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Callous-Unemotional Traits: A Potential Mediator of the Impulsivity-Antisocial Behaviour Relation

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Callous-Unemotional Traits: A Potential Mediator of the Impulsivity-Antisocial
Behaviour Relation

by

Andrew White

A Thesis
Submitted to the Faculty of Graduate Studies
through the Department of Psychology
in Partial Fulfillment of the Requirements for
the Degree of Master of Arts at the
University of Windsor

Windsor, Ontario, Canada

2013

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Impulsivity-Antisocial Behaviour Relation

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Abstract

The present study investigated the hypothesis that callous-unemotional traits mediate the relation between impulsivity and antisocial behaviour in an undergraduate, emerging adult sample. Participants (n=181) provided demographic information and completed a computerized battery of questionnaires and tasks addressing personality and behaviour. Total scores on the Inventory of Callous-Unemotional Traits (ICU) and Self-Report Delinquency Scale (SRD) were used as indicators of callous-unemotionality and antisociality, respectively. Stop-signal reaction time (SSRT) was calculated from a stop-signal task as an indicator of impulsivity. A stepwise multiple regression showed that the best combination of predictors for antisocial behaviour was having a mother whose highest level of education is a high school diploma and callous-unemotional traits. Additionally, using the Baron and Kenny (1986) mediation model, it was found that callous-unemotional traits do not mediate the impulsivity-antisocial behaviour relation. Several results were inconsistent with previous studies, indicating the need for more research in this population.

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LIST OF ABBREVIATIONS

ADHD.....Attention-Deficit/Hyperactivity Disorder

SRD.....Self-Report Delinquency Scale

SSRT.....Stop Signal Reaction Time

ICU.....Inventory of Callous-Unemotional Traits

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Chapter I

INTRODUCTION

Objectives

The present study focuses on antisocial behaviour in an emerging adult sample (late teens through the mid-to-late twenties; Arnett, 2000). Antisocial behaviour can be defined as intentional actions that have the potential to harm others or property (Loeber & Hay, 1997). Studying antisocial behaviour in emerging adults is an important avenue of research, considering roughly half of all Canadians accused of a crime are under the age of 22 years (Statistics Canada, 2009). The extant literature in this area focuses on people who persist in their antisocial behaviour throughout their life, namely adjudicated individuals and those diagnosed with a disruptive behaviour disorder. However, most antisocial behaviour is committed by individuals who behave this way inconsistently, and will desist in their antisociality by early adulthood (Moffitt, 1993). Even though these individuals may stop committing antisocial acts, they are still at risk for several negative outcomes, including mental health and financial difficulties.

Reducing the rates of antisocial behaviour will not only have the obvious direct effects, but may also improve the lives of the individuals who would have committed these acts. Such change is dependent upon having a better understanding of what contributes to antisocial behaviour in this population. A variety of factors contributing to antisocial behaviour have been identified, including environmental factors such as parenting and peer influences, as well as personality characteristics. Specifically, numerous studies have shown how impulsivity and callous-unemotional traits can

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contribute to antisocial behaviour. Despite this rich research area, no studies have investigated if callous-unemotional traits mediate the relation between impulsivity and antisociality.

The goals of the present study are to identify the combination of factors that best predict antisocial behaviour in an emerging adult sample, and to determine if callous-unemotional traits mediate the relation between impulsivity and antisocial behaviour in this population. This information will improve our understanding of how these characteristics interact in the population responsible for the majority of antisocial behaviour. This knowledge could be used to inform clinical practice and help parents and teachers better identify children at risk of future antisocial behaviour.

Chapter II

Literature Review

Organization of Review

This chapter begins with an overview of antisocial behaviour and describes predictors of antisocial behaviour, as well as the trajectory and possible outcomes for individuals who commit antisocial acts based on previous research. This is followed by a discussion of impulsivity and how it relates to antisocial behaviour, which will be followed by a description of how callous-unemotional traits also relate to antisocial behaviour. Lastly, the chapter will conclude with an outline of the purpose for the present study.

Antisocial Behaviour

Antisocial behaviour is defined by behaviours that violate societal expectations and it is often conceptualized within the developmental stage of the acting individual. For example, young children commit antisocial acts such as fighting with other children, bullying or teasing other children, and telling lies (Campbell, 1995). As individuals develop, antisocial behaviour is often transformed to include nonviolent acts, such as truancy, theft, vandalism, and drug use, and violent acts, including robbery, assault, rape, and homicide (Elliot, Huizinga, & Ageton, 1985; Moffitt, 1993; Pakiz, Reinherz, & Frost, 1992; Tolan, 1988).

Crime statistics provide a crude measure of antisocial behaviours within a large population, but unfortunately, these data can be a misleading underrepresentation, as many less serious cases of antisocial behaviour are not reported or may be handled

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outside of the court system. For example, from 1999 to 2006, the number of youths in Canadian prisons or on probation declined (Statistics Canada, 2006), but the number of accusations remained steady, and the violent crime rate actually increased by 11% (Statistics Canada, 2009). Youth crime and antisocial behaviour is clearly an important issue in Canada, as nearly 30% of those accused of a crime were 18 years of age or younger, and roughly 50% were at or below age 22 (Statistics Canada, 2009). The problem is similar in the United States, where nearly 20% of people arrested for violent crimes (including murder, rape, robbery, and aggravated assault) and over 25% of those arrested for property crimes (burglary, larceny, arson, and theft) are younger than 18 years of age (U.S. Department of Health and Human Services, 2008).

Predictors of antisocial behaviour. Factors that may play a role in the development of antisocial behaviours include: belonging to a group of friends who engage in antisocial acts (Heinze et al., 2004; Kimonis et al., 2004), exposure to violence (Schwab-Stone, 1999), parental factors such as harsh punishment, low parental warmth, and poor supervision (Bowman et al, 2007; Fontaine et al., 2011; Hipwell et al., 2007; Loeber & Stouthamer-Loeber, 1986), and the delinquency of parents, grandparents, and siblings (Frick et al., 1992, 1993; Blazei, 2007; Loeber & Dishion, 1983; Loss, 2003). However, the focus of the current study is on personality characteristics of impulsivity (D'Antonio, 1997; Farrington, 1990; Grande et al., 1984; Luengo et al., 1994; Neumann et al., 2010; Tremblay, Pihl, Vitaro, and Dobkin, 1994; Vitacco et al., 2002) and callous-unemotional traits (Burke, Loeber, & Lahey, 2007; Frick et al., 2003; McMahon et al., 2010).

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The context in which the aforementioned factors exist is also important in determining their effect on behaviour. For example, the relation between paternal and adolescent antisocial behaviour may be dependent on the child's gender, as Loss (2003) reported a positive correlation between the antisocial behaviour of father and son, but a negative correlation for father and daughter. Similarly, Pardini and colleagues (2006) reported that the best predictor of future delinquency was dependent on the timing of the assessment. They found that the only statistically significant predictor in first grade children was current conduct problems, whereas both conduct problems and inattention were significant in fourth graders, and only interpersonal callousness was a significant predictor of delinquency in seventh grade children. The authors suggest that interpersonal callousness was only a significant predictor in older children because none of the younger children had developed empathic abilities yet.

Patterson and colleagues (1989) outline a sequence of events that may lead to antisocial behaviours. First, ineffective parenting practices and the family interaction process may produce behavioural problems, which could result in academic failure and peer rejection. These failures could then increase the child's risk of becoming involved with a deviant peer group, resulting in a heightened risk of persistent delinquent behaviour. This model highlights a few of the important longitudinal risk factors for future antisocial behaviour, namely, early behaviour problems, the parent-child interaction, and deviant peer association.

A second model for the development of antisocial behaviours is based on the finding that responses to emotional stimuli differ in antisocial youth based on the presence of callous-unemotional traits (Loney et al., 2003). A diminished response to

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emotional situations in children showing callous-unemotional traits may lead to a failure to develop empathy because they would be less likely to feel any response to the troubles of others (Blair, 1999; Kochanska, 1993, 1997). These youth are more likely to commit antisocial behaviours because they focus on potential gains of their actions and are less distressed by the negative effects their behaviour has on others (Blair et al., 1997).

Attention-Deficit/Hyperactivity Disorder (ADHD) diagnosis is another important predictor of antisocial behaviour (Fowler et al., 2009; Miller et al., 2008; van Lier et al., 2007). Thapar and colleagues (2006) suggest that ADHD symptom severity and pervasiveness predicted the development of antisocial behaviour. Also, in line with Patterson's suggested path to antisocial behaviour, the authors reported that antisocial behaviour in children with ADHD was linked with family adversity as well as peer rejection. The combination of ADHD and antisocial behaviour may be particularly problematic, as these children are at a greater risk for poor school performance, school dropout, social rejection, and criminality in comparison to children with either conduct problems or attention problems in isolation (Lynam, 1996).

Trajectory of antisocial behaviour. Although many antisocial behaviours may be seen as developmentally appropriate as a child or adolescent adjusts to new challenges and learns to deal with new responsibility, persistent problems are not appropriate. Indeed, Hamilton and Armando (2008) suggest that children who demonstrate a stable pattern of oppositional behaviour in preschool are likely to meet criteria for Oppositional Defiant Disorder; subsequently, these individuals are at an increased risk of having poor relationships with their parents, teachers, and peers, and are more likely to develop ADHD, mood disorders, and Conduct Disorder over the course of development, as well

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as Antisocial Personality Disorder later in life. Mannuzza and colleagues (2004) report that even low levels of conduct problems in children with ADHD are highly predictive of later a diagnosis of Conduct Disorder.

Moffitt (1993) discusses two, seemingly contradictory, trajectories for antisocial behaviour: it is stable over time and there is a dramatic increase in the incidence of antisocial behaviour during adolescence. This controversy was explained by identifying two groups of individuals who commit antisocial behaviours: a life-course persistent group and an adolescence-limited group. The small group of life-course persistent individuals may begin acting antisocially as early as age four, and their behaviours change in modality and increase in severity as they develop (e.g., from biting at age 4, to truancy at 10, and child abuse by 30). The surge in antisocial behaviour during adolescence is caused by the adolescence-limited group, which is composed of people with no history of behaving antisocially and who do so inconsistently during adolescence. The adolescent-limited group may be mimicking their delinquent peers during adolescence because these peers have characteristics that make them seem more like adults (e.g., they make their own decisions, father children, and are not dependent on their parents), which may be desirable for an adolescent. However, as they age, the adolescence-limited group desist in their antisocial behaviour because these behaviours then limit their ability to be seen as competent and successful adults.

There are also important developmental differences between the children of these two groups. Using data from the Dunedin Multidisciplinary Health and Development Study (a cohort of 1037 children born between April 1972 and March 1973 in Dunedin, New Zealand), Moffitt & Caspi (2001) report that children with life-course persistent

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antisocial behaviour experienced many of the aforementioned risk factors for antisocial behaviour (including parenting, neurocognitive, temperament, and behavioural factors), whereas the group of children with adolescence-limited antisocial behaviour did not. Subsequent research on these trajectories determined that although individuals in the life-course persistent group had more mental health, drug, financial, and criminal problems than any other group at age 26, those previously identified as adolescence-limited (and a third, childhood-limited, group) were not without their own difficulties. Specifically, Moffitt and colleagues (2002) found that the adolescence-limited group also experienced many of the same problems as the life-course persistent group, but to a less extreme degree. These results imply that the adolescence-limited antisocial behaviour group may not be the benign, normative group it was originally thought to be.

Distinctions among antisocial behaviour, Oppositional Defiant Disorder, Conduct Disorder, and Antisocial Personality Disorder. It is important to make the distinction between antisocial behaviour and Oppositional Defiant Disorder, Conduct Disorder, Antisocial Personality Disorder, and psychopathy. Antisocial behaviours are not included in the DSM-IV-TR criteria for a diagnosis of Oppositional Defiant Disorder, as many of the criteria are more related to defiant attitudes and being argumentative. Conduct Disorder, on the other hand, does incorporate having a pattern of antisocial behaviours, specifically aggression directed at people and animals, property destruction, theft and deceitfulness, and serious rule violations. The diagnostic criteria for Antisocial Personality Disorder are more broad than those for Conduct Disorder in that they include consistent irresponsibility in terms of work or financial obligations and also a lack of remorse, an emotional aspect which makes these criteria very similar to common

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conceptualizations of psychopathy. Frick and colleagues (1999) explain psychopathy as a two dimensional construct, with one dimension representing an impulsive and antisocial lifestyle and the second a callous and unemotional interpersonal style. A psychopathic individual may appear authentic despite being insincere, superficial, deceitful, manipulative, arrogant, and lacking empathy and remorse (First, Frances, & Pincus, 2004). It should be clear that while antisocial behaviours may be involved in any of the above disorders, they are just one element, and, in the absence of other impairment, committing a single antisocial act, regardless of the severity, is not enough to diagnose someone with one of these disorders.

Future implications of adolescent delinquency. Adolescent delinquency has also been associated with outcome concerns beyond an Oppositional Defiant Disorder, Conduct Disorder, or Antisocial Personality Disorder diagnosis. These concerns include educational difficulties (Colman et al., 2009), unemployment (Caspi et al., 1998), alcohol and drug abuse (Sutker et al., 1984; Windle, 1990), tobacco use, general health problems, depression, anxiety (Bor et al., 2010), ADHD (Loeber et al., 2000; Molina et al., 2007; Thapar et al., 2006), other mental health problems (Kim-Cohen et al., 2003), and mortality (Jokela et al., 2009). In terms of future mental health concerns, Kim-Cohen and colleagues (2003) report a history of Conduct Disorder or Oppositional Defiant Disorder in 25-60% of people diagnosed with other DSM-IV disorders (including a variety of mood, anxiety, eating, substance use, and personality disorders) by age twenty-six.

Impulsivity

The overlap between antisocial behaviour and impulsivity is evidenced by the fact that many definitions of antisocial behaviour incorporate some aspect of impulsivity. For example, Eysenck (1981) describes the antisocial child as “exceptionally impulsive, somewhat extraverted, but mainly tough-minded individual who is low on empathy” (p.36). Furthermore, impulsive individuals have been described as having a tendency to “act on the spur of the moment without being aware of any risk involved” (Eysenck, 1984, p.315). Although impulsivity and antisocial behaviour appear to be moderately overlapping constructs, the multidimensional nature of impulsivity makes the conclusions of extant literature in the field complicated, as comparisons are made between measures that do not tap into the same aspects of impulsivity (e.g., response inhibition and delay discounting). Swann and colleagues (2002) state that the most widely accepted conceptualization of impulsivity involves two types: rapid response impulsivity, or the failure to fully evaluate stimuli before responding; and reward-delay impulsivity, the preference for an immediate reward, even if it is smaller than a delayed reward.

Impulsivity and antisocial behaviour. Many studies support a positive correlation between impulsivity and both current (D’Antonio, 1997; Farrington, 1990; Grande et al., 1984) and future antisocial behaviour (Luengo et al., 1994; Neumann et al., 2010; Vitacco et al., 2002). Impulsivity has also been shown to be the best predictor of early-onset, stable, severe delinquency (Tremblay et al., 1994). Behavioural impulsivity appears to be a stronger predictor of future antisocial behaviour, as well as more serious and stable delinquency, than cognitive impulsivity (which involves shifting mental sets; Fossati et al., 2004; White et al., 1994). Behavioural impulsivity includes making

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decisions without fully evaluating the stimulus (rapid response impulsivity) and a preference for a smaller, immediate reward over a larger, delayed reward (reward delay impulsivity, or delay discounting; Swann et al., 2009).

It is quite common that studies of antisocial behaviour focus on participants with a diagnosis of Conduct Disorder or Antisocial Personality Disorder because, by definition, these individuals engage in antisocial behaviours. Swann and colleagues (2009) report that participants diagnosed with Antisocial Personality Disorder displayed increased rapid-response impulsivity (with intact reward delay impulsivity), and that this impulsivity was a significant predictor of Antisocial Personality Disorder diagnosis. Additionally, based on the results of Wang and colleagues (1999), both verbal and physical aggression are significantly correlated with impulsivity and antisocial personality style in male prisoners. Similarly, Komarovskaya and colleagues (2007) report a significant correlation between impulsivity and antisocial behaviour in female inmates, with no difference in impulsivity between violent and nonviolent offenders.

Like patients with Conduct Disorder or Antisocial Personality Disorder, individuals with ADHD are frequently used in studies of antisocial behaviour because they often have elevated rates of antisocial behaviour (Colledge & Blair, 2001; Eisenbarth et al., 2008; Soderstrom et al., 2005). In fact, ADHD patients with a history of Conduct Disorder exhibit significantly higher ADHD-related impulsivity than those without a history of Conduct Disorder (Dowson et al., 2008). In line with Kim-Cohen and colleagues' (2003) findings, ADHD patients with a history of Conduct Disorder displayed features of a range of psychopathologies, most notably Cluster B personality disorders (Antisocial, Borderline, Histrionic, and Narcissistic Personality Disorders).

Callous-Unemotional Traits

Callous-Unemotional traits and antisocial behaviour. Elevated levels of callous-unemotional traits, including a lack of guilt and empathy toward others, are frequently seen in people who commit antisocial behaviours. In fact, callous-unemotional traits appear to pose a unique risk for antisocial behaviour beyond more established risk factors, such as prior or current conduct problems (Fontaine et al., 2011; McMahon et al., 2010), early onset of antisocial behaviour, social information processing, and impulsivity (Stickle, Kirkpatrick, & Brush, 2009). Furthermore, callous-unemotional traits also appear to be stable over time and identify people likely to have persistent antisocial behaviours (Burke, Loeber, & Lahey, 2007; Pardini et al., 2007; Taormina, 2011). It has also been shown that at low levels of impulsivity (based on motor inhibition), the relation between delinquency and empathy was stronger than in those who are more impulsive (D'Antonio et al., 1997). This suggests an interaction effect in which callous-unemotional traits have a greater contribution to antisocial behaviour for individuals who are less impulsive.

Frick and Viding (2009) propose a model similar to Moffitt's (1993) life-course persistent and adolescent-limited antisocial behaviour groups, but they identified three separate developmental pathways that lead to antisocial behaviour: two that begin in childhood and one beginning in adolescence. In this model, the adolescent onset group generally exhibits a more extreme level of normative rebellion that is limited to adolescence, so researchers tend to focus on the childhood-onset groups. These children develop antisocial behaviours as a result of a non-optimal combination of personal and environmental factors (parenting, schooling, etc.) leading to socialization problems and,

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thus, impaired relationships with others. These two child onset groups differ in that one group shows callous-unemotional traits, whereas the second group does not. The first group tends to be more aggressive and display more serious and persistent antisocial behaviours. Previous research by Viding and colleagues (2005, 2008) has also shown that antisocial behaviour is more heritable if the child shows callous-unemotional traits. Similarly, Larsson and colleagues (2008) report that callous-unemotional traits are highly heritable (.68 – .80), regardless of the child's behaviour. These findings suggest that callous-unemotional traits may provide a way to subtype individuals with an early onset of antisocial behaviour.

Indeed, many researchers have proposed using callous-unemotional traits to identify more severe and stable subgroups within other disorders, such as disruptive behaviour disorders (Frick & White, 2008; Pardini & Fite, 2010). Additionally, children who show callous-unemotional traits in combination with a disruptive behaviour disorder tend to lack fearfulness, have a reward-dominant response style, be less distressed by their behaviour (Barry et al., 2000), be resistant to behaviour therapy (Waschbusch et al., 2007), and even have a different cognitive profile, highlighted by weaker non-verbal abilities (Loney et al., 1998).

Purpose of the Present Research

The present study incorporates the contribution of behavioural impulsivity and callous-unemotional traits to antisocial behaviour in typically developing emerging adults. Previous studies that have looked at these two predictors of antisocial behaviour in conjunction have found that people with poor impulse control and empathic abilities were

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more likely to behave aggressively (Heilbrun, 1982). Similarly, Vitacco and colleagues (2002) report that adolescents who were less callous and impulsive reported fewer antisocial behaviours than people who showed elevated levels of one or both traits.

Although previous studies have incorporated both impulsivity and callous-unemotional traits in relation to antisocial behaviour, an extensive literature review did not reveal any research examining the mediating effect of callous-unemotional traits on the relation between behavioural impulsivity and antisocial behaviour. The present study attempts to fill this void by investigating whether callous-unemotional traits mediate the well-established relation between antisocial behaviour and impulsivity (specifically, rapid response impulsivity), in a typically-developing emerging adult sample. There also appears to be no research addressing the relation between delay discounting and antisocial behaviour; therefore, all hypotheses focus on rapid response impulsivity. Callous-unemotional traits are proposed as a potential mediator because many of the studies that have investigated the relation between impulsivity and antisocial behaviour have done so in populations that are elevated in callous-unemotional traits as well. Based on the presented literature, the current study addresses the following hypotheses:

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(1) As Swann and colleagues (2009) reported, rapid response impulsivity will be positively correlated with antisocial behaviour as well as callous-unemotional traits.

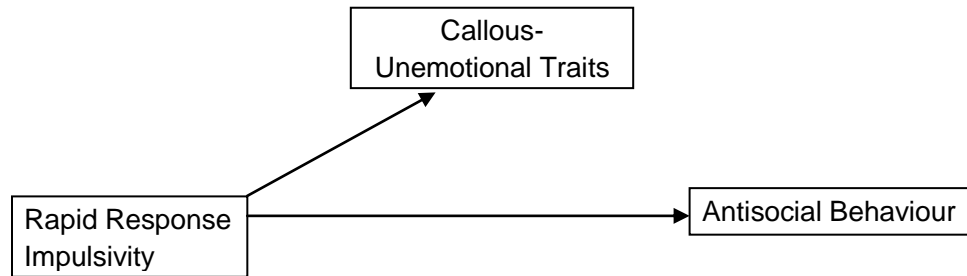


Figure 1. Rapid response impulsivity will be positively correlated with both antisocial behaviour and callous-unemotional traits.

(2) Even after controlling for rapid response impulsivity, callous-unemotional traits will be positively correlated with antisocial behaviour, as suggested by Stickle, Kirkpatrick, and Brush (2009).

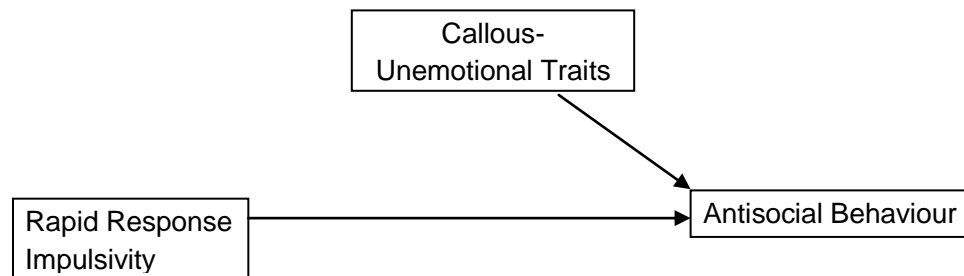


Figure 2. Callous-unemotional traits will be positively correlated with antisocial behaviour after controlling for rapid response impulsivity.

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- (3) Callous-unemotional traits will serve as a partial mediator of the relation between rapid response impulsivity and antisocial behaviour.

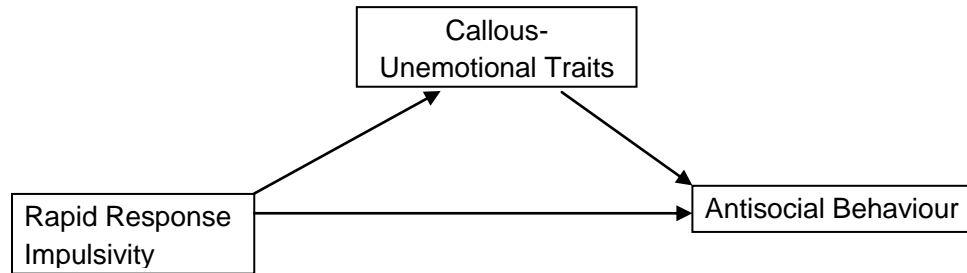


Figure 3. Callous-unemotional traits will partially mediate the relation between rapid response impulsivity and antisocial behaviour.

Support for the final hypothesis could have serious implications for how people with disorders such as ADHD are viewed and treated. For example, it could be applied to identify children with ADHD who are more likely to develop disruptive behaviour disorders, such as Conduct Disorder or Antisocial Personality Disorder, as adolescents and adults. Furthermore, this distinction of impulsivity alone and impulsivity combined with callous-unemotional traits may allow for identification of subtypes within individuals with disruptive behaviour disorders or Antisocial Personality Disorder.

Chapter III

Method

Participants

A power analysis determined that one hundred and fifty participants were required in order to detect a small to medium effect size (Cohen et al., 2003). In all, one-hundred and eighty one full- and part-time undergraduate students at the University of Windsor were recruited through the Department of Psychology Participant Pool for the present study. These participants earned course credit for their participation. Participants were required to have no history of a traumatic brain injury by self-report, be able to read and speak English (although it did not have to be their primary language), and be no older than thirty years of age. The participants recruited were primarily young (mean age = 21.11; $SD = 2.53$), female ($n=149$), and Caucasian ($n=96$). A summary of demographic information can be seen in Table 1.

Measures

Demographics. A self-report demographic form was completed to gather data on basic information such as the participants' sex, age, race, employment, and education, as well as parental education and employment (see Appendix).

Self-Report Delinquency Scale (SRD; Elliot, Huizinga, & Ageton, 1985). The Self-Report Delinquency scale (SRD) was given in order to measure the frequency of both minor and serious antisocial behaviour over the course of the past year (see Appendix). Previous research has found that the SRD has excellent internal consistency,

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with a Cronbach's alpha of 0.93 (Hofstein, 2009). Following Loeber, Farrington, Stouthmer-Loeber, and Van Kammen (1998) and categories from the National Survey of Crime Seriousness (Wolfgang et al., 1985), Hofstein (2009) added a "level of seriousness" value to many of the 46 items on the SRD (level of serious values are provided after each applicable item in the Appendix, although they were not visible to participants). Several items on the SRD that appear to measure risk-taking behaviour rather than antisocial behaviour (e.g., using drugs, drinking alcohol, sexual intercourse, etc.) were removed for the current study. The resulting survey included 41 items, ranging in severity from non-delinquent or minimally illegal common behaviors in adolescents (such as running away from home) to serious delinquency ("attacked someone with the idea of seriously hurting or killing him or her"). Internal consistency for this modified version of the SRD was acceptable, with a Cronbach's alpha of .702. This reduction was likely caused by the inconsistent nature of antisocial behaviour in this sample. Three items ("lied about your age to gain entrance or to purchase something," "avoided paying for such things as movies, bus rides, and food," and "sold marijuana or hashish") appeared to be particularly problematic; Cronbach's alpha rose to .805 when these items were removed.

The level of seriousness values assigned by Hofstein (2009) were all increased by one for the present study (these values are presented in the Appendix, rather than the original values). This adaptation increased the value of minimally illegal behaviours from 0 to 1, allowing them to contribute to an overall delinquency score, which was calculated by summing the product of the level of seriousness value and frequency count for each item. For example, if someone reported that they had "stolen or tried to steal things worth

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\$5 or less” three times in the past twelve months, they received a score of 9 for that item (level of seriousness value of 3 multiplied by the frequency count of 3). Some items refer to prosocial acts (such as helping others or refusing to engage in antisocial behaviours with others), experience as a victim of violence, and promoting delinquency in others; although these items are included in the measure, they were assigned a level of seriousness value of 0 so that they did not contribute to the overall delinquency score.

Stop-Signal Task. A stop-signal task that was developed based on a similar task used by Logan and Cowan (1984), and was programmed for ongoing research in the lab, was also used. This task required participants to make one of two responses based on the stimuli presented. On “go” trials, participants saw the letter “X” or “O” and had to make the corresponding response on the keyboard (“G” for “X” and “H” for “O”) as quickly as possible. The “G” and “H” keys were chosen as response keys due to their central location on the keyboard and were covered by the letters “X” and “O” during administration. The “stop” trials were identical to the “go” trials, with the addition of a tone that was presented at variable times after the letter appeared on the screen. This tone informed the participant to inhibit their response and not press a key. Similar tasks have been shown to have acceptable test-retest reliability (ICC = 0.72) (Soreni et al., 2009), be strongly correlated with behavioural observations of inattentive and hyperactive behaviour ($r = 0.65$), and accurately separate children with ADHD from controls (Cohen’s $d = 0.64$; Nichols & Waschbusch, 2004).

Each trial included a 500ms fixation cross in the center of the screen, followed by a 1000ms letter stimulus. On “stop” trials, a 500ms tone was presented shortly after the letter presentation. The delay prior to the tone began at 250ms after the letter appeared,

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and then varied in 50ms increments (ranging from 50-500ms) depending on the previous response. For example, if the participant was able to inhibit their response on a 250ms delay trial, the tone will be presented later (after a 300ms delay) on the next “stop” trial in order to determine at what delay they are no longer able to inhibit their response. In contrast, if they failed to inhibit their response on the 250ms delay trial, the next “stop” trial would have a 200ms delay, in order to make the inhibition more likely.

Participants completed 10 blocks of 32 trials of this task, with each block containing 24 “go” trials and 8 “stop” trials. The first block was a practice block in which participants were told to ignore any sounds they hear and just focus on pressing the correct key. The second block of trials was a practice block in which they had to attend to the “stop” tone and inhibit their response. This left 8 experimental blocks for a total of 256 trials, which were randomized within the block composition parameters. The average delay period was calculated by summing the delay before the tone presentation for all “stop” trials throughout the task. This number was then subtracted from the average reaction time for all “go” trials in order to obtain the stop signal reaction time (SSRT) for each participant. The SSRT is a measure of response inhibition (Walcott & Landau, 2004), in which a higher score indicates greater difficulty inhibiting a response.

Inventory of Callous-Unemotional Traits (ICU; Frick, 2004). This 24-item self-report measure (see Appendix) was developed by Frick (2004) as an attempt to address concerns that other measures of callous-unemotional traits do not separate these traits from other aspects of antisocial behaviour, such as impulsivity, narcissism, and conduct problems (Frick & White, 2008). In both German adolescents from a community sample ($n = 1443$; Essau, Sasagawa, & Frick, 2006) and juvenile offenders in the United States

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($n = 248$; Kimonis et al., 2008), three independent factors (Uncaring, Callousness, and Unemotional) were found to load on a higher-order Callous-Unemotional factor in the ICU. In a review of research conducted on callous-unemotional traits, Frick and White (2008) state that total scores of the ICU are related to measures of antisocial behaviour, aggression, delinquency, and emotional reactivity. Finally, the self-report version of the ICU has been shown to have good internal consistency in a community sample of adolescents ($n = 455$), with Cronbach's alpha for the Uncaring, Callousness, and Unemotional subscales being 0.77, 0.79, and 0.73, respectively, and 0.83 for the ICU total score (Roose et al., 2010). For the current sample only the ICU total score was used, which had a Cronbach's alpha of 0.78.

Procedure

All of the previously mentioned questionnaires and tasks, with the exception of one page of the demographics form, were completed on a computer for both practical (ease of data collection and storage) and qualitative reasons. Specifically, computer-based tests have been shown to have comparable psychometric characteristics to paper-and-pencil tests (Lunz & Deville, 1996), and undergraduates taking curriculum-based tests on a computer finished before those taking a paper-and-pencil equivalent, with no detriment to their scores (Bodmann & Robinson, 2004). Furthermore, computerized testing appears to reduce social desirability effects often seen on paper-and-pencil measures (Booth-Kewley et al., 2007; Wang et al., 2005). Additionally, the stop-signal task requires computerized administration.

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Participants were able to choose what time they would like to complete the study through the Department of Psychology participant pool system. Upon their arrival, participants completed, and received a copy of, an informed consent form. This informed the participant of the general procedures and length of the study (roughly two hours), the risks involved (minimal potential discomfort as a result of answering personal questions), the benefits of their participation (course credit and contribution to our understanding of basic human traits and behaviour), and provided them with the researcher's contact information in case they had any questions or concerns regarding the study.

After completing the informed consent process, the participants were ready to begin the test battery. The battery included the tasks and questionnaires listed above, as well as others that are not pertinent to the current study, but concern related constructs, such as sensation seeking. The order of the test battery measures was randomized for each participant.

Chapter IV

Results

Preliminary Analyses

Of the 181 participants who consented to participate in the study, data were not collected for four participants due to computer malfunction, and the data for another five participants were removed due to the overuse of “prefer not to answer” on the Self-Report Delinquency. Specifically, if the participant indicated “prefer not to answer” five times or more on the questionnaire, their data were excluded; this cutoff was used because it creates a great deal of instability in the total score for this measure due to its multiplicative nature. These procedures resulted in the removal of data for nine of the original 181 participants (4.97%).

Next, the data were checked for outliers and influential observations. Standardized residuals were calculated in order to identify outliers on the outcome variable, Self-Reported Delinquency total score. Three cases had values exceeding 3.29 in absolute value (all were above +3.29, indicating very high SRD scores), and were excluded from the analyses. Similarly, outliers on the predictor variables, Stop-Signal Reaction Time and Inventory of Callous-Unemotional Traits total score, were assessed by calculating Mahalanobis distance for each case. Two additional cases were excluded because the Mahalanobis distance exceeded 9.21 (based on the chi-squared distribution with $df=k=2$). Cook’s Distance values were calculated to check for influential observations, but there were no cases in which this value exceeded the cutoff of one. These steps resulted in the removal of data from an additional five participants (2.91% of

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the remaining 172), bringing the total sample size for the analyses to 167 (7.73% of the original 181 were removed), well over the 150 participants required to detect a small to medium effect based on the preliminary power analysis.

There were fifteen participants who were under 80% accuracy on all blocks of the stop-signal task, meaning they had no valid data on the task. For this reason, Expectation Maximization (EM) imputation was used in order to estimate their score on this measure. All demographic variables, as well as scores on the ICU and SRD were used in order to inform this estimation.

After removing outliers and imputing the missing SSRT values, the assumptions of multiple regression were checked. Significant Kolmogorov-Smirnov tests showed that both SRD total score (0.296, $p < 0.001$) and SSRT (0.122, $p < 0.001$) were not normally distributed, although ICU total score was (0.063, $p = 0.200$). Visual inspection, as well as skewness and kurtosis values supported this conclusion; SRD total score and SSRT were both positively skewed (3.018, $p < 0.001$ and 3.337, $p < 0.001$, respectively) and leptokurtic (10.111, $p < 0.001$ and 21.228, $p < 0.001$, respectively). The distribution of total scores on the ICU did not show problems with skewness (0.356, $p > 0.05$) or kurtosis (-0.226, $p > 0.05$). Similarly, visual inspection of the error distributions showed that the residuals for each analysis were roughly normally distributed. A plot of standardized residuals and standardized predicted values was examined to check the assumption of homoscedasticity, which appears to be violated. In light of these findings, the square root and reciprocal transformations were applied to the data; however, neither of these transformations improved the problems seen in terms of normality or heteroscedasticity, so the non-transformed data were used for all analyses.

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Although SSRT and ICU total score were linearly related to one another and to SRD total score, no two variables were correlated strongly enough to suggest singularity (see Table 2 for these correlations). In addition to this finding, all VIF values were well below 10 and tolerance values were all above 0.2, providing further evidence that the multicollinearity assumption was not violated. Finally, Durbin-Watson statistics for each regression analysis indicate that the independence of errors assumption may have been violated.

In light of the several assumptions that were violated, the current results may hold true for this particular sample, but the results are unlikely to be generalizable to the larger population.

Main Analyses

A forward stepwise multiple regression analysis revealed that the best linear combination of predictors for antisocial behaviour included having a mother whose highest level of education is a high school diploma and callous-unemotional traits. The forward procedure was selected so that predictors that were not significant at the $\alpha = 0.05$ significance level were excluded from the model. All demographic information, SSRT, and ICU total scores were included in the analysis, but only predictors significant at the $\alpha = 0.05$ level were entered and retained in the model. Overall, this model was significant ($F_{(2,164)} = 9.760, p < 0.001$) and explained 10.6% of the variance in antisocial behaviour ($R^2 = 0.106$) in the current sample; this same regression equation is estimated to predict 9.5% of the variance in the population (Adjusted $R^2 = 0.095$). Based on standardized beta weights, maternal high school education was the strongest predictor ($\beta = 0.274$), followed

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closely by callous-unemotional traits ($\beta = 0.203$). The next strongest predictor was impulsivity ($\beta = 0.106$), although it was not statistically significant ($p = .154$). None of the higher levels of maternal education were statistically significant, but both “some university” and “college/trade-school” had negative standardized β weights.

Unstandardized B weights with 95% Confidence Intervals, the standard error of the B weight, standardized β weights, squared semi-partial (sr^2), partial (pr^2), and zero order (r^2) correlations for each significant predictor are presented in Table 3.

These results were corroborated by an RSQUARE regression analysis conducted in SAS 9.2. This procedure showed that the best single predictor of antisocial behaviour was having a mother whose highest level of education is a high school diploma ($r^2 = 0.0654$), followed by callous-unemotional traits ($r^2 = 0.0318$). The best two-variable combination was once again callous-unemotional traits and having a mother whose highest level of education was a high school diploma ($r^2 = 0.1064$). The second-best two variable combination was impulsivity and highest level of maternal education being a high school diploma ($r^2 = 0.0794$). In terms of three-variable models, the combination of callous-unemotional traits, age, and highest level of maternal education being a high school diploma was the best at predicting antisocial behaviour ($r^2 = 0.1388$). The combination of callous-unemotional traits, impulsivity, and highest level of maternal education being a high school diploma accounted for 11.75% of the variance in antisocial behaviour ($r^2 = 0.1175$).

Hypothesis 1. The Baron and Kenny (1986) mediation model states that there must be non-zero correlations between the predictor variable and both the outcome variable and the proposed mediator, irrespective of the significance level. In order to test

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this, bivariate correlations were calculated between rapid-response impulsivity and both self-reported delinquency and callous-unemotional traits. As predicted, rapid response impulsivity was modestly correlated with antisocial behaviour, although the correlation was not statistically significant ($r = .110, p = .156$). In contrast to the hypothesis that rapid response impulsivity would be positively correlated with callous-unemotional traits, no correlation was found ($r = 0.066, p = 0.396$).

Hypothesis 2. The next step in the Baron & Kenny model is to assess the correlations between the proposed mediator and the outcome variable, after controlling for the predictor variable. A partial correlation between callous-unemotional traits and antisocial behaviour was calculated in order to examine this relation after removing the variance in antisocial behaviour accounted for by rapid-response impulsivity. As predicted, there was a significant positive partial correlation between ICU total score and SRD total score ($pr = 0.172, p < 0.05$).

Hypothesis 3. Because no correlation was found between impulsivity and callous-unemotional traits, it can be concluded that callous-unemotional traits do not mediate the relation between rapid-response impulsivity and antisocial behaviour based on the Baron and Kenny (1986) model. Therefore, there is no reason to conduct the bootstrapping mediation analysis outlined by Preacher and Hayes (2008).

Post Hoc Analyses. As a post-hoc follow-up analysis, a hierarchical regression analysis was run in order to determine if callous-unemotional traits serve as a moderator of the impulsivity-antisocial behaviour relation. The rationale behind this analysis is that the correlations that are required in the mediation model would not detect a relation if

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callous-unemotional traits alter the relation between impulsivity and antisocial behaviour only at certain levels of impulsivity.

Prior to running the hierarchical regression, an interaction term was calculated by multiplying each participant's centered SSRT score by their centered ICU total score. All demographic variables were entered in the first step of the hierarchical regression, in order to control for their effect on the prediction equation. At this stage of the analysis, the model was significant ($F_{(17,149)} = 1.811, p < 0.05$), and explained 17.1% of the variance in antisocial behaviour in the current sample (estimated 7.7% in the population). At the next step of the regression, the centered SSRT and centered ICU total score were entered. Although the model was still significant overall ($F_{(19,147)} = 1.971, p < 0.05$), and explained 20.3% of the variance in antisocial behaviour for the sample (estimated 10.0% for the population), the effect of adding SSRT and ICU total scores to the prediction equation was only moderately significant ($F \text{ change} = 2.932, p = 0.056$). The centered interaction term was entered in the final step of the hierarchical regression analysis in order to check for a moderation effect. Again, model was significant overall ($F_{(20,146)} = 1.864, p < 0.05$), and explained 20.3% of the variance in antisocial behaviour for the sample (estimated 9.4% for the population), but this addition did not significantly add to the predictive value of the model ($F \text{ change} = 0.067, p = 0.796$).

As an additional follow-up, commission errors on the stop-signal task (making a response on a "stop" trial) were calculated as a second indicator of impulsivity. As with SSRT, scores were only calculated on blocks with at least 80% accuracy. All analyses were repeated, substituting the total number of commission errors for SSRT. As expected, commission errors were not correlated with ICU total score ($r = 0.082, p =$

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0.319) or SRD total score ($r = 0.045, p = 0.581$), and controlling for commission errors instead of SSRT did not change the partial correlation between ICU total score and SRD total score ($r = .237, p < 0.005$). Contrary to expectations, commission errors were significantly negatively correlated with SSRT ($r = -0.437, p < 0.001$). The results from the stepwise multiple regression were unchanged by the substitution of commission errors for SSRT.

Chapter V

Discussion

Review of Primary Research Questions

The purpose of the current study was to investigate if callous-unemotional traits mediate the relation between impulsivity and antisocial behaviour. There is strong support for individual relations between impulsivity with antisocial behaviour (Farrington, 1990; Grande et al., 1984; Luengo et al., 1994; Neumann et al., 2010; Tremblay et al., 1994), as well as between callous-unemotional traits and antisocial behaviour (Burke, Loeber, & Lahey, 2007; Fontaine et al., 2011; McMahon et al., 2010; Pardini et al., 2007; Stickle, Kirkpatrick, & Brush, 2009; Taormina, 2011). There is also support for this relation with antisocial behaviour when impulsivity and callous-unemotional traits are considered in conjunction with one another (D'Antonio, 1997; Heilbrun, 1982; Vitacco et al., 2002). However, no previous studies have tested if callous-unemotional traits mediate the impulsivity-antisocial behaviour relation. Therefore, self-report and behavioural data were used to examine this relation in an emerging adult sample.

Although there has been a great deal of research on the relations among impulsivity, callous-unemotional traits, and antisocial behaviour, few studies have investigated these traits with an emerging adult sample. Furthermore, the focus of much of the research has been on young individuals with disruptive behaviour disorders (Colledge & Blair, 2001; Eisenbarth et al., 2008; Soderstrom et al., 2005; Swann et al., 2009). Other studies have looked at these characteristics in adjudicated individuals, who

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often have a diagnosis of Conduct Disorder or Antisocial Personality Disorder (Komarovskaya et al., 2007; Wang et al., 1999). In short, research in this area has likely focused on individuals in with life-course persistent antisocial behaviour, as described by Moffitt and colleagues (1993). Because the majority of antisocial behaviour is committed at very low levels by individuals who display adolescence-limited antisociality (Moffitt, 2007), the lack of research on the intersection of these constructs in individuals without significant psychopathology is notable. The current study did not distinguish between the several groups of antisocial behaviour (i.e., life-course persistent, childhood-limited, and adolescence-limited) or between groups who commit antisocial behaviour and those who do not. However, collecting data from an emerging adult university student sample (81% aged 22 years or younger) increased the likelihood that individuals from the life-course persistent group of antisocial behaviour were filtered out; thus making it likely that the antisocial behaviour reported could be described by membership in the adolescence-limited group. The current sample also contained a considerable number of people who would belong to the “never antisocial” group or “low externalizers” (Roisman et al., 2010), as 45.56% indicated no antisocial behaviour in the past year. These points suggest that the current study does, in fact, address the shortcoming of the extant literature by investigating the interaction between impulsivity, callous-unemotional traits, and antisocial behaviour in people who are unlikely to have significant psychopathology.

Based on the results of previous research in this area, it was expected that callous-unemotional traits would partially mediate the relation between impulsivity and antisocial behaviour in an undergraduate population. Research by D’Antonio (1997) also suggests

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that callous-unemotional traits may moderate the impulsivity-antisocial behaviour relation.

Review of results

The current study showed that impulsivity and antisocial behaviour were positively correlated, as were callous-unemotional traits and antisocial behaviour after controlling for impulsivity. These results are similar to previous findings in terms of the relations between impulsivity and antisocial behaviour (D'Antonio, 1997; Fossati et al., 2004; Luengo et al., 1994; Neumann et al., 2010; Stickle et al., 2009; White et al., 1994) and between callous-unemotional traits and antisocial behaviour (D'Antonio, 1997; Pardini et al., 2007; Stickle et al., 2009). In contrast to previous studies (Colledge & Blair, 2001; D'Antonio, 1997; Stickle et al., 2009), impulsivity and callous-unemotional traits were not correlated in the current study.

In terms of predicting antisocial behaviour, having a mother whose highest level of education is a high school diploma was the strongest single predictor. Given that maternal education has been used as a proxy measure for offspring IQ (Vanderploeg et al., 1998), this finding is in line with reports that IQ is related to antisocial behaviour (Koenen et al., 2006). This was further supported by the negative relation between having a mother with more than a high school education and antisocial behaviour in this study. That impulsivity was excluded from this model was an unexpected finding, and likely the result of measurement differences from previous studies.

Hypothesis one was partially supported, with rapid-response impulsivity positively correlated with antisocial behaviour. However, contrary to this hypothesis, no

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correlation was found between rapid-response impulsivity and the proposed mediator, callous-unemotional traits. These results suggest that rapid-response impulsivity is only weakly correlated with self-reported antisocial behaviour, and not correlated with self-reported callous-unemotional traits.

Hypothesis two, which stated that self-reported callous-unemotional traits would be correlated with self-reported delinquency, even after accounting for rapid-response impulsivity, was supported. Specifically, participants were more likely to report delinquent behaviour if they also reported elevated levels of callous-unemotional traits. Alternatively, this correlation may be explained by individuals with elevated levels of callous-unemotional traits being more willing to report antisocial behaviour because they do not care about social norms.

The potential role of callous-unemotional traits as a mediator of the impulsivity-antisocial behaviour relation, as stated in hypothesis three, was not examined because impulsivity and callous-unemotional traits were not correlated. Follow-up tests to check if callous-unemotional traits affect this relation at specific levels of impulsivity, did not find this effect. This finding contradicts the findings of D'Antonio (1997) with respect to delinquency ratings, but is in line with the results for aggressive behaviour.

Overall, the results of the present study suggest that both callous-unemotional traits and rapid-response impulsivity are related to antisocial behaviour. These findings are consistent with previous research, although the effects seen in the present study were considerably smaller. Despite these relations, rapid-response impulsivity and callous-unemotional traits were not correlated with one another, and neither variable affected the

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others' relation with antisocial behaviour. Several differences between the present study and previous research in this area may explain the discrepant findings. One notable difference is the use of a behavioural indicator of impulsivity, as the large majority of this work has been conducted using either self- or other-report questionnaires. Additionally, the present study investigated these traits in an often overlooked sample: non-adjudicated emerging adults, who were unlikely to have a diagnosis of Conduct Disorder or Antisocial Personality Disorder. The present study also differed in design by investigating both impulsivity and callous-unemotional traits. Although few other studies have taken both impulsivity and callous-unemotional traits into account in their samples, this is an important consideration for better understanding the processes that lead to antisocial behaviour, and differentiating among groups who commit these acts.

The results of the present study may be difficult to generalize as a result of several of the statistical assumption violations (Field, 2009), namely the non-normal distributions for SSRT and SRD and the violation of the homoscedasticity assumption. Beyond this, several of the findings contradict previous research, suggesting the results may be specific to this particular sample. However, the several differences in the results between the present study and previous research in this area cannot be ignored, and may reflect differences between the interactive effects impulsivity and callous-unemotional traits have on antisocial behaviour for individuals with a significant psychopathology (e.g., Conduct Disorder, Antisocial Personality Disorder, etc.) and those without.

Limitations

Despite the many strengths of the present study, including using a behavioural indicator of rapid-response impulsivity and self-report rather than other-report measures for other variables, there were several limitations to consider. One key limitation is that the sample in the present study contained a disproportionate number of females (82.77%), due to the nature of the recruitment population. This is important to note because males are more likely to commit overt antisocial behaviour (Elis, 2000), which is most often emphasized on measures of antisociality. Additionally, the sample was drawn from a university population, in which antisocial behaviour is less likely to be found, and individuals from the life-course persistent antisocial behaviour group are very unlikely.

There are also several areas for improvement in terms of measurement. For example, only overall scores were used for the Inventory of Callous-Unemotional Traits and the Self-Report Delinquency Scale. Examining the subscales of the ICU (Uncaring, Callousness, and Unemotional) may provide a more complete picture of how these traits are related to impulsivity and antisocial behaviour. Similarly, the overall score on the SRD combines a variety of antisocial behaviours, but considering specific types (e.g., aggressive or non-aggressive) and severities may be beneficial. Although the SRD provides useful information on the severity of antisocial behaviours, a concern with this measure is that it only includes delinquent behaviour over the last 12 months.

Another limitation in the present study was the use of SSRT as an indicator of impulsivity. The unexpected negative correlation with commission errors suggests that SSRT may not be an accurate measure of impulsivity. There is also evidence of a great

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deal of inconsistency in reaction times at the high and low portions of the reaction time distribution (Williams et al., 2007), which may suggest that there are other factors contributing at the extremes of reaction time. Commission errors were calculated to avoid relying entirely on SSRT; however, an additional potential measure of impulsivity, post-error reaction time, was not calculated for the present study. The decision to not calculate post-error reaction times was based on recent research by Steinborn and colleagues (2012), which suggests that post-error slowing is not a strategic conservative behaviour, but rather the result of an orienting response that causes slowed and inaccurate performance. Additionally, impaired post-error slowing has been shown in the inattentive subtype of ADHD, but not in those with the combined subtype, suggesting post-error slowing is more related to inattentiveness than impulsivity (Shiels, Tamm, & Epstein, 2012).

Investigating the role of impulsivity and callous-unemotional traits in a group of individuals with near normal distributions of antisocial behaviour could be a fruitful line of research and would greatly improve our understanding of how these characteristics relate to antisocial behaviour in the population. The sample in the current study likely consisted of a mixture of individuals who have not committed antisocial behaviours, or “low externalizers,” and those from the adolescence-limited group. Separating these two groups for subsequent analyses could help clarify how impulsivity and callous-unemotional traits are related to antisocial behaviour in the people responsible for the large majority of such acts.

Clinical Implications

The current study makes valuable contributions to our understanding of antisocial behaviour. First, this study demonstrated that callous-unemotional traits play an important role in predicting antisocial behaviour in emerging adults. Arguably more important are the discrepancies between the present study and previous research in this area. These differences suggest differences in how impulsivity and callous-unemotional traits relate to antisocial behaviour in the life-course persistent antisocial behaviour group (who often have a disruptive behaviour disorder), and for people who have no history of antisocial behaviour or who do so only infrequently during adolescence. If future analyses show specific differences in these relations for the adolescence-limited and life-course persistent groups, then different intervention approaches should be considered.

Considering the low levels of antisocial behaviour present within the current sample, specific clinical implications are limited. Because there were likely some individuals from the adolescence-limited group in the present study, some implications for this group will be addressed. Although parenting was not examined in the current study, this would be a good area for future research because parental training has been shown to reduce the likelihood of future antisocial behaviour (Frick & Dickens, 2006). With respect to callous-unemotional traits, there is evidence to suggest that cognitive-behaviour therapy, combined with methylphenidate, may help reduce callous-unemotional traits, and thus, the likelihood of future antisocial behaviour (Waschbusch et al., 2007) and the numerous negative consequences associated with antisocial behaviour. However, research addressing the efficacy of this approach in the adolescent-limited

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group of antisocial behaviour is necessary, as Waschbusch and colleagues (2007) focused on children with ADHD and persistent conduct problems.

Future directions

The results and limitations of the current study suggest several avenues for future research in this area. Due to the multidimensional nature of each of the constructs involved in this study, further research is required to have a better understanding of the relations among these variables. More specifically, future research should investigate multiple forms of impulsivity, including both rapid-response and delay-discounting. Future research could also look at the subscales of the ICU to see if Uncaring, Callousness, or Unemotional characteristics play a more prominent role in antisocial behaviour. Similarly, the type of antisocial behaviour committed (e.g., theft, vandalism, assault, etc.) should be taken into consideration, rather than combining all of these acts in one all-encompassing score.

Furthermore, future studies should check the validity of their measures by using multiple measures for each construct. For example, behavioural indicators of impulsivity could be checked against self- and other-report questionnaires. A similar approach, in which both self- and other-report measures are used, could be employed for measuring callous-unemotional traits and antisocial behaviour. Lastly, the results of future research would be more generalizable if data were collected from a more heterogeneous sample, including a roughly equal distribution of males and females (or a male bias if anything, given their greater likelihood to commit antisocial behaviours), education levels (rather than an exclusively undergraduate sample), and several other demographic variables.

Conclusions

In conclusion, the current study found that callous-unemotional traits neither mediate, nor moderate, the relation between rapid-response impulsivity and antisocial behaviour. However, callous-unemotional traits and having a mother whose highest level of education is a high school diploma are strong predictors of antisocial behaviour in an undergraduate, emerging adult sample. Although the results are not generalizable beyond the current sample, the findings do contribute to the quickly growing research in this area. Of crucial importance is that this study was conducted in an emerging adult sample, a group that is suggested to be responsible for a large portion of all antisocial behaviour (Frick & Viding, 2009; Moffitt, 1993). In fact, the participants in the current study were ages 17-30, which represents the group accused of 49.8% of Canadian crimes in 2010 (Statistics Canada, 2010), even though this age group makes up less than 20% of the Canadian population (Statistics Canada, 2012). Because callous-unemotional traits appear to play an important role in antisocial behaviour, even in this sample, it is possible that using interventions to target these traits at an early age may reduce the risk of the negative consequences associated with antisocial behaviour, whether it be life-course persistent or adolescence-limited.

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Table 1

Frequencies and Percentages for Demographics

Variable	Frequency	Percentage
Sex		
Male	30	16.67
Female	149	82.77
Prefer Not to Answer	1	0.56
Race		
Asian/Asian Descent	29	16.11
Hispanic/Latino	3	1.67
Black/African Descent	14	7.78
Caucasian	96	53.33
Other/Mixed	30	16.67
Prefer Not to Answer	8	4.44
Employment		
Employed	104	57.78
Unemployed	73	40.55
Prefer Not to Answer	3	1.67
Maternal Education		
Less than High School	11	6.29
High School Diploma	32	18.29
Some college/trade-school	3	1.71
College/trade-school degree	64	36.57
Some University	42	24
University Degree	16	9.14
Prefer Not to Answer	7	4

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Table 1 (cont.)

Frequencies and Percentages for Demographics

Variable	Frequency	Percentage
Paternal Education		
Less than High School	18	10.53
High School Diploma	34	19.88
Some college/trade-school	2	1.17
College/trade-school degree	46	26.9
Some University	37	21.64
University Degree	20	11.7
Prefer Not to Answer	14	8.19
Maternal Employment		
Employed	128	72.73
Unemployed	41	23.30
Prefer Not to Answer	7	3.98
Paternal Employment		
Employed	131	75.29
Unemployed	31	17.82
Prefer Not to Answer	12	6.9

Note. All percentages are based on the total number of participants who completed that particular question. Categories that were not selected were excluded from this table.

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Table 2

Correlations between Impulsivity, Callous-Unemotional Traits, and Antisocial Behaviour Indicators

	ICU	SRD	SSRT	Commission Errors
ICU	–	.172*	.066	.044
SRD	.172*	–	.129	.004
SSRT	.066	.129	–	-.453**
Commission Errors	.044	.004	-.453**	–

Note. All correlations are bivariate, with the exception of the correlation between ICU and SRD, which is a partial correlation controlling for SSRT.

* Correlation is significant at the 0.05 level (2-tailed)

** Correlation is significant at the 0.01 level (2-tailed)

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Table 3

Stepwise Regression Results for Predicting Antisocial Behaviour

Predictor	B	SE B	95% CI for B		β	sr^2	pr^2	r^2
			Lower	Upper				
Mat. Ed.	13.091	3.538	6.106	20.076	.274	.075	.077	.066
ICU	.540	.197	.151	.929	.203	.041	.044	.032

Note. Adjusted $R^2 = 0.095$.

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APPENDIX

Measures

Demographic Information

Participant's Name: _____

Participant's Student Number: _____ Current Year: _____ Major: _____

Home Address: _____

Home Phone: _____

Cell Phone: _____

Email: _____

Name/phone number for another person who will know how to find you if we cannot reach you:

May we contact you again in the future for other studies? YES _____ NO _____

How should we contact you in the future? _____

Instructions:** For questions that include numbered choice options, please circle the number(s) that best describes your answer. Other items will provide you with space(s) to provide a written response. Be sure to read each item carefully, and if you do not understand a question, please ask the person working with you. Please try to answer each item, however, if you feel uncomfortable with any question, you do not need to answer it. Your answers will be kept completely confidential. **Please do not write your name on any page but this front page. (This cover page will be detached and stored with your consent forms to protect your confidentiality.)

(FOR PROJECT USE ONLY – ID # _____)

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DEMOGRAPHIC INFORMATION

	Participant - YOU
Sex	[1] FEMALE [2] MALE [3] OTHER: _____ [4] PREFER NOT TO ANSWER
Employed outside the home?	[1] YES [2] NO [3] PREFER NOT TO ANSWER
Job title?	
Highest grade completed?	[1] Less than high school [2] High school [3] Some college/trade-school [4] College/trade-school [5] Some university [6] University [7] Graduate degree [8] Prefer not to answer

Are there any other adults living in the home? [1] YES [2] NO

If yes, please describe: _____

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Parental Education: If known, please indicate the highest level of education completed by each of your parents.

	Mother	Father
Did not complete high school		
High school diploma		
Obtained GED		
College degree		
University degree		
Advanced degree (Master's, Ph.D., M.D., etc)		

Is your mother currently employed? [1] YES [2] NO

Occupation: _____

Is your father currently employed? [1] YES [2] NO

Occupation: _____

Date of Birth (MM/YY): ___/___ Age: _____

Today's Date (DD/MM/YY): ___/___/___

Race/ethnic background: (please circle)

[1] ABORIGINAL

[2] ASIAN OR ASIAN DESCENT

[3] HISPANIC/LATINO

[4] NON-HISPANIC BLACK OR AFRICAN DESCENT

[5] NON-HISPANIC WHITE OR CAUCASIAN

[6] OTHER/MIXED (please describe) _____

[7] PREFER NOT TO ANSWER

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Self-Report Delinquency Scale (Elliot, Huizinga, & Ageton, 1985)

“We would like to ask you some questions about your behaviour and experiences in the last year. Please give your best estimate of the exact number of times you have done or experienced each of the following things in the past 12 months.

Your responses for the following questions are anonymous and confidential; they will be used for research purposes only. They will NOT be reported to the court or family members.”

How many times in the last 12 months have you:

- 1) Purposefully damaged or destroyed property belonging to your parents or other family members? (2)
- 2) Purposefully damaged or destroyed property belonging to a school? (3)
- 3) Stolen or tried to steal a motor vehicle, such as a car or a motorcycle? (4)
- 4) Purposefully damaged or destroyed property that did not belong to you, not counting family or school property? (5)
- 5) Stolen or tried to steal something worth more than \$50? (4)
- 6) Been beaten up by your mother or father? (0)
- 7) Been attacked with a weapon, such as a gun, knife, bottle or chair by someone other than your mother or father? (0)
- 8) Been beaten up by someone other than your mother or father? (0)

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- 9) Knowingly bought, sold or held stolen goods or tried to do any of these things?
(4)
- 10) Found something like a wallet or jewelry and returned it to the owner or the police? (0)
- 11) Thrown objects such as rocks or bottles at cars or people? (1)
- 12) Run away from home? (1)
- 13) Lied about your age to gain entrance or to purchase something. For example, lying about your age to buy liquor or get into a movie or club? (3)
- 14) Carried a hidden weapon other than a plain pocket knife? (2)
- 15) Stolen or tried to steal things worth \$5 or less? (3)
- 16) Attacked someone with the idea of seriously hurting or killing him or her? (5)
- 17) Been paid for having sexual relations with someone? (0)
- 18) Been involved in gang fights? (4)
- 19) Sold marijuana or hashish ("pot", "grass", "hash")? (5)
- 20) Cheated on school tests? (1)
- 21) Hitchhiked where it was illegal to do so? (1)
- 22) Helped out someone who was badly hurt such as someone who was beaten up, has been in an accident or was very sick? (0)

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- 23) Stolen money or other things from your parents or other members of your family?
(2)
- 24) Had or tried to have sexual relations with someone against their will? (5)
- 25) Hit or threatened to hit a teacher or an adult at school? (0)
- 26) Hit or threatened to hit one of your parents? (0)
- 27) Hit or threatened to hit other students? (0)
- 28) Been loud, rowdy, or unruly in a public place? (0)
- 29) Sold hard drugs such as heroin, cocaine, and LSD? (5)
- 30) Taken a vehicle for a ride or drive without the owner's permission? (5)
- 31) Bought or provided liquor for a minor? (0)
- 32) Given money, food, or clothing to someone or some group who needed them very
much? (0)
- 33) Pressured or pushed someone such as a date or a friend to do more sexually than
they wanted to do? (5)
- 34) Used force or strong-arm methods to get money or things from other students? (5)
- 35) Used force or strong-arm methods to get money or things from a teacher or other
adult at school? (5)
- 36) Refused to participate when another student asked you to help him or her cheat on
an exam? (0)

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37) Avoided paying for such things as movies, bus rides and food? (3)

38) Stolen or tried to steal things worth less than \$50? (4)

39) Broken or tried to break into a building or vehicle to steal something or just look around? (5)

40) Physically hurt or threatened to hurt someone to get them to have sex with you?
(5)

41) Tried to talk your friends out of doing something that was against the law? (0)

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Inventory of Callous-Unemotional Traits (Frick, 2004)

“This questionnaire contains statements about feelings, opinions, and actions.

Please use the following scale to respond to each statement:

0 = Not at all true; 1 = Somewhat true; 2 = Mostly true; 3 = Definitely true

Your responses for the following questions are anonymous and confidential; they will be used for research purposes only.”

- 1) I work hard on everything that I do.
- 2) I always try my best.
- 3) I care about how well I do at school or work.
- 4) I do things to make others feel good.
- 5) I apologize (‘say I am sorry’) to persons I hurt.
- 6) I feel bad or guilty when I do something wrong.
- 7) I easily admit to being wrong.
- 8) I try not to hurt others’ feelings.
- 9) I do not care about doing things well.
- 10) I do not like to put the time into doing things well.
- 11) I do not feel remorseful when I do something wrong.
- 12) I do not care about being on time.

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- 13) I do not care if I get into trouble.
- 14) I seem very cold and uncaring to others.
- 15) The feelings of others are unimportant to me.
- 16) I do not care who I hurt to get what I want.
- 17) I am concerned about the feelings of others.
- 18) I do not like to put the time into doing things well.
- 19) What I think is right and wrong is different from what other people think.
- 20) I do not show my emotions to others.
- 21) I express my feelings openly.
- 22) I hide my feelings from others.
- 23) It is easy for others to tell how I am feeling.
- 24) I am very expressive and emotional.

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VITA AUCTORIS

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