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Aggression Among Children and Youth: An Examination of Service Allocation for Subtypes of Aggression

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Abstract

To date, there is a paucity of research examining service utilization in relation to aggression in youth, particularly when addressing the typologies of reactive and proactive aggression. This study aimed to determine how subtypes of aggression (reactive, proactive or comorbid) present for service allocation and cost. Participants consisted of 1283 youth receiving care in the province of Ontario, Canada. Bivariate and multivariate analyses using logistic regression were used. Results revealed significant associations between age and aggression type with service utilization. In particular, service complexity was most present for those with comorbid aggression. Those who were identified as reactive were significantly younger in age. No association between type of aggression and sex were found. Due to the scantiness of information for resource allocation for subtypes of aggression, this study will make a significant contribution to the field in assisting service providers and further providing implications for practice.

Key Words: interRAI, services, service allocation, service delivery, reactive, proactive, aggression, service complexity

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Introduction

In 2006 violent offences comprised one quarter of youth crime in Canada (Taylor-Butts, 2010). In 2010/2011, approximately 14, 800 youth were involved in Canada's correctional system (Munch, 2012). Beyond the human cost in suffering and lost potential, these youth represent a substantial service and financial burden for the community. Research has underscored the complexity of understanding the multiple dimensions of aggression that are critical in advancing knowledge regarding the nature of childhood psychopathology (Little, Henrich, Jones, & Hawley, 2003; Pulkkinen, 1996; Vitiello & Stoff, 1997). These dimensions tend to be associated with differing types of aggression and future delinquency.

As highlighted below, the literature has identified well-validated constructs that represent typologies associated with aggressive behaviours, thoughts and actions. Studies have revealed that an immense amount of money is allocated to support children and youth who are highly aggressive. The literature emphasizes the importance of understanding of the needs associated with aggression given that there is little research designed to understand service utilization and resource allocation based on specific typologies not only within the Canadian context but also internationally. Understanding the current availability of services and uses of mental health amenities in Canada is needed. Further, a need to delineate what typologies related to aggression are utilizing what services and referrals will be beneficial in prioritizing and improve triaging and treatment.

The following review highlights current literature on aggression, specifically amongst children and youth. Underlying theoretical frameworks upon which current

literature has relied are presented along with their relevance to the current study. In addition to examining the subtypes of these dimensions and their various related symptoms, variables related to age and sex that are relevant to aggression and differential program outcomes are explored. Finally, service allocation, including needs and costs for those youth with aggressive behaviours is reviewed.

Literature Review

Youth Aggression

Aggression is defined as "acts that are hurtful and/or harmful to others" (Artz & Nicholson, 2002, p. 2). While aggression in youth has been extensively studied, there remains a gap with respect to the specificities of the nature and degree of aggression among youth. Research has emphasized particular acts of aggression as being predictive of delinquency and disruptive behaviours (Reef, Donker, Van Meurs, Verhulst, & Van Der Ende, 2011; Vitaro, Gendreau, Tremblay, & Oligny, 1998). This literature highlights aggression as one of the symptoms of conduct disorder, attention deficit hyperactivity disorder, psychoses, substance abuse, depression and other psychiatric disorders (Connor, Steingard, Cunningham, Anderson, & Melloni, 2004; Vitiello & Stoff, 1997).

Current research suggests there are two unique types of aggression: proactive (PA) and reactive (RA) (Dodge & Coie, 1987; McAdams III, 2002). Different types of aggression yield different correlates; therefore, understanding these differences is essential for the purposes of both treatment and prevention. Connor et al. (2004) describe PA as a coercive action used as a means of achieving a goal. It is often characterized as being deliberate and predatory in nature (Vitiello & Stoff, 1997). Further, literature has explained PA as a form of intimidation and domination. This type of aggression is

generally unprovoked and used as a purposeful act to influence others (Dodge & Coie, 1987). Conversely, Connor et al. (2004) describe RA as a defensive response often acted out of frustration or anger that is caused by provocation. RA is often associated with strong negative affect, impulsivity and being hostile in intent (Dodge & Coie, 1987).

The literature converges on the high construct validity and reliability of these two subtypes of aggression (Dodge & Coie, 1987; Poulin & Boivin, 2000). Babcock, Tharp, Sharp, Heppner and Stanford (2014) noted that aggression, particularly typologies characterized as PA and RA are often used incorrectly. Numerous studies do not appropriately operationalize their subtypes of aggression and tend to use the terminology 'reactive' and 'proactive' synonymously with impulsive and premeditated. Babcock et al.'s study (2014) considers the symptoms and behaviours for each typology, as distinct. While reactive and impulsive terms were found to be quite similar, there were significant differences between proactive and premeditated types (Babcock et al., 2014). This fact emphasizes the need for the current research to use clear and operationally defined typologies of reactive and proactive aggression. Babcock et al. (2014) further suggest that health care providers should ensure that they are tailoring any treatments to the determined specific subtypes. The intent of the current study is to contribute to this knowledge base in differentiating the two concepts. Treatment outcomes related to aggression, while being somewhat encouraging, could be improved with further understanding regarding the underlying processes and psychiatric diagnoses associated with aggressive incidents (Vitiello & Stoff, 1997). This could be integrated within targeted interventions based on differential typologies. For instance, Vitiello and Stoff (1997) recommend that research assess whether behaviour therapy has significant impact

for those displaying symptomology consistent with proactive aggression rather than those displaying reactive aggression.

Theoretical Orientation

There are two theoretical frameworks common within the literature that effectively describe and support the two typologies of RA and PA, these include the frustration-aggression model and social learning theory (Bandura, 1978; Berkowitz, 1989; Card & Little, 2006; Connor et al., 2004).

Frustration-aggression model. The *frustration-aggression model* postulates that aggression occurs as a result of frustration or anger to an event. This theory is reflective of reactive aggression as it views aggression as a hostile reaction to a perceived threat (Berkowitz, 1989). This type of aggression is a product of emotional affect and environmental cues. Therefore, it is suggested that while aggression is instigated by frustration, there must be a relatively powerful stimuli to allow aggression to be fully expressed (Berkowitz, 1989). This can further be associated with Dodge's (Dodge & Coie, 1987) model of social information processing that states children who are aggressive tend to process information from environmental social cues differently (Berkowitz, 1989). Here, they are more likely to focus on threatening cues or misinterpret cues of others' behaviours that are often ambiguous, known as hostile attribution bias (Dodge & Coie, 1987).

Social learning theory. *Social Learning Theory* as posited by Bandura (1978) has strong associations with proactive aggression. Bandura (1978) highlighted that aggression does not require frustration to exist. Rather, aggressive behaviours and responses increase when such behaviours are socially reinforced through some type of reward. This can

include reward by the removal of an appetitive stimulus (victimization, humiliation) or by obtaining control in a particular situation (Bandura, 1978). This theory considers aggression as an instrumental behaviour that is altered based on reinforcement. Social learning theory is based on cognitive functions that aid in perceiving and evaluating a situation as an individuals' cognitive appraisal that leads to a determination of a behaviour (Bandura, 1978). Personal self-efficacy is an important component of this theory. Proactive aggression takes place once individuals are confident that they will achieve their goal or when their particular actions have been reinforced. It is important to note that there is compatibility between the *Frustration-Aggression Model* and the *Social Learning Theory*, and that they are considered complimentary theoretical frameworks.

Symptomology

Distinct behaviours and symptoms have been identified for each subtype of aggression. Pulkkinen (1996) conducted the first longitudinal study to assess adolescents displaying either type of aggression. In this study, proactive individuals tended to display externalizing behaviours in childhood. Those who continued to be proactive had an increased frequency of problematic behaviours into adulthood (Pulkkinen, 1996). Specifically, these individuals had adjustment problems throughout their adolescence that included conduct and non-compliance issues. They were also more likely to be involved in criminality later in life compared to their non-proactive counterparts. Interestingly, this group did not demonstrate higher levels of self-control compared to reactive and non-aggressive participants (Pulkkinen, 1996). Alcohol abuse was more related to PA rather than RA in adulthood (Pulkkinen, 1996). It is this literature that gave rise to the belief that proactive aggression leads to criminality later in life.

Proactive aggression is more highly related to callous individuals who score higher on measures of psychopathy (Marsee & Frick, 2007; White, Gordon, & Guerra, 2015). Literature has noted moderate to high relationships between proactive aggression and callous, uncaring traits (Frick, Cornell, Barry, Bodin, & Dane, 2003; Kimoni et al., 2014; White, Gordon, & Guerra, 2015). As a result, proactive aggression is highly associated with children in the youth justice system. Individuals with higher ratings of callous-unemotional traits tend to score higher on violent delinquency and future criminality (Frick & Marsee, 2006; Kimonis et al., 2014; Vitaro et al., 1998).

Further research has found higher psychopathy scores associated with proactive aggression for both children and adults suggesting that proactive aggression could be a possible indicator of psychopathic behaviours (Kolla et al., 2013). This finding has been noted throughout all stages of development (Kolla et al., 2013). The literature has also shown that proactive aggression tends to be related to other behavioural problems, such as hyperactivity and impulsivity (Scarpa, Haden, & Tanaka, 2010). In previous studies, correlations have shown that substance abuse and family violence is also related to proactive aggression (Connor et al., 2004; Frick & Marsee, 2006). In a previous study, proactive aggression at 12 years of age was predictive of delinquency and disruptive behaviour (i.e. conduct disorder, oppositional defiance disorder) throughout adolescence (Vitaro, Gendreau, Tremblay, & Oligny, 1998). Moreover, those who demonstrated high levels of reactive aggression displayed a weaker association between delinquency and proactive aggression, though reactive aggression did not moderate the link between proactive aggression and disruptive behaviours (Vitaro et al., 1998). Raine et al. (2006) similarly found that individuals who were proactive had a tendency to be more violent

and involved with delinquency, while those who are reactive carried symptoms related to reality distortions. Understanding the link between proactive aggression and potential criminality is important in treatment and prevention programs.

There is additional research that has noted the presence of callous-unemotional traits to be more common in those exhibiting comorbid typologies of both reactive and proactive aggression (Fanti, Frick, & Georgiou, 2009). Fanti et al. (2009) indicated that such traits were predictive of more complex antisocial behaviours, though in the area of callousness, proactive aggression was exclusively more strongly related to this trait. Literature has also noted a higher number of individuals who crossover in both typologies of reactive and proactive aggression and were therefore highly aggressive in nature (Frick & Marsee, 2006; Poulin & Boivin, 2000).

It is important to note that distinct behaviours within each typology reflect unique risks. While previous literature has controlled for the overlap of typologies, the current study examines both distinct and comorbid groups in identifying possible differences among the three. Currently, there is a lack of research looking at the special circumstance and needs of youth who crossover into both trajectories, especially in a large clinical sample. Therefore, those participants who overlap into both trajectories in the current study will be referred to as the comorbid group.

Currently in the literature individuals who have displayed reactive aggression were found to have a higher likelihood of adult adjustment problems compared to those who are proactive (Pulkkinen, 1996). Longitudinally, children who exhibited reactive aggression had higher rates of maladaptation such as internalizing problems like neuroticism into adulthood (Pulkkinen, 1996). Youth who have been a victim of sexual

abuse tend to display reactive aggressive behaviours (Connor et al., 2004). Individuals who display reactive aggression were more likely to be impulsive and socially incompetent compared to those who display proactive aggression (Scarpa, Haden, & Tanaka, 2010). Further, reactive aggression was significantly associated with symptoms of emotion dysregulation and ADHD (Card & Little, 2006). These emotional problems included high negative emotionality that was often reflected in disordered mood and anxiety (Card & Little, 2006). Scarpa, Haden and Tanaka (2010) found conflicting evidence showing support for both types of aggression and relatedness to various aspects of ADHD. Reactive relational aggression was more strongly associated with anger and hostility in adults (Murray-Close, Ostrov, Nelson, Crick, & Coccaro, 2010) than proactive relational aggression. Overall, internalizing problems have been significantly related to those individuals exhibiting reactive aggression (Card & Little, 2006; Fite, Rubens, Preddy, Raine, & Pardini, 2014). Loudin, Loukas, and Robinson (2003) examined an older sample of youth and found that those who had more social anxiety and feared negative evaluation tended to be more relationally aggressive, in turn leading to increased frequency of relational aggression when empathy was at a lower level (Loudin, Loukas, & Robinson, 2003). Due to the fact that emotional dysregulation is strongly linked to reactive aggression it would be expected that such anxiety would be strongly associated with reactive aggression.

Dodge and Coie (1987) first noted the association between reactive aggression and early childhood biases in information processing and in perceiving situational cues. This finding was supported by Murray-Close et al. (2010) who found that reactive aggression was associated with histories of abuse, hostile attribution biases and feelings

of distress in regards to relational provocation. Conflicting research has found associations of hostile attribution with both types of aggression (Connor et al., 2004). Childhood experiences of victimization have been related to reactively aggressive tendencies as well (Card & Little, 2006; Poulin & Boivin, 2000). Poulin and Boivin (2000) noted that while childhood victimization has been linked to the reactive subtype, it was not only negatively associated with proactive aggression, but that the presence of proactive aggression was associated with the lack of victimization in one's life. When examining other studies looking at these variables, research found that reactive aggression had stronger associations to victimization versus weaker associations with proactive aggression (Card & Little, 2006). A possible explanation for this is the association between reactive aggression and younger populations by which victimization is prominent (Card & Little, 2006). Overall, noticeable trends and some distinct behavioural presentations are noted for both reactive and proactive types of aggression as in Table 1. The comorbid typology has been significantly understudied in the literature; however, those researchers who have completed preliminary work related to the overlap in typologies have found that these individuals tend to be highly aggressive and have a stronger link to antisocial behaviour.

Table 1
Behaviour Presentation of Subtypes of Aggression.

<u>Proactive</u>	<u>Reactive</u>	<u>Comorbid*</u>
Callous, psychopathic traits	Reality Distortions	Understudied
Future criminality	Internalizing Symptoms	More complex, antisocial behaviours
Adjustment problems	Neuroticism	Highly Aggressive
Externalizing behaviours	Emotion-Regulation	
Alcohol Abuse	ADHD	

*for this particular project is indicative of the conjunction of both typologies

Teacher reports have revealed that relationally aggressive boys and physically aggressive girls display adjustment problems (Underwood, 2003). Further, these teacher reports showed that girls who were physically aggressive demonstrated more internalizing and externalizing behaviours than their relationally aggressive or non-aggressive female counterparts (Underwood, 2003). Research has also indicated that relational aggression has been used to help youth ‘cope’ who have felt victimized and reported feelings of inferiority within a peer group (Little, Henrich, Jones, & Hawley, 2003), though in this research instrumental and reactive types were not related to such victimization. Conversely, those who exhibited overt aggression were more socially competent and maintained control over their social peers, using aggression only when needed. Overt forms of aggression were highly related to influential youth who planned and were thoughtful in their actions (Little et al., 2003).

Age of Onset

The age of onset in aggression is also a relevant factor in differentiating the nature and type of aggression. A significant amount of literature has indicated that aggression

decreases throughout childhood (Dodge & Coie, 1998; Fite, Colder, Lochman, & Wells, 2008). However, there are differing beliefs as to when aggression reaches its peak. For instance, Tremblay (2000) posited that aggression peaks during preschool age as this is when children develop the capacity to inhibit their physical aggression. Other researchers have stated that aggression tends to come to its peak and begins to decrease around the fifth grade (Fite et al., 2008). Studies have indicated that males tend to exhibit antisocial behaviours at a much earlier age than females (Berkout, Young, & Gross, 2011). In Connor et al.'s (2004) study of referred youth, data revealed that younger children were significantly more reactive than their older counterparts. This was similar to Murray-Close and Ostrov (2009), who noted a reduction in physical aggression among older youth and a higher frequency of physical aggression among younger children who tended to alter their type of aggressive behaviour dependent upon their needs. The authors also indicated that their findings did not provide evidence of an association between age and proactive aggression (Murray-Close & Ostrov, 2009). Connor et al. (2004) highlighted that older children had a tendency to have more thoughtful planning and have more intent in their aggression as opposed to uninhibited younger children. These modest findings leave several unanswered questions including: 1) Understanding if certain types of aggression only occur as a stage of development; and 2) Differences of age of onset between males and females.

Findings generally confirm the extant research identifying changes and behaviours as being dependent on age of onset of the aggression (Frick & Marsee, 2006; Lahey et al., 1998). Children who begin displaying conduct problems at an early age tend to show more callous typologies as well as ADHD symptoms. These tend to lead to more

extreme antisocial behaviours with age (Frick & Marsee, 2006). Tremblay (2002) noted that while research focuses on adolescents, evidence showed that it was younger children who had a tendency to be more physically aggressive compared to older counterparts. This behaviour decreased with age and increasing cognitive capacity. On the contrary, non-physical aggression was associated with intent and had an opposite effect (Tremblay, 2002). It was also more common amongst older youth (Tremblay, 2002). This was further supported by findings stating that children who were unable to regulate emotions and demonstrated higher rates of physically aggressive behaviour in early childhood were more likely to exhibit significant, violent behaviour in adolescence and adulthood (Tremblay et al., 2004).

Sex

Prior research has emphasized the importance of studying sex in respect to youth aggression. Female youth crime has increased 127% since 1999, almost twice as fast as male crime (Savoie, 1999). While female crime is not as prevalent as such behaviours committed by males, violent crime accounted for more crime committed by females than by males. Further, two thirds of female youth had charges of common assault (Savoie, 1999). These results have also indicated that female youth tend to be younger when committing violent crime than males (Savoie, 1999). While Lahey (1998) found that those who experienced adolescent-onset aggressive behaviour were not only more likely to be female, these youth also had a reduced likelihood of meeting criteria for oppositional defiant disorder. The literature also noted that, no matter the age, females were more strongly associated with indirect aggression than their male counterparts, though the level of such aggression did increase with age for both sexes (Tremblay,

2002). However, more recent literature has found that males and females exhibit equal, high rates of relational aggression (Hyde, 2014).

The majority of studies have focused primarily on male samples (Fite et al., 2014; Vitaro et al., 1998). Of the studies that have incorporated both male and female participants, researchers have noted significant sex differences (Berkout, Young, & Gross, 2011; Murray-Close et al., 2010). Reports have generally found that males were more likely to be charged with serious offences compared to females (Odgers & Moretti, 2002). When research included covert types of indirect and relational aggression, aggression was more equally distributed across sex, with some reports suggesting a higher prevalence rate in girls (Odgers & Moretti, 2002). Murray-Close et al. (2010) found that girls were more likely to be involved in romantic relational aggression compared to boys. Conversely, males were more likely to engage in both more proactive and reactive peer-directed relational aggression compared to females (Murray-Close et al., 2010). While males had a tendency to exhibit more externalizing behaviours, females appeared to have a much higher frequency of internalizing disorders (Berkout, Young, & Gross, 2011). Anxiety comorbidity tended to be more frequent among female samples than males (Berkout, Young, & Gross, 2011). Despite this, a subset of girls has been known to engage in behaviours reflective of bullying and callousness, which is commonly classified as a proactive type of aggression (Marsee & Frick, 2007; White, Gordon, & Guerra, 2015). Murray-Close and Ostrov (2009) indicated that proactive aggression was associated with increasing physical aggression over time. Also, males were no more significantly associated with physical aggression than girls (Murray-Close, 2009). Research is conflicted but has found that both male and female youth is equally

associated with proactive aggression. Further, results indicated that females were more likely to reduce their physical aggression over time and tended to be more indirectly aggressive (Côté, Vaillancourt, Barker, Nagin, & Tremblay, 2007).

As with other types of criminal behaviour, sex differences clearly emerge when aggression is being assessed. Males who exhibited proactive aggression demonstrated externalizing behaviours in childhood and criminal behaviours throughout adolescence and adulthood (Pulkkinen, 1996). They also tended to be more aggressive than males exhibiting reactive aggression up until the age of 27, though this difference was not apparent for females (Pulkkinen, 1996). Conversely, proactive females displayed more internalizing behaviours throughout childhood such as anxiety and were likely to demonstrate neuroticism in adulthood (Pulkkinen, 1996). Connor, Steingard, Anderson and Melloni (2003) investigated proactive and reactive aggression in a sample of clinically referred children and youth and found results contrary to others who had studied non-referred youth. These researchers found no sex differences for proactive or reactive aggression though they did note a non-significant higher frequency for boys with severity and frequency of aggression than girls.

Marsee and Frick (2007) conducted a study on detained girls to determine the forms and functions of relational aggression. They found that, similar to overt aggression, callous traits and the expectation of positive outcomes was exclusively linked to proactive aggression. This finding suggested that the emotional processes of incarcerated girls revealed differences in intervention and how types of aggression relate to certain psychopathic behaviours. White, Gordon and Guerra (2015) also investigated callous-unemotional traits and their association with proactive aggression in a sample of young

women. Supportive of research by Marsee and Frick (2007), the study found that callous-unemotional traits were related to proactive aggression. While their research focused on relational aggression in women, previous research examined aggression in youth and found similar results (Fanti et al., 2009). Similar to their male counterparts, proactive female youth displayed adjustment issues of attentiveness, non-compliance, and conduct problems (Pulkkinen, 1996).

Aggression, Delinquency and its Relationship to Costs

Aggression among children and youth has a significant impact on society. High levels of aggression and subsequent delinquency in childhood are more likely to lead to youth justice involvement. The literature notes that child and youth aggression is a predictor for later violence (Broidy et al., 2003; Pulkkinen, 1996). As a result, this leads to high cost interventions and legal fees. This research indicates that children involved in delinquent behaviour are much more likely to be violent offenders as adults (Loeber, Farrington, & Petechuk, 2003). Aggressive individuals tend to be highly stable over time and are at higher risk for outcomes associated with antisocial behaviour such as delinquency (Dodge & Coie, 1987). In turn, stressing the importance of gaining a better understanding of aggressive behaviours in childhood and youth to facilitate the development of early interventions and treatment programs is needed. In a 25 year longitudinal study conducted by Fergusson, Horwood and Ridder (2005), conduct problems were found to be associated with later adjustment and risk for involvement in future criminality, mental health issues and substance use.

Given that particular traits related to conduct problems and antisocial youth have been associated with future criminality (Kimonis et al., 2014), there remains only a

modest literature on sex differences in service utilization. Exploring the severity in symptoms and care planning needs for both sexes by the time they are in triage would be useful. This research could improve prioritization and triaging efforts to allocate scarce resources more appropriately, thereby reducing the need for high intensity services and involvement with the justice system for those in need (Stewart et al., 2015). Furthermore, including a study that compares both sexes with equal, large sample sizes is needed.

It has been established that about 10-20% of children and youth in the general population suffer from a mental health disorder (Canadian Mental Health Association, 2013). Moreover, youth in the justice system suffer from substantially higher rates of mental health disorders, with estimates ranging from 50-75% of those in the youth justice system suffering from at least one mental health diagnosis (International Society of Psychiatric Mental Health Nurses, 2008). Consequently, researchers have begun to explore the costs of aggression in youth populations. A Canadian report on the estimates of social and economic costs of crime outline approximately 967 million dollars spent in the youth criminal justice system per year, with this more than tripling in the adult criminal justice system (Zhang, 2008). Similarly, over 158 billion dollars is reportedly spent each year on youth violence in the United States (Bastiaens & Bastiaens, 2006). Berkout, Young and Gross (2011) note the immense financial impact that aggressive behaviours reflective of conduct disorder have on society. Foster and Jones (2005) estimate a total cost of \$70,000 in a seven-year span for a child with conduct disorder. These authors note that a majority of this spending results from school expenditures for special education, though this was proportionally less of an issue due to higher dropout rates for those with conduct disorder. Twenty percent of these costs were related to

juvenile justice expenditures whereas undiagnosed youth who had displayed severe behavioural problems required relatively larger amounts of inpatient mental health services (Foster & Jones, 2005). Craig, Schumann, Petrunka, Khan and Peters (2011) note the limited data on costs associated with delinquent behaviour in Canada. The study examined a longitudinal sample of at-risk youth to determine a comprehensive evaluation of costs for youth offending in a Canadian context. These researchers found higher rates of government expenditures for remedial education, health care and social services, social assistance and criminal justice system expenditures whereby 80% of costs to the government were from 18% of the sample representative of the high-risk youth (Craig et al., 2011). While approximately half of these costs were going towards preventative measures, the other half were reactionary costs such as visits to the doctor, emergency room visits, and having serious injuries (Craig et al., 2011). Female youth costs were much higher than their male counterparts within the high-risk group. The authors suggested that this might be due to a higher frequency of medical needs and issues (Craig et al., 2011). Craig et al. (2011) found that girls in high-risk groups tended to have much higher costs with arrests and court appearances. The likelihood of entering the criminal justice system after an arrest was much higher for female youth than their male counterparts (Craig et al., 2011). Overall, it was suggested that female delinquency is more costly at approximately \$244,056, and boys at \$229,236 over a ten year time span. Previous research indicated a younger onset of offending in males, though Craig et al.'s (2011) study revealed that male and female youth began offending at similar times. A previous study noted that continuing medium and high-risk offenders who started in their adolescence increased their severity of crime and had significant increased costs later in

life (Cohen, Piquero, & Jennings, 2010). This is important information for policy makers for both implementation of early prevention programs and more evidence-based treatment. Further, this is one of the few studies examining costs related to delinquency. To date, there is essentially no research examining service allocation and treatment costs for the subtypes of proactive and reactive aggression.

Service Utilization

Research and clinical records to date highlight excessively high rates of unmet needs by children and youth in the mental health system (Burns et al., 1995; Kataoka, Zhang, & Wells, 2002). A study using data from the National Survey of American Families to address the amount of services being used by children and adolescents in a year revealed that the most in need of such services were not receiving them (Kataoka et al., 2002). Specifically, Kataoka et al. (2002) found that up to 80% of youth who needed mental health services did not receive any such care, particularly when uninsured. Rates were even lower when looking at children under the age of five years. The literature has highlighted that children with aggressive behaviours require higher levels of resource allocation and service need that are reflected in higher costs to treat the aggression and associated symptoms (Dean, Duke, George, & Scott, 2007). Kataoka et al. (2002) found that while higher rates of need were associated with higher rates of received care, this population is still a small portion of those in need. The authors discuss the many implications that result from this data such as the increased risk of suicidality and other negative coping behaviours if left untreated from their mental illness (Kataoka et al., 2002). Cheung and Dewa (2007) further highlight that growing mental health concerns within Canada, particularly around suicidality, remain unaddressed. Their study revealed

that 40% of adolescents between the ages of 15 and 18 who were diagnosed with depression and 50% with suicidality did not receive any services. Another study examining the patterns of service utilization among children and youth found that those categorized as having a disruptive disorder received more mental health services than those who suffered from depressive disorders (Wu et al., 1999). Further, there was a greater perceived need to seek treatment by parents for those children with disruptive disorders than those with other symptoms (Wu et al., 1999).

Service utilization, aggression and psychiatric co-morbidity

One of the main reasons for referrals to children's mental health agencies is aggression, with over half of emergency room referrals serving youth (Campbell, 2006; Dean et al., 2007; Margulies & Carlson, 2012). While latency age children comprise the greatest number of referrals to emergency rooms for aggression, only 5% of the referrals include preschool age children (Margulies & Carlson, 2012). Aggressive behaviours are often exhibited across a variety of psychiatric disorders. For instance, children who display aggressive tendencies often exhibit socially withdrawn behaviours (Campbell, 2006; Margulies & Carlson, 2012). The suggested reason for this is because children displaying such behaviours tend to be harder to manage and are considered to be more of a problem. This reinforces the unmet needs for children who are displaying different symptoms such as social withdrawal and other various internalizing disorders linked with aggression (Campbell, 2006). Individuals diagnosed with conduct disorder tend to exhibit high levels of co-morbidity with other conditions such as ADHD, anxiety, depression and substance use (Loeber & Keenan, 1994). Consequently, it is difficult to classify aggression as it is common to a variety of disorders such as bipolar, conduct disorder,

mood disorder and ADHD (Edelsohn et al., 2003; Margulies & Carlson, 2012). This suggests that high levels of aggression in conjunction with comorbid psychiatric disorders increase the likelihood of complex service usage. Developing a further understanding of aggressive typologies to better understand its symptoms as well as service allocation will aid in appropriately connecting children and youth to the necessary resources. This may also provide clarity and understanding of children displaying a variety of behaviours before an escalation occurs.

Emergency room referrals

Referrals to emergency rooms have been identified as a crucial access point for children in need, particularly with mental health problems (Davidson, Kutcher, Manion, McGrath, & Reynolds, 2010), especially those exhibiting out-of-control, aggressive behaviors that often reflect reactive symptomology. To date, there is no national data on children and youth service use for mental health or for wait times, which adds to the lack of knowledge currently available about our Canadian mental health system (Davidson et al., 2010). There is further little knowledge around what specific behavioural typologies are receiving such referrals. Research has noted an increase in rates for referrals of children and youth to mental health interventions due to aggressive, antisocial and suicidal behaviours, with rates of aggressive behaviour exhibited by 25-90% of patients (Connor, 2002). There is a scarcity however with respect to what typologies of aggressive behaviour are yielding what types of referrals. Moreover, it has been noted that boys tend to have more psychiatric emergency visits (58%) in comparison to their female counterparts (42%), with 37% of visits including some type of aggressive or violent behaviour (Edelsohn, Braitman, Rabinovich, Sheves, & Melendez,

2003). Similarly, youth had the highest number of visits, followed by children between the ages of 6 and 12 (Edelsohn et al., 2003). Understanding the subtypes of aggression will allow us to predict the needs for referrals and facilitate triaging and prioritizing in a more timely and cost-efficient manner. Data from this province-wide study will begin to add to the picture of what service use for children and youth looks like in this country.

Service utilization and sex differences

Research has noted that female youth have a lower incidence of CD and ODD, though this prevalence is lower, the symptoms are more extreme (Underwood, 2003). This is referred to as the “gender paradox” by which, in this case, girls exhibiting disruptive behaviour tend to have more severe symptoms with high comorbidity of the symptoms noted above (Loeber & Keenan, 1994; Tiet, Wasserman, Loeber, McReynolds, & Miller, 2001; Underwood, 2003). Further, incarcerated girls had a higher tendency to have multiple psychiatric diagnoses and mental health problems alongside higher rates of suicidal ideation and attempts compare to boys (Odgers & Moretti, 2002). This finding would suggest a higher likelihood of deviant behaviours in females with conduct disorders compared to males. Preferential treatment for young men has been found whereby female youth tended to receive informal services (Cheung & Dewa, 2007). In line with the gender paradox, Loeber and Keenan (1994) suggest that risks such as suicide are higher for female youth with conduct disorder as well. Tiet et al. (2001) found that girls tend to have as many needs and symptoms as boys when covert problems are included in the definition of conduct disorder. Overall female youth involved with delinquent behaviour tend to display more significant patterns of symptoms, with some research implying greater externalizing behaviours compared to delinquent boys

(McCabe, Lansing, Garland, & Hough, 2002). Therefore, while statistics reflect a higher frequency of behavioural and disruptive disorders in boys, it is the girls who fall into this category that are most at risk.

It has been suggested that the concern around the gender paradox reflects the fact that the referral system tends to be more attentive to the needs of male youth (Tiet et al., 2001). As a result, girls are only receiving such services when they are demonstrating extreme deviance and disruption. This study will further drive the examination of aggressive typologies with respect to biological sex and offer a clearer picture of when female youth are referred. This could further offer insight into what in particular are driving the large amounts of costs when treating female youth. Considering the typologies of aggression will also be useful in comparing whether one gender is actually “more deviant” than another or whether their behaviour is simply exhibited differently.

Service utilization in youth justice settings

Tracy, Kempf-Leonard and Abramoske-James (2009) reported that girls tend to be arrested for less serious crimes than boys. Female youth were more likely to receive more serious charges in court for offenses or violations and were more likely to be detained (Tracy et al., 2009). Tracy et al. (2009) noted that girls are much younger in age when they are placed in correctional facilities compared to boys. They are also placed in residential settings for offenses far more than their male counterparts, who commit more serious offenses prior to entering a similar setting. Similarly, Odgers and Moretti (2002) noted that girls exhibiting behaviours associated with conduct disorder were placed in foster care and other facilities earlier than boys. Craig et al. (2011) found that delinquent girls were more expensive than delinquent boys in society, with criminal justice costs

doubling those of boys. It was argued that these higher rates for girls were reflective of their disproportionate involvement with medical care, court and other legal costs (Craig et al., 2011). Overall, these results suggested that the criminal justice system treats male and female youth differently for aggressive and disruptive behaviours whereby it appears girls are treated more punitively.

Finally, a comprehensive body of research highlights the overrepresentation of youth with mental illness in the justice system. Therefore, youth who display aggressive behaviours are more likely to be charged and treated for mental health reasons within the youth justice system (Odgers, Burnette, Chauhan, Moretti, & Reppucci, 2005; Yampolskaya & Chuang, 2012). In particular, Yampolskaya and Chuang (2012) note that youth are five times more likely to be involved in the justice system when they had a diagnosis of conduct disorder. Another noteworthy finding indicated that children who had any psychiatric diagnosis had a higher rate of criminal recidivism over time (Yampolskaya & Chuang, 2012). The literature has highlighted that the juvenile system tends to exacerbate issues for youth and bring about several more challenges within the institution such as more violence (Defense for Children International, 2007). Odgers et al. (2005) emphasizes the lack of evidence-based practice and useful strategies to help youth at-risk. In sum, a better screening tool to identify and effectively assess and refer youth in need to appropriate services is required, particularly before they become involved with the justice system and increase costs for themselves and their community exponentially.

Service utilization in educational settings

Research to date has explored the use of educational institutions as a main source of receiving mental health services for children and youth (Burns et al., 1995). Burns et

al. (1995) found that schools were the main source of care for children in their sample, who tended to receive service from their school counsellor or school psychologist. Further, only 11-13% of their participants received any care from the medical/clinical sector, while the justice and welfare sectors provided mental health services to very few overall (Burns et al., 1995). It is important to note that the services that were provided tended to be with children who had more severe symptomology, nonetheless still less than half of the more severe group still received no services (Burns et al., 1995).

Aggression and restraint use

Aggressive behaviours in mental health facilities tend to lead to medication and restraints (Canadian Institute for Health Information, 2011). The literature highlights the high costs associated with the use of restraints (Lebel & Goldstein, 2005; Phillips, Hawes, & Fries, 1993). It further indicates an increased need in the use of restraints with male youth (Delaney & Fogg, 2014; Jacob et al., 2015). Specifically, male youth tend to be in restraints for a longer period of time than their female counterparts (Jacob et al., 2015). Phillips et al. (1993) first noted the decrease in cost when the use of restraints was lowered. This is due to a variety of reasons that include reduced need for staff involvement and fewer injuries. In a more recent study, an adolescent inpatient service was explored to assess the costs of using restraints on such a population (Lebel & Goldstein, 2005). Their study revealed that reduction in restraint use led to a reduction in staff time and costs for staff, reduced number of injuries for both staff and youth, reduced staff turnover and sick time, as well as improved outcomes for the youth (Lebel & Goldstein, 2005). Specifically, when calculating the costs of restraints, the authors considered time, duration, and number of staff required. When decreasing restraint usage

from 3,991 to 373 in a year, costs were reduced by 92% (\$1,446,740 to \$117,036) (Lebel & Goldstein, 2005). Further, staff time spent on restraints was reduced from 23% to 4%, with greater time spent on programming for the youth and relationship building (Lebel & Goldstein, 2005). In particular, there was a 98% reduction in days missed as a result of staff injury (Lebel & Goldstein, 2005). Finally, the change in restraint use allowed for effective change in debriefing and the addition of prevention strategies (Lebel & Goldstein, 2005).

The Maryland Youth Practice Improvement Committee developed a scientific report to manage acute aggression in youth (dosReis, Barnett, Love, Riddle, & Maryland Youth Practice Improvement Committee, 2014). They established three levels of aggression and treatment to reduce the use of restraints. The first level targets autonomous youth with the possibility for aggressive tendencies while the second is for youth who may cause imminent violence. This treatment targets specific symptoms and may include the use of medication and consider providing the treatment in various environments. Finally, the third level occurs when the safety of others is of imminent importance and the aforementioned interventions have not been effective (dosReis, Barnett, Love, Riddle, & Maryland Youth Practice Improvement Committee, 2014). Understanding the needs of the child based on imminent risk can circumvent aggressive incidents, prevent restraint use, reduce injuries and ultimately reduce costs.

Types of treatment

As noted above, there is little research that focuses on the subtypes of reactive and proactive aggression with respect to service utilization and its various moderators. Some literature notes that when treating aggression, focus tends to be on treating behavioural

symptoms and comorbid diagnoses, and addressing the lack of response to various treatments (Bastiaens & Bastiaens, 2006). Further, the need to meet the child in his or her own setting was indicated to effectively observe their behaviour and other associated factors for multi-systemic therapy to occur. It is believed that this would be effective in reducing arrests rates and improving level of functioning for youth in the justice system, among other settings (Bastiaens & Bastiaens, 2006).

Dean et al. (2007) conducted a study to evaluate the effectiveness of behaviour management programs to reduce aggressive behaviours in inpatient youth. This organizational approach included individualized plans, staff training, positive reinforcement, all using the least restrictive measures possible (Dean et al., 2007). Their results showed that such a program was successful in not only reducing aggressive tendencies but also staff injuries, need for restraints and seclusions, and security services (Dean et al., 2007). If properly implemented such an intervention could reduce costs of using restraints, injuries caused and turnover in staff (Dean et al., 2007). Additionally, they recommend engaging the family and entire team in all aspects of treating the aggressive behaviour (Knapp et al., 2012).

Further research has noted in-home and family-based therapies as being most effective for young, aggressive children (Bastiaens & Bastiaens, 2006). Such a multi-systemic approach on treatment was shown to improve both arrests rates and overall functioning (Bastiaens & Bastiaens, 2006). Yates et al. (2010) evaluated a long-term cognitive skills inpatient program named STAIR. Overall, a significant decrease in arrests and hospitalizations were noticeable with 21% remaining stable over 5 years after the treatment, while the other patients experienced re-arrests, re-hospitalization, or both.

Treatment approaches for aggressive behavior are varied and some have included psychotropic medication. For example, Bastiaens and Bastiaens (2006) have found that, though common in adult violent behaviour, there is a lack of evidence for drug treatment and the use of antipsychotics for youth when associated with aggression and underlying psychiatric disorders. Further, Knapp, Chait, Pappadopoulos, Crystal, and Jensen (2012) describe the increased use of medication for aggressive behaviour including antipsychotics and mood stabilizers, though there is minimal research to support its efficacy. Some research still supports medication compliance as the most effective long-term treatment, particularly for criminal behaviour (Bastiaens & Bastiaens, 2006; Yates, Kunz, Khan, Volavka, & Rabinowitz, 2010).

A clear picture of what services are being geared towards the youth based on their aggressive behaviours within a Canadian context is needed. This would enlighten service providers and policy makers of ways to not only ensure effective treatment but also reduce costs that arise from hospitalizations, arrests and violent occurrences.

Health care practitioners

Bastiaens and Bastiaens (2006) have further discussed the various types of health care provided to aggressive youth. Their research found that it was psychologists who delivered treatment and evaluation services to those exhibiting childhood-onset and reactive aggression. Further, Cheung and Dewa (2007) did not find any sex difference in overall service use for mental health services. They did find a statistically significant gender difference for participants with depression and suicidality whereby female participants were more likely to use services particularly from general practitioners, social workers and counselors. While it is evidenced that psychiatrists tend to only be

accessed in the most extreme cases, they are often requested for the assessment of reactive aggression (Bastiaens & Bastiaens, 2006).

Current Study

There is a paucity of research examining service utilization in relation to aggression in youth, particularly when addressing the typologies of reactive and proactive aggression. The literature is scarce with respect to the examination of differential service allocation for children and youth who present with different aggressive behaviours. Of importance, previous literature has demonstrated that female youth only receive services once their situation has escalated and has become extreme (McCabe et al., 2002). This research needs to be further investigated in order to offer practical assessment and treatment guidance. The literature highlights that using only one dimension to study and define aggression exhibited by children and youth prevent us from appropriately meeting their needs (Dodge & Coie, 1987).

As a result the current aims of this study is to: 1) Assess whether sex is linked to differing rates of aggression in a sample of clinically-involved youth. There is currently varying findings on aggressive behaviours between sexes, though most research has demonstrated that males tend to have a higher frequency and intensity in aggressive behaviours compare to their female counterparts. It is therefore hypothesized that males will have higher rates of aggressive behaviour in comparison with female participants. 2) Examine rates of proactive versus reactive aggression including those who overlap into both trajectories will be assessed. The literature has highlighted that the two subtypes of reactive and proactive aggression are theoretically different. This study hypothesizes that

reactive aggression will be more common and expects to see a substantial number of participants who overlap into the comorbid typology as noted in previous literature.

3) Further assess variations in service utilization across sex by addressing key differences with respect to dominant subtypes of aggression that have been noted based on the individual's age at the time of the aggressive behaviour. Particularly, reactive aggression has been demonstrated more in younger children due to its association with emotion dysregulation (Connor et al., 2004). Hence, it is hypothesized that younger children will tend to display more reactive styles of aggression than older children. 4) Finally, to conduct a valuable examination of subtypes of aggression and service utilization within child and youth mental health facilities and their relation to age and biological sex. A final hypothesis expects that comorbid aggressive youth, those overlapping in both typologies, will have higher costs and use higher intensity services than those falling into an individual subtype.

Overall, the predominant research question for this study is to determine how subtypes of aggression (reactive, proactive or comorbid) present for service allocation and cost. This study will contribute to the knowledge of assessing and differentiating subtypes of aggression using the interRAI ChYMH instrument. This will provide essential information in regards to service utilization and complexity for youth exhibiting these particular types of aggression. Due to the scantiness of information for resource allocation for subtypes of aggression, this study will make a significant contribution to the field in assisting services providers to do so. Overall this research will provide implications for policy, evidence-based practice, and service delivery.

Method

Design

This descriptive field study aimed to differentiate between aggressive behaviours in a convenience sample of clinically referred youth. The study utilized items from the existing data set of the interRAI ChYMH. These items were selected in an adhoc manner to depict the two constructs of reactive and proactive aggression. Using this data, the study measured both the prevalence of the aggression subtypes and identified differentiating correlates between them. Similar to Connor et al. (2004), this between-group study incorporated a cross-sectional design to examine the prevalence of each type of aggression and establish correlates within each. Finally, the subtypes of aggression were compared to examine potential differences in service utilization and complexity among the samples. The research was approved by the Western Research Ethics Board (REB: #106415) and used a pre-existing dataset. It is important to note, however, that any determined relationships from this study do not infer causality.

Participants

The participants consisted of 1283 youth from 20 sites across the Province of Ontario. Of this sample 35.4% ($n = 454$) were female and 64.6% ($n = 794$) were male. The participants ranged in age from 4 to 18 years ($M = 11.18$, $SD = 3.44$). The data utilized in this thesis was collected from November of 2012 to September of 2015 and were all date stamped.

All data collected from each participant are stored on a secure server at the University of Waterloo. Each participant was randomly assigned a case record number

unique to that individual. Therefore, there were no personal identifiers collected or stored on the server. The lead interRAI developer (Dr. Shannon L. Stewart) received the de-identified data on a quarterly basis. This data was stored on a standalone computer that has no USB ports or access to the Internet. It is further password protected in the lead investigator's locked laboratory.

Measure

This research utilized a multi-source approach to assessment employing the interRAI Child and Youth Mental Health Instrument (Stewart et al., 2015) within the interRAI suite, a well-validated suite that develops comprehensive assessment systems for vulnerable individuals. It can be used for children and youth between the ages of 4 and 18 years and identifies risks, needs and strengths of the individual (Stewart & Hirdes, 2015). The interRAI ChYMH is based on a semi-structured clinician-rated interview that covers a range of common issues in child and youth mental health. The clinician creates a clinical profile of the children and youth based on a collection of reports, observations and judgments made from interactions with the family, the children and youth themselves, and any other appropriate service providers with appropriate consent (Stewart, Currie, Arbeau, Leschied, & Kerry, 2015). With the aim of improving continuous care, the instrument allows for effective care planning and communication between service providers and across service sectors (e.g., health, youth justice, mental health, education). It is important to note that interRAI instruments are not diagnostic tools but, rather, a needs-based assessment that can be used across an extensive array of care settings (Stewart et al., 2015). A supplement to the interRAI ChYMH is available for

adolescents who are over the age of 12, or who are under the age of 12 who are engaging in more adolescent-like risk taking behaviours (Stewart et al., 2015).

The interRAI ChYMH consists of several items that assess mental health, functioning and behaviour risk. It provides for useful communication with all health care and service providers with respect to care planning and options for treatment. It also allows for the care providers to effectively respond to the needs of both the client and their family. The instrument evaluates over 400 clinical elements and is made up of 22 scales. This study used items from the Risk of Harm to Others Scale (violent ideation, intimidation of others or threatened violence, violence to others, and preoccupation with violence) and the Disruptive Behaviour Scale (socially inappropriate or disruptive behaviour, destructive behaviour towards property, and outburst of anger) to determine both reactive and proactive typologies.

One of the applications available with the interRAI Child and Youth assessment suite includes 29 Collaborative Action Plans (CAPS). These CAPs are used to inform clinical decision-making and notify the practitioner of any imminent needs. Items within the ChYMH are used to trigger certain CAPs to measure needs for care planning. This also assists with prioritizing the client's needs and service recommendation. CAPS of interest for this particular study include Social and Peer Relationships, Substance Use and Interpersonal Conflict based on the literature noted above that considers aspects of each of these to be presenting problems related to either reactive or proactive aggression.

The interRAI suite of instruments has presented strong psychometric properties for adults (Burrows, Morris, Simon, Hirdes, & Phillips, 2000; Martin et al., 2007; Morris, Carpenter, Berg, & Jones, 2000; Morris et al., 1997; Perlman & Hirdes, 2008). Further,

rigorous reliability and validity studies have been conducted for child and youth samples displaying strong psychometric properties for children (Phillips et al., 2012; Phillips & Hawes, 2015; Stewart, Baiden, & Ninan, 2013; Stewart, Currie, Arbeau, Leschied, & Kerry, 2015; Stewart, Klassen, & Tohvner, 2015a, 2015b).

Procedure

InterRAI ChYMH

The interRAI ChYMH instrument was implemented into 20 sites across the Province of Ontario, Canada. Every agency involved selected assessors based on their education (a degree/diploma in child and youth mental health) and two years of relevant experience. The assessors ranged in disciplines including nurses, psychiatrists, child and youth workers, speech and language therapists, developmental workers, social workers and psychologists. These assessors received two and a half days of training on how to administer the interRAI ChYMH and Adolescent Supplement.

Aggressive Typologies

Aggressive typologies were determined based on constructs within the literature. Items indicative of reactive and proactive aggression were developed into typologies based on Dodge and Coie (1987). These classifications were established based on previous literature on reactive and proactive aggressive behaviours (See Appendix A). To determine the items that were utilized within each typology, an extensive review of the literature was first conducted to ensure the face validity of the proactive and reactive aggression. With consultation, items representing proactive and reactive aggression were identified from the instrument and the assessor manual. Any items that specifically addressed intent and were characterized as purposeful and deliberate were addressed as

proactive while those items that were not characterized in this way but rather provoked and explosive were identified as reactive. With respect to reactive aggression, the following interRAI ChYMH items were included: Socially Inappropriate/Disruptive Behaviour, Destructive Behaviour towards Property, Outbursts of Anger, and Argumentativeness. Proactive aggression was identified using the following items: Violent Ideation, Intimidation of Others, Violence to Others, Cruelty to Animals, and Preoccupation with Violence. Those youth who presented with both Proactive and Reactive aggression (as noted from the items on the interRAI ChYMH) were identified as Comorbid. Once the data was differentiated into their groups (Reactive, Proactive, and Comorbid), the allocated services for each participant were examined. Items such as Verbal Abuse and Physical Abuse were excluded from any typology as such items risked overlapping into both proactive and reactive descriptives.

A total of 526 participants were triggered as fitting the Reactive Aggression typology (41% of the sample). Of this group 60.5% were male and 39.5% were female. Further, 609 participants were categorized as the comorbid group (47.5% of the sample) as they triggered items from both individual typologies and consisted of 28.7% females and 71.3% males. The number of proactive only participants was rare and because it was under the threshold of 25 further analyses were not conducted with this particular subset. All participants in this study were English speaking therefore this study excludes non-English speakers. To avoid steering away from the scope of the project, any participants that had developmental disabilities were also excluded from the study. Overall, this is a suitable sample for this research due to the various types and aspects of aggression that can be identified from items on the interRAI ChYMH assessment.

Service Utilization

Service utilization was determined using specific items from the instrument (See Appendix B). An entire section of the interRAI ChYMH is dedicated to Service Utilization/Service Complexity. The instrument codes for the professional care provided to the child in the last three years. The interRAI ChYMH defines care as any “direct services provided to the child or youth and the management involved in providing the care that was received.” This care has to have been provided for at least 15 minutes in a day. In addition, any professionals and type of treatment provided to the child are both coded. This is coded based on contact in the last seven days to no contact in the last three years. Professional care sought includes seeing a psychiatrist, psychologist, social worker, occupational therapist, behavior therapist, recreation/play therapist, registered nurse, child/youth counselor, child protection, speech pathologist or dietician. For the purpose of this and related studies on service utilization, to determine costs, services were weighted based on the professional care obtained in treatment. Weighted costs were based on salary grids ranging from psychiatrists being the most costly, followed by psychologists, social workers and so forth (Stewart, Hirdes, & Poss, manuscript in preparation).

With respect to treatment, interventions received were coded based on whether they were *received for the last seven days to not offered/received in the last 30 days*. These included life skills training, social skills, family functioning, anger management, behaviour management, crisis intervention, family preservation, family support, and medication management. Finally, whether formal case management and any medical care have been received was also addressed.

A service complexity variable was developed for the purpose of this study. This variable was constructed using eight individual flags which consisted of number of lifetime admissions, case management, two or more hospital visits or stays, having had at least three or more of the focus interventions listed on the interRAI in the last 30 days, as well as seeing any of the following professionals at least twice in the last 30 days: a psychiatrist, a social worker a psychologist or psychometrist, and child protection. This resulted in a score ranging between 0-8. These scores were then dichotomized whereby anyone with a score of 0-2 was identified as not having service complexity and those with a score of 3-8 were identified with service complexity.

Ethical Considerations

All data was obtained from a secondary de-identified database. For additional protection, no data with groups under 25 will be reported. Data was encrypted on a password protected stand-alone computer that was not connected to the Internet and had no functioning USB port.

Results

The following statistical analyses were conducted to obtain a more clear understanding of service utilization and subtypes of aggression. Frequencies for each pre-determined subtype of aggression were first established amongst the youth. The children and youth were first assessed as either displaying RA, PA, comorbid RA/PA, or determined to be non-aggressive. In maintaining ethical integrity in confidentiality, this study will not be reporting on findings specific to proactive aggression due to its small sample size (below the threshold of 25 participants).

After this restriction, the total data set consisted of 1283 participants. Table 1 shows the breakdown of the divided groups within the sample. Overall, 148 youth did not exhibit aggressive behaviours based on the preselected items noted above. The non-aggressive sub-sample served as a reference group for purposes of the analysis. The remainder of the sample consisted of 526 RA and 609 identified as comorbid RA/PA.

Table 2
Descriptive Statistics for Typologies.

	<i>N</i>	%	Male <i>N</i>	%	Female <i>N</i>	%	Age <i>M</i>
Overall	1283	100	829	64.6	454	35.4	11.18
Reactive	526	41	318	38.4	208	45.8	10.64
Comorbid	609	47.5	434	52.4	175	38.5	11.60
Non-Aggressive (RG)	148	11.5	77	9.2	71	15.6	11.38

RG = Reference Group

Of the 1283 participants, the sample was predominantly male, 64.6% (n=829). Table 1 shows that male participants were more predominant in every aggression subtype, though the comorbid typology was the most common constellation of behaviours overall. Further, the average age of participants was 11.18 with a standard deviation of 3.44. Interestingly, older youth displayed more comorbid aggression than younger counterparts.

Bivariate Analyses

Bivariate analysis was used to determine the association between service complexity and predictor variables of aggression, age and sex.

For all analyses, the Bonferroni correction was used to reduce the likelihood of Type 1 error. Chi-square analyses were conducted to assess differences between subtypes and establish differential patterns of behaviour. The first chi-square determined whether sex was linked to particular types of aggression. This revealed a significant relationship between sex and the reactive group, $X^2(1, N = 526) = 6.741, p < .001$, with males exhibiting higher rates of reactive aggression than females. A significant relationship was also determined between sex and the comorbidly aggressive group, $X^2(1, N = 609) = 22.423, p < 0.001$, with males exhibiting higher rates of comorbid aggression than females. Finally, sex was found to be significant for the non-aggressive group as well, $X^2(1, N = 148) = 11.593, p < 0.001$, indicating that aggression was more common for both sexes than non-aggression. While the bivariate analyses reveal significance, it will be the multivariate analyses below that provide a clearer picture of aggression.

A goal of this study was to assess differences in aggression based on age. A one-way ANOVA was performed to determine whether there was statistically significant difference for age between aggressive subtypes. A main effect was found $F(2, 1280) = 11.325, p < .001$. The Tukey post hoc test identified that age was significantly lower when the participant was exhibiting reactive aggression ($M=10.64, SD = 3.44, p < .001$) compared to those who had a comorbid type of aggression ($M=11.60, SD = 3.24$). The Tukey post hoc test also indicated that children who exhibited reactive aggression were significantly young than their non-aggressive counterparts ($M=11.38, SD = 4.01, p = .05$).

An independent samples *t*-test was also performed to examine age and service complexity. A significant difference was found between those who had experienced service complexity ($M=13.4, SD=3.4$) and those who had not ($M=11.1, SD=3.4$); $t(1281)$

$= -5, p < .001$ indicating that service complexity is related to increasing age. Interestingly, no differences were found between sex and service complexity, $X^2(1, N = 1283) < .001, p = .975$. Of the sample, those who were identified with comorbid aggression had greater levels of service complexity, $X^2(1, N = 609) = 23.386, p < .001$, while less of those who were reactive experienced greater levels service complexity, $X^2(1, N = 526) = 18.316, p < .001$. Finally, no association was found between the non-aggressive reference group and service complexity, $X^2(1, N = 148) = .941, p = .332$.

Multivariate Analyses

Additionally, analyses were completed to determine the service complexity required for each sub-type of aggression by exploring how the subtypes of aggression predict service utilization using the following moderators: biological sex and age. A logistical regression analysis was conducted to determine whether reactive and comorbid aggression predicted particular types of service utilization.

To determine service complexity, a binary logistic regression was used to see if aggression, age and sex could predict service complexity as seen in Table 2. This model displayed a significantly better fit to the data than the constant model, $\chi^2 = 46.902, df = 4, p < .001$. This indicated that the predictor variables of age, sex, and aggression as a model were able to discriminate between those who had service complexity and those who did not. Further, a goodness of fit model was demonstrated with a non-significant Hosmer and Lemeshow test, $\chi^2 (n=757) = 13.624, df = 8, p = .092$. The model correctly classified 95.8% of the participants. There was no significant association between sex and service complexity, $Wald = .004, df = 1, p = .950$, nor was there with reactive aggression, $Wald = .652, df = 1, p = .419$. Of importance, those exhibiting the comorbid type of

aggression were almost three times more likely to have service complexity, $Wald=3.985$, $df=1$, $p=.046$. With respect to age, older participants had a higher likelihood of service complexity of 1.2 times, $Wald=18.843$, $df=1$, $p<.001$.

Table 3
Logistic Regression for Aggression and Service Complexity.

Predictor	β	Wald Chi-square	Odds Ratio (Exp β)	<i>P</i> value	95% Confidence Interval
Sex	.019	.004	1.019	.950	[.562-1.847]
Age	.202	18.843	1.224	.000	[1.117-1.341]
Aggression					
Reactive	-.517	.652	.596	.419	[.170-2.091]
Comorbid	1.078	3.985	2.939	.046	[1.020-8.472]

Hosmer-Lemeshow G.O.F. (sig) = 13.624 ($p<0.092$)
C statistic = 0.958

Discussion

Findings

The current study explored how subtypes of aggression predict service utilization, specifically service complexity. To date, there is a paucity of research examining various types of aggression and service utilization. While much research to date has explored aggression and service utilization (Dean et al., 2007; Kataoka et al., 2002), very few studies have addressed the various styles and behaviours of aggression. The following will address previous literature in comparison to the current findings, discuss clinical implication for practice, strengths and limitations of the current study, and future directions for research.

Differences among sex.

One aim of this study was to examine sex differences in aggression. As evidenced above, the bivariate analyses did show a significant relationship between sex and both reactive and comorbid aggression.

When multivariate analyses were conducted using logistic regression, sex was not predictive of service complexity. This raises questions around why sex was significant in the initial analysis but not in the logistic regression model. It is possible that it is not sex that predicts costs but equally concerning behaviours exhibited differentially by males and females that are driving the cost. For instance, suicidality and cutting behaviours have been found to be more prevalent among females over males (Canetto & Sakinofsky, 1998). It is possible that psychiatric conditions that tend to occur alongside aggressive behaviours are more prevalent in female children and youth and may be driving service costs, however more research in this area is needed. While this contradicts results found in many studies with non-referred samples (Pulkkinen, 1996), this study found similar results to Connor et al.'s (2003) study of clinically-referred youth that found no sex difference among types of aggression. They suggest that this could be due to the fact that aggressive tendencies do not discriminate once risk and need are high. When looking at the specific data there was no sex difference in prevalence rates for those identified as having service complexity.

Cheung and Dewa (2007) posited that male youth receive preferential treatment when it comes to services. Literature has found that while girls tend to be less aggressive, when they do exhibit aggressive behaviours they are more severe. For instance, girls demonstrating aggression or conduct disorder have a higher likelihood of experiencing

comorbid conditions such as anxiety, substance abuse, depression and several other mental health problems (Loeber & Keenan, 1994; Odgers & Moretti, 2012). Therefore, girls may require more individualized and formal services due to higher-risk which could include cutting or suicidality.

Service Complexity and Age

An additional goal of this study was to determine the association between service utilization and the age of the participants. When examining the mean age of those who had complexity versus those who did not, participants who were identified as having such high resources were significantly older than those who had not (13.4 versus 11.1). Further analyses indicated that older youth exhibited higher levels of service complexity. Specifically, older children and youth were 22% more likely to receive complex services. Other research on service utilization and age has found that levels of aggression increased with age for both sexes (Tremblay, 2002). It also has reported that it is older children and youth that tend to experience more emergency referrals and visits (Edelsohn et al., 2003; Margulies & Carlson, 2012). There are a few reasons that this could be. It is possible that with age comes more strength and ability to become harmful with one's aggression requiring more intensive services and support. In general, a small, aggressive child is easier to manage than a larger youth. It is also possible that other aspects are driving costs such as suicide and self-harm that generally surface in adolescence.

Reactive Aggression and Age

This study hypothesized that reactive aggression would be more common in those who were younger, compared to older counterparts. A significantly lower mean age of 10.64 was found compared to the non-aggressive and comorbid groups. This is

supportive of previous research that also states reactive children tend to be younger than other groups (Connor, 2002; Connor et al., 2004). Researchers have stated that younger populations have been significantly linked to reactive aggression due to a lack of ability to regulate emotions effectively (Card & Little, 2006). In their study, Marsee and Frick (2007) also found that only reactive aggression was associated with poor emotion regulation. It is possible that reactive behaviours are more common at this developmental stage and dissipate due to a youth's growing ability to plan and deceive as they develop cognitively in older age (Connor et al., 2004). This knowledge could be essential to understanding how to approach and treat children and youth displaying more reactive behaviours while also exploring whether reactive aggression remains longitudinally or tends to dissolve over time.

Comorbid Aggression

Finally, this study hypothesized that children identified as comorbid in aggressive typologies would yield higher costs and more intensive services than either proactive or reactively aggressive children. This data indicated that those children who exhibited comorbid aggression were 2.9 times more likely to have service complexity. Once again, those children who were not aggressive did not seem to have a significant relationship with service complexity. As suspected the comorbid group had the most cases of service complexity. This is supportive of other research that found a high number of individuals who met criteria for both reactive and proactive (Frick & Marsee, 2006; Poulin & Boivin, 2000). These authors labeled those meeting both of these criteria as being very aggressive.

Proactive Aggression and Psychopathy in the Literature

The intent of this study was to examine subtypes of proactive aggression. However, due to the unexpected small sample size, this analysis was unable to be carried out. Overall, the data in this study revealed that children who are proactively aggressive are not receiving care in sites providing in and outpatient services or simply that proactive aggression, without the presence of reactive aggression is rare. Firstly, it could be assumed that these children are benefitting from alternative services that prevent a child from reaching clinical services. The fact that there are so few proactively aggressive children could relate in some way to children from clinical settings and their high level of co-morbidity. Vitiello and Stoff (1997) discussed the degree of coexistence within subtypes in their research that was evident in this study. They also suggested that individuals who display proactive traits may be less likely to receive psychiatric care which is a possibility in this case as well.

Literature to date does note that behaviours related to proactive aggression are more common with age (Connor et al., 2004) though there are conflicting studies suggesting that psychopathic traits in fact express themselves in both older and younger populations (Forth & Mailloux, 2000). While this cannot be reported on, a possibility is that the few individuals who did score as purely proactive were older and approaching adulthood. Another possibility is that issues lie in the procedure of completing the assessment, specifically in the ways that the assessors coded aggression. It is possible that the assessors are inherently disinclined to infer intent in childhood. While Lynam (1998) has noted an increased interest in identifying psychopathy early in life due to the extreme costs that such behaviours leave to society, it could be argued that, with this study's

results, assessors and professionals remain hesitant to put such a stigmatizing label on children and youth. Boccaccini, Murrie, Clark, and Cornell (2008) note the caution given by many professionals in administering a psychopathy assessment to a youth due to not only a lack of valid research but also out of concern for an increased bias by the system in their processing of youth offenders. While the current study consists of a sample of clinically-referred youth and not of young offenders similar concerns around diagnoses and labels at a young age may still be present. Of course, there is also the possibility that this study defined typologies that do not reflect real clinical issues or that these subgroups are not clearly delineated in clinical samples.

Finally, it is important to acknowledge the resemblance to rates of psychopathy within society. While psychopathy was not assessed in this study, literature has found a strong link between proactive aggression and callous, uncaring traits related to psychopathy (Frick et al, 2003; Kimonis et al., 2014; Marsee & Frick, 2007; White et al., 2015). In line with this, proactive aggression is described as a deliberate and unprovoked act. Research has suggested that proactive aggression may be an indicator of psychopathy (Kolla et al., 2013). Coid, Yang, Ullrich, Roberts, and Hare (2009) found that, while psychopathy is prevalent among particular populations such as those found in the justice system, their sample from the general population identified that less than 1% demonstrated levels of psychopathy. Neumann and Hare (2008) found that 1-2% received a score that indicated potential psychopathy in a random sample of individuals aged 18-40. As explained by Coid et al. (2009) the psychopathy score was most likely elevated as a result of their sample being from a community with elevated crime and an older age range. They further noted that in the general population a majority of individuals have no

psychopathic traits, while others have low values, with a small subset demonstrating severe related behaviours (Coid et al., 2009). Other research has found similar results with prevalence rates of psychopathy among university students ranging between 1-5% with a tendency to favour males over females (Forth, Brown, Hart, & Hare, 1996; Salekin, Trobst, & Krioukova, 2001). Considering that this is not a justice sample and that levels of psychopathy and proactive aggression are rarer in children, and that psychopathy is only linked to proactive aggression, the small number of proactive participants found in this study are reflective of previous research findings.

Clinical Implications

The current study has multiple implications for health care professionals, particularly psychologists, counsellors and social workers. It reflects the importance and implications of treating various aggressive behaviours differentially. The aforementioned results are supportive of previous research that highlight earlier onset for those displaying reactive aggression. Clinicians and health care professionals should be aware of key differences and needs based on types of aggression being displayed. It also further presented curiosity into where those exhibiting proactive behaviours are residing. Service complexity being associated with comorbid aggression demonstrates the higher need associated with such behaviours. Perhaps earlier identification of aggressive subtypes could ensure earlier intervention. Being aware of and treating various signs of aggression subtypes in early childhood would aid in reducing cost to the system and to improve outcomes for children and youth in the long-term. As noted by earlier researchers (Dodge & Coie, 1987), using only one dimension to study aggression is doing a disservice to clients by the complexity and differential data that each subtype of aggression appears to

yield. Service providers should remain cautious when attempting to define aggressive typologies. Previous research notes the various definitions of these subtypes when trying to assess aggressive behaviour and this may lead to various prevalence rates as with the exceptionally low rate of purely proactive participants in this study. It is important that the diverse range of behaviours and symptoms linked to both types of aggression are considered during initial assessments. We must shift focus to strategies that can help support children and youth exhibiting various types of aggression, particularly those demonstrating a comorbid typology as this study revealed a much higher frequency of such participants. Being considerate of the psychiatric conditions and level of complexity that tend to be associated with the subtypes will play a role in treatment as well as they appear to be more linked to complexity and cost rather than sex differences. Overall, there is still a vast amount of research needed to understand the complexity around aggressive behaviours and their most effective treatments.

Strengths and Limitations

Among the strengths of this study is the sample size. With a sample of 1238 youth, this limits the potential of outliers having a strong effect and further makes the data more generalizable to broader clinical population. Further, this large sample includes both male and female participants. Though the prevalence of female participants is less than that of males, it still remains a large subset compared to previous studies. Another strength of this study is the instrument used. As noted above, the interRAI ChYMH uses a multi-source approach to assessment where information is received by various sources of information. This provides for a comprehensive report on an individual's experiences to date encompassing a range of important medical and behavioural information.

While the current study has many strengths, there are limitations to note. First, though the overall sample size is a strength, when breaking down sample size into aggressive sub-groups, the proactive subset was unable to be reported on due to its small sample size, and therefore low generalizability. Another limitation is the time frame in which intervention reports were considered. While the formal care provided was obtained over a three-year timeframe (e.g., psychiatrist, psychologist, social worker), the focus of the interventions received (e.g., life skills, crisis intervention, behavioural management) by the participants were reported within a 30 day period. This means any previous services utilized prior to a three-year timeframe were not accounted for. Moreover, the participants were not randomly selected as they consisted of children and youth who consented and had parents who also provided consent to having this assessment completed. Finally, it is important to note that the sample size of the service complex group was substantially smaller than its comparison group representative of non-service complex participants. Hence, the analyses conducted could only utilize a limited number of predictors within the logistic model. There could have been other substantial predictors that dictated costs. However, due to the uneven numbers within the service complexity groups, the analyses were limited in scope.

Future Directions

Literature suggests that there are key physiological, behavioural and gender differences in youth who exhibit aggressive behaviours. Deciphering both similarities and differences between gender in regards to biological sex, and its association with aggression must be further explored. Studies that compare sex and gender with large sample sizes are needed. Future research should also examine variables related to poverty

and how services are accessed as a result. For example, it could be assumed that those who are living below the poverty line do not always have a family physician who could help navigate the variety of services that are available.

It would be interesting to conduct a study that examines aggressive behaviours in children and youth for those who have been assessed with the interRAI Youth Justice instruments. Further, as more children and youth are assessed using the interRAI Child and Youth suite, a similar study should be replicated once a substantial number of proactive only participants are identified. This will provide further insight to those who tend to be proactively aggressive and allow for further comparisons within the sample.

Next steps should examine the actual differences in services received by males and females to determine why, despite the fact that males are more aggressive, costs associated with related services do not differ for males and females. One possibility could be that treatment being provided to girls is geared towards other services and not related to aggression.

Finally, it would also be beneficial to explore the symptoms and diagnoses associated with subtypes of aggression to gain a better understanding of needs and what services are being allocated. Diagnoses such as Fetal Alcohol Spectrum Disorder, that tend to have high prevalence rates in the justice system, would benefit from further exploration with respect to both types of aggression and service utilization.

Summary

Despite the limitations to the current study, it has identified important findings related to childhood aggression and service complexity. The aforementioned findings are in line with previous research that state reactivity is strongly linked to younger children

and youth. Service complexity was more prevalent for those who displayed comorbid aggression than the other groups within this study. Specifically, children and youth who were reactive or non-aggressive had considerably lower rates of service complexity compared to those exhibiting comorbid aggression. Furthermore, there was no significant relationship between sex and aggression when examining these factors in relation to service complexity. Overall, age and the comorbid subtypes were the only predictors identified in addressing service complexity. This information provides new insight into the area of service allocation as well as the complexities of aggressive behaviour. It also emphasizes the importance of addressing and treating clinical youth differentially based on the type of behaviours they exhibit. This study has important clinical implications that will aid health care professionals in understanding the best practice for each child and youth based on the aggressive behaviours they demonstrate.

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Appendix A

Reactive and Proactive Aggressive Typologies based on interRAI ChYMH items

Reactive Aggression	Proactive Aggression	Comorbid Aggression
Socially Inappropriate /Disruptive Behaviour	Violent Ideation	Participants displaying behaviours coded as the items from the interRAI ChYMH (to the left) identified under both typology
Destructive Behaviour towards Property	Intimidation of Others	
Outbursts of Anger	Violence to Others	
Argumentativeness	Preoccupation with Violence	
	Cruelty to Animals	

Appendix B

Coding for Service Complexity with interRAI ChYMH.

Items	Formal Care	Focus of Interventions	Treatment Modalities	Case Management	Hospital Use, Emergency Room Use, Physician Visit.
Instruction	<i>Contact with formal care provider</i>	<i>Code for types of issues that were a major focus of interventions in LAST 30 DAYS (or since admission if LESS THAN 30 DAYS)</i>	<i>Code for treatment modalities used in LAST 30 DAYS (or since admission if LESS THAN 30 DAYS)</i>	<i>Receives formal care coordination services</i>	<i>Code for number of times during the LAST 90 DAYS (or since last assessment if LESS THAN 90 DAYS AGO)</i>
Coding	0. No contact in last 3 years 1. No contact in last 90 days, but contact in last 3 years 2. No contact in last 30 days, but contact 31-90 days ago 3. No contact in last 7 days, but contact 8 – 30 days ago 4. Contact in last 7 days but not daily 5. Daily contact in last 7 days a. Psychiatrist b. Social Worker c. Psychologist, Psychometrist, Psychological Associate d. Occupational Therapist, Physiotherapist e. Behaviour Therapist f. Recreation, Art, Music, Play Therapist g. Registered Nurse h. Child/youth counsellor i. Child Protection j. Speech Language Pathologist k. Dietician	0. No intervention of this type 1. Offered, but refused 2. Not received, but scheduled to start within next 30 days 3. Received 8 – 30 days ago 4. Received in last 7 days a. Life skills training—e.g., communication, money management b. Social skills—e.g., interpersonal skills, etiquette c. Family functioning—e.g., positive parenting, family cohesion d. Anger management e. Behavioural management f. Crisis intervention g. Family preservation—e.g., intensive in-home program h. Family support—e.g., wraparound, respite i. Medication management	0. Not offered and not received 1. Offered, but refused 2. Not received, but scheduled to start within next 30 days 3. Received 8 – 30 days ago 4. Received in last 7 days a. Individual b. Group c. Family or couple d. Self-help /consumer group	0. No 1. Yes	a. Inpatient acute hospital with overnight stay (non-psychiatric) B. Emergency room visit (not counting overnight stay) c. Physician visit (or authorized assistant or practitioner)

Curriculum Vitae

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Education

Masters of Arts, Counselling Psychology Western University, London, Ontario	2014-2016
Victimology Graduate Certificate Algonquin College, Ottawa, ON	2012-2013
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Related Work Experience

Counsellor (Intern) London Family Court Clinic	September 2015– April 2016
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