with psychopathic features may not yet manifest the deficits in dorsolateral frontal or orbitofrontal cortical functioning typical of adults with psychopathy. Thus, any cognitive or behavioural deficits associated with neurological features of psychopathy may not become apparent until adulthood, as children and youth with low CU traits may exhibit similar characteristics (and these may, in fact, be developmentally normative).

Impulsivity. The negative association between impulsivity and the magnitude of differences between concrete and abstract accuracy may make some intuitive sense if we look to the literature on attention deficit-hyperactive disorder (ADHD), motivation, and optimal stimulation. Frick and Hare (2002) demonstrated that the impulsivity factor of the APSD is strongly correlated with symptoms of both the inattentive (r = .642) and hyperactive (r = .692) variants of ADHD. Links between impulsivity and ADHD have been noted elsewhere, as well (e.g. Loney et al., 2003). This observed overlap is logical, as impaired behavioural inhibition appears to be a core feature of ADHD (see Barkley, 1997) and the APSD impulsivity scale primarily measures ability to inhibit behaviours (e.g. “Acts without thinking,” “Engages in risky activities”). Thus, ADHD research may help to guide our understanding of cognitive phenomena associated with impulsivity as measured by the APSD.

Theorists and researchers have partially supported the contention that optimal levels of cognitive stimulation may enhance motivation and performance in children with ADHD (for a discussion, see Antrop, Stock, Verté, Wiersema, Baeyens, & Royers, 2006). Thus, it is possible that children with higher levels of impulsivity and inattention are better able to focus on task

conditions that are more cognitively challenging. Although the concrete and abstract conditions of the task were designed to be of equivalent familiarity, length, and age of acquisition, it may be that abstract semantic processing involves a higher cognitive load than concrete processing and thus encourages greater attention and effort from highly impulsive children. Indeed, Paivio's (1991) dual-coding theory might support this reasoning. Paivio's theory posits that the strong and consistent advantages for concrete versus abstract word recall observed across multiple studies occurs because concrete words capitalize not only the neural substrate governing semantic processing, but also the substrate governing nonverbal imagery. Thus, it is possible that abstract words require greater effort to process and perhaps this amounts to higher levels of neurological stimulation. Unfortunately, it is equally possible that the reverse is true and *concrete* words are more neurologically stimulating due to their activation of multiple cortical substrates.

It also may be possible that children who exhibit high levels of impulsivity had greater initial accuracy for the abstract condition due to a greater tendency toward impulsive responding in the concrete condition. For example, de Zeeuw et al. (2008) observed that children with ADHD exhibited poorer response inhibition than control children in a stop-signal paradigm. Perhaps if concrete words (or pseudowords) seemed easier to identify than the abstract words, the children with higher impulsivity scores may have had an increased likelihood of responding automatically (and incorrectly) to these words. Although there were no significant differences in response time between the two task conditions, it is still possible that impulsive errors were more common in the concrete than abstract condition.

Narcissism. There were a number of significant (or near-significant) associations between the APSD Narcissism factor and both concrete and abstract accuracy in the LD task. Indeed, these results are consistent with research involving adults with high levels of narcissism.

Using a series of well-designed experiments, Wallace and Baumeister (2002) found that adults with high narcissism scores outperformed low-scorers on physical and cognitive tasks in situations where opportunities for monetary incentives and/or recognition of superior achievement were present. Further support of this observation was provided by Foster and Trimm (2008), who found that adults with high narcissism scores tended to have higher levels of approach motivation than low scorers. Together, these studies suggest that, in situations where personal rewards are likely, individuals with narcissistic features may outperform individuals without these features. This may explain the relationship observed between narcissism scores and LD task performance. Children were informed at the outset of the study that they would receive a toy in exchange for participation, and the LD task offered a feedback screen that rewarded accurate responses during the training phase. Children with higher narcissism scores may have viewed the task as an opportunity for personal reward, and therefore been more highly motivated to perform well on the task.

Caveats and Conclusions for Hypothesis I

There were a number of caveats that severely limited the generalizability of the associations described above – these will be discussed in detail further on. However, the most problematic issue involved the two significant correlations between impulsivity, and age, with the difference in concrete versus abstract accuracy in Block 1 of the LD task. This raised a potential alternative explanation for differences in LD performance. It may have been age, rather than impulsivity, that was driving the apparent association between impulsivity and differences in accuracy. Indeed, it is possible that ability to process abstract words might increase with age. However, one would not expect this increase to come at the expense of concrete processing (yet this is what the age/difference in accuracy correlation would suggest). In addition, the positive

age/impulsivity correlation seen in the present study contradicted findings from large-scale community samples used to gather normative data for the APSD. These studies found that impulsivity scores were higher in younger children (e.g., see Frick & Hare, 2002). The findings summarized by Frick and Hare (2002) suggested that the association between age and impulsivity seen in the present study is not typical of the general population. However, these arguments do not rule out the possibility that age is a more salient factor in LD task performance than impulsivity. More rigorous research controlling for age, ability level, diagnosis, and perhaps including multiple measures of impulsivity would be needed to clarify these relationships.

Nonetheless, it may be argued that the observed significant associations between impulsivity, narcissism, and task performance underscore the importance of addressing the individual sub-factors (i.e., CU traits, impulsivity, and narcissism) that underlie the construct of psychopathy when evaluating its effects on cognitive performance (e.g., Loney et al., 2003). Loney et al. (2003) argued that, while many studies examining adults and children with psychopathic characteristics focus on the CU traits alone, or on the broad construct of psychopathy (i.e. APSD Total score, PCL-R scores in adults), it may be that the impulsive and narcissistic features of psychopathy are as important to understanding differences in cognitive functioning as is the CU factor and the overarching construct of psychopathy itself.

Summary of Support for Hypothesis II

Hypothesis II predicted that children would perform significantly better in the concrete conditions of all of the cognitive tasks than the abstract conditions. This advantage for processing concrete words is extremely well-established in the research literature and has formed the basis for Paivio's dual-coding theory of memory and cognition (for a review see Paivio, 1991). Additionally, all the incarcerated adults in Kiehl and associates' (2004) study (regardless

of level of psychopathy) were faster and more accurate when identifying concrete words than abstract words in the LD paradigm, suggesting that this concreteness advantage should exist for populations with antisocial behaviour patterns, as well. Unfortunately, the data collected for this project were not consistent with this hypothesis, as no significant differences between the concrete and abstract conditions were found for any of the cognitive outcome measures. This is quite perplexing, as it suggests the present data are not comparable with patterns long observed in the general population. A number of potential explanations for this lack of expected superiority for concrete word conditions will be discussed in the next section. Most importantly, it is possible that problems with instrumentation (i.e. the design of the cognitive tasks) or uncontrolled variables such as intelligence, child psychopathology, or inattention, resulted in the present study's lack of congruence with previous research.

Limitations

The purpose of this thesis was, in part, to establish whether the current research protocol was effective in testing the potential relationship between psychopathic characteristics and deficits in abstract semantic processing. Thus, a detailed examination of the limitations of the present study will assist in guiding future research efforts. Limitations regarding the study's sample characteristics, cognitive tasks, survey measures, and statistical procedures will be discussed in the following sections.

Sample limitations. The characteristics of the sample used for the present study are problematic for a number of reasons. The participating families comprised a very small, clinical convenience sample including children with multiple developmental and behavioural difficulties. The small sample size greatly reduced the representativeness and generalizability of the results and made it impossible to use advanced statistical procedures (such as a hierarchical multiple

regression model) to control important variables such as age, sex, child psychopathology, medication use, and ethnicity. All these variables are known to affect measures of psychopathic features or cognitive task performance. For example, APSD scores can vary according to age and sex (Frick and Hare, 2002). Additionally, while findings with regard to youth psychopathy scores and ethnicity have been mixed, at least some investigations have suggested differences across ethnic groups (Schmidt, McKinnon, Chattha, & Brownlee, 2006). Many of the children in the present study were using stimulant medication, which has been demonstrated to improve performance on a variety of cognitive tasks (Agay, Yechiam, Carmel, & Levkovitz, 2010). Additionally, a number of the children had ADHD diagnoses or learning disabilities. Research has demonstrated that children diagnosed with ADHD or verbal learning disabilities may exhibit deficits across a number of cognitive performance domains, particularly when task conditions are not optimized to take inattention, behavioural inhibition, or learning difficulties into account (Kuntsi, Wood, van der Meere, & Asherton, 2009). Indeed, there are even important behavioural, cognitive, and neurological distinctions between the inattentive and hyperactive/combined subtypes of ADHD, which would certainly produce variation in performance on cognitive tasks (see Diamond, 2005). It is therefore extremely important to properly measure and control for these variables.

Furthermore, as it was difficult to obtain a sufficient number of families for the study, use of children younger than originally intended was necessary. The age of acquisition level for words used in the cognitive tasks was set to eight years old or greater, yet there were three children younger than eight years old in the sample. It should be noted that the parents of all three children younger than eight reported that the children were reading at, or above, their current grade level. Partly consistent with this, these children were all able to complete the

required tasks. Nonetheless, age did affect performance on some of the cognitive measures, as the children below the original age limit had longer response times than the older children. This type of extraneous variance may partially explain the present study's lack of significant findings for LD response time.

Additionally, there was no control condition of children from a non-clinical population. It should be noted, however, that such a comparison group was not included due to concern that any differences between the two groups might be driven by difficulties other than psychopathic characteristics, as the children from the clinical sample are multi-problem youth. Indeed, difficulties such as ADHD, conduct disorder, lack of impulse and emotional control, learning disabilities, pervasive developmental disorders, chaotic or abusive family environment, trauma, and poverty are more prevalent among the population of children at risk of developing psychopathy in adulthood (e.g. Porter, 1996; Sevecke, Kosson, & Krischer, 2009). Thus, it would be difficult to attribute differences between clinical and community-based children's cognitive performance to psychopathic characteristics alone, when many other variables would be expected to differ systematically between the two child populations. Perhaps for the same reason, Kiehl et al.'s (2004) study did not utilize a control condition of men from the general population.

Nonetheless, a comparison group of children from the general population would provide information on whether this clinic-based sample differed as a whole from children in the broader community. While this would not delineate the unique role of psychopathic features, it might add some useful perspective. For example, it may be that differences according to psychopathic features pale in comparison to differences between clinical and non-clinical samples, which would provide information about the clinical utility of the present line of inquiry. In addition,

inclusion of a non-clinical sample of children might provide information regarding the unanticipated results found with the present sample, and whether these anomalies were due to instrumentation difficulties or unique features of the children in this clinical population (e.g., the observed lack of a concreteness effect).

Cognitive task limitations. A number of problems arose with the cognitive tasks designed for the study. Within the word lists, there was a very small pool of available abstract nouns properly controlled for concreteness, frequency, imagery, length, and meaningfulness with ages of acquisition less than or equal to 8 years of age. This limited the number of trials that could be created for the PA and LD tasks, and this may have affected statistical power. Cognitive tasks designed for adults (Kiehl et al., 2004) and children (Loney et al., 2003) have traditionally included more trials to maximize accurate measurement of cognitive performance across a set period of time.

Additionally, the abstract nouns used in the LD task had significantly higher age of acquisition ratings than the concrete nouns. Although the words in both conditions were generally acquired at ages well below 8 years, this still may have created differences in ability when identifying concrete versus abstract nouns, particularly as the study involved children younger than originally intended. Indeed, this discrepancy may partly account for the observed effect of age on the difference in concrete versus abstract LD accuracy in block 1, as the younger children tended to perform more poorly with the abstract words. Furthermore, word length was not sufficiently controlled between the concrete and abstract conditions of the PA task, as the concrete words were significantly longer. This may partially explain the lack of the expected concreteness effect (Hypothesis II) for PA accuracy. Finally, emotionality ratings were provided by a very small, convenience sample of children and university students. In the future,

emotionality ratings from a large, normative sample of children should be sought to ensure emotionality is properly controlled.

APSD/ICU limitations. The study's reliance on parent-reported measures of child psychopathic characteristics was less than ideal. Parent-reported measurement of children's personality, behaviour, and conduct problems may be vulnerable to inaccuracies such as incomplete memory, lack of awareness of children's negative behaviours (which may be concealed), and socially desirable responding (see Arsenault, Kim-Cohen, Taylor, Caspi, & Moffitt, 2005). To partly counteract this, the APSD typically involves collecting ratings from parents and teachers, and creates a composite score combining the responses of both sources. Unfortunately, teacher ratings for the APSD could not be obtained for the present study. Thus, information about children's behaviours across other contexts (such as school) may not be accurately reflected. Child-reported measures were collected, but were not used in the primary analyses. The literature on the reliability and validity of children's self-reporting of personality and conduct problems is mixed, with some studies suggesting lack of reliability and validity, and others demonstrating that carefully worded and structured child self-reports may be useful compliments to parent-reports (Arsenault et al., 2005; Brown, Mangelsdorf, Agathen, & Ho, 2008). It would have been interesting to use children's self-reports on the APSD and ICU to evaluate the study hypotheses, but the small sample size, paired with children's difficulty with the ICU, prohibited conducting a duplicate set of correlational analyses. Nonetheless, the potential value of child-reported APSD and ICU scores should be explored in future research initiatives.

Additionally, the ICU self-report measure may have been too difficult for many of the children in the 6 to 8 year old range. These children appeared to find reverse-scored items

particularly confusing, and were further daunted by the increase to 4 response options (as opposed to the 3 options offered in the APSD self-report measure). Thus, three of the 12 children in the study were not able to complete this measure.

Finally, the study relied on measures of psychopathic characteristics developed and conceived by the same pair of researchers (Paul Frick and Robert Hare). No additional measures of psychopathic characteristics or associated features were used to evaluate the convergent and discriminant validity of the APSD and ICU.

Statistical limitations. There were a number of limitations to the statistical analyses used. The correlational design was largely descriptive, and left a number of important variables uncontrolled for. For example, children's age is potentially confounded with impulsivity, as they are correlated with each other, as well as with concrete-abstract differences in LD accuracy during Block 1 of the task. In addition, some potentially important variables remained unmeasured. There were no specific questions or measures to quantify children's diagnostic status. Additionally, no measures of children's intelligence were included, even though this factor might have affected cognitive task performance.

As the alpha level used to determine statistical significance was not adjusted to compensate for the study's multiple comparisons, there was an increased chance of spurious significant findings due to inflated Type I error rates. Additionally, use of difference scores may have increased the probability of spurious significant correlations. While these limitations are important to recognize, effect size calculations were included to assist in evaluating whether the observed relationships are meaningful.

Finally, the decision to dichotimize some of the demographic variables may have attenuated the variability of these measurements. In future research with larger samples, it would

be preferable to retain more detailed categories for analysis. However, dichotomization was thought to be favorable given the small sample size, as cell numbers in the original variables' various categories were often too small to allow for tenable comparisons.

Strengths

The present thesis project had a number of notable strengths worth mentioning. For instance, the sample of families collected, albeit small, was quite ethnically diverse, with half the study participants being members of ethnic minority groups. Additionally, the study had good ecological validity, as children were not excluded from participation on the basis of comorbid diagnoses, learning disabilities, or medication use. Although this created difficulties ruling out alternative explanations for variations in cognitive performance, comorbidity is the rule rather than the exception among children with antisocial behaviour problems (Seagrave and Grisso, 2002), and thus, research aimed at understanding and assisting these children must be generalizable to those with complex psychological profiles.

Despite the limitations associated with self-report and parent-report surveys, the APSD and ICU had fairly strong psychometric properties. The ICU had particularly high reliability for both parents and the children who were able to complete it, and the APSD's reliability was generally solid as well. Additionally, the parent-reported APSD scores indicated excellent variability in psychopathic features for the present sample, with children ranging from "Below Average" to "Markedly Atypical" on all APSD subscale and Total scores. This indicated that the chosen population of children may be very appropriate for investigations of the role of psychopathic features in cognitive functioning and development.

Furthermore, the study's use of the APSD sub-factors to evaluate the impact of the underlying features of psychopathy (impulsivity, narcissism, CU traits) was an improvement

over previous studies of psychopathy and abstract processing. For example, Kiehl et al. (2004) used three groups (low, medium, and high psychopathy) created by using cut-scores. They were thus unable to examine the independent effects that features such as impulsivity, narcissism, and CU traits may have had on cognitive performance. Loney et al. (2003) have demonstrated the importance of examining these features for emotional processing, and the present study suggested it may be important in examining semantic processing as well.

Future Directions

There are a number of potential future directions for the present line of research. It would be prudent to examine the variables used in the present study using an improved protocol. Recruitment of a much larger sample would allow for use of more sophisticated statistical procedures, such as a hierarchical multiple regression model, to control for variables such as age, sex, ethnicity, known diagnosis, and medication use, which may all potentially affect cognitive task performance and/or scores on measures of psychopathic characteristics. A short-form measure of intelligence, such as the Weschler Abbreviated Scale of Intelligence™ (WASI™), and a measure of linguistic ability, such as the Wide Range Achievement Test (WRAT) could also be included to control for differences in children's verbal and nonverbal cognitive abilities.

The present protocol might also be improved through recruitment of older children or adolescents. This would allow for an increased bank of abstract words, as a higher age of acquisition limit could be used, making a far greater number of nouns available. Additional words would permit an increased number of trials in the PA and LD tasks, and help to ensure that all relevant word properties can be properly controlled for. Use of an adolescent sample may also solve some of the problems seen with the self-report APSD and ICU – for example, the ICU may not be as challenging for adolescent participants to complete (see Arsenault et al., 2004).

The cognitive measures used in future versions of the study might be improved as well. An increased number of trials in the PA and LD tasks could improve statistical power. The present study used 120 trials within 2 blocks. However, Loney and colleagues (2003) used 180 trials in 10 blocks with youth aged 12-18, while Williamson et al. (1991) included 468 trials in 26 blocks with incarcerated adults. An improved protocol might also include longer practice trials to ensure extinction of practice and learning effects, better between-block randomization of word conditions, and multi-session data collection to prevent fatigue. Furthermore, use of more complex cognitive tasks might increase ability to recognize underlying deficits in abstract reasoning. Possible options might include an abstract versus concrete categorization task (e.g. Hare & Jutai, 1988; Pexman et al., 2007), or a Q-sort task for categorizing metaphorical statements (e.g. Hervé et al., 2003). Finally, inclusion of a stop-signal task might help to clarify the role of impulsive responding, particularly among children diagnosed with ADHD (see de Zeeuw et al., 2008).

With regard to the measurement of psychopathic features in children, more research is needed to establish appropriate age ranges for the self-reported ICU measure. Moreover, in future research on childhood precursors of psychopathy, additional measures of psychopathic features, such as Lynam's Child Psychopathy Scale (see Lynam, 1997), or the Youth Psychopathic Traits Inventory-Child Version (van Baardewijk, Stegge, Andershed, Thomaes, Scholte, & Vermeiren, 2008) could be used to improve measurement of psychopathic traits. Additionally, general children's mental health screening measures, such as Achenbach's Child Behaviour Checklist, Teacher Report Form, and Youth Self Report (Achenbach, Rescorla, McConaughey, Pecora, Wetherbee, & Ruffle, 2003), would enable exploration of convergent

validity with features such as externalizing symptoms, inattention, and antisocial behaviours, and to establish discriminant validity with constructs such as mood and thought disorders.

Inclusion of the various sub-factors of psychopathic features (Impulsivity, Narcissism, and CU traits) does appear to be quite important in assessing links between the construct of psychopathy and cognitive performance (as was reasoned by Loney et al., 2003). Again, in a larger, more rigorous study, a hierarchical multiple regression model would allow for individual consideration of each of these factors. Additionally, the link between narcissism and accuracy suggests that inclusion of measures of motivation or social desirability might add to our understanding of how this dimension interacts with children's performance across various cognitive tasks.

Conclusion

Although the present findings were generally unsupportive of the study hypotheses, a number of potentially interesting relationships were found between parent-reported psychopathic features and the cognitive outcome measures. In addition, important information was gathered that can be used to improve upon the present study's sample characteristics, cognitive tasks, measurement tools, and statistical procedures. Ultimately, this information may help guide future research into the potential links between child precursors of psychopathy and abstract semantic processing. Such research may yet inform treatment and intervention programs intended to prevent children with psychopathic characteristics from manifesting the full range of negative outcomes typically associated with adult presentations of psychopathy.

References

Achenbach, T. M., Rescorla, L. A., McConaughey, S. H., Pecora, P. J., Wetherbee, K. M., & Ruffle, T. M. (2003). *Achenbach System of Empirically Based Assessment.* Research Center for Children, Youth, and Families: Burlington, VT.

Agay, N., Yechiam, E., Carmel, Z., & Lekovitz, Y. (2010). Non-specific effects of methylphenidate (Ritalin) on cognitive ability and decision-making of ADHD and healthy adults. *Psychopharmacology, 210,* 511-519. DOI: 10.1007/s00213-010-1853-4.

Altarriba, J., & Bauer, L. M. (2004). The distinctiveness of emotion concepts: A comparison between emotion, abstract, and concrete words. *The American Journal of Psychology, 117,* 389-410. DOI: 10.2307/4149007

Andrade, J. T. (2008). The inclusion of antisocial behavior in the construct of psychopathy: A review of the research. *Aggression and Violent Behavior, 13,* 328-335. doi:10.1016/j.avb.2008.05.001

Antrop, I., Stock, P., Verté, S., Wiersema, J. R., Baeyens, D., & Roeyers, H. (2006). ADHD and delay aversion: The influence of non-temporal stimulation on choice for delayed rewards. *Journal of Child Psychology and Psychiatry, 47,* 1152-1158. DOI: 10.1111/j.1469-77610.2006.10619.x

Arsenault, L., Kim-Cohen, J., Taylor, A., Caspi, A., & Moffitt, T. (2005). Psychometric evaluation of 5- and 7-year-old children's self-reports of conduct problems. *Journal of Abnormal Child Psychology, 33,* 537-550. DOI: 10.1007/s10802-005-6736-5

Barkley, R. A. (1997). Behavioral inhibition, sustained attention, and executive functions: Constructing a unifying theory of ADHD. *Psychological Bulletin, 121,* 65-94. DOI: 10.1037/0033-2909.121.1.65

Baslogu, C., Semiz, U., Oner, O., Gunay, H., Ebrinc, S., et al., (2008). A magnetic resonance spectroscopy study of antisocial behaviour disorder, psychopathy and violent crime among military conscripts. *Acta Neuropsychiatrica, 20,* 72-77.

Binder, J. R., Westbury, C. F., McKiernan, K. A., Possing, E. T., & Medler, D. A. (2005). Distinct brain systems for processing concrete and abstract concepts. *Journal of Cognitive Neuroscience, 17,* 905-917. DOI: 10.1162/0898929054021102

Blair, K. S., Richell, R. A., Mitchell, D. G. V., Leonard, A., Morton, J., & Blair, R. J. R. (2006). They know the words, but not the music: Affective and semantic priming in individuals with psychopathy. *Biological Psychology, 73,* 114-123. DOI: 10.1016/j.biopsycho.2005.12.006

Brown, G. L., Mangelsdorf, S. C., Agathen, J. M., & Ho, M-H. (2008). Young children's psychological selves: Convergence with maternal reports of child personality. *Social Development, 17,* 161-182.

Campbell, M. A., Porter, S., & Santor, D. (2004). Psychopathic traits in adolescent offenders: An evaluation of criminal history, clinical, and psychosocial correlates. *Behavioral Sciences and the Law, 22,* 23-47. DOI: 10.1002/bsl.572

Cleckley, H. M. (1988). *The Mask of Sanity ~ An Attempt to Clarify Some Issues About the So-Called Psychopathic Personality.* (5th Ed.).

Cooke, D. J., & Michie, C. (2001). Refining the construct of psychopathy: Towards a hierarchical model. *Psychological Assessment, 13,* 171-188. DOI: 10.1037/1040-3590.13.2.171

Crutch, S. J., & Warrington, E. K. (2005). Abstract and concrete concepts have structurally different representational frameworks. *Brain, 128,* 615-627. DOI: 10.1093/brain/awh349

Dadds, M. R., Fraser, J., Frost, A., & Hawes, D. J. (2005). Disentangling the underlying dimensions of psychopathy and conduct problems in childhood: A community study. *Journal of Consulting and Clinical Psychology, 73,* 400-410. DOI: 10.1037/0022-006X.73.3.400

Diamond, A. (2005). Attention-deficit disorder (attention-deficit/hyperactivity disorder without hyperactivity): A neurobiologically and behaviorally distinct disorder from attendion-deficit/hyperactivity disorder (with hyperactivity). *Development and Psychopathology, 17,* 807-825. DOI: 10.1017/S0954579405050388

Ellen, A. S., & Kelley, M. L. (2002). Antisocial Process Screening Device. *Mental Measurements Yearbook, 16.* Persistent link: http://ezproxy.lib.ryerson.ca/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=loh&AN=16122834&site=ehost-live

Field, A. (2009). *Discovering Statistics Using SPSS: 3rd Edition.* London: Sage Publications, Ltd.

Forsman, M., Lichtenstein, P., Andershed, H., & Larsson, H. (2008). Genetic effects explain the stability of psychopathic personality from mid- to late adolescence. *Journal of Abnormal Psychology, 117,* 606-617. DOI: 10.1037/0021-843X.117.3.606

Foster, J. D., & Trimm, R. F. (2008). On being eager and uninhibited: Narcissism and approach-avoidance motivation. *Personality and Social Psychology Bulletin, 34,* 1004-1017. DOI: 10.1177/0146167208316688

Frick, P. J. (2004). *The Inventory of Callous-Unemotional Traits.* Unpublished rating scale: University of New Orleans.

Frick, P. J., & Hare, R. D. (2001). *Antisocial Process Screening Device*. Toronto, Canada: Multi-Health Systems Inc.

Frick, P. J., & White, S. F. (2008). Research review: The importance of callous-unemotional traits for developmental models of aggressive and antisocial behaviour. *The Journal of Child Psychology and Psychiatry, 49,* 359-375. DOI: 10.1111/j.1469-7610.2007.01862.x

Gilhooly, K. J., & Logie, R. H. (1980). Age-of-acquisition, imagery, concreteness, familiarity, and ambiguity measures for 1,944 words. *Behavior Research Methods & Instrumentation, 12,* 395-427.

Guay, J-P., Ruscio, J., Knight, R. A., & Hare, R. D. (2007). A taxometric analysis of the latent structure of psychopathy: Evidence for dimensionality. *Journal of Abnormal Psychology, 116,* 701-716. DOI: 10.1037/0021-843X.116.4.701.

Harpur, T. J., Hakstian, R., & Hare, R. D. (1988). Factor structure of the psychopathy checklist. *Journal of Consulting and Clinical Psychology, 56,* 741-747. DOI: 10.1037/0022-006X.56.5.741

Hare, R. D. (1996). Psychopathy: A clinical construct whose time has come. *Criminal Justice and Behavior, 23,* 25-54. DOI: 10.1177/0093854896023001004

Hare, R. D., & Jutai, J. W. (1988). Psychopathy and cerebral asymmetry in semantic processing. *Personality and Individual Differences, 9,* 329-337. DOI: 10.1016/0191-8869(88)90095-5

Hervé, H. F., Hayes, J., & Hare, R. D. (2003). Psychopathy and sensitivity to the emotional polarity of metaphorical statements. *Personality and Individual Differences, 35,* 1497-1507. DOI: 10.1016/S0191-8869(02)00365-3

Kiehl, K. A., Bates, A. T., Laurens, K. R., Hare, R. D., & Liddle, P. F. (2006). Brain potentials implicate temporal lobe abnormalities in criminal psychopaths. *Journal of Abnormal Psychology, 115,* 443-453. DOI: 10.1037/0021-843X.115.3.443

Kiehl, K. A., Liddle, P. F., Smith, A. M., Mendrek, A., Forster, B. B., and Hare, R. D. (1999). Neural pathways involved in the processing of concrete and abstract words. *Human Brain Mapping, 7,* 225-233. DOI: 10.1002/(SICI)1097-0193(1999)7:4<225::AID-HBM1>3.0.CO;2-P

Kiehl, K. A., Smith, A. M., Mendrek, A., Forster, B. B., Hare, R. D., & Liddle, P. F. (2004). Temporal lobe abnormalities in semantic processing by criminal psychopaths as revealed by functional magnetic resonance imaging. *Psychiatry Research: Neuroimaging, 130,* 297-312. DOI: 10.1016/j.pscychresns.2004.02.002

Kimonis, E. R., Frick, P. J., Fazekas, B. S., and Loney, B. R. (2006). Psychopathy, aggression, and the processing of emotional stimuli in non-referred girls and boys. *Behavioral Sciences and the Law, 24,* 21-37. DOI: 10.1002/bsl.668

Kuntsi, J., Wood, A. C., van der Meere, J., & Asherton, P. (2009). Why cognitive performance in ADHD may not reveal true potential: Findings from a large population-based sample. *Journal of the International Neuropsychological Society, 15,* 570-579. DOI: 10.1017/S135561770909081X

Loeber, R., Burke, J., & Pardini, D. A. (2009). Perspectives on oppositional defiant disorder, conduct disorder, and psychopathic features. *Journal of Child Psychology and Psychiatry, 50,* 133-142. DOI: 10.1111/j.1469-7610.2008.02011.x

Lynam, D. R. (1997). Pursuing the psychopath: Capturing the fledgling psychopath in a nomological net. *Journal of Abnormal Psychology, 106,* 425-437. DOI: 10.1037/0021-843X.106.3.425

Lynam, D. R., Caspi, A., Moffitt, T. E., Loeber, R., & Stouthamer-Loeber, M. (2007). Longitudinal evidence that psychopathy scores in early adolescence predict adult

psychopathy. *Journal of Abnormal Psychology, 116,* 155-165. DOI: 10.1037/0021-843X.116.1.155

Marsee, M. A., & Frick, P. J. (2007). Exploring the cognitive and emotional correlates to proactive and reactive aggression in a sample of detained girls. *Journal of Abnormal Child Psychology, 35,* 969-981. DOI: 10.1007/s10802-007-9147-y

Mitchell, D. G. V., Richell, R. A., Leonard, A., & Blair, R. J. R. (2006). Emotion at the expense of cognition: Psychopathic individuals outperform controls on an operant response task. *Journal of Abnormal Psychology, 115,* 559-566. DOI: 10.1037/0021-843X.115.3.559

Müller, J. L., Sommer, M., Döhnel, K., Weber, T., Schmidt-Wilcke, T., & Goran, H. (2008). Disturbed prefrontal and temporal brain function during emotion and cognition interaction in criminal psychopathy. *Behavioral Sciences & the Law. Special Issue: International Perspectives on Brain Imaging and the Law, 26,* 131-150. DOI: 10.1002/bsl.796

Muñoz, L. C., & Frick, P. J. (2007). The reliability, stability, and predictive utility of the self-report version of the Antisocial Process Screening Device. *Scandinavian Journal of Psychology, 48,* 299-312. DOI: 10.1111/j.1467-9450.2007.00560.x

Nakagawa, S. (2004). A farewell to Bonferroni: The problems of low statistical power and publication bias. *Behavioral Ecology, 15,* 1044-1045. DOI:10.1093/beheco/arh107

Olweus, D. (1979). Stability of aggressive reaction patterns in males: A review. *Psychological Bulletin, 86,* 852-875. DOI: 10.1037/0033-2909.86.4.852

Paivio, A. (1991). Dual coding theory: Retrospect and current status. *Canadian Journal of Psychology, 45,* 255-287. DOI: 10.1037/h0084295

Paivio, A., Yuille, J. C., & Madigan, S. A. (1968). Concreteness, imagery, and meaningfulness values for 925 nouns. *Journal of Experimental Psychology, 76,* 1-25. DOI: 10.1037/h0025327

Papagno, C., Fogliata, A., Catricalà, E., & Miniussi, C. (2009). The lexical processing of abstract and concrete nouns. *Brain Research, 1263,* 78-86. DOI: 10.1016/j.brainres.2009.01.037

Perneger, T. (1998). What's wrong with Bonferroni adjustments. *British Medical Journal, 316,* 1236-1238. DOI: 10.1023/A:1008807909274

Peter, J. P., Churchill, G. A., & Brown, T. J. (1993). Caution in the use of difference scores in consumer research. *Journal of Consumer Research, 19,* 655-662. DOI: 10.1086/209329

Pexman, P. M., Hargreaves, I. S., Edwards, J. D., Henry, L. C., & Goodyear, B. G. (2007). Neural correlates of concreteness in semantic categorization. *Journal of Cognitive Neuroscience, 19,* 1407-1419. DOI: 10.1162/jocn.2007.19.8.1407

Porter, S. (1996). Without conscience or without active conscience? The etiology of psychopathy revisited. *Aggression and Violent Behavior, 1,* 179-189.

Salekin, R. T., Rosenbaum, J., Lee, Z., & Lester, W. S. (2009). Child and adolescent psychopathy: Like a painting by Monet. *Youth Violence and Juvenile Justice, 7,* 239-255. DOI: 10.1177/1541204009333832

Schmidt, F., McKinnon, L., Chattha, H. K., & Brownlee, K. (2006). Concurrent and predictive validity of the Psychopathy Checklist: Youth Version across gender and ethnicity. *Psychological Assessment, 18,* 393-401. DOI: 10.1037/1040-3590.18.4.393

Seagrave, D., & Grisso, T. (2002). Adolescent development and the measurement of juvenile psychopathy. *Law and Human Behavior, 26,* 219-239. DOI: 10.1023/A:1014696110850

Sevecke, K., Kosson, D. S., & Krischer, M. K. (2009). The relationship between attention deficit hyperactivity disorder, conduct disorder, and psychopathy in adolescent male and female detainees. *Behavioral Sciences and the Law, 27,* 577-598. DOI: 10.1002/bsl.870

Shatz, M., Tare, M., Nguyen, S. P., & Young, T. (2010). Acquiring non-object terms: The case for time words. *Journal of Cognition and Development, 11,* 16-36. DOI: 10.1080/15248370903453568

van Baardewijk, Y., Stegge, H., Andershed, H., Thomaes, S., Scholte, E., & Vermeiren, R. (2008). Measuring psychopathic traits in children through self-report. The development of the Youth Psychopathic traits Inventory-Child Version. *International Journal of Law and Psychiatry, 31,* 199-209. DOI:10.1016/j.ijlp.2008.04.004

Vasta, R., Miller, S. A., Ellis, S., Younger, A., & Gosselin, P. (2006). *Child Psychology: Canadian Edition.* Mississauga, ON: John Wiley & Sons Canada, Ltd.

Viding, E., Frick, P. J., & Plomin, R. (2007). Aetiology of the relationship between callous-unemotional traits and conduct problems in childhood. *British Journal of Psychiatry, 190,* 33-38. DOI: 10.1192/bjp.190.5.s33

Wallace, H. M., & Baumeister, R. F. (2002). The performance of narcissists rises and falls with perceived opportunity for glory. *Journal of Personality and Social Psychology, 82,* 819-834. DOI: 10.1037//0022-3514.82.5.819

Williamson, S., Harpur, T. J., & Hare, R. D. (1991). Abnormal processing of affective words by psychopaths. *Psychophysiology, 28,* 260-273. DOI: 10.1111/j.1469-8986.1991.tb02192.x

Wilson, M. (1988). MRC psycholinguistic database: Machine usable dictionary, version 2.00. *Behavior Research Methods, Instruments, & Computers, 20,* 6-10.

Woodworth, M. T., & Waschbusch, D. (2008). Emotional processing in children with conduct problems and callous/unemotional traits. *Child: Care, Health, and Development, 34,* 234-244. DOI: 10.1111/j.1365-2214.2007.00792

Appendix A

APSD
(Parent Version)

ID #:_____
Completed by: Mother Father Other (specify): _____
Date Completed: ___/___/_____
Instructions: Please complete the information above. Then read each statement and decide how well it describes your child. Mark your answer by circling the appropriate number (0-2) for each statement. You are free to skip any questions you feel uncomfortable answering.

	Not At All True	Sometimes True	Definitely True
1. Blames others for his/her mistakes	0	1	2
2. Engages in illegal activities.	0	1	2
3. Is concerned about how well she/he does at school or work.	0	1	2
4. Acts without thinking of the consequences.	0	1	2
5. His/her emotions seem shallow and not genuine.	0	1	2
6. Lies easily and skillfully.	0	1	2
7. Is good at keeping promises.	0	1	2
8. Brags excessively about his/her abilities, accomplishments, or possessions.	0	1	2
9. Gets bored easily.	0	1	2
10. Uses or cons other people to get what he/she wants.	0	1	2
11. Teases, makes fun of other people.	0	1	2
12. Feels bad or guilty when she/he does something wrong.	0	1	2
13. Engages in risky or dangerous activities.	0	1	2
14. Can be charming at times, but in ways that seem insincere or superficial.	0	1	2

15. Becomes angry when corrected or punished.	0	1	2
16. Seems to think that he/she is better than other people.	0	1	2
17. Does not plan ahead or leaves things until the “last minute.”	0	1	2
18. Is concerned about the feelings of others.	0	1	2
19. Does not show feelings or emotions.	0	1	2
20. Keeps the same friends.	0	1	2

Appendix B

APSD
(Youth Version)

ID #:_____
Date Completed: ___/___/_____
Instructions: Please read each statement and decide how well it describes you. Mark your answer by circling the appropriate number (0-2) for each statement. You are free to skip any questions you feel uncomfortable answering.

	Not at all True	Sometimes True	Definitely True
1. You blame others for your mistakes.	0	1	2
2. You engage in illegal activities.	0	1	2
3. You care about how well you do at school/work.	0	1	2
4. You act without thinking of the consequences.	0	1	2
5. Your emotions are shallow and fake.	0	1	2
6. You lie easily and skillfully.	0	1	2
7. You are good at keeping promises.	0	1	2
8. You brag a lot about your abilities, accomplishments, or possessions.	0	1	2
9. You get bored easily.	0	1	2
10. You use or “con” other people to get what you want.	0	1	2
11. You tease or make fun of other people.	0	1	2
12. You feel bad or guilty when you do something wrong.	0	1	2
13. You do risky or dangerous things.	0	1	2
14. You act charming and nice to get things you want.	0	1	2
15. You get angry when corrected or punished.	0	1	2
16. You think you are	0	1	2

better or more important than other people.			
17. You do not plan ahead or you leave things until the “last minute.”	0	1	2
18. You are concerned about the feelings of others.	0	1	2
19. You hide your feelings or emotions.	0	1	2
20. You keep the same friends.	0	1	2

Appendix C

ICU
(Parent Version)

ID #:_____
Completed by: Mother Father Other (specify): _____
Date Completed: ___/___/_____

Instructions: Please complete the information above. Then read each statement and decide how well it describes your child. Mark your answer by circling the appropriate number (0-3) for each statement. You are free to skip any questions you feel uncomfortable answering.

	Not at all true	Somewhat true	Very true	Definitely true
1. Expresses his/her feelings openly.	0	1	2	3
2. Does not seem to know "right" from "wrong."	0	1	2	3
3. Is concerned about schoolwork.	0	1	2	3
4. Does not care who he/she hurts to get what he/she wants.	0	1	2	3
5. Feels bad or guilty when he/she has done something wrong.	0	1	2	3
6. Does not show emotions.	0	1	2	3
7. Does not care about being on time.	0	1	2	3
8. Is concerned about the feelings of others.	0	1	2	3
9. Does not care if he/she is in trouble.	0	1	2	3
10. Does not let feelings control him/her.	0	1	2	3
11. Does not care about doing things well.	0	1	2	3
12. Seems very	0	1	2	3

cold and uncaring.				
13. Easily admits to being wrong.	0	1	2	3
14. It is easy to tell how he/she is feeling.	0	1	2	3
15. Always tries his/her best.	0	1	2	3
16. Apologizes (“says he/she is sorry”) to persons he/she has hurt.	0	1	2	3
17. Tries not to hurt others’ feelings.	0	1	2	3
18. Shows no remorse when he/she has done something wrong.	0	1	2	3
19. Is very expressive and emotional.	0	1	2	3
20. Does no like to put the time into doing things well.	0	1	2	3
21. The feelings of others are unimportant to him/her.	0	1	2	3
22. Hides his/her feelings from others.	0	1	2	3
23. Works hard on everything.	0	1	2	3
24. Does things to make others feel good.	0	1	2	3

Appendix D

ICU
(Youth Version)

ID #:_____
Date Completed: ___/___/_____

Instructions: Please read each statement and decide how well it describes you. Mark your answer by circling the appropriate number (0-3) for each statement. You are free to skip any questions you feel uncomfortable answering.	Not at all true	Somewhat true	Very true	Definitely true
1. I express my feelings openly.	0	1	2	3
2. What I think is "right" and "wrong" is different from what other people think.	0	1	2	3
3. I care about how well I do at school or at work.	0	1	2	3
4. I do not care who I hurt to get what I want.	0	1	2	3
5. I feel bad or guilty when I do something wrong.	0	1	2	3
6. I do not show my emotions to others.	0	1	2	3
7. I do not care about being on time.	0	1	2	3
8. I am concerned about the feelings of others.	0	1	2	3
9. I do not care if I get into trouble.	0	1	2	3

10. I do not let my feelings control me.	0	1	2	3
11. I do not care about doing things well.	0	1	2	3
12. I seem very cold and uncaring to others.	0	1	2	3
13. I easily admit to being wrong.	0	1	2	3
14. It is easy for others to tell how I am feeling.	0	1	2	3
15. I always try my best.	0	1	2	3
16. I apologize (“say I am sorry”) to persons I hurt.	0	1	2	3
17. I try not to hurt others’ feelings.	0	1	2	3
18. I do not feel remorseful when I do something wrong.	0	1	2	3
19. I am very expressive and emotional.	0	1	2	3
20. I do not like to put the time into doing things well.	0	1	2	3
21. The feelings of others are unimportant to me.	0	1	2	3
22. I hide my feelings from others.	0	1	2	3
23. I work hard on everything I do.	0	1	2	3
24. I do things to make others feel good.	0	1	2	3

Appendix E

Please rate how "emotional" the following words are to you. Type your answer in the space beside each word (e.g. cat = 2). To rate each word, please use the following 5-point rating scale:

1	2	3	4	5
Not at all emotional	Slightly emotional	Somewhat emotional	Quite emotional	Extremely emotional

When you give each word a number, remember the word can make you think of bad, good, or no feelings.
For example, you might give the word "monster" a 5, because it is scary, and *also* give the word "birthday" a 5, because it is happy. However, you might give the word "wood" a 1, because it doesn't make you feel one way or the other.

When you have finished rating all of the words, please save your answers in the word document and email them back to me at nicole.cormier@psych.ryerson.ca (.doc and .docx formats are both fine).

Thank you very much for your help!!! ☺

1. Aunt		26. Egg		51. Rest	
2. Banker		27. Band		52. Safety	
3. Berry		28. Ship		53. Sense	
4. Blanket		29. Tent		54. Shame	
5. Bow		30. Yard		55. Sin	
6. Butter		31. Duck		56. Sum	
7. Cake		32. Diamond		57. Term	
8. Cellar		33. Mirror		58. Thaw	
9. Coffee		34. Soldier		59. Theft	
10. Door		35. Chicken		60. Throw	
11. Jar		36. Flame		61. Trust	
12. Kettle		37. Kitten		62. Type	
13. Mule		38. Act		63. West	
14. Nail		39. Age		64. Year	
15. Note		40. Answer		65. Look	
16. Nurse		41. Crime		66. Moment	
17. Palm		42. Danger		67. Thought	
18. Rain		43. Joke		68. Cure	
19. Rod		44. Loss		69. Half	
20. Silver		45. Minute		70. Trouble	
21. Snake		46. Number		71. Deal	
22. Thief		47. Pardon		72. Lie	
23. Toe		48. Pity		73. Law	
24. Violet		49. Prayer		74. Call	
25. Whip		50. Problem			

Appendix F: Word Lists for Paired-Associate Task

Abstract (Order 1)	Concrete (Order 1)
1.Close-Call	1. Clever-Chicken
2. Extra-Cure	2. Eight-Diamond
3. Junior-Deal	3. Fairy-Duck
4. Main-Half	4. Magic-Flame
5. Public-Law	5. Plain-Kitten
6. Spare-Lie	6. Second-Mirror
7. Waste-Trouble	7. Trim-Soldier
Abstract (Order 2)	Concrete 2 (Order 2)
1. Waste-Trouble	1. Trim-Soldier
2. Spare-Lie	2. Second-Mirror
3. Public-Law	3. Plain-Kitten
4. Main-Half	4. Magic-Flame
5. Junior-Deal	5. Fairy-Duck
6. Extra-Cure	6. Eight-Diamond
7. Close-Call	7. Clever-Chicken
Abstract 3 (Order 3)	Concrete 3 (Order 3)
1. Main-Half	1. Magic-Flame
2. Close-Call	2. Clever-Chicken
3. Waste-Trouble	3. Trim-Soldier
4. Extra-Cure	4. Eight-Diamond
5. Spare-Lie	5. Second-Mirror
6. Junior-Deal	6. Fairy-Duck
7. Public-Law	7. Plain-Kitten
Practice Words:	
1. Red-Ball	
2. Big-Fish	
3. Funny-Girl	
4. Nice-Idea	
5. Happy-Planet	
6. Free-Jump	
7. Yellow-Rule	

Appendix G: Word Lists for Lexical Decision Task

Abstract	AbstractPseudo	Concrete	ConcretePseudo
1.Act	Ect	1.Aunt	Eunt
2.Age	Uge	2.Band	Bund
3.Answer	Unswer	3.Banker	Binker
4.Crime	Crame	4.Berry	Birry
5.Danger	Dangir	5.Blanket	Blunket
6.Joke	Jike	6.Bow	Baw
7.Look	Louk	7.Butter	Botter
8.Loss	Luss	8.Cake	Cako
9.Minute	Monute	9.Cellar	Cillar
10.Moment	Mament	10.Coffee	Coffue
11.Number	Namber	11.Door	Deor
12.Pardon	Purdon	12.Egg	Igg
13.Pity	Puty	13.Jar	Jor
14.Prayer	Proyer	14.Kettle	Kuttle
15.Problem	Preblem	15.Mule	Muli
16.Rest	Rist	16.Nail	Nuil
17.Safety	Sufety	17.Note	Nute
18.Sense	Sanse	18.Nurse	Narse
19.Shame	Shome	19.Palm	Pilm
20.Sin	San	20.Rain	Roin
21.Sum	Sem	21.Rod	Rud
22.Term	Tarm	22.Ship	Shap
23.Thaw	Thiw	23.Silver	Selver
24.Theft	Thoft	24.Snake	Snike
25.Thought	Thiught	25.Tent	Tont
26.Throw	Thriw	26.Thief	Thaef
27.Trust	Trest	27.Toe	Toa
28.Type	Typu	28.Violet	Viulet
29.West	Wost	29.Whip	Whep
30.Year	Yoar	30.Yard	Yerd

Appendix H

Consent Form
Information for Parents/Guardians

Kids, Words, and Personality

You and your child are being asked to participate in a research study. Before you and your child agree to volunteer, it is important that you read the following information and ask as many questions as necessary to be sure you understand what s/he will be asked to do. Your child is also being provided with this information and asked to provide his/her assent or consent (on the same form).

Researchers:
Nicole Cormier, BA (Hons), MA Year II, Department of Psychology, Ryerson University
David M. Day, Ph.D., Associate Professor, Department of Psychology, Ryerson University

Purpose of the Study:
We are interested in learning about how kids act, think, and feel, and whether these issues are related to difficulties using and learning some types of words. We are hoping to include about 114 participants aged 8-11 years who are enrolled in the Camp Wimadasus program in Toronto. This information (without your name), will hopefully help us to better understand the needs of the children, and to provide better services.

Description of the Study:
If you and your child decide to participate in this research, you will be asked to complete two standardized assessment questionnaires measuring how your child acts, thinks, and feels, including questions like "Is good at keeping promises," "Feels bad/guilty when he/she does something wrong," and "Becomes angry when corrected or punished." You will also complete a demographic questionnaire that asks about your child's age, grade, biological sex, and ethnicity. These will take approximately 20 minutes to complete. Additional information will be gathered through standardized questionnaires filled out by your child about the way s/he thinks and feels about him/herself and about his/her behaviour. This includes questions like whether he/she "Gets bored easily," "Keeps the same friends," "Always tries his/her best," or "Hides his/her feelings from others." Your child will additionally play two computerized word games, to determine how quickly and accurately they use and learn different kinds of words. Filling out the parent questionnaires will take no more than 20 minutes, while the children's questionnaires and word task will involve 45 to 60 minutes of your child's time. You and your child will be offered small tokens of our appreciation in exchange for participating.

While the study will occur on-site at CDI, only you, your child, and myself (the researcher) will be present at your appointment. SNAP agency staff will not be present during the tasks, and will not be made aware of your participation status, your child's responses, or any other details of your family's involvement with the study.

Risks or Discomforts:
Occasionally, individuals feel uncomfortable answering questions about themselves and about their children. In addition, while the computer games are designed to be fun, some children may become frustrated or upset if they find them too hard. To counteract these potential discomforts, you and your child should only answer the questions you or he/she are comfortable addressing. Both you and your child will be participating in a quiet place and at your/his/her own pace - this should make you/him/her more comfortable. Finally, your child will be assured that some of the games may seem easy, while others may seem hard, but that this is okay – we are happy so long as he/she tries his/her best. However, if any aspect of the study makes you/him/her feel uncomfortable, you and your child are free to skip certain questions or tasks, or to withdraw from the study at any time without penalty.

Benefits of the Study:
There are no direct benefits (in terms of additional services, monetary gain, or treatments) to you or your child as a consequence of this study. However, as the study is focused on how children use and learn words, our findings may help to improve school and agency interventions, as well as contributing to our existing knowledge about children and word learning.

Confidentiality:
Your responses and your child's responses in this study will be completely confidential; your/his/her name or any other identifying information will not appear on any of the questionnaires or game results. The questionnaires are only identified by a pre-assigned ID number. Questionnaire responses will be kept in locked filing cabinet until they are entered into an electronic database for analysis. This database, along with the results from the computer games will be stored on a password-protected USB key, which will be kept in a locked cabinet in a secure research lab. Only Nicole Cormier, Dr. Day, and a trained Research Assistant will have access to these materials. All materials will continue to be kept in a secure filing cabinet and office at Ryerson University, and destroyed after ten years.

There are some limitations to confidentiality. The law requires that the proper authorities are notified if it is suspected that a child is in need of protection, or if it is suspected that a child might harm him/herself or someone else. Any such disclosures will be discussed with the Camp manager, who will determine necessary steps.

You will be asked to sign this consent form, as will your child, but these will be filed separately from the questionnaire and game responses. When the data are published or presented, it will only be presented in summary form (i.e., results will be pooled across all individuals who participate in the study), so no one can be identified by his or her responses. The electronic database will be discarded five years following the publication of results.

Incentives to Participate:
Your contribution and your child's contribution to this study are very important to improving our knowledge in this area. To compensate for his/her time, we will give your child a small token of our appreciation. In addition, as a token of our appreciation for your participation, we will provide you with a $10 gift card for either WalMart or Zellers (your option).

Voluntary Participation:
Participation in this study is completely voluntary and does not affect the services you and your child receives. If you choose to participate, you and your child will receive the same services at this time or at any time in the future. If you decide to participate, you are free to withdraw at any time without any consequences to the services you and your child receive from CDI , or from Ryerson University, now or in the future. At any particular point in the study, you may refuse to answer any particular question or stop participation altogether.

Questions about the Study:
This project has been approved by Ryerson University's institutional Research Ethics Board, as well as by the Research Ethics Board of your child's SNAP program agency. If you have any questions regarding the research, you may contact:

Nicole Cormier, Ryerson University
(416) 979-5000, extension 2194
ncormier@psych.ryerson.ca

Dr. David Day, Ryerson University
416-979-5000, extension 7104
dday@psych.ryerson.ca

If you have questions regarding your child's rights as a human subject and participant in this study, you may contact Ryerson University for information, at the number below:

Alex Karabanow
Research Ethics Board
c/o Office of Research Services, Ryerson University
350 Victoria Street
Toronto, ON M5B 2K3
Tel. (416) 979-5000, extension 7112

Agreement:
Your signatures below indicate that you have read the information in this agreement and have had a chance to ask any questions you have about the study. Your signatures also indicate that

you agree to be in the study/have your child participate in the study and have been told that you/your child can change his/her mind and withdraw consent to participate at any time. You have been given a copy of this agreement.

You have been told that by signing this consent agreement you are not giving up any of your legal rights.

_____

Name of Participant (please print)

_____	_____
Signature of Participant	Date
_____	_____
Signature of Investigator	Date

Appendix I
Assent Form

Information for Children

Kids, Words, and Ways You Act, Think, and Feel

You are being asked to participate in a research study. It is your choice to take part or not. Before you agree to volunteer to be part of the study, it is important that you understand what is going to happen during the study. We will read these pages and ask as many questions as you need to make sure you understand what you will be asked to do. We have already asked your parent or guardian if it is okay for you to participate in the study.

Who are the researchers?
The researchers are a university student and a psychologist who want to understand why some kids find it hard to use and learn certain words. Our names are Nicole Cormier and Dr. David Day.

Why are we doing this study?
We want to learn all about how you feel, how you get along with other people, and how you see the world – and figure out whether this makes it easy or hard for you to use and learn different types of words. It is important that you know that there are no "right" or "wrong" ways to do the study; we just want to learn more about you, and how you use words. Some of the games we'll play today might seem very easy, while some might be hard. That's okay – we just want you to do your best! We are hoping to include about 120 children, such as yourself, aged 8-11 years, who are taking part in Camp. After we learn about all these things, we will let other psychologists and teachers know what we find. If kids like you or your classmates are having trouble with certain words, it is important that people who work with kids find out, so kids can learn better.

What will you be asked to do?
If you decide to participate in this study, two things will happen. First, we will ask you to play some word games. There are two types of word games we'll play. For the first game, you'll decide "is this a word?" when we show you letters on the computer. For the second game, I'll show you words in pairs, and ask you to memorize them, so that when you see the first word again, you'll be able to tell me the second one. Third, I will ask you and your parent/guardian some questions about you. The questions will ask about the way you think and feel about yourself and others, and how you get along with people. Some examples are: "Do you get bored easily?" "Do you keep the same friends?" "Do you always try your best?" or "Do you hide your feelings from others?" The word games will take around 45 minutes to play. The questionnaires will take about 20 minutes for you and your parent/guardian.

The only people who will be there during the word games will be you, your parent/guardian, and me (the researcher).

Will anything weird happen?

Some parts of the word game might seem like they are really easy, but some might be pretty hard. We don't want you to feel bad if you find something hard – it's okay. All we want is for you to try your very best. When you do the questionnaires, you might find it hard to answer questions about yourself, and sometimes it might make you feel uncomfortable. You should only answer the questions you feel comfortable answering. You will be answering the questions in a quiet place and at your own pace, so this should make things easier. But, if any questions in the study make you feel uncomfortable, you can skip them or even decide to stop the study all together.

Why is this study important?

This study is important because it will help us understand how different kids use and learn words, which can be important for teachers and staff at the Camp. We are not the only ones who will learn from your answers; When we are done looking at your answers and all the answers of other children, you and your parent/guardian are welcome to learn about what we have found and ask questions, but nobody will know the names of the children who gave us the information.

Who will read my answers?

For the study, you will be given a special identification number that only you and I will know, so that we know which questionnaires go together; but your name will not go on any of the question forms and no one will know which number goes with your name. All your answers to the questions will be stored in a locked filing cabinet until the answers can be entered into a computer. The computer file is protected by a password. Only me, Dr. Day, and a Research Assistant will be able to see the computer files. The actual questionnaire/interview materials will continue to be kept in a secure filing cabinet/office at Ryerson and destroyed after ten years, and only Dr. Day and I will be able to see them. You and your parent/guardian will be asked to sign this consent form, but these papers with your names, will be kept away from your answers.

The information that we get from the questions will not be shown to other people who work with children and families unless you indicate that you might hurt yourself or cause harm to others – in these cases, your worker and your parents will also be notified. In general, the information we gather will only talk about children as a group, no one will know who participated in the study.

Why should I participate?

Your answers will be helping people who work with kids and their families understand kids, and how they use and learn words, better. Because we really appreciate your help with this study, we

will give you a small gift (a toy).

Voluntary Participation:
It is completely your choice to participate in this study or not. If you decide not to participate, it won't change anything for you at the Camp. Also, your decision won't change any current or future relationship you might have with Ryerson University.

Questions about the Study:
If you have any questions about the study now, please ask. If you have any questions later about the research, you can talk to your parents/guardian and they will contact:

Nicole Cormier, Ryerson University
(416) 979-5000, extension 2194
ncormier@psych.ryerson.ca

Dr. David Day, Ryerson University
416-979-5000, extension 7104
dday@psych.ryerson.ca

If you have questions about the rules that researchers must follow when studying people, your parents/guardians can contact Ryerson University for information, at the number below:

Alex Karabanow
Research Ethics Board
c/o Office of Research Services, Ryerson University
350 Victoria Street
Toronto, ON M5B 2K3
Tel. (416) 979-5000, extension 7112

Do you have any questions? Would you like to participate?

Assent
I was present when _____ read/was read this form and gave written/verbal assent.

_____
Name of person who obtained verbal assent