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RISK PREDICTION FOR NEGATIVE OUTCOMES AMONG CHILDREN AND ADOLESCENTS WITH SERIOUS EMOTIONAL DISORDER

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RISK PREDICTION FOR NEGATIVE OUTCOMES AMONG CHILDREN AND ADOLESCENTS WITH SERIOUS EMOTIONAL DISORDER

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Abstract

This study examined the differences upon intake between children who improved and those who did not improve during a follow-up period that extended for two years after their placement in a residential treatment facility. Participants included 201 children (155 males, 46 females) accepted for residential treatment at the Child and Parent Resource Institute (CPRI), a tertiary care facility for children with mental health difficulties. The findings indicate that pretreatment measures of conduct disorder and negative behaviour towards others predict elevated conduct scores at six-months post-discharge. Anxiety and substance use predict conduct scores *below* clinical level at six-months post-discharge. Co-morbid conduct and attention-deficit/hyperactivity disorder predict elevated conduct scores at six-months and two-years post-discharge, and substance use predicts elevated conduct scores and police involvement at two-years post-discharge. These findings are discussed as they relate to both clinical and policy issues related to seriously emotionally disordered children who are placed in residential treatment.

Keywords: Child and Adolescent Mental health, Risk Prediction, Persistent Antisocial Behaviour, Tertiary Treatment

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Introduction

The development and implementation of interventions for children and youth who exhibit mental health disorders and antisocial behaviours can be challenging due to the heterogeneity within this group of individuals. Previous studies examining the effects of treatment on youth experiencing mental health disorders (Halliday-Boykins, Henggeler, Rowland, & DeLucia, 2004; Renaud, Brent, Baugher, Birmaher, Kolko, & Bridge, 1998; St. Pierre, Leschied, Stewart, & Cullion, 2008) have identified a subgroup of youth who do *not* improve regardless of the type of treatment provided. Studies suggest that these youth are at risk for poor long-term functioning, inpatient mental health treatment and incarceration, as well as continuing to be heavy consumers of costly social services well into their adult years (Halliday-Boykins et al., 2004; Renaud et al., 1998; St. Pierre et al., 2008).

In order to determine the effectiveness of a mental health psychiatric milieu treatment for youth in alleviating mental health symptoms, St. Pierre et al. (2008) tracked clients for three years following their admission. Consistent with previous studies (Halliday-Boykins et al., 2004; Renaud et al., 1998), while two-thirds of subjects demonstrated significant symptom reduction and functional improvement, a third of the sample did not show significant improvement. This latter group is at high risk of ongoing serious life difficulties including conflict with the law and incarceration (St. Pierre et al., 2008). In the study by St. Pierre et al. (2008), at the two-year follow-up, incarceration

was twice as common in the nonimproved group relative to the improved group. The present study examined differences at intake between children and youth who improved and those who did not improve after receiving an average of four months of intensive child and family multidisciplinary treatments. This study focused specifically on mental health variables including externalizing behaviour disorders such as conduct disorder and attention-deficit/hyperactivity disorder (ADHD), post-traumatic stress disorder (PTSD), learning disorders, and internalizing behaviour disorders such as depression and anxiety, in the context of age of onset, and how these variables predict outcomes following an approximately four month period of residential treatment at six-months and two-years post-treatment.

Literature Review

Within the group of children and adolescents who exhibit serious emotional disorder and antisocial behaviour, it is important to appreciate the factors that are associated with increased risk for persistent and serious antisocial behaviour such that treatment can be tailored to meet their specific needs. Higher-risk children and adolescents benefit from more intensive services relative to lower-risk children and youth who benefit from less intensive service (Leschied, Chiodo, Nowicki, & Rodger, 2008). Many factors that are associated with increased risk for antisocial outcomes have been identified (Leschied et al., 2008). These factors include individual risk factors such as externalizing behaviour disorders including hyperactivity, conduct disorder, and aggression and internalizing behaviour disorders such as depression and anxiety; family factors such as inconsistent parent management, punitive parenting, and parental

rejection; and witnessing and experiencing violence within the home (Canadian Institute for Health Information [CIHI], 2008; Leschied, 2007; Leschied et al., 2008). It is important to explore and understand how these factors interact, the implications for when they occur at different developmental stages, and how they are associated with an increased risk for persistent antisocial behaviour.

Age of Onset

It has been well established that there are different developmental pathways to antisocial behaviour in adolescents (Bierman et al., 2002; Moffitt, 1993; Moffitt & Caspi, 2001; Moffitt, Caspi, Harrington, & Milne, 2002; Ruchkin, Koposov, Vermeiren, & Schwab-Stone, 2003; van Lier, Wanner, & Vitaro, 2007; Vermeiren, Schwab-Stone, Ruchkin, De Clippele, & Deboutte, 2002). Previous studies have found that the age at which a child or adolescent begins to display antisocial behaviour can be used to distinguish different etiological pathways among these individuals, as well as predict different outcomes in adolescents (Cottle, Lee, & Heilbrun, 2001; Loeber & Farrington, 2000; Moffitt & Caspi, 2001) and across the adult life course (Moffitt et al., 2002)

Early versus late stage onset. Moffitt (1993) identified two distinct categories of individuals who share problem behaviours. The first, referred to as life-course-persistent or early-onset offenders, and the second, adolescence-limited or late-onset offenders. Early- and late-onset conduct problems have different etiologies as well as different outcomes across the adult life course (Moffitt, 1993; Moffitt & Caspi, 2001). Early-onset offenders exhibit antisocial behaviours at every life stage, with problem behaviours beginning in childhood and continuing to increase thereafter, persisting throughout

adolescence into adulthood (Moffitt, 1993). Late-onset offenders begin to exhibit antisocial behaviours in adolescence and desist in young adulthood (Moffitt, 1993). While the early- and late-onset types have different risk factors, they exhibit similar levels of offending in adolescence (Moffitt & Caspi, 2001). Early- and late-onset of conduct problems distinguish outcomes into adulthood with the early-onset group exhibiting the most violent behaviours compared to the late-onset group (Moffitt et al., 2002). While early-onset offenders represent a relatively small proportion of all young offenders (5-6%), this group is especially problematic since it has been found that their behaviour is resistant to intervention (Bierman et al., 2002) and they account for the majority of antisocial acts, estimated at 50-60% (Bierman et al., 2002; Lynam, 1996; Vermeiren et al., 2002). Based on this developmental taxonomic model, the DSM-IV reflects the age of onset in characterizing the early-onset subtype as antisocial behaviour beginning prior to or at the age of 10 (Ruchkin et al., 2003; Vermeiren, Jespers, & Moffitt, 2006).

Etiology of early-onset offending. Early- and late-onset developmental pathways to antisocial behaviour can be differentiated on both background factors and on the nature of their behaviour (van Lier et al., 2007; Vermeiren et al., 2002). The early-onset group of offenders are characterized by their early behavioural problems, higher rates of psychopathology, and early neuropsychological problems (Loeber & Farrington, 2000; Moffitt, 1993; Moffitt & Caspi, 2001; Ruchkin et al., 2003; van Lier et al., 2007; Vermeiren et al., 2002). These childhood characteristics may be maintained and further exacerbated by other social environmental factors such as parenting styles, poverty, and

relationships with peers (Moffitt & Caspi, 2001; van Lier et al., 2007). Disruptive child behaviours such as serious and persistent disobedience, frequent lying, aggression, minor forms of theft, truancy during early school years, and early substance use have been associated with an early onset of offending (Loeber & Farrington, 2000). Children exhibiting these disruptive behaviours are at risk of following an antisocial pathway from disruptive child behaviours to early offending, to serious, violent, and chronic offending (Loeber & Farrington, 2000).

Disruptive children tend to have multiple problems early in life including attention-deficit/hyperactivity disorder, problem behaviour in the home, poor school performance, and internalizing problems such as depressed mood (Loeber & Farrington, 2000). There are numerous consequences for children who display early disruptive behaviours. It is likely that these disruptive behaviours at an early and formative period of life contribute to the stability and continuation of negative and disruptive behaviour over the longer term (Loeber & Farrington, 2000). Persistent disruptive behaviour is also associated with poor social skills and low interest and motivation in education, which can lead to poor social relationships throughout life as well as poor educational achievement and later restricted employment opportunities (Loeber & Farrington, 2000).

Externalizing psychopathology and neuropsychological deficits, especially expressed as ADHD, have been associated with the development of early-onset antisocial behaviour and have been found to distinguish children in the early-onset group from those in the late-onset group (Moffitt and Caspi, 2001; van Lier et al., 2007; Vermeiren et al., 2002). Moffitt and Caspi (2001) posit that a child's risk emerges from inherited or

acquired neuropsychological variation. Neuropsychological deficits are initially manifested as subtle cognitive deficits, difficult temperament or hyperactivity (Moffitt & Caspi, 2001). Difficult child behaviour that is a result of neuropsychological deficits is then exacerbated by environmental risks such as inadequate, harsh, and inconsistent parenting, disrupted family bonds and poverty, and later by poor relationships with peers and teachers (Moffitt & Caspi, 2001). The interaction between child and environmental risk factors continues to accumulate throughout childhood and adolescence resulting in persistent physical aggression and antisocial behaviour (Moffitt & Caspi, 2001).

In a longitudinal study conducted by van Lier et al. (2007), it was found that membership in the early-onset trajectory could be predicted in children who followed a trajectory of high attention-deficit/hyperactivity (ADH). Membership in the high ADH group was not associated with the late-onset trajectory. Ruchkin et al. (2003) found that among a group of Russian incarcerated juvenile offenders, the early-onset conduct disorder group had the highest rates of psychopathology reflected in ADHD, conduct disorder, alcohol and substance abuse, PTSD, and anxiety compared to those in the late-onset conduct disorder group and the late-onset non-conduct disorder group. In addition, the early-onset group had the highest rate of overall co-morbid psychopathology, suggesting that these youth are the most severely disordered within the offending population (Ruchkin et al., 2003). The early-onset group reported higher rates of conduct problems, oppositional defiant behaviour, and attention problems prior to 12 years of age, thereby providing evidence for the stability of externalizing problems in this early-onset group (Ruchkin et al., 2003).

Studies examining the risk for recidivism among young offenders have also identified age of onset to be one risk factor that is strongly associated with reoffending among juveniles (Cottle et al., 2001; Putnins, 2005). Cottle et al. (2001) conducted a meta-analysis to identify factors related to recidivism among juveniles. They found that two of the strongest predictors of recidivism were age at first commitment and age at first contact with the law. Putnins (2005) also found age of first proven offence to be significantly related to recidivism in a group of youth in secure care.

Trajectory of early-onset offending. Children with an early-onset of antisocial behaviour follow a time-ordered trajectory, demonstrating different forms of behaviour which increase in severity in each time period (Patterson, Forgatch, Yoerger, & Stoolmiller, 1998). The earliest point detected in the trajectory is reflected in childhood measures of antisocial behaviour that are assessed at ages nine to ten years (Patterson et al., 1998). Early antisocial behaviours are related to an early first arrest, the second point in the sequence (Patterson et al., 1998). This occurs when early-onset children shift from antisocial acts to acts that constitute indictable offenses (Patterson et al., 1998). Early age at first arrest is a predictor of recidivism in juveniles (Cottle et al., 2001; Putnins, 2005). Chronic juvenile offending, defined as three or more police arrests prior to the age of 18 years, is the third event in the trajectory (Patterson et al., 1998). Early status offenses and early offending are strong predictors of serious, violent, and chronic offending (Moffitt, 1993; Loeber & Farrington, 2000). Patterson et al. (1998) found that among the 51 male chronic offenders in their study, 71% moved through all three points in the trajectory, which supported their hypothesis of a single path to chronic juvenile offending.

Etiology of late-onset offending. On the other hand, the development of antisocial behaviour in the late-onset group emerges alongside puberty and stems from social and environmental risk factors such as rebellion against adults or association with deviant peers in adolescence, rather than from early childhood behaviour problems and/or neuropsychological deficits (van Lier et al., 2007). Late-onset children have backgrounds that are normative; they have significantly less background risk factors compared to the early-onset children (Moffitt & Caspi, 2001). During adolescence, youth go through a "maturity gap" (Moffitt & Caspi, 2001, p.356), a time between their biological maturation and their access to adult-like privileges and responsibilities. During this maturity gap, adolescents in the late-onset group begin to display antisocial behaviours similar to those displayed by children in the early-onset group as a way to, "demonstrate autonomy from parents, win affiliation with peers, and hasten social maturation" (Moffitt & Caspi, 2001, p. 356). In childhood, late-onset children tend to ignore and reject those who display an early-onset of antisocial behaviour. In adolescence, however, late-onset children begin to model the behaviour of their early-onset peers, thus resulting in an increase of antisocial behaviour (Moffitt & Caspi, 2001; van Lier et al., 2007). van Lier et al. (2007) found that while children in the early-onset group display higher levels of antisocial behaviour compared to their friends in both childhood and adolescence, the increase in antisocial behaviour during adolescence exhibited by children in the late-onset group parallels the increase in antisocial behaviour displayed by their friends. It was also found that children in the late-onset group are less likely to display high levels of physical violence compared to their early-onset peers suggesting that the behaviour of children in

the early-onset group is more severe than the behaviour of children in the late-onset group (van Lier et al., 2007).

Unlike early-onset children, late-onset children experience healthy development in childhood and, therefore, most late-onset children desist from their antisocial ways as they mature into young adults and turn to a more conventional lifestyle (Moffitt & Caspi, 2001). Children in the late-onset group are not at a high risk of adult arrest compared to children in the early-onset group (Patterson et al., 1998). Late-onset children are at no more risk of adult arrest than are individuals who were never arrested as adolescents (Patterson et al., 1998). This is not to say that late-onset offenders will not face harmful consequences (e.g. dropping out of school, becoming a teen parent, becoming addicted to drugs or alcohol, incarceration) during their adolescent years or that they will desist from antisocial behaviour without intervention or treatment (Moffitt & Caspi, 2001).

Sex as a mediator in the offending pattern. Studies using Moffitt's developmental taxonomic model have focused largely on males, which raises the question as to whether or not females fit into the taxonomy or if females require a different theory that is better suited to them. Girls are involved in and express aggressive behaviour in ways that are different from boys. For example, males tend to exhibit more physically aggressive behaviour whereas females are involved in more social and relational forms of aggression (Antonishak, Reppucci, & Mulford, 2004; Leschied, Cummings, Van Brunschot, Cunningham, & Saunders, 2001; Moretti, Odgers, & Jackson, 2004). The tendency for females to be involved in more covert, albeit destructive, forms of aggression may explain why studies on antisocial behaviour have focused on males. On average, males

are more antisocial than females (Moffitt & Caspi, 2001), females commit less serious offences compared to males (Lanctôt, Èmond, & Le Blanc, 2004), and compared to males the rate of female violence, arrest, and adjudication is small (Antonishak et al., 2004; Leschied et al., 2001; Moretti et al., 2004). However, recently there has been a significant increase in girls' involvement in aggressive acts and violent behaviour, as well as arrests and adjudication (Antonishak et al., 2004; Leschied et al., 2001; Moretti et al., 2004).

The low rate of antisocial behaviours in females creates a barrier to testing how the developmental taxonomy applies to the sexes. Studies that have attempted to compare both sexes have suffered in low statistical power (Moffitt & Caspi, 2001). Moffitt and Caspi (2001) explored how the Dunedin females fit into early-onset and late-onset groups. Using a gender-neutral cutoff, it was found that of 477 males and 445 females, 122 males (26%) and 78 females (18%) were on the late-onset trajectory and 47 males (10%) and 6 females (1%) were on the early-onset trajectory. The developmental taxonomy fit both sexes: the majority of female offenders fit the late-onset group, whereas very few followed the early-onset trajectory. This finding is consistent with studies that have found that females participate in higher rates of violence and antisocial acts during their mid-adolescence but participation in violence declines as they progress towards adulthood, with only a few persisting in serious forms of antisocial behaviour in early adulthood (Lanctôt et al., 2004). This is not to say, however, that antisocial females make a positive transition into early adulthood; many of these females will become involved in other systems such as mental health, medical, welfare, and social assistance (Odgers, Schmidt, & Reppucci, 2004). Similar to early-onset and late-onset males, early-

onset females have high-risk backgrounds compared to the late-onset females who have normal childhood backgrounds (Moffitt & Caspi, 2001).

Mental Health Factors

Serious mental health disorders in childhood are debilitating and cause later life maladjustment as well as predict aggression, violence, and antisocial behaviour (Leschied, 2007; Loeber, Farrington, Stouthamer-Loeber, Moffitt, Caspi, & Lynam, 2001; Vermeiren et al., 2006). Externalizing behaviour disorders including hyperactivity, aggression, and conduct disorder; internalizing behaviour disorders such as depression; post-traumatic stress disorder; and substance abuse have been identified as strong predictors for antisocial outcomes (CIHI, 2008; Leschied et al., 2008; Loeber et al., 2001; Vermeiren et al., 2002; Vermeiren et al., 2006). A considerable proportion of youthful offenders exhibit co-occurring mental health problems and other problem behaviours (Loeber et al., 2001), underscoring the importance of understanding the association between mental health problems and antisocial behaviour in this population.

Externalizing behaviour disorders. Externalizing behaviour disorders in childhood are associated with increased risk for persistent and serious antisocial behaviour. Disruptive externalizing behaviour disorders including hyperactivity, aggression, and conduct disorder in childhood and adolescence are the most common reason for psychiatric referrals (Fite, Stoppelbein, Greening, & Dhossche, 2008) as well as predictors of future conduct problems and adult criminality (Leschied et al., 2008). Externalizing behaviour disorders are highly stable showing continuity from early

childhood to adolescence and from adolescence to adulthood (CIHI, 2008; McMahon, 1994).

The association between externalizing disorders and persistent and serious antisocial behaviour have been identified in numerous studies (e.g. Babinski, Hartsough, & Lambert, 1999; Broidy et al., 2003; Fite et al., 2008; Shabat, Lyons, & Martinovich, 2008; Vermeiren et al., 2002). Using data from six sites and three countries, Broidy et al. (2003) examined the developmental course of physical aggression in childhood and the linkages to violent and nonviolent offending outcomes in adolescence. Among boys, chronic physical aggression in childhood is a distinct and consistent predictor of later violent and nonviolent delinquency. Independent of physical aggression, early chronic nonaggressive conduct problems increased the risk of later violent behaviour and early chronic oppositional behaviours independently increase the risk of nonviolent delinquency (Broidy et al., 2003). Relative to those who display chronic trajectories of hyperactivity or opposition, those who display a chronic trajectory of physical aggression, along with those who display chronic conduct problems, are at higher risk for violent juvenile offending (Broidy et al., 2003).

Externalizing behaviour disorders have also been associated with negative outcomes among youth who have received treatment. Shabat et al. (2008) found that after receiving residential treatment, youth with a diagnosis of conduct disorder had an increased tendency toward negative discharges including an increased likelihood of being discharged into the department of corrections or being discharged in a level of care that is more restrictive compared to youth without a diagnosis of conduct disorder. Fite et al.

(2008) found that externalizing behaviour problems were not only associated with an increased risk for repeat admission among children to a psychiatric inpatient facility, they were also associated with a younger age of first admission. This is consistent with developmental models of risk for antisocial behaviour that posit that early-onset behaviour problems are associated with poor long-term outcomes (Fite et al., 2008; Moffitt, 1993).

Using an unselected sample of adolescents brought to juvenile court, Vermeiren et al. (2002) found that youth with higher levels of psychopathology and more neuropsychological deficits were more likely to recidivate. Specifically, a diagnosis of conduct disorder predicted recidivism over and above a number of criminological findings. Higher rates of ADHD were evident among recidivists; however, it was unclear whether ADHD contributed to recidivism as most ADHD subjects also had a diagnosis of conduct disorder (Vermeiren et al., 2002).

Problems occur when examining the association between hyperactivity and later antisocial behaviour due to the high rate of overlap between hyperactivity and conduct problems (Lynam, 1996). It has been estimated that 30-50% of children with hyperactivity also meet criteria for conduct problems (Lynam, 1996). This has led to inconsistency among studies concerning the association between hyperactivity and adolescent offending. Some studies have found that hyperactivity does not independently influence adolescent offending (Broidy et al., 2003). Broidy et al. (2003) found that after controlling for the correlated effects of other disruptive behaviours such as physical aggression, opposition, and nonphysically aggressive conduct problems, hyperactivity did

not predict violent or nonviolent offending in any of the data sets. It was concluded that while hyperactivity may interact with other disruptive behaviours in childhood to aggravate their influence on later offending, hyperactivity alone does not independently predict offending outcomes (Broidy et al., 2003).

Other studies, however, have found that childhood symptoms of hyperactivity-impulsivity alone are predictive of official arrests and self-reported crime for males (e.g. Babinski et al., 1999; Putnins, 2005). In the development of a recidivism risk index for use with young offenders, Putnins (2005) found a number of items had a significant relationship with recidivism. Included in these items were self-reported signs of ADHD including difficulties with restlessness, concentration, impulsivity, and boredom.

Main effects for childhood conduct problems and hyperactivity-impulsivity as well as comorbid hyperactivity-impulsivity and conduct problems were found to predict criminal involvement in a group of male subjects (Babinski et al., 1999), however, only predominant symptoms of hyperactivity-impulsivity were related to criminal activity and not symptoms of inattention. While both conduct problems and hyperactivity-impulsivity were found to predict later criminal activity, it was found that individuals with a history of conduct problems alone were at higher risk for more serious crimes, such as crimes of violence, whereas individuals with a history of hyperactivity-impulsivity alone were at a higher risk for less serious crimes that were specifically related to their impulsivity and inability to delay gratification such as public disorder and property crimes (Babinski et al., 1999). Individuals with symptoms of both conduct problems and hyperactivity-

impulsivity were at the greatest risk for criminal involvement compared to those with conduct problems or hyperactivity-impulsivity alone (Babinski et al., 1999).

An alternative way to examine the association between mental health disorders and persistent and serious antisocial behaviour is to examine the mental health history of youth who have been arrested for committing violent offences (Leschied, 2007). Youth and adults with diagnosed mental health disorders are over-represented in Canada's correctional facilities (CIHI, 2008). It should be stressed, however, that most people with a mental illness do not commit crimes (CIHI, 2008). Studies of adolescent offenders have identified higher rates of conduct disorder, ADHD, depression, PTSD, substance abuse (Vermeiren et al., 2002), and learning disabilities (Hall, 2000) among this population. In a large report that examined the relationship between mental health, delinquency, and criminal activity among Canadians (CIHI, 2008), high rates of mental illness such as depression, anxiety disorders, ADHD, substance use disorder, conduct disorder, PTSD, and schizophrenia were found among youth in custody compared to youth in the general population. Finding from the *Pittsburgh Youth Study* (Loeber et al., 2001) indicated that 5.7% of boys with persistent serious antisocial behaviour also had persistent mental health problems. Teplin, Abram, McClelland, Dulcan, and Mericle (2002) examined psychiatric epidemiologic data on juvenile detainees. Approximately two thirds of males and three quarters of females met diagnostic criteria for one or more disorders. The most common disorders among males and females were substance use and disruptive behaviour disorders. Affective disorders, such as a major depressive episode, were also prevalent, especially among females (Teplin et al., 2002).

Learning disorders. Youth with learning disabilities are prevalent among those in the juvenile justice system (Hall, 2000; Shelton, 2006). In a review of young offenders with learning disabilities, Hall (2000) reported that most studies have shown a high rate of learning disabilities among young offenders. Shelton (2006) reported that of the 376 youth in the Maryland juvenile justice system, 143 (38%) met diagnostic criteria for a learning disability. Compared to those without learning disabilities or those with extremely severe learning disabilities, individuals with mild learning disabilities have a higher rate of offending (Hill, 2000). Those with learning disabilities also have a higher prevalence of coexisting psychiatric disorders including antisocial and disruptive behaviour disorder, mood disorders, anxiety disorders, and substance use disorders (Hall, 2000; Shelton, 2006), highlighting the increased vulnerability and risk among these individuals.

Post-traumatic stress disorder. High rates of PTSD have been found among young offenders (Ruchkin, Schwab-Stone, Koposov, Vermeiren, & Steiner, 2002; Ruchkin et al., 2003; Vermeiren et al., 2006). In a group of 370 Russian male juvenile offenders (Ruchkin et al., 2002), 96% reported experiencing at least one potentially traumatic event and 82.3% reported multiple events. The most commonly reported events were violence-related including witnessing domestic violence, witnessing a violent crime, physical abuse, and being a victim of a violent crime (Ruchkin et al., 2002). It was also found that higher PTSD scores were related to higher scores of violence exposure (Ruchkin et al., 2002).

Many studies have reported an association between early experiences with maltreatment and/or exposure to violence in a child's family of origin and emotional and behavioural disorders and later aggression (Leschied, 2007). It has been estimated that 15 million children see, hear, intervene in and cope with the aftermath of domestic violence each year in Canada and in the United States (Simmons, Lehman, & Duguay, 2008). It is clear from studies that exposure to domestic violence has a significant negative effect on a child's functioning (Wolfe, Crooks, Lee, McIntyre-Smith, & Jaffe, 2003). Children exposed to violence in their home display a wide range of negative outcomes including social, emotional, behavioural, cognitive functioning, and poor academic adjustment in the short- and long-term (Chiodo, Leschied, Whitehead, & Hurley, 2008; Gewirtz & Edleson, 2007; Wolfe et al., 2003). For example, some children may exhibit more aggressive and antisocial behaviours while others exhibit more fearful and inhibited behaviours (Abercromby, Cassidy, DeSousa, 2008; Gewirtz & Edleson, 2007). Gewirtz and Edleson (2007) found that, in general, boys exposed to violence in their homes exhibit more externalized behaviour problems such as hostility and aggression, whereas girls exposed to violence in their homes exhibit more internalized problems such as depression and somatic complaints.

A trauma model of violence suggests a relationship between truamatization and later violence. This model posits that traumatic experiences lead to specific physiologic changes, and these changes potentiate the development of violent behaviour (Ruchkin et al., 2003). This model is supported by studies that have found that witnessing violence

and victimization are positively associated with novelty seeking, aggression, and antisocial behaviours, and negatively related to cooperativeness (Ruchkin et al., 2002).

The importance of PTSD in youthful offenders is highlighted in studies that have found an association between offenders with PTSD and impulsivity, aggression, and negative emotions such as anxiety and depression (Ruchkin et al., 2002; Vermeiren et al., 2006). Ruchkin et al. (2002) found that among a group of juvenile offenders, those with PTSD had the highest rates of internalizing and externalizing problems as well as the highest rates of comorbid psychopathology compared to those with partial PTSD criteria or no PTSD. Those in the PTSD group also had higher rates of retrospectively established diagnoses of separation anxiety disorder and past ADHD which suggests that children with pre-existing psychiatric disorder or prior emotional vulnerabilities are at great risk for PTSD (Ruchkin et al., 2002).

Internalizing behaviour disorders. An association between internalizing disorders such as depression and anxiety and antisocial behaviour has been found. There is, however, contradictory evidence concerning how internalizing disorders influence antisocial behaviour. Some studies report an association between internalizing disorders such as depression and anxiety revealed in being unhappy, worrying, crying, being nervous or having trouble being happy, and delinquent and aggressive behaviour (CIHI, 2008). Other studies have found internalizing disorders during childhood and adolescence to be modest predictors of later violent behaviour (Leschied et al., 2008). However, studies have also found internalizing disorders to be unrelated to, or to act as a protective factor against, later problem behaviour (Fite et al., 2008; Vermeiren et al., 2002;

Vermeiren et al., 2006). Fite et al. (2008) found that internalizing behaviour was unrelated to readmissions among children admitted to an acute child psychiatric inpatient facility. Internalizing behaviour problems were only associated with readmissions when they co-occurred with externalizing behaviour problems. Fite et al. (2008) drew upon the nature of internalizing symptoms as a possible explanation for the findings; internalizing symptoms impact the child only and not the caregiver, therefore, internalizing problems alone may not lead a caregiver to readmit their child.

Studies examining characteristics among recidivists have found that major depressive disorder acts as a protective factor for future recidivism (Vermeiren et al., 2002; Vermeiren et al., 2006). Vermeiren et al. (2002) found that the presence of conduct disorder, low verbal IQ, and the absence of a major depressive disorder explained 44% of the variance between recidivists and nonrecidivists. Several explanations were considered for this finding. It was suggested that an individuals capacity to react with depressive symptoms and experiences of guilt, shame, and other internalizing emotions may be a sign of their potential for reflecting on their actions and the consequences for others; that symptoms of depression such as diminished energy and apathy may reduce the likelihood of future criminal offending; or that depressive adolescents represent a distinct subgroup of offenders with specific tendencies and prognosis (Vermeiren et al., 2002). It was also suggested that young offenders with major depressive disorder may belong to the adolescence-limited type (late-onset group) as previous studies have found higher rates of internalizing problems in this group category of offenders (Vermeiren et al., 2002).

The presence of an increased rate of anxiety among incarcerated adolescents has also been found (Ruchkin et al., 2003; Vermeiren et al., 2006), however, the association between symptoms of anxiety and the development of antisocial behaviour remains largely unknown. High rates of anxiety disorders among young offenders may be a function of legal involvement, incarceration itself, as well as the result of multiple out-of-home placements that many youth experience (Vermeiren et al., 2006). It is therefore important to further explore the association between internalizing behaviour disorders and antisocial behaviour in order to better understand the relationship between internalizing behaviour disorders and risk for offending.

Co-Morbidity. Research has found that co-occurring behaviour problems are more strongly associated with later problem behaviours than internalizing and externalizing behaviour problems alone (Fite et al., 2008; McMahon, 1994). Fite et al. (2008) found that the combination of high levels of both internalizing and externalizing behaviour was associated with the highest risk for repeat admission among children admitted to an acute psychiatric inpatient facility. This finding, however, is inconsistent with previous studies that have found that children with conduct problems and coexisting anxiety disorders were markedly less deviant than other children with conduct problems only (Lynam, 1996). Internalizing disorder acting as a protective factor is consistent with findings from studies mentioned previously (e.g. Vermeiren et al., 2002; Vermeiren et al., 2006).

In his review of treatment outcomes for children with externalizing behaviour problems, McMahon (1994) found ample evidence that children who display both conduct problems and hyperactivity problems have more serious and higher levels of

conduct problems and poorer prognosis than children with conduct problems or hyperactivity problems alone. This finding, that children who are both hyperactive and antisocial are at greater risk for continuing antisocial behaviour and becoming chronic offenders compared to children with hyperactivity or conduct problems alone, has received support from subsequent studies (Babinski et al., 1999; Lynam, 1996). Babinski et al., (1999) found that individuals with comorbid childhood conduct problems and hyperactivity-impulsivity were at higher risk of adult criminal activity than those with conduct problems or hyperactivity-impulsivity alone. Lynam (1996) draws support from multiple studies to show that children with hyperactivity and conduct problems manifest more frequent, severe, and various patterns of antisocial behaviour, an earlier onset of antisocial behaviour, as well as commit antisocial acts in multiple settings relative to children with hyperactivity only, conduct problems only, and children with no diagnosis. Lynam provided evidence to support the hypothesis that children with symptoms of hyperactivity and conduct problems are at a higher risk for antisocial personality disorder. Lynam also suggested that these children are at high risk for psychopathy as adults.

Sex Differences and Mental Health Disorder in Children

The majority of research concerning mental health and antisocial behaviour has focused almost exclusively on males and, for the most part, little attention has been given to these issues in females (Moretti et al., 2004; Odgers et al., 2004). The paucity of research on aggressive, violent, and antisocial females may be due to the fact that, compared to males, female are less likely to engage in serious forms of physical violence (Moretti et al., 2004; Odgers et al., 2004). The increasing involvement of females in

violent and aggressive acts, however, has led to an increased interest in, and understanding of, female aggression and violence (Moretti et al., 2004). Incarcerated girls are more likely than boys to have mental health problems, be victims of maltreatment and physical and sexual abuse, experience trauma, and grow up in homes that are dysfunctional (Odgers et al., 2004). Research with females who are involved in the justice system have found differences in the types of mental health problems that females exhibit compared to males as well as strikingly high rates of mental health disorders among females (Antonishak et al., 2004). Mental health disorders that are particularly prevalent among females involved in the justice system are depression, PTSD, substance abuse, and ADHD (Antonishak et al., 2004; Teplin et al., 2002).

The relationship between victimization and antisocial behaviour in girls is of increased interest as girls are at higher risk for being victimized both physically and sexually within their families, community, or by a stranger, compared to boys (Antonishak et al., 2004; Leschied et al., 2001). In a review of the literature that pertains to aggression and violence in adolescent girls, Leschied et al. (2001) found that girls who have been victimized physically or sexually within their families of origin have an increased risk of developing overtly aggressive behaviour. It has also been found that girls who are involved with the justice system are significantly more likely to have experienced victimization, particularly sexual abuse (Odgers et al., 2004), and have high rates of PTSD symptoms (Antonishak et al., 2004).

The association between internalizing disorders such as depression, suicidal ideation, and anxiety disorders and aggression and violence is different in girls compared

to boys (Antonishak et al., 2004; Leschied et al., 2001). Leschied et al. (2001) reported that studies have found a correlation between depression and aggression in girls. Girls who are aggressive report higher rates of depression and suicidal ideation (Leschied et al., 2001). It has been suggested that depression may be a central pathway for the development of antisocial behaviour among girls (Antonishak et al., 2004). Girls who experience depression may have weaken bonds to prosocial institutions or indifference to personal safety thus increasing their likelihood of participation in risky, antisocial activities (Antonishak et al., 2004). Internalizing disorders, such as a major depressive episode, are also prevalent among female juvenile detainees (Teplin et al., 2002). The increase of violent and aggressive acts committed by females, as well as the higher rate of, and differences in, mental health problems among females involved in the justice system highlights the importance of understanding what mental health variables are associated with persistent and serious antisocial behaviour among females.

Present Study

It has been well established that there are different developmental pathways to antisocial behaviour in adolescents and that early-onset of problem behaviour distinguishes a group of children who are at increased risk for persistent and serious antisocial behaviour. Moffitt's developmental taxonomic model has shown to have predictive abilities in past studies that have used general and clinical samples. It is questioned whether or not this model can be used to distinguish children who are at risk for persistent antisocial behaviour among a group of children identified as having *extreme* levels of mental health problems and were referred to a regional residential treatment

facility. The present study examined differences upon intake between children and youth who improved and those who did not improve after receiving an average of four months of intensive child and family multidisciplinary treatment. Involvement with the police and elevated conduct scores were used as outcome variables to reflect level of improvement. This study focused on mental health variables including externalizing behaviour disorders such as conduct disorder and attention-deficit/hyperactivity disorder; post-traumatic stress disorder; learning disorders; and internalizing behaviour disorders such as depression and anxiety, examining which combination of variables, in the context of age of onset, predict outcomes at six-months and two-years post-treatment.

Age of Onset

The current study examined whether age of onset of problem behaviour is associated with offending and conduct disorder at the post-treatment follow-up periods. Consistent with past studies (e.g. Bierman, et al., 2002; Cottle et al., 2001; Moffitt, 1993; Moffitt & Caspi, 2001; Moffitt et al., 2002; Putnins, 2005; Ruchkin et al., 2003; van Lier et al., 2007; Vermeiren et al., 2002), it was predicted that early-onset of problem behaviour is associated with offending and conduct disorder after receiving treatment, whereas, late-onset of problem behaviour is unrelated to offending and conduct disorder after receiving treatment.

Mental Health Disorders

Externalizing behaviour disorders. The present study examined whether externalizing behaviour disorders are associated with offending and conduct disorder after receiving treatment. The association between specific externalizing behaviour

disorders and outcomes were also examined. Based on developmental models of risk which posit that early externalizing problem behaviour is associated with more severe behaviour problems (Moffitt, 1993), and consistent with past studies (e.g. Babinski et al., 1999; Broidy et al., 2003; et al., 2008; Shabat et al., 2008; Teplin et al., 2002; Vermeiren et al., 2002), it was hypothesized that high levels of externalizing behaviour predict offending and conduct disorder post-treatment.

Post-traumatic stress disorder. A trauma model of violence suggests that traumatic experiences lead to specific physiologic changes, and these changes potentiate the development of violent behaviour (Ruchkin et al., 2003). The present study examined the association between PTSD symptoms and offending. It was hypothesized that PTSD symptoms are associated with offending and conduct disorder post-treatment.

Internalizing behaviour disorders. The present study examined the association between internalizing disorders and offending and conduct disorder after receiving treatment. The association between specific internalizing disorders and outcomes were also examined. It was hypothesized that internalizing behaviour problems are associated with a decreased risk for offending and conduct disorder among males after receiving treatment. It was also hypothesized that internalizing behaviour problems are associated with offending and conduct disorder post-treatment among females.

Co-Morbidity. Co-morbid diagnoses among children with mental health disorders are common within the population under study. Many children may exhibit co-occurring externalizing behaviour disorders such as conduct disorder and attention-deficit/hyperactivity disorder, as well as co-occurring externalizing and internalizing

behaviour disorders. Consistent with past research (Babinski et al., 1999; Fite et al., 2008; McMahon, 1994), it was predicted that co-morbid externalizing behavior disorders are associated with offending and conduct disorder after treatment. The association between co-morbid externalizing and internalizing behaviour disorders and offending and conduct disorder post-treatment were examined.

Method

Participants

Participants included all consecutive admissions of children and youth, age 6 to 17 years, accepted for residential treatment at the Child and Parent Resource Institute (CPRI), a tertiary care facility for children and youth with complex mental health difficulties. All children and youth were referred for residential treatment through their local mental health single point of access agency, following consultation with the community case manager and guardian. These 10 single point access centers exist in the 17 counties served by CPRI, extending from Windsor to Niagara to Owen Sound. The referral process used by CPRI ensures that only those children and youth with extreme levels of need and high risk of permanent school and home break down are accepted for inpatient treatment.

Archival program evaluation data available at this regional centre monitored consecutive inpatient referrals (n=360; 287 male, 76 female) from October 1, 2002 to July 1, 2006, ensuring that a consistent battery of standardized intake rating scales were completed with all children and youth admitted. Clients diagnosed at referral with a

developmental handicap were directed to other units at CPRI and were not a part of this study. Otherwise, there were no diagnostic exclusionary criteria. From these original referrals, 225 children, 170 Males (*M age* = 11.26, *SD* = 2.47) and 55 females (*M age* = 13.15, *SD* = 2.26) completed residential treatment during the time frame. Data from 201 participants, 155 Males (*M age* = 11.18, *SD* = 2.44) and 46 Females (*M age* = 13.07, *SD* = 2.36) who had complete data for each measure were used in this study. There was not a significant difference between those included in this study and those not included by sex, $F(1, 223) = 2.49$, $p = .12$, and by age at entry $F(1, 223) = 3.43$, $p = .07$.

It is important to appreciate the characteristics of the children and youth who participate in residential treatment and their unique needs. Children and youth referred for residential assessment or treatment typically have already had early contact with community services such as mental health services, justice services, and the Children's Aid Society (CAS). At the time they are referred for residential assessment, these children have received psychiatric attention including psychotropic medication, professional interventions, and individual educational plans. Table 1 summarizes some of the important characteristics of the children and youth that participated in this study prior to their admission.

It is apparent from Table 1 that this sample of children and youth were significant consumers of mental health services prior to admission into residential treatment. Upon admission, every child had received mental health services with some children receiving services as early as one-year of age. Another distinguishing characteristic of the sample is that 99% had already received at least one diagnosis and 94% were receiving

psychotropic medication at the time of admission. It is also important to note the high co-morbidity rate among the participants: participants had received, on average, two diagnoses upon admission, which highlights the severity of mental health problems among these children.

The majority of children and youth in this sample had been placed out of their home prior to admission. Seventy-one percent had out-of-home placements including placement in a mental health facility, youth justice facility and/or foster or group home. Legal involvement is also a significant problem among these children and youth: 42% had been involved with the law with 16% of the sample having charges laid against them. The Children's Aid Society was involved with half of the sample of children and youth. It is also important to note that maltreatment was a significant factor among these children. According to parent/guardian reports of maltreatment on the BCFPI, 66.2% of the children experienced one or more forms of maltreatment: 31.3% experienced physical abuse, 18.9% experienced sexual abuse, 24.9% experienced neglect, and 54.2% witnessed verbal or physical abuse. The percentage of children in the sample who were maltreated highlights the traumatic backgrounds of these children as well as the severity of their safety needs.

Table 1

Characteristics of Children at the Time of Admission

Factor	% Yes	Minimum	Maximum	Mean
Received Mental Health Services	100			
Age of First Mental Health Encounter		1	15	6.31
Received Diagnosis	99.0			
Age at First Diagnoses		3	15	7.63
Number of Diagnoses		0	6	1.51
Received Medication	93.5			
Age When First on Medication		3	15	7.75
Number of Medications		0	3	1.1
Out of Home Placement/Number of Times Out of Home	70.6	0	10	2.15
Mental Health Facility	47.8	0	9	0.93
Youth Justice Facility (custody)	9.0	0	3	0.14
Foster/Group Home	44.8	0	3	0.79
Children's Aid Society Involvement	50.2			
CAS Involvement	33.8			
CAS Temporary Care Agreement	4.0			
CAS Guardian	12.4			
Involvement with the Law	41.8			
Charges Laid	16.4			
No Charges Laid	22.4			
Charges Pending	1.5			
Too Young to be Charged	1.5			

Note. n = 201

Another distinguishing characteristic of the sample of children and youth is their extremely elevated externalizing and internalizing mental health scores on the BCFPI. The results of the BCFPI are summarized as t-scores. T scores are standardized measure based on a distribution with a mean of 50 and a standard deviation of 10. T-scores of 70 (greater than 98% of the norming population) are generally considered to be a significant elevated score. A t-score of 65 (greater than 93% of the population) might be considered a borderline score. As illustrated in Table 2 the mean pre-treatment externalizing and internalizing T scores of participants were 82.9 and 71.05 respectively, indicating the extreme level of mental health problems exhibited by this sample. Table 2 summarizes BCFPI externalizing and internalizing scores at admission and six-months and two-years post-treatment.

Table 2

Summary of Scores at Admission and Six-Months and Two-Years Post-Discharge

	Mean Score		
Measure	Pre-Treatment	6-Months Post-Treatment	Two-Years Post-Treatment
BCFPI			
Externalizing T Score	82.9	73.58	73.48
Internalizing T Score	71.05	67.36	64.79

Note: n = 201.

Higher scores represent pathology with 65-70 typical of clinical cut off in the literature (normal T score mean is 50, standard deviation is 10).

Procedure

Children and youth admitted to CPRI receive assessment, treatment, and individualized care plans developed collaboratively by the family/guardian, community case manager, and CPRI clinicians, which are formally reviewed monthly. Children and

youth are referred to five cottage-like psychiatric inpatient units: three child units and two adolescent units. All programs are licensed directly by the Ministry of Children and Youth. Units differ slightly in admission policy and typical length of stay but the treatment models are convergent on current best practice, drawing on structured behavioural milieu and individualized intervention strategies. Treatment efforts reflect programming emphasizing multimodal clinical assessment, adaptive skill development, family and guardian involvement and coordinated discharge planning.

The living milieu is structured to promote interpersonal skill development, with concomitant psychotropic medication and psychosocial, family-oriented and educational interventions. An onsite school offers full time attendance in a personalized, special education environment which is essential for students who have often been suspended from school prior to admission.

Active involvement and support of the parent/guardian is considered essential. A majority of children and youth in residence at CPRI return home every weekend, therefore, child and family home goals are in place.

Discharge dates are flexible based on progress. The average length of stay is 4 months and CPRI outpatient services are often provided during the immediate post-discharge periods. Post-discharge follow-up could include outreach assistance in the home or classroom as well as ongoing therapeutic contact and medication monitoring.

Measures

Measures were gathered from multiple informants at critical points in a continuum of service. This investigation repeated measures collected before, during, and after

residential treatment by contacting clients six-months and two-years after the day of discharge.

Age of Onset

Chart reviews. Chart reviews were utilized to gather data on participants' first recorded diagnosis. Age at entry into CPRI was also used as a measure for age of onset.

Mental Health Disorders

The Brief Child and Family Phone Interview (BCFPI; Cunningham, Pettingill, & Boyle, 2004). The BCFPI is a structured phone interview conducted with the caregiver that is based on Ontario norms. Standardized scale (T) scores provide normative data on subscale factors describing several externalizing, internalizing, family and individual functioning factors. Internal consistency scores indicated adequate reliability, especially given that the brief screening consists of a few items per factor. This study included the BCFPI's six-item scales measuring ADHD ($\alpha = 0.82$), oppositional behavior ($\alpha = 0.83$), conduct problems ($\alpha = 0.68$), separation anxiety ($\alpha = 0.78$), anxiety ($\alpha = 0.78$), depression ($\alpha = 0.84$), and 18 item composite externalizing ($\alpha = 0.86$) and internalizing scales ($\alpha =$ 0.85; Cunningham, Deal, Rimas, Buchanan, Gold, Sdao-Jarvie, et al., 2008). The content validity of the measure is based on the mapping of items to the DSM-IV criteria. A subset of questions from this tool was also used in this study to assess for known instances of child abuse or neglect. Parents/caregivers are asked whether their child has ever been physically abused, sexually abused, neglected, or witnessed verbal of physical violence.

There are potential advantages of utilizing the BCFPI. Past BCFPI phone interview rates were more than double the mail-in questionnaire responses. This increases

its utility for outcome investigations. Also, the adoption within Ontario of the BCFPI across children's mental health services affords a large clinical referral database, generating both a clinical norms and local norms database.

Child and Adolescent Functional Assessment Scale (CAFAS; Hodges, 2000). The CAFAS is a clinician's rating of child and youth functioning. The CAFAS consists of subscales measuring functional impairment in eight domains: School/Work, Home, Community, Behaviour toward Others, Moods and Emotions, Self-Harm, Substance Abuse, and Thinking. Each is rated in ten-point increments on a scale from 0 (no impairment) to 30 (severe impairment).

Outcome Measures

Offending. Offending information was obtained from parents and/or guardians two years after the day of discharge. Parents and/or guardians were asked whether or not their child had any police involvement during the past two years.

Results

The present study examined differences upon intake between children and youth who offended and those who did not offend as well as differences between those who had conduct disorder and those who did not have conduct disorder after receiving on average four months of intensive child and family multidisciplinary treatments. Mental health variables including externalizing and internalizing behaviour disorders in the context of age of onset were hypothesized to predict outcomes at six-months and two-years post-discharge. To test these hypotheses, a series of Logistic Regressions were used in which six-month and two-year post-discharge measures of conduct disorder and two-year post-

discharge data on police involvement served as dependent variables, sex served as a covariate, and pre-admission measures of externalizing behavior disorders including ADHD, cooperation, conduct, behavior towards others, and substance use; internalizing behavior disorders including anxiety and mood; and maltreatment served as the predictor variables. The six-month and two-year conduct disorder outcome variables were formed by dichotomizing the BCFPI measure of conduct into two groups: those who scored in the clinical range (>70) and those who scored below the clinical range (≤ 70).

The tests for the hypothesized relationships were done using the binary logistic model type in the Generalized Linear Model module in SPSS for Statistics 17.0.1 (2008). Binary logistic analysis specifies a binomial distribution with a logit link function. Generalized Linear Models were used because they support logistic models for binary dependents (Garson, 2009). Various measures of model fit are provided by this analysis. The Wald chi-square statistic was used to test the model in each analysis with analysis type set at Type III and confidence intervals set at 95%. The likelihood ratio test was examined in each model to determine whether or not the coefficients in the model were different from 0. If the likelihood ratio was significant, the null hypothesis that the coefficients are not different from 0 was rejected and the model was accepted. The likelihood value reflects how likely it is that the model would result in the observed patterns in the actual data. The larger the likelihood value, the better the fit of the model to the data. Goodness-Of-Fit Tests were also examined to determine the fit of the model. In a well-fitting model, the ratio of the deviance value to its degrees of freedom and the Pearson chi-square should be close to 1.

Generalized Linear Models do not assume normally distributed dependent variables or independent variables. Linearity between the predictors and the dependent is not assumed, nor is homogeneity of variance for the range of the dependent variable (Garson, 2009). In addition, it is assumed an absence of high multicollinearity among the independent variables. A linear regression analysis was conducted to test for high multicollinearity. Multicollinearity is considered not a problem if the VIF test is less than or equal to 10 (Garson, 2009). Multicollinearity was high between the attention, impulsivity, and activity BCFPI subscales and therefore these variables were centered in order to reduce problems associated with multicollinearity. The VIF test was conducted on the centered variables, however, multicollinearity was still high and therefore an aggregate measure of attention, impulsivity, and activity score was used.

The first model examined age at first diagnosis, composite measures of externalizing and internalizing behaviour, behaviour towards others, mood, substance use, and maltreatment as predictors of six-month post-discharge conduct disorder. The likelihood ratio test was significant ($p < .001$) and therefore the null hypothesis that the coefficients in this model are not different from 0 was rejected and the model was accepted. With alpha set at .05, it was found that conduct disorder at six-months post-discharge was significantly predicted by externalizing behaviour ($p < .01$), internalizing behaviour ($p < .05$), behaviour towards others ($p < .05$), and substance use ($p < .05$) (see Table 3). The results show that higher scores on pre-treatment measures of externalizing behaviour and behaviour towards others predict elevated conduct disorder scores at six-months post-discharge and higher scores on pre-treatment measures of internalizing

behaviour and substance use predict conduct disorder scores below clinical level at six-months post-discharge.

Table 3
Summary of Logistic Regression Analysis for Predicting Conduct Disorder at Six-Months Post-Discharge

T5BCFPI	β	*SE* β	*Wald's* X^2	*df*	*P*	Odds Ratio
Predictor						
Constant	-6.88	2.54	7.33	1	.007	0.00
Sex = Male	0.63	0.53	1.42	1	.233	1.88
Age at First Diagnosis	0.09	0.08	1.27	1	.259	1.10
Externalizing	0.08	0.02	12.09	1	.001	1.08
Internalizing	-0.03	0.01	5.44	1	.020	0.97
Behaviour	0.07	0.03	5.51	1	.019	1.08
Mood	-0.01	0.02	0.16	1	.687	0.99
Substance Use	-0.07	0.03	4.50	1	.034	0.93
Maltreatment	-0.69	0.41	2.89	1	.089	0.50

Test			
Overall Model Evaluation	Value	*df*	*P*
Likelihood Ratio Test	31.77	8	.000
Goodness-Of-Fit Test	Value	*df*	Value/*df*
Deviance	178.86	144	1.24
Pearson chi-square	152.90	144	1.06

Note: $n = 153$ participants.

The second model examined age at first diagnosis; externalizing subscales including attention, impulsivity, hyperactivity, cooperation, and conduct; a composite measure of internalizing behaviour; behaviour towards others; mood; substance use; and maltreatment as predictors of six-month post-discharge conduct disorder. In this model externalizing behaviour was broken down into subcategories in order to examine whether or not certain externalizing behaviours better predict conduct disorder at six-months post-discharge. The likelihood ratio test was significant ($p < .001$) and therefore the null hypothesis that the coefficients in this model are not different from 0 was rejected and the

model was accepted. With alpha set at .05, it was found that conduct disorder at six-months post-discharge was significantly predicted by conduct disorder behaviour ($p < .01$), internalizing behaviour ($p = .05$), behaviour towards others ($p < .05$), and substance use ($p < .05$) (see Table 4). The results indicate that higher scores on pre-treatment measures of conduct disorder behaviour and behaviour towards others predict elevated conduct disorder scores at six-months post-discharge and higher scores on pre-treatment measures of internalizing behaviour and substance use predict conduct disorder scores below clinical level at six-months post-discharge.

Table 4
Summary of Logistic Regression Analysis for Predicting Conduct Disorder at Six-Months Post-Discharge Broken Down into Externalizing Subcategories

T5BCFPI	β	*SE* β	*Wald's* X^2	*df*	*p*	Odds Ratio
Predictor						
Constant	-5.76	3.03	3.62	1	.057	0.00
Sex = Male	0.67	0.57	1.41	1	.236	1.96
Age at First Diagnosis	0.09	0.08	1.13	1	.287	1.09
Attention, Impulsivity, Hyperactivity	0.05	0.03	2.98	1	.084	1.05
Cooperation	-0.01	0.03	0.10	1	.748	0.99
Conduct	0.03	0.01	9.97	1	.002	1.03
Internalizing	-0.03	0.01	3.94	1	.047	0.97
Behaviour	0.08	0.03	6.09	1	.014	1.08
Mood	-0.01	0.02	0.07	1	.794	0.99
Substance Use	-0.08	0.04	5.10	1	.024	0.92
Maltreatment	-0.65	0.42	2.42	1	.120	0.52

Test			
Overall Model Evaluation	Value	*df*	*P*
Likelihood Ratio Test	36.61	10	.000
Goodness-Of-Fit Test	Value	*df*	Value/*df*
Deviance	174.02	142	1.23
Pearson chi-square	149.32	142	1.05

Note: $n = 153$ participants.

Model three examined age at first diagnosis; a composite measure of externalizing behaviour; internalizing subscales including anxiety and managing mood; behaviour towards others; mood; substance use; and maltreatment as predictors of six-month post-discharge conduct disorder. Internalizing behaviour was broken down into subcategories in this model in order to examine whether or not certain internalizing behaviours better predict conduct disorder at six-months post-discharge. The likelihood ratio test was significant ($p < .001$) and therefore the null hypothesis that the coefficients in this model are not different from 0 was rejected and the model was accepted. With alpha set at .05, it was found that conduct disorder at six-months post-discharge was significantly predicted by externalizing behaviour ($p < .01$), anxiety ($p < .05$), behaviour towards others ($p < .05$), and substance use ($p < .05$) (see Table 5). The results indicate that higher scores on pre-treatment measures of externalizing behaviour and behaviour towards others predict elevated conduct disorder scores at six-months post-discharge and higher scores on pre-treatment measures of anxiety and substance use predict conduct disorder scores below clinical level at six-months post-discharge.

Table 5

Summary of Logistic Regression Analysis for Predicting Conduct Disorder at Six-Months Post-Discharge Broken Down into Internalizing Subcategories

T5BCFPI	β	*SE* β	*Wald's* X^2	*df*	*p*	Odds Ratio
Predictor						
Constant	-6.37	2.65	5.80	1	.016	0.00
Sex = Male	0.65	0.56	1.34	1	.247	1.91
Age at First Diagnosis	0.10	0.08	1.40	1	.237	1.10
Externalizing	0.08	0.02	10.74	1	.001	1.08
Anxiety	-0.03	0.01	5.06	1	.024	0.97
Managing Mood	-0.02	0.01	1.89	1	.169	0.98
Behaviour	0.07	0.03	4.90	1	.027	1.07
Mood	-0.01	0.02	0.06	1	.808	0.99
Substance Use	-0.08	0.03	4.60	1	.032	0.93
Maltreatment	-0.69	0.41	2.83	1	.093	0.50

Test			
Overall Model Evaluation	Value	*df*	*p*
Likelihood Ratio Test	33.93	9	.000
Goodness-Of-Fit Test	Value	*df*	Value/*df*
Deviance	176.70	143	1.24
Pearson chi-square	150.93	143	1.06

Note: $n = 153$ participants.

An exploratory model was then created using age at first diagnosis, the conduct subscale, the anxiety subscale, behaviour towards others, mood, substance use, and maltreatment as predictors of six-month post-discharge conduct disorder. In this model conduct and anxiety were used as more specific measures of externalizing and internalizing behaviours respectively as these subscales were the only externalizing and internalizing behaviour subcategories that significantly predicted elevated conduct disorder scores at six-months post-discharge. The likelihood ratio test was significant ($p < .001$) and therefore the null hypothesis that the coefficients in this model are not different from 0 was rejected and the model was accepted. With alpha set at .05, it was found that conduct disorder at six-months post-discharge was significantly predicted by

conduct ($p < .01$), anxiety ($p = .05$), behaviour towards others ($p < .05$), and substance use ($p < .05$) (see Table 6). The results indicate that higher scores on pre-treatment measures of conduct disorder and behaviour towards others predict elevated conduct disorder scores at six-months post-discharge and higher scores on pre-treatment measures of anxiety and substance use predict conduct disorder scores below clinical level at six-months post-discharge. The odds ratio indicates that: for a unit increase in conduct, the odds of receiving an elevated conduct score six-months post-discharge increase by 1.03 or approximately 3%; for a unit increase in anxiety, the odds of receiving an elevated conduct score six-months post-discharge decrease by 0.98 or approximately 2%; for a unit increase in behaviour towards others, the odds of receiving an elevated conduct score six-months post-discharge increase by 1.07 or approximately 7%; and for a unit increase in substance use, the odds of receiving an elevated conduct score six-months post-discharge decrease by 0.93 or approximately 7%.

Table 6
Summary of Logistic Regression Analysis for Predicting Conduct Disorder at Six-Months Post-Discharge: Final Model

T5BCFPI	β	*SE* β	*Wald's* X^2	*df*	*p*	Odds Ratio
Predictor						
Constant	-2.82	1.65	2.91	1	.088	0.06
Sex = Male	0.36	0.50	0.51	1	.477	1.43
Age of Onset	0.06	0.08	0.48	1	.486	1.06
Conduct	0.03	0.01	11.97	1	.001	1.03
Anxiety	-0.02	0.01	3.75	1	.053	0.98
Behaviour	0.06	0.03	4.37	1	.036	1.07
Mood	-0.01	0.02	0.19	1	.663	0.99
Substance Use	-0.08	0.04	4.91	1	.027	0.93
Maltreatment	-0.56	0.40	1.92	1	.166	0.57

Test			
Overall Model Evaluation	Value	*df*	*p*
Likelihood Ratio Test	33.72	8	.000
Goodness-Of-Fit Test	Value	*df*	Value/*df*
Deviance	178.10	144	1.24
Pearson chi-square	152.20	144	1.06

Note: $n = 154$ participants.

Predictors of two-year post-discharge conduct disorder were then examined. The fifth model used age at entry into residential treatment, composite measures of externalizing and internalizing behaviour, behaviour towards others, mood, substance use, and maltreatment as predictors of two-year post-discharge conduct disorder. The likelihood ratio test was significant ($p < .05$) and therefore the null hypothesis that the coefficients in this model are not different from 0 was rejected and the model was accepted. With alpha set at .05, it was found that conduct disorder at two-years post-discharge was significantly predicted by externalizing behaviour ($p < .01$), and substance use ($p < .05$) (see Table 7). The results show that higher scores on pre-treatment measures

of externalizing behaviour and substance use predict elevated conduct disorder scores at two-years post-discharge.

Table 7
Summary of Logistic Regression Analysis for Predicting Conduct Disorder at Two-Years Post-Discharge

T6BCFPI	β	*SE* β	*Wald's* X^2	*df*	*p*	Odds Ratio
Predictor						
Constant	-3.41	2.14	2.54	1	.111	0.03
Sex = Male	0.35	0.46	0.59	1	.444	1.42
Age at Entry	-0.13	0.07	3.19	1	.074	0.88
Externalizing	0.05	0.02	7.02	1	.008	1.05
Internalizing	0.00	0.01	0.02	1	.890	1.00
Behaviour	-0.01	0.02	0.09	1	.762	0.99
Mood	-0.01	0.02	0.43	1	.512	0.99
Substance Use	0.07	0.03	5.10	1	.024	1.07
Maltreatment	0.28	0.37	0.58	1	.446	1.33

Test			
Overall Model Evaluation	Value	*df*	*p*
Likelihood Ratio Test	15.61	8	.048
Goodness-Of-Fit Test	Value	*df*	Value/*df*
Deviance	212.15	158	1.34
Pearson chi-square	169.22	158	1.07

Note: $n = 167$ participants.

Model six examined age at entry into residential treatment; externalizing subscales including attention, impulsivity, and hyperactivity, cooperation, and conduct; a composite measure of internalizing behaviour; behaviour towards others; mood; substance use; and maltreatment as predictors of two-years post-discharge conduct disorder. In this model externalizing behaviour was broken down into subcategories in order to examine whether or not certain externalizing behaviours better predict conduct disorder at two-years post-discharge. The likelihood ratio test was significant ($p < .05$) and therefore the null hypothesis that the coefficients in this model are not different from

0 was rejected and the model was accepted. With alpha set at .05, it was found that conduct disorder at two-years post-discharge was significantly predicted by conduct disorder behaviour ($p < .01$), and substance use ($p < .05$) (see Table 8). The results show that higher scores on pre-treatment measures of conduct disorder behaviour and substance use predict elevated conduct disorder scores at two-years post-discharge.

Table 8
Summary of Logistic Regression Analysis for Predicting Conduct Disorder at Two-Years Post-Discharge Broken Down into Externalizing Subcategories

T6BCFPI	β	*SE* β	*Wald's* X^2	*df*	*p*	Odds Ratio
Predictor						
Constant	-2.03	2.52	0.65	1	.421	0.13
Sex = Male	0.33	0.49	0.46	1	.497	1.39
Age at Entry	-0.13	0.07	3.07	1	.080	0.88
Attention, Impulsivity, Hyperactivity	0.02	0.02	0.82	1	.365	1.02
Cooperation	-0.01	0.02	0.34	1	.560	0.99
Conduct	0.02	0.01	8.85	1	.003	1.02
Internalizing	0.01	0.01	0.42	1	.516	1.01
Behaviour	-0.01	0.02	0.13	1	.720	0.99
Mood	-0.01	0.02	0.40	1	.525	0.99
Substance Use	0.07	0.03	4.74	1	.029	1.07
Maltreatment	0.36	0.39	0.85	1	.356	1.43

Test			
Overall Model Evaluation	Value	*df*	*p*
Likelihood Ratio Test	20.66	10	.024
Goodness-Of-Fit Test	Value	*df*	Value/*df*
Deviance	207.09	156	1.33
Pearson chi-square	167.40	156	1.07

Note: $n = 167$ participants.

An exploratory model was then created using age at entry into residential treatment, the conduct subscale, a composite measure of internalizing behaviour, behaviour towards others, mood, substance use, and maltreatment as predictors of two-years post-discharge conduct disorder. In this model conduct was used as a more specific

measure of externalizing behaviour as it was the only externalizing behaviour subcategory that significantly predicted elevated conduct disorder scores at two-years post-discharge. The likelihood ratio test was significant ($p < .05$) and therefore the null hypothesis that the coefficients in this model are not different from 0 was rejected and the model was accepted. With alpha set at .05, it was found that conduct disorder at two-years post-discharge was significantly predicted by conduct disorder behaviour ($p < .01$), and substance use ($p < .05$) (see Table 9). The results show that higher scores on pre-treatment measures of conduct disorder behaviour and substance use predict elevated conduct disorder scores at two-years post-discharge. The odds ratio indicates that for a unit increase in conduct, the odds of receiving an elevated conduct score two-years post-discharge increase by 1.02 or approximately 2%, and for a unit increase in substance use, the odds of receiving an elevated conduct score two-years post-discharge increase by 1.07 or approximately 7%.

Table 9
Summary of Logistic Regression Analysis for Predicting Conduct Disorder at Two-Years Post-Discharge: Final Model

T6BCFPI	β	*SE* β	*Wald's* X^2	*df*	*p*	Odds Ratio
Predictor						
Constant	-1.37	1.53	0.80	1	.371	0.25
Sex = Male	0.27	0.46	0.35	1	.556	1.31
Age at Entry	-0.13	0.07	3.42	1	.064	0.88
Conduct	0.02	0.01	10.38	1	.001	1.02
Internalizing	0.01	0.01	0.62	1	.432	1.01
Behaviour	-0.01	0.02	0.15	1	.698	0.99
Mood	-0.01	0.02	0.43	1	.512	0.99
Substance Use	0.07	0.03	4.68	1	.031	1.07
Maltreatment	0.30	0.38	0.62	1	.433	1.35

Test			
Overall Model Evaluation	Value	*df*	*p*
Likelihood Ratio Test	19.59	8	.012
Goodness-Of-Fit Test	Value	*df*	Value/*df*
Deviance	208.16	158	1.32
Pearson chi-square	165.37	158	1.05

Note: $n = 167$ participants.

Predictors of two-year post-discharge police involvement were then examined. This model used age at first diagnosis, composite measure of externalizing and internalizing behaviour, behaviour towards others, mood, substance use, and maltreatment as predictors of two-year post-discharge police involvement. The likelihood ratio test was significant ($p < .05$) and therefore the null hypothesis that the coefficients in this model are not different from 0 was rejected and the model was accepted. With alpha set at .05, it was found that police involvement at two-years post-discharge was significantly predicted by substance use ($p < .05$) (see Table 10). The results indicate that higher scores on pre-treatment measures of substance use predict police involvement at

two-years post-discharge. The odds ratio indicates that for a unit increase in substance use, the odds of police involvement at two-years post-discharge increase by 1.10 or approximately 10%.

Table 10

Summary of Logistic Regression Analysis Predicting Police Involvement at Two-Years Post-Discharge: Final Model

T6Police	β	*SE* β	*Wald's* X^2	*df*	*p*	Odds Ratio
Predictor						
Constant	-1.59	2.13	0.55	1	.457	0.21
Sex = Male	0.76	0.48	2.58	1	.109	2.14
Age at First Diagnosis	-0.04	0.07	0.26	1	.613	0.96
Externalizing	0.01	0.02	0.54	1	.463	1.01
Internalizing	0.01	0.01	0.98	1	.321	1.01
Behaviour	-0.01	0.02	0.16	1	.694	0.99
Mood	-0.03	0.02	2.58	1	.108	0.97
Substance Use	0.09	0.04	6.31	1	.012	1.10
Maltreatment	-0.48	0.37	1.65	1	.198	0.621

Test			
Overall Model Evaluation	Value	*df*	*p*
Likelihood Ratio Test	18.90	8	.015
Goodness-Of-Fit Test	Value	*df*	Value/*df*
Deviance	205.66	153	1.34
Pearson chi-square	157.36	153	1.03

Note: $n = 162$ participants.

Co-morbid diagnoses as predictors of six-month post-discharge conduct disorder were then examined. The ninth model used age of first diagnosis; co-morbid conduct and attention, impulsivity, and hyperactivity; co-morbid conduct and anxiety; co-morbid conduct and mood; co-morbid anxiety and mood; behaviour towards others; mood; substance use; and maltreatment as predictors of two-year post-discharge conduct disorder. The likelihood ratio test was significant ($p < .05$) and therefore the null hypothesis that the coefficients in this model are not different from 0 was rejected and the model was accepted. With alpha set at .05, it was found that conduct disorder at six-

months post-discharge was significantly predicted by co-morbid conduct and attention, impulsivity, and hyperactivity ($p < .05$), behavior towards others ($p < .05$) and substance use ($p < .05$) (see Table 11). The results show that higher scores on pre-treatment measures of co-morbid conduct and attention, impulsivity, and hyperactivity as well as behavior towards others predict elevated conduct disorder scores at six-months post-discharge and higher scores on pre-treatment measures of substance use predict conduct disorder scores below clinical level at six-months post-discharge. The odds ratio indicates that: for a unit increase in co-morbid conduct and attention, impulsivity, and hyperactivity, the odds of receiving an elevated conduct score six-months post-discharge increase by 2.90 or approximately 190%; for a unit increase in behaviour towards others, the odds of receiving an elevated conduct score six-months post-discharge increase by 1.08 or approximately 8%; and for a unit increase in substance use, the odds of receiving an elevated conduct score six-months post-discharge decrease by 0.94 or approximately 6%.

Table 11
Summary of Logistic Regression Analysis for Predicting Conduct Disorder at Six-Months Post-Discharge: Co-Morbid Mental Health Variables

T5BCFPI	B	*SE* β	*Wald's* X^2	*df*	*p*	Odds Ratio
Predictor						
Constant	-2.58	1.11	5.46	1	.019	0.08
Sex = Female	0.01	0.47	0.00	1	.991	1.01
Age at First Diagnosis	0.08	0.08	0.99	1	.321	1.08
Attention, Impulsivity, Hyperactivity and Conduct	1.07	0.44	5.95	1	.015	2.90
Conduct and Anxiety	-0.43	0.59	0.53	1	.468	0.65
Conduct and Mood	-0.41	0.41	1.00	1	.317	0.66
Anxiety and Mood	0.05	0.63	0.01	1	.935	1.05
Behaviour	0.07	0.03	5.99	1	.014	1.08
Mood	-0.03	0.02	1.28	1	.258	0.98
Substance Use	-0.07	0.03	3.97	1	.046	0.94
Maltreatment	0.58	0.39	2.20	1	.138	1.78

Test			
Overall Model Evaluation	Value	*df*	*P*
Likelihood Ratio Test	20.06	10	.029
Goodness-Of-Fit Test	Value	*df*	Value/*df*
Deviance	185.02	135	1.37
Pearson chi-square	146.93	135	1.09

Note: $n = 153$ participants.

Co-morbid diagnoses as predictors of two-year post-discharge conduct disorder were then examined. This model used age at entry into residential treatment; co-morbid conduct and attention, impulsivity, and hyperactivity; co-morbid conduct and anxiety; co-morbid conduct and mood; co-morbid anxiety and mood; behaviour towards others; mood; substance use; and maltreatment as predictors of two-year post-discharge conduct disorder. The likelihood ratio test was significant ($p < .01$) and therefore the null hypothesis that the coefficients in this model are not different from 0 was rejected and the model was accepted. With alpha set at .05, it was found that conduct disorder at two-

years post-discharge was significantly predicted by co-morbid conduct and attention, impulsivity, and hyperactivity ($p < .01$), and substance use ($p < .05$) (see Table 12). The results show that higher scores on pre-treatment measures of co-morbid conduct and attention, impulsivity, and hyperactivity as well as substance use predict elevated conduct disorder scores at two-years post-discharge. The odds ratio indicates that for a unit increase in co-morbid conduct and attention, impulsivity, and hyperactivity, the odds of receiving an elevated conduct score two-years post-discharge increase by 3.32 or approximately 232%, and for a unit increase in substance use, the odds of receiving an elevated conduct score two-years post-discharge increase by 1.07 or approximately 7%.

Table 12
Summary of Logistic Regression Analysis for Predicting Conduct Disorder at Two-Years Post-Discharge: Co-Morbid Mental Health Variables

T6BCFPI	B	*SE* β	*Wald's* X^2	*df*	*P*	Odds Ratio
Predictor						
Constant	0.88	1.08	0.67	1	.414	2.42
Sex = Female	-0.12	0.44	0.07	1	.788	0.89
Age at Entry	-0.12	0.07	2.83	1	.093	0.89
Attention, Impulsivity, Hyperactivity and Conduct	1.20	0.44	7.59	1	.006	3.32
Conduct and Anxiety	0.88	0.65	1.81	1	.179	2.40
Conduct and Mood	-0.41	0.43	0.88	1	.350	0.67
Anxiety and Mood	-1.03	0.71	2.10	1	.147	0.36
Behaviour	-0.00	0.02	0.01	1	.914	1.00
Mood	-0.01	0.02	0.22	1	.641	0.99
Substance Use	0.07	0.03	4.96	1	.026	1.07
Maltreatment	-0.27	0.38	0.48	1	.489	0.77

Test			
Overall Model Evaluation	Value	*df*	*P*
Likelihood Ratio Test	23.37	10	.009
Goodness-Of-Fit Test	Value	*df*	Value/*df*
Deviance	191.21	146	1.31
Pearson chi-square	160.60	146	1.10

Note: $n = 167$ participants.

Co-morbid diagnoses as predictors of two-year post-discharge police involvement were then examined. The final model used age of first diagnosis; co-morbid conduct and attention, impulsivity, and hyperactivity; co-morbid conduct and anxiety; co-morbid conduct and mood; co-morbid anxiety and mood; behaviour towards others; mood; substance use; and maltreatment as predictors of two-year post-discharge police involvement. The likelihood ratio test was significant ($p < .05$) and therefore the null hypothesis that the coefficients in this model are not different from 0 was rejected and the model was accepted. With alpha set at .05, it was found that police involvement at two-years post-discharge was significantly predicted by substance use ($p < .05$) (see Table 13). The results show that higher scores on pre-treatment measures of substance use predict police involvement at two-years post-discharge. The odds ratio indicates that for a unit increase in substance use, the odds of receiving an elevated conduct score two-years post-discharge increase by 1.10 or approximately 10%.

Table 13
Summary of Logistic Regression Analysis for Predicting Police Involvement at Two-Years Post-Discharge: Co-Morbid Mental Health Variables

T6Police	B	*SE* β	*Wald's* X^2	*df*	*p*	Odds Ratio
Predictor						
Constant	0.48	0.95	0.26	1	.612	1.62
Sex = Female	-0.72	0.45	2.52	1	.113	0.49
Age at First Diagnosis	-0.04	0.07	0.24	1	.624	0.97
Attention, Impulsivity, Hyperactivity and Conduct	0.36	0.43	0.69	1	.405	1.43
Conduct and Anxiety	0.06	0.56	0.01	1	.918	1.06
Conduct and Mood	-0.14	0.42	0.12	1	.732	0.87
Anxiety and Mood	0.11	0.58	0.03	1	.857	1.11
Behaviour	-0.01	0.02	0.10	1	.755	0.99
Mood	-0.03	0.02	2.04	1	.154	0.97
Substance Use	0.09	0.04	5.90	1	.015	1.10
Maltreatment	0.50	0.37	1.83	1	.176	1.65

Test			
Overall Model Evaluation	Value	*df*	*P*
Likelihood Ratio Test	18.08	10	.054
Goodness-Of-Fit Test	Value	*df*	Value/*df*
Deviance	187.07	139	1.35
Pearson chi-square	143.37	139	1.03

Note: $n = 162$ participants.

In summary, the results from this study indicate that pre-treatment measures of conduct disorder and behaviour towards others predict elevated conduct disorder scores at six-months post-discharge and pre-treatment measures of anxiety and substance use predict conduct disorder scores *below* clinical level at six-months post-discharge. The results also indicate that pre-treatment measures of conduct disorder behaviour and substance use predict elevated conduct disorder scores at two-years post-discharge. Substance use was the only variable that predicted police involvement at two-years post-discharge. Finally, the results indicate that pre-treatment measures of co-morbid conduct

disorder and attention, impulsivity, and hyperactivity predict elevated conduct disorder scores at six-months and two-years post-discharge. Age of onset (age at first diagnosis and age at entry), sex, mood, and maltreatment did not predict outcomes at six-months or two-years post-discharge.

Table 14
Summary of Results Related to the Predictions

Prediction	Conduct Disorder at 6-Months Post Treatment	Conduct Disorder at Two-Years Post-Treatment	Police Involvement at Two-Years Post-Treatment
Early-onset of problem behaviour predicts outcomes	Rejected	Rejected	Rejected
Externalizing behaviours predict outcomes	Accepted	Accepted	Accepted
Post-traumatic stress disorder predicts outcomes	Rejected	Rejected	Rejected
Internalizing behaviours predict decreased risk for outcomes	Accepted	Rejected	Rejected
Co-morbid externalizing behaviour predicts outcomes	Accepted	Accepted	Rejected

Discussion

This study examined differences upon intake between children and youth who improved and those who did not improve after receiving, on average, four months of intensive child and family multidisciplinary treatments. Involvement with the police and elevated conduct scores were used as outcome variables to reflect the level of improvement. Mental health variables including conduct disorder, attention-deficit/hyperactivity disorder, depression, anxiety, post-traumatic stress disorder, and learning disorders were examined in order to determine which combination of variables in the context of age of onset of mental health disorder predict outcomes at six-months

and two-years post-treatment. Multiple hypotheses were examined: (a) Early-onset of problem behaviours are associated with offending and conduct disorder after receiving treatment, whereas, late-onset of problem behaviour are unrelated to offending and conduct disorder after treatment; (b) high levels of externalizing behaviour predict offending and conduct disorder post-treatment; (c) symptoms of PTSD are associated with offending and conduct disorder after treatment; (d) internalizing behaviour problems predict a decreased risk for offending and conduct disorder after receiving treatment; and (e) co-morbid externalizing behavior disorders are associated with offending and conduct disorder after treatment. The association between co-morbid externalizing and internalizing behaviour disorders and offending and conduct disorder post-treatment were examined.

Age of Onset

Moffitt (1993) identified two distinct categories of youth in conflict, early- and late-onset offenders, who share problem behaviour but have different etiologies as well as different outcomes. Late-onset offenders begin to exhibit antisocial behaviour as adolescents and desist in young adulthood, whereas early-onset offenders begin to exhibit antisocial behaviour in childhood and continue to exhibit these behaviours throughout adolescence and into adulthood (Moffitt, 2003). Moffitt and colleagues (Moffitt & Caspi, 2001; Moffitt et al., 2002) identified early-onset of conduct disorder as a predictor of persistent antisocial behaviour. One goal of the present study was to determine the extent to which the age of onset of problem behaviour would differentiate those who improve from those who do not improve after receiving four months of intensive treatment.

Inconsistent with expectations, the age at which a child or adolescent began to display antisocial behaviour did not predict involvement with the police or elevated conduct scores at six-months and two-years post-treatment. Unlike Moffitt's studies, however, which examined participants from the Dunedin Multidisciplinary Health and Development Study, a generalized sample comprised of 91% of all consecutive births between April 1972 and March 1973 in Dunedin, New Zealand, the current study examined a very specific sample of participants: children and youth identified as having extreme levels of mental health needs and were referred to a regional residential treatment facility. It is speculated that age of onset may not have been identified as a significant predictor of persistent antisocial behaviour in the current study due to the nature of the participants and the range of disorders covered in the measurements used in this study. The measures used in this study examined behavioural features such as those seen in opposition defiant disorder symptoms, conduct disorder symptoms, and attention-deficit/hyperactivity disorder symptom. Research conducted by Flight and Forth (2007) and Vincet, Vitacco, Grisso, and Corrado (2003) suggest that interpersonal and affective features need to be identified in order to identify persistent offenders; offenders who use instrumental (predatory or premeditated) violence, a more callous form of violence compared to reactive (hostile or affective) violence. Flight and Forth (2007) found that interpersonal and affective features such as lack of remorse and empathy, shallow emotions, and failure to take responsibility for action contributed to an increased likelihood of instrumental violence whereas reactive violence was better explained by deficits in anger reactivity and impulsivity. The measures used in the current study may

not have adequately tapped into the nature of psychopathy described by Flight and Forth that may be needed in order to distinguish early-onset offenders from late-onset offenders in a sample of participants identified as having extreme levels of mental health needs.

Mental Health Factors

Externalizing behaviour disorders. Consistent with expectations, it was found that externalizing behaviours predict outcomes at six-months and two-years post-treatment. Specifically, it was found that higher scores on pre-treatment measures of conduct disorder behaviour and behaviour towards others predict elevated conduct disorder scores at six-months post-discharge; higher scores on pre-treatment measures of substance use predict conduct disorder scores below clinical level at six-months post-discharge, and higher scores on pre-treatment measures of conduct disorder behaviour and substance use predict elevated conduct disorder scores at two-years post-discharge. These results converge with past studies that found an association between externalizing behaviour disorders in childhood and persistent and serious antisocial behaviour (Babinski et al., 1999; Broidy et al., 2003; Fite et al., 2008; Shabat et al., 2008; Vermeiren et al., 2002).

One goal of this study was to identify the types of externalizing behaviours that predict persistent antisocial behaviour. There is inconsistency among studies concerning the association between ADHD behaviours and later antisocial behaviour. Some studies found that ADHD does not independently predict antisocial behaviour (e.g. Broidy et al., 2003) while others have found that ADHD alone is predictive of antisocial behaviour (Babinski et al., 1999; Putnins, 2005). The results of this study found that externalizing behaviour in general is predictive of conduct disorder behaviour at both six-months and

two-years post-treatment. Externalizing behaviour was then broken down into subcategories in order to examine whether or not certain externalizing behaviours improve the prediction of conduct disorder post-treatment. The results show that pre-treatment measures of conduct disorder behaviour predict elevated conduct scores at both six-months and two-years post-treatment; attention, impulsivity, and hyperactivity and cooperation are not significant predictors of post-treatment conduct disorder.

Substance use was also identified as a significant predictor of conduct disorder at six-months and two-years post-treatment as well as police involvement at two-years post-treatment, however, the direction of these relationships differed. It was found that while higher scores on pre-treatment measures of substance use predict lower scores on conduct disorder at six-months, at two-years post-treatment it was found that higher scores on pre-treatment measures of substance use predict elevated conduct disorder scores as well as involvement with the police. That is, children identified pre-treatment as having problems with substance use initially showed significant improvements at six-month post-treatment, receiving conduct disorder scores below clinical range, however, at two-years post-treatment they appear to regress significantly now receiving conduct disorder scores above clinical range and having police involvement. Substance use is targeted in treatment and it may be that initially the treatment has a very positive effect on those with substance use problems, however, after treatment when these children return to their home environment and are without daily treatment and supervision they may become involved in drugs and alcohol again and thus may revert back to living a negative lifestyle that involves antisocial behaviour and involvement with the police. If this is in fact what

is occurring, it would appear that children and youth entering into treatment with substance use problems are at increased risk of losing the effects of treatment over time and therefore it would be beneficial to offer this population increased support after treatment has ended. Further support could include outreach assistance in the home, outpatient services, ongoing therapeutic contact, mentoring, or a weekly substance use group. This is one possible explanation for the change in the relationship between substance use and outcomes over time. This relationship should be explored further in subsequent research in order to better understand how children and youth with substance use problems respond to treatment so that treatment can be tailored to their needs.

Post-traumatic stress disorder. Past studies have identified an association between PTSD and violent and antisocial behaviour (Ruchkin et al., 2002; Ruchkin et al., 2003; Vermeiren et al., 2006). The present study sought to examine the extent to which a history of trauma is associated with persistent antisocial behaviour. A measure of PTSD symptoms was not obtained and therefore experiences of maltreatment including physical and sexual abuse, neglect, and witnessing verbal and/or physical violence were used as a proxy measure of trauma. Maltreatment has a significant negative effect on children's functioning and many studies have identified an association between early experiences with maltreatment and later behavioural disorders and aggression (Leschied, 2007). Inconsistent with expectations, maltreatment was not identified as a significant predictor of conduct disorder or involvement with the police at either time period. It is possible that a diagnosis of PTSD needs to be present in order to identify the association between traumatic experiences and conduct disorder. The nature of the trauma experience may

also influence the impact that a trauma experience has on a child's behaviour. For example, violence-related trauma including witnessing domestic violence or a violent crime, physical abuse, and being a victim of a violent crime are the most commonly reported traumatic events among juvenile offenders (Ruchkin et al., 2002). Future research should be conducted that examines the differential effects of different types of trauma on children's behaviour. Future studies using actual measures of PTSD symptoms should also be conducted in order to determine the extent to which a diagnosis of PTSD is a predictor of persistent antisocial behaviour.

Internalizing behaviour disorders. Another goal of this study was to examine the relationship between internalizing disorders and antisocial behaviour. Past studies have found contradictory evidence concerning how internalizing disorders influence antisocial behaviour. Some studies report an association between internalizing disorders and antisocial and aggressive behaviour (CIHI, 2008), other studies have found internalizing disorders to be modest predictors of later violent behaviours (Leschied et al., 2008), while some studies have found internalizing disorders to be unrelated to or to act as a protective factor against later problem behaviour (Fite et al., 2008; Vermeiren et al., 2002; Vermeiren et al., 2006). The findings of the current study support the hypothesis that internalizing disorders decrease the risk for later problem behaviour. The results of this study show that higher scores on pre-treatment measures of internalizing behaviour predict conduct disorder scores below clinical level at six-months post-discharge. More specifically, it was found that higher scores on pre-treatment measures of anxiety predict conduct disorder scores below clinical level at six-months post-discharge. While these

finding are in support of the hypothesis that internalizing disorders decrease the risk for later problem behaviour, they are also inconsistent with Vermeiren's et al. (2002, 2006) findings which found major depressive disorder to at as a protective factor against future recidivism. Behaviours consistent with depression did not predict lower scores on conduct disorder post-treatment in the current study; anxiety was the sole predictor of conduct disorder post-treatment.

This finding, that anxiety is predictive of lower conduct scores, is an important contribution to this field of study as the association between symptoms of anxiety and antisocial behaviour is relatively unknown. Past studies found an increased rate of anxiety among incarcerated adolescents (Vermeiren et al., 2006; Ruchkin et al., 2003), however, it was questioned whether high rates of anxiety disorder among this population is a indication that anxiety is a risk factor for antisocial behaviour or if high rates of anxiety disorder is a function of legal involvement and incarceration. The results from the current study show that childhood anxiety decreases the risk for later problem behaviour thus suggesting that higher rates of anxiety found among incarcerated adolescents may be a function of the stressful environments that they are living in and not a risk factor for incarceration. A possible explanation for this finding can be made by drawing upon Vermeiren's et al. (2002) explanation for the protective effects of depressive symptoms found in their study. Vermeiren et al. (2002) reasoned that an individual's capacity to react with depressive symptoms and other internalizing emotions may indicate their ability for reflecting on their actions and the consequences of their actions on others. A similar explanation could be used for children and youth who experience high levels of

anxiety. That is, their feelings of anxiety may be a sign of their potential for reflecting on their behaviours and the consequences of their behaviours as well as their capacity to experience guilt, shame, and remorse; characteristics that will aid in the success of treatment. This is one possible explanation; future research should further examine this relationship in order to increase our understanding of how and why anxiety decreases the risk for later conduct disorder.

Co-Morbidity. Another goal of the current study was to examine the relationship between co-occurring mental health disorders and persistent antisocial behaviour. It has been found that co-morbid diagnoses are more strongly associated with later problem behaviour compared to a single diagnosis. There is, however, inconsistency among studies regarding the combination of diagnoses that are associated with persistent antisocial behaviour. For example, while Fite et al. (2008) found that the combination of internalizing and externalizing behaviour is associated with high risk for repeat admission to an inpatient facility, other studies found that children with co-occurring externalizing and internalizing behaviour disorders are markedly less deviant than children with conduct problems only (Lynam, 1996). The current study identified that higher scores on pre-treatment measures of co-morbid conduct disorder and attention, impulsivity, and hyperactivity predict elevated conduct disorder scores at six-months and two-years post-discharge. No other combination of co-occurring behaviours predicted outcomes at either time period. When examining the odds ratio statistic it was found that for a unit increase in co-morbid conduct and attention, impulsivity, and hyperactivity, the odds of receiving an elevated conduct score six-months post-discharge increase by 2.90 or approximately

190%; and that for a unit increase in co-morbid conduct and attention, impulsivity, and hyperactivity, the odds of receiving an elevated conduct score two-years post-discharge increased by 3.32 or approximately 232%. These results support past studies that found that children with co-occurring conduct problems and hyperactivity problems are at the greatest risk for persistent antisocial behaviour compared to children with hyperactivity or conduct problems alone (e.g. Babinski et al., 1999; Lynam, 1996; McMahon, 1994) and emphasize the need to develop more intensive treatments that are specifically tailored to these children's needs.

Sex Differences and Mental Health Disorder in Children

Past studies examining mental health and antisocial behaviour have focused almost exclusively on males and therefore little is know about the impact of these issues among females. Another purpose of the current study was to examine what mental health variables are associated with persistent and serious antisocial behaviour among females. Past research has found differences in the types of mental health problems that females exhibit compared to males. For example, studies have found a correlation between depression and aggression in females and therefore it was hypothesized that internalizing behaviour problems would be associated with increased risk for conduct disorder and offending among females after receiving treatment. This difference was not found and, in fact, the results of this study indicate that there is not a significant difference between males and females when predicting conduct disorder and police involvement six-months and two-years post-treatment suggesting that females and males are similarly impacted by

mental health disorders. This finding is important as it increases our understanding of mental health predictors of risks for offending among females.

Implications for Treatment

The findings from this study have important implications for the treatment of children and youth with serious emotional disorders and furthers knowledge and understanding of the effectiveness of tertiary treatment for this population. The findings from this research allows for an improved identification of those children who are at increased risk for persistent and serious antisocial behaviour as well as offending. The ability to identify predictors of risk among this population of children has many important implications. For example, from this research we know that children who exhibit high levels of conduct disorder, negative behaviour towards others, substance use, and co-morbid conduct disorder and attention deficit/hyperactivity disorder are at higher risk of not showing significant improvements after receiving treatment compared to children who do not exhibit this behaviours. Children who do not show significant improvements after receiving treatment are at increased risk of ongoing serious life-course difficulties including incarceration (St. Pierre et al., 2008). It is therefore imperative that children who show evidence of these behaviours receive more intensive services that focus on their unique needs.

This research indicates that more intensive treatments need to be developed for children and youth with serious emotional disorders. The results from this study should be used as a guide when developing more intensive services as they identify the specific behaviours that increase the risk for persistent antisocial behaviour and therefore are the

behaviours that should be targeted. The results also offer insight into mental health variables, such as anxiety, that may decrease the risk for persistent antisocial behaviour. Developing treatments for high-risk children that are more intensive and tailored to their needs will in turn facilitate the mental health care system's ability to improve the lives of these youth as well as the lives of those affected by them. For example, the current findings suggest that children who have co-morbid conduct disorder and attention-deficit/hyperactivity disorder are at the highest risk for persistent antisocial behaviour and therefore are in need of the most intensive services. This finding can better direct the focus of treatment development and service efforts for this extremely high risk population.

This research also provides more understanding regarding females who are impacted by mental health disorders and antisocial behaviour. As previously mentioned, there is a paucity of research examining antisocial behaviour and mental health in females, however, the recent increase in girls' involvement in aggressive and violent offences and arrests (Antonishak et al., 2004; Leschied et al., 2001; Moretti et al., 2004) highlights the need for a better understanding of this population. The findings from the current research have important clinical implications for the treatment of females with serious emotional disorders since they suggests that there is a non significant difference between males and females when predicting the level of improvement after receiving intensive treatment and, therefore, treatment efforts should be focused accordingly. These finding also suggest that further research on females' experiences of mental health and

antisocial behaviour is needed in order to increase our knowledge on this largely ignored area of children's mental health.

Future Research

The current research has important implications for future research in the field of children's mental health. This research provides an increased understanding regarding how serious emotional disorders impact the lives of children and youth as well as the impact that specific mental health disorders have on the effectiveness of treatment. Suggestions for future research were mentioned throughout this section. Further research should focus on the identified mental health disorders and how and why they impact the differential effectiveness of treatments in the way that they do. For example, in what way does conduct disorder, substance use, and co-morbid conduct disorder and attention-deficit/hyperactivity disorder negatively impact the effectiveness of treatment? Why is the combination of conduct disorder and attention-deficit/hyperactivity disorder extremely lethal to the long-term functioning of children and youth and how can treatment be tailored to either prevent or better alleviate these symptoms and thus improve the functioning and well-being of these children? Why does anxiety disorder decrease the risk for antisocial behaviour? Further exploration of these questions would allow for a better understanding of the impact that these mental health disorders have on children and therefore help guide the development of more effective treatments for children and youth who exhibit these mental health problems.

Limitations

The current study used a secondary data source collected for a larger study conducted by St. Pierre et al. (2008) and therefore there were limitations on the variables that could be examined as they were not included in the original dataset. For example, the current study sought to explore the relationship between trauma and antisocial behaviour as past research has found an association between PTSD and aggression, impulsivity, anxiety, and depression (Ruchkin et al., 2002; Vermeiren et al., 2006). The current study used maltreatment as a proxy measure of trauma, however, maltreatment was not found to significantly predict the outcome variables. As previously mentioned, future research would benefit from the use of actual measures of PTSD symptoms in order to determine the extent to which PTSD is a predictor of persistent antisocial behaviour.

The current study also sought to examine the predictive ability of learning disorders, however, a measure of learning disorders was not available in the dataset and therefore standardized academic test scores on the Woodcock-Johnson Tests of Achievement (WJIII) were used. The inclusion of academic test scores as a measure of learning disorders in the Logistic Regression model skewed the results of the analysis, resulting in likelihood ratio scores that were not significant and therefore the model had to be rejected. Future research should be conducted that uses actual measures of learning disorders in order to determine whether or not a diagnosis of a learning disorder can be used to predict antisocial outcomes.

A second limitation of this study is that the sample was comprised of a clinical sample. The referral process used ensured that only children and youth with extreme

levels of need were accepted for inpatient treatment. Children and youth from this limited demographic differ from children and youth receiving treatment through other tertiary treatment facilities as well as from the general population. Therefore, the results found in the current study may not generalize to different populations. The predictive effects of conduct disorder, negative behaviour towards others, substance use, anxiety, and co-morbid conduct disorder and attention-deficit/hyperactivity disorder on persistent antisocial behaviour should therefore be tested using different populations.

A final limitation is the nature of the measurements used in this study. This study utilized measurements that examined behavioural features only which may have limited our ability to tap into the nature of psychopathy needed in order to detect differences related to age of onset of mental health disorders. As previously mentioned, recent studies have found that interpersonal and affective traits need to be identified in order discriminate persistent and serious young offenders, traits that were not captured by the measurements used in the study. Future research should utilize measures that assess interpersonal and affective features or measures that adequately reflect the nature of psychopathy needed to distinguish early-onset from late-onset offenders among a sample of children and youth with serious emotional disorder.

Conclusions

Notwithstanding the above limitations, the findings of this study further knowledge and understanding regarding children and youth with serious emotional disorders and therefore have important clinical implications for the development and implementation of treatment. Developing and implementing effective treatments for

children and youth with serious emotional disorder is challenging due to the heterogeneity within this population. The purpose of this study was to identify predictors of risk for conduct disorder and offending among children and adolescents with serious emotional disorder such that treatment can be tailored to meet their specific needs. Without effective treatment these children and youth are at an increased risk for poor long-term functioning, inpatient mental health treatment, conflict with the law and incarceration, as well as continuing to be heavy consumers of costly social services throughout their lives (Halliday-Boykins et al., 2004; Renaud et al., 1998; St. Pierre et al., 2008).

The results of this study suggest that elevated scores on conduct disorder, negative behaviour towards other, substance use, and co-morbid conduct disorder and attention-deficit/hyperactivity disorder can be used to identify children and youth who are at increased risk for persistent and serious antisocial behaviour and offending. The results also indicate that elevated scores on measure of anxiety can be used to identify children who are at decreased risk for antisocial behaviour. Identifying these mental health variables as predictors of antisocial outcomes increases our knowledge of the processes through which mental health affects treatment effectiveness. The results also encourage subsequent research in this area and inform treatment development and implementation such that high-risk children receive more intensive services that are tailored to their needs. Developing more effective treatments will, in turn, facilitate the mental health care system's ability to improve the lives of these youths as well as the lives of those affected by them.

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Appendix A

Western

Faculty of Education

TO: Rebecca Cuthbert

FROM: Alan Leschied, PhD., C.Psych.

This letter will serve as permission for you to use the existing data set that has been collected through the recently completed longitudinal study conducted at the Child and Parent Resource Institute in London Ontario. This study received ethics approval from the University of Western Ontario Ethics Committee for Human Subjects which was conducted under the auspices of the joint Principal Investigators, Drs. Alan Leschied and Dr. Jeff St. Pierre.

Sincerely,

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