ATTENTION DEFICIT HYPERACTIVITY DISORDER SYMPTOMS AND NONSUICIDAL
SELF-INJURY AMONG CLINICALLY-REFERRED CHILDREN AND YOUTH

by

Lindsey Dawn Gerrard

A thesis submitted in conformity with the requirements
for the degree of Master of Arts
Department of Applied Psychology and Human Development
Ontario Institute for Studies in Education
University of Toronto

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Master of Arts 2018
Lindsey Dawn Gerrard
Department of Applied Psychology and Human Development
University of Toronto

Abstract

Nonsuicidal self-injury (NSSI; direct and deliberate damage of bodily tissue) is a widespread concern among clinically-referred youth. Individuals with Attention Deficit Hyperactivity Disorder (ADHD) may be at increased risk for NSSI engagement; however, ADHD consists of heterogeneous symptomatology, and there may be differential risk based on varying symptomatology. The current study investigated differential risk for NSSI engagement associated with selected hyperactive/impulsive symptoms and inattentive symptoms in a sample of 1006, 8-18-year-old children/youth from Ontario, Canada. The Children and Youth Mental Health Assessment (ChYMH) was used to collect all measures at intake into clinical care. Three binary logistic regression analyses were conducted to assess the predictive ability of selected hyperactivity/impulsivity symptoms, selected inattentive symptoms and a combination in predicting NSSI. Only the hyperactivity/impulsivity symptoms were significantly predictive of NSSI engagement over and above age, sex, anxiety symptoms and social disengagement. The results are discussed in the context of implications for prevention/intervention.

Acknowledgments

I would like to thank several people, without whom, the completion of this project would not have been possible. Firstly, I would like to sincerely thank my thesis supervisor, Dr. Chloe Hamza, for all of her expertise, guidance and patience throughout the course of this project. I am very grateful to have had the opportunity to work with her on this project. Secondly I would also like to thank my MA committee members and MA thesis readers, Dr. Anne-Claude Bedard and Dr. Shannon Stewart for their thoughtful comments and contributions. I greatly appreciate their time and expertise, in helping to make this project the best it could be. Finally, I would also like to thank my family and my partner for their support, patience, and encouragement throughout the duration of this project.

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Overview

Nonsuicidal self-injury (NSSI) is an area of growing interest because of its high prevalence rates and significant impact on children, youth, and their families. In the literature, there has been increased interest in identifying factors that might lead to increased risk of NSSI engagement (e.g. Arbuthnott & Lewis, 2015; Ford & Gomez, 2015), to inform efforts to prevent NSSI behaviour among children and youth. There is emerging evidence that individuals with Attention Deficit Hyperactivity Disorder (ADHD) may be at an increased risk for NSSI (e.g. Hurtig, Taanila, Moilanen, Nordstrom, & Ebeling, 2012; Swanson, Owens, & Hinshaw, 2014). However, research in this area is limited, especially considering the heterogeneity of youth presenting with ADHD. The *Diagnostic and Statistical Manual of Mental Disorders*, Fifth Edition (DSM-5), highlights that there are 3 primary presentations of ADHD: predominantly hyperactive/impulsive presentation, predominantly inattentive presentation, and combined presentation (American Psychiatric Association, 2013). These presentations are composed of differing predominance of the two major symptom clusters; hyperactive/impulsive symptoms and inattentive symptoms. Since ADHD is composed of two main symptom clusters, it is important not only to investigate ADHD in general as a risk factor for NSSI but also to investigate whether there is differential risk associated with selective symptoms from the two clusters of symptomology for NSSI engagement. There has been very little research that has investigated the possibility of differential risk. The present study seeks to address this gap in the literature by examining whether different levels of selected ADHD symptomatology are predictive of NSSI engagement in a large sample of children and youth. Based on the existing

literature highlighting impulsivity as a strong predictor of NSSI engagement (see Hamza, Willoughby & Heffer, 2015 for a review), hyperactive/impulsive symptoms may be more predictive of NSSI risk than inattentive symptoms. Risk associated with inattentive symptoms is less clear. Higher levels of inattention may serve as a protective factor, as there is evidence to suggest that distraction and a lack of task persistence, which are both symptoms of inattention, may protect against NSSI engagement (Nock, Prinstein & Sterba, 2009; Polanco-Roman, Jurska, Quinones, & Miranda, 2015). Still, other research suggests that individuals classified as meeting criteria for the predominantly inattentive presentation may not differ from other presentations in terms of frequency of engagement in NSSI (Swanson et al., 2014). Therefore, the present study will investigate and attempt to clarify differential risk for NSSI based on differing levels of ADHD symptomatology.

Nonsuicidal Self-Injury

  Definition. NSSI is defined in the DSM-5 as the direct and deliberate destruction of bodily tissue, without suicidal intent (American Psychiatric Association, 2013). NSSI behaviors include self-cutting, self-burning, self-scratching, head banging, or interfering with wound healing (Nock & Favazza, 2009). It is important to note that NSSI would not include behaviors which are socially sanctioned (e.g., tattooing, piercing), or stereotypical behaviors that would be seen among youth with complex developmental delays (American Psychiatric Association, 2013). In the past, NSSI and suicidal behaviours were often studied together under the umbrella term of deliberate self-harm (DSH). Although related, NSSI and suicidal behavior represent distinct behaviours, which vary on the basis of an individual's intent (Nock & Favazza, 2009). Suicidal behaviour can consist of both suicidal ideation, which is thinking about engaging in behaviours to end one's own life, and suicidal attempts, meaning engaging in behaviours with

the intent to end one's own life (Muehlenkamp, 2014). In addition to serving different functions, NSSI and suicidal behaviour also vary with respect to types of behaviour, and their frequency (Hamza, Stewart & Willoughby, 2012; Klonsky, May, & Glenn, 2013).

Research shows that the primary function of engaging in NSSI is to help lessen and regulate negative affect (Hamza & Willoughby, 2015; Klonsky, 2007; Klonsky, 2009). NSSI usually follows heightened negative emotions, and after engaging in NSSI, there is often a reduction in negative affect (Armey, Crowther, & Millar, 2011; Chapman & Dixon-Gordon, 2007; Hamza & Willoughby, 2015; Klonsky, 2009). Evidence to support this function of regulation comes from a recent review by Hamza and Willoughby (2015), who summarized evidence from studies looking at NSSI episodes in real-time via ecological moment sampling techniques (EMA). When NSSI episodes are examined in real time, studies show increasing negative emotions frequently associated with guilt, self-anger, or self-hatred and rejection, prior to engaging in NSSI, and after the episode there is evidence of a decrease in these negative emotions (Armey et al., 2011; Nock et al., 2009). Similarly, suicidal behaviour is associated with elevated negative affective and a desire to relieve these intense negative feelings. In contrast, suicidal behaviours do not serve to regulate these intense emotions, but to escape them altogether (Chapman & Dixon-Gordon, 2007; Hamza et al., 2012; May & Klonsky, 2013; Paul, Tsypes, Eidlitz, Ernhout, & Whitlock, 2015). Unlike NSSI, which serves to regulate negative affect, suicidal behaviour is usually associated with a strong desire to escape, or a feeling that they would rather die in order to alleviate a burden on others, thereby seeking to alleviate negative emotions by ending these negative affective states (Brown, Comtois, & Linehan, 2002; Muehlenkamp, 2014). It is this key distinction in desire and intent that differentiates functions of NSSI and suicidal behaviour, even though they share a common motivation to relieve strong

negative emotions (Klonsky et al., 2013; O'Connor, Comtois, Atkins, & Kerbrat, 2017; Paul et al., 2015).

NSSI and suicidal behaviours also differ in terms of the types of behaviours used and the frequency of these behaviours (Hamza et al., 2012; Klonsky et al., 2013). Suicide attempts use methods with the intention that they will result in death, for example, hanging, use of a firearm, or ingesting a poisonous substance. In contrast, NSSI methods tend to be less lethal, with about 70% of individuals using cutting (Briere & Gil, 1998; Klonsky & Muehlenkamp, 2007). In addition, it is very common for those engaging in NSSI to use multiple methods to harm themselves (Klonsky & Muehlenkamp, 2007; Klonsky, 2009), whereas most individuals engaging in suicidal behaviours use the same method, even if they attempt suicide multiple times (Bergen et al., 2012; Muehlenkamp, 2014). Interestingly, individuals that engage in NSSI and then later attempt suicide still tend to use different methods between the NSSI engagement and suicide attempts, suggesting that these are two unique behaviours (Bergen et al., 2012). A final difference is that NSSI is an action that is often performed multiple times and quite frequently (Heath, Toste, Nedecheva, & Charlebois, 2008; Klonsky, May, & Glenn, 2013; Lilley et al., 2008), whereas individuals are less likely to engage in multiple suicide attempts (Lilley et al., 2008; Muehlenkamp, 2014). These findings underscore why NSSI and suicidal behavior should each be studied in their own right.

Prevalence of NSSI

Community Samples. NSSI varies greatly in prevalence between community and clinical samples and also varies greatly across studies. Starting in early adolescence, the prevalence in community samples of NSSI is around 7.5-8%, and seems to increase through adolescence, peaking in later adolescence (Barrocas, Hankin, Young, & Abela, 2012; Hilt, Nock,

Lloyd-Richardson, & Prinstein, 2008). Prevalence rates range from 7-24% in adolescent samples (Barrocas et al., 2012; Jacobson & Gould, 2007; Muehlenkamp & Gutierrez, 2004; Swannell, Martin, Page, Hasking, & St. John, 2014) and then seem to decrease with age, leading to a prevalence of about 13.4 % in young adults and about 5.5% among adults (Swannell et al., 2014).

Clinical Samples. Prevalence rates of NSSI in clinical samples are much higher than in community samples. Prevalence rates range from 40-60% in varying clinical samples of adolescents including adolescents presenting for emergency care, referred for other psychiatric difficulties, or in outpatient services for adolescents with depression and suicidality. The prevalence rate among clinical samples of youth is approximately 2-3 times as prevalent as in community adolescent samples (Cloutier, Martin, Kennedy, Nixon, & Muehlenkamp, 2010; DiClemente, Ponton, & Hartley, 1991; Jacobson, Muehlenkamp, Miller & Turner, 2008). Among varying adult clinical samples, including adults in inpatient and outpatient care, there is also a significantly higher prevalence than in adult community samples, with approximately 20% of adults engaging in at least occasional NSSI (Briere & Gil, 1998; Klonsky, Oltmanns, & Turkheimer, 2003). Although prevalence rates vary widely between community and clinical samples it is important to note that the age of onset for NSSI does not typically vary across sample type. NSSI typically has its onset in adolescence, most often between the ages of 12-16 years (Heath et al., 2008; Muehlenkamp, Williams, Gutierrez, & Claes, 2009; Nock, 2010).

Variation in estimate of prevalence may stem from differences in assessments of NSSI (Heath et al., 2008; Swannell et al., 2014). The main differences in prevalence occur depending on whether checklists or a single item "yes/no" question format to assess NSSI is used. A checklist format would consist of a list of possible forms of NSSI, and require participants to

check all that apply (e.g., self-cutting, burning, scratching, etc.). The checklist format is associated with obtaining higher prevalence rates compared to single item assessments (Muehlenkamp, Claes, Havertape, & Plener, 2012). This may be because checklists may serve as a prompt to help individuals to recall incidents that they may otherwise not have considered to be NSSI (Heath et al., 2008; Swannell et al., 2014). There also appear to be differences in prevalence between interview formats and when questions are answered independently. Higher prevalence rates are found when information is filled out independently (i.e., participant completes a self-report assessment) compared to interview formats (Heath et al., 2008; Swannell et al., 2014). Therefore, dependent on methodologies used there can be wide variability in prevalence rates reported.

Gender. Research on gender differences in NSSI engagement have been highly mixed, with significant disagreement as to whether or not females are more likely to engage in NSSI than males. In adolescent samples (both clinical and community), findings on gender differences in NSSI prevalence are mixed. Some studies report that females are at an increased risk for NSSI engagement (Madge et al., 2008; Muehlenkamp & Gutierrez, 2007; Sornberger, Heath, Toste, & McLouth, 2012; Stewart, Baiden, & Theall-Honey, 2014; Wilkinson, Kelvin, Roberts, Dubicka, & Goodyer, 2011), whereas other studies have found no differences between adolescent male and female prevalence of NSSI engagement (Lloyd-Richardson, Perrine, Dierker, & Kelley, 2007; Nock, Joiner, Gordon, Lloyd-Richardson, & Prinstein, 2006). Similarly, within adult samples, findings have been equally conflicting. Some research suggests that there may not be differences in prevalence between men and women (Andover, Primack, Gibb & Pepper, 2010; Briere & Gil, 1998; Heath et al., 2008; Klonsky et al., 2003; Klonsky & Muehlenkamp, 2007; Whitlock, Eckenrode, & Silverman, 2006), whereas other studies suggest that women are at an

increased risk for NSSI engagement in adulthood as well (Bresin & Schoenleber, 2015; Claes, Vandereycken, & Vertommen, 2007). One possibility that may explain the seemly increased prevalence rates among females in adolescence may be due to an earlier age of onset for females. Onset of NSSI seems to occur in early adolescence for both genders, but females may engage in NSSI slightly earlier (Andover et al., 2010; Nixon, Cloutier, & Aggarwal, 2002). Nixon and colleagues, for example, reported that female onset was around 12 years old, whereas male onset was around 15 years old. This may be a possible explanation as to why, in some studies, female NSSI engagement appears to be more prevalent in adolescence.

A recent meta-analysis by Bresin and Schoenleber (2015) examined whether there were differences in NSSI prevalence across genders depending on the age of the sample as well as the type of sample. They found that overall, across study types, there was a small but significant effect showing that females are approximately 1.5 times more likely to engage in NSSI than males, indicating that females are slightly more likely than males to engage in NSSI. They did not find significant differences based on age in terms of differences in gender prevalence. However, they did find that there were significant differences based on sample type. Specifically, they found that clinical samples tend to have larger gender differences (where females have higher prevalence rates) than community and college samples. Bresin and Schoenleber (2015), hypothesize that this may be because males are less likely to seek help with NSSI than females.

Males and females also seem to differ in the types of NSSI that they engage in. Females seem to be more likely to use cutting, biting, scratching, hair pulling, and interference with wound healing, with some of the most common methods being cutting and scratching (Andover et al., 2010; Bresin & Schoenleber, 2015; Claes et al., 2007; Sornberger et al., 2012). Males appear to be more likely to engage in burning and self-hitting (Andover et al., 2010; Sornberger

et al., 2012). There is also preliminary evidence that males and females may engage in NSSI for different functions. Both males and females report engaging in NSSI for regulating negative affect, though, females may be more likely to engage in NSSI as a form of self-punishment, whereas males may be more likely to engage in NSSI as a means of communication (e.g. showing they are strong enough, or seeking support) (Claes et al., 2007; Rodham, Hawton, & Evans, 2004).

      International Prevalence. It is difficult to draw conclusions about prevalence differences across countries because of the methodological differences between studies. Not only do prevalence rates differ based on checklist compared to single item measures (Muehlenkamp et al., 2012; Swannell et al., 2014), but there are also important differences in definition of self-injury that make it very difficult to directly compare prevalence rates across studies (Muehlenkamp et al., 2012). In European countries, the term Deliberate Self Harm (DSH) is frequently used; however, this can include self-harming acts that do not result in death either with or without suicidal intent, whereas NSSI tends to be used in North American research (Muehlenkamp et al., 2012). Therefore, it is important to use studies across countries that not only use similar methods, but also that use the same definition of self-injury. Preliminary findings suggest that NSSI prevalence may be similar across countries (Giletta, Scholte, Engels, Ciairano, & Prinstein, 2012; Plener, Libal, Keller, Fegert, & Muehlenkamp, 2009). One study by Plener, and colleagues (2009), compared two adolescent community samples, one United States (US) adolescent community sample and another German adolescent community sample. These samples were compared because they had comparable methodology and were both examining NSSI. Under these conditions where all study factors were comparable, there were no significant differences found in prevalence. They found that a prevalence rate of 25.6% of German

adolescents from a community sample engaged in NSSI, which is comparable to other studies that have been conducted in North American community samples examining NSSI prevalence (e.g. Jacobson & Gould, 2007; Muehlenkamp & Gutierrez, 2004, Muehlenkamp & Gutierrez, 2007). Similarly, another study comparing NSSI rates across three countries: Italy, the Netherlands, and the US, using similar methodology with community samples of adolescents, found no significant differences in prevalence of NSSI. This study reported that approximately 24% of adolescents engaged in NSSI at least once within the last year on average across these countries. These studies provide preliminary evidence that NSSI may be equally problematic across countries.

Research examining DSH across countries has shown prevalence rates to be much less consistent, showing varying prevalence rates across countries (e.g. Madge et al., 2008; Portzky, De Wilde, & van Heeringen, 2008). One study comparing Belgian and Dutch adolescents found significant differences in prevalence of DSH rates between those two countries. They reported that Belgian adolescents were 2.8 times more likely to self-injure than Dutch adolescents (Portzky et al., 2008). Therefore, although further research is required, the consistency in cross country prevalence found for NSSI, in contrast with the inconsistent rates found for DSH, provides further evidence that these concepts are distinct, and that perhaps cross country prevalence rate differences are due to self-harming behaviours with suicidal intent (Giletta et al., 2012).

NSSI and long-term outcomes

NSSI is associated with a wide variety of psychological difficulties, such as anxiety disorders, depressive disorders, and personality disorders (e.g. Hankin & Abela, 2011; Hoff & Muehlenkamp, 2009; Klonsky et al., 2003; Muehlenkamp & Gutierrez, 2007). One of the

behaviours of greatest concern associated with NSSI is elevated risk of suicidal behaviour (Klonsky et al., 2013). Recent research has shown that individuals who engage in NSSI are at a significantly greater risk of attempting suicide than those who do not engage in NSSI (Wilkinson et al., 2011). In a longitudinal study of adolescents receiving treatment for Major Depressive Disorder (MDD), results showed that adolescents who engaged in NSSI were 10 times more likely to attempt suicide than those without a history of NSSI (Wilkinson et al., 2011). Similar findings were found in another longitudinal study with 12-18-year old adolescents being treated for MDD. They found that NSSI was a significant predictor of suicide attempts over the course of treatment (Asarnow et al., 2011).

Recent theory supports the contention that NSSI may be an important risk factor for suicidal behavior (Van Orden et al., 2010). According to Joiner's (2005) Interpersonal Theory of Suicide, in order to attempt suicide, an individual must: 1) have the desire to die, which is often associated with a lack of social connectedness, a sense that one is a burden, and general self-hatred, and 2) must have the capability, meaning that they must lose the fear of engaging in life threatening behaviours, and have a high tolerance for physical pain (Van Orden et al., 2010). Klonsky and colleagues (2013), proposed that engaging in NSSI may increase suicide risk through both increased desire and capability. Self-injury is often associated with high levels of negative emotion, and can be associated with self-hatred and self-punishment (Klonsky & Muehlenkamp, 2007; Klonsky et al., 2013); these negative feelings and thoughts towards the self may increase the desire to die. Additionally, repeated self-inflicted harm, may lead to increased pain tolerance and lower fearlessness about death over time (Klonsky et al., 2013; Nock et al., 2006). In support of this theoretical explanation, research shows that NSSI is in one of the strongest predictors of suicide attempts, second only to suicidal ideation (Klonsky et al., 2013).

Notably, in one study the relationship between NSSI and attempted suicide was stronger than that of anxiety, depression, impulsivity, and borderline personality disorder with suicide attempts (Klonsky et al., 2013).

Risk factors for NSSI

There has been increasing interest surrounding what factors might increase risk for NSSI, to inform efforts to prevent this behaviour early (e.g. Adrian, Zeman, Erdley, Lisa, & Sim, 2011; Arbuthnott & Lewis, 2015; Armiento, Hamza, Stewart, & Leschied, 2016; Ford & Gomez, 2015; Martin et al., 2016). Research suggests that both intrapersonal risk factors (e.g. difficulties in emotion regulation, impulsivity) as well as interpersonal risk factors (e.g., deficits in social communication) may undermine an individual's ability to cope with distress, and increase risk for NSSI (e.g. Adrian et al., 2011; Glenn & Klonsky, 2010; Heath et al., 2008; Nock & Mendes, 2008; Nock, 2009). Despite interest in researching risk factors for NSSI engagement, one risk factor that has received little empirical attention thus far is ADHD. ADHD could be an important risk factor for NSSI engagement since it is characterized by deficits in executive functioning leading to difficulties with inhibition and emotion regulation (Barkley, 1997; Steinberg & Drabick, 2015). It is also common for individuals with ADHD to struggle with effective communication and effective social interaction (Barkley, 2006). These deficits associated with ADHD align with the vulnerabilities commonly associated with NSSI risk (Nock, 2009), suggesting that ADHD may be a potential risk factor for NSSI.

Attention Deficit Hyperactivity Disorder (ADHD)

ADHD is a heterogeneous neurodevelopmental disorder, meaning that there are multiple possible presentations of this disorder (American Psychiatric Association, 2013). It is characterized by inattentive symptoms, meaning difficulty controlling attention (e.g. failing to

pay attention to details, having trouble holding attention for long periods of time, difficulties with planning and organizing, and distractibility), and/or hyperactive/impulsive symptoms, meaning acting rashly without consideration of long-term outcomes (e.g. difficulties sitting still, or waiting their turn), or a combined presentation of both inattentive and hyperactive/impulsive symptoms (American Psychiatric Association, 2013; Roberts, Milich, & Barkley, 2014).

Currently, the DSM-5 (American Psychiatric Association, 2013) specifies that ADHD can be diagnosed if an individual displays a consistent pattern of inattention and/or hyperactivity/impulsivity that is impairing to their day-to-day functioning. In terms of inattention, an individual must display a minimum of six out of the nine possible inattentive symptoms over a period of at least six months in a way that is impairing. Inattentive symptoms can include: difficulties paying attention to details, difficulties with sustained attention, difficulties listening when spoken to, difficulties following instructions or finishing required tasks, disorganization, avoidance of tasks requiring sustained effort, losing important items, distractibility, and forgetfulness. Similarly, an individual must display a minimum of six symptoms of hyperactivity/impulsivity out of a possible nine symptoms, that have been present at least 6 months in a way that is interfering with their day to day functioning, to meet the criteria for hyperactivity/impulsivity. These symptoms can include: frequent fidgeting, frequently leaving seat their when it is not appropriate, running or climbing when it is not appropriate, not being able to play quietly, difficulty staying still, excessive talking, blurting out answers, difficulty with waiting for their turn, and frequent interruptions or intrusions. Consideration of the onset of these symptoms, and also whether these symptoms occur across many settings is also required. Based on the profile of symptoms present, according to the DSM-5 it should be specified whether an individual meets criteria for a combined presentation, where inattentive and

hyperactive/impulsive symptom criteria are both met, predominantly inattentive presentation, where only inattentive symptom criteria is met over the past 6 months, or a predominantly hyperactive/impulsive presentation, where only hyperactive/impulsive symptom criteria has been met for the past 6 months (American Psychiatric Association, 2013). It is important to note that the specification of presentation was introduced in the DSM-5 and prior to its introduction, individuals were differentiated by subtypes: combined subtype, inattentive subtype, or hyperactive/impulsive subtype. The current shift in the DSM-5 language was to address the transient nature of the presentations of ADHD. By using the term presentation, it captures that this is just a specifier of their current symptom profile and it is not necessarily a permanent subtype categorization (Tannock, 2013; Willcutt, 2012).

Prevalence of ADHD

  Community Samples. The prevalence of ADHD varies across age, with the highest prevalence of approximately 10.5-11.4% in preschool to elementary school aged children (Willcutt, 2012). Prevalence rates drop slightly in adolescence to approximately 8.0% of adolescents having ADHD in community samples (Willcutt, 2012). In adult samples the prevalence of ADHD is approximately 5.0% (Almeida Montes, Hernandez Garcia, & Ricardo-Garcell, 2007; Thomas, Sanders, Doust, Beller, & Glasziou, 2015), and some research suggests that the prevalence in older adults (over the age of 70 years) is approximately 3.0% (Michielsen et al., 2012). But, there is considerable variability in prevalence rates across studies. For example, a meta-analysis conducted by Skounti, Philalithis, and Galanakis (2007), found that reported prevalence rates for children and adolescents with ADHD in community samples ranged from 2.2-17.8%. According to a meta-analysis by Polanczyk, Silva de Lima, Horta, Biederman, and Rohde (2007), the worldwide pooled prevalence of ADHD was 5.29%. Similarly, the

American Psychiatric Association (2013) reports a prevalence of 5.0% in children and 2.5% in adults. Therefore, there is considerable variability in prevalence rates reported across studies.

   Clinical Samples. Prevalence rates of ADHD are significantly higher in clinical samples than in community samples, but much like in community samples, there is a wide amount of variability in rates reported. Lewczyk, Garland, Hurlburt, Gearity, and Hough (2003), reported a 46.7% prevalence rate of ADHD in a clinical sample of youth (ages 6-18 years) who had received treatment from a mental health facility at least once during the year prior to the research assessment. Studies of specific clinical populations have also yielded significantly higher prevalence rates than are typically found in community samples. For example, in a review conducted by van Emmerik-van Oortmerssen and colleagues (2012), it was found that ADHD prevalence rates in samples of adolescents with Substance Use Disorders (SUD) ranged from 8% to 44.3%. Similarly, Speranza and colleagues (2011), reported that in a sample of adolescents meeting criteria for Borderline Personality Disorder (ages 15-19 years), 46% of individuals showed at least one ADHD symptom of clinical concern; yet only 11% met criteria for a current ADHD diagnosis. Adult ADHD prevalence in clinical samples seems to be about 3 times the prevalence of adult ADHD in community samples, with a prevalence of approximately 17.0% for adults in clinical samples, compared with a 5.0% prevalence in community samples of adults (Almeida Montes et al., 2007). Like with adolescent samples, these higher prevalence rates seem to occur across a wide range of psychiatric disorders, such as Bipolar Disorder and SUDs (e.g. Daigre et al., 2013; Tamam, Karakus, & Ozpoyraz, 2008; Tamburin et al., 2017; van Emmerik-van Oortmerssen et al., 2012). In a sample of adults (ages 18-65 years) diagnosed with Bipolar Disorder, 16.3% met criteria for ADHD as adults and 27% met criteria for ADHD at some point during their lifetime (Tamam et al., 2008). Studies of adults with SUDs have shown equally high

prevalence rates for ADHD with rates ranging from 10-55% depending on the study (Daigre et al., 2013; Tamburin et al., 2017; van Emmerik-van Oortmerssen et al., 2012).

ADHD Presentations. Overall ADHD diagnoses in general appear to be relatively stable over time. That said, specific symptoms appear to change, making presentations of ADHD much less stable (Lahey, Pelham, Loney, Lee, & Willcutt, 2005; Willcutt et al., 2012). Specifically, hyperactive/impulsive symptoms appear to decrease with age, whereas inattentive symptoms seem to remain relatively constant (Hinshaw, Owens, Sami, & Fargeon, 2006; Willcutt, 2012; Willcutt et al., 2012). Willcutt and colleagues (2012) in their meta-analytic review of the literature reported that research suggests that when individuals were reassessed 5-9 years after being diagnosed with ADHD in childhood, it was found that 59% of these youth still met criteria for ADHD; but only 35% remained within the same ADHD presentation. Thus, when examining prevalence rates across presentations of ADHD it is important to consider presentation prevalence at different ages, since symptoms seem to follow a developmental pattern. The predominantly hyperactive/impulsive presentation appears to be most prevalent in preschool children, but decreases slightly in elementary school children and decreases even more in adolescents (Willcutt, 2012). The combined presentation shows a slight increase between preschool and elementary children, but its prevalence declines in adolescence and adulthood (Willcutt, 2012). Finally, the predominantly inattentive presentation increases from preschool to elementary and then remains highly prevalent in adolescents (accounting for approximately 72% of all adolescents with ADHD) and has the highest prevalence of all the presentations in adulthood (Willcutt, 2012). Therefore, it is difficult to gain an accurate assessment of prevalence rates across ADHD presentations, since symptoms appear to change with age, as

hyperactive/impulsive symptoms appear to decrease more than inattentive symptoms (Hinshaw et al., 2006; Willcutt, 2012; Willcutt et al., 2012).

As was mentioned, prevalence rates vary widely across studies examining the prevalence of ADHD. Research suggests that multiple factors may contribute to these varied prevalence rates. Firstly, the diagnostic criteria used within the study can have a significant impact on the prevalence rate that is obtained. Research shows that different prevalence rates emerge depending on the edition of the DSM used to specify the exact criteria for diagnoses. Specifically, higher prevalence rates were found when DSM-IV criteria were used compared with the DSM-III-R (Polanczyk et al., 2007; Polanczyk, Willcutt, Salum, Kieling, & Rohde, 2014; Thomas et al., 2015). Prevalence rates also differed depending on whether or not impairment was required for a diagnosis, and whether or not only some symptoms of ADHD or full diagnostic criteria were required. Requiring impairment for diagnosis is associated with lower prevalence rates (Polanczyk et al., 2007; Polanczyk et al., 2014), and when full DSM criteria were required for a diagnosis, lower prevalence rates were reported as well (Willcutt, 2012). Secondly, prevalence rates vary depending on the assessor type. Prevalence rates tend to be higher when based on teacher reports rather than parent reports (Polanczyk et al., 2014; Willcutt, 2012), but parental reports tend to yield higher prevalence than do clinician reports (Thomas et al., 2015). Overall it seems that teacher and parent ratings result in higher prevalence rates than other informants such as clinicians (Polanczyk et al., 2007). Thirdly, prevalence rates also seem to vary based on the geographic location in which the data were collected. Some research shows that prevalence rates in Africa and the Middle East differ from other parts of the world (Polanczyk et al., 2007; Thomas et al., 2015). Yet, in other meta-analyses with a wider breadth of studies conducted in Africa and the Middle East, no prevalence differences were

found based on geographic location (Polanczyk et al., 2014; Willcutt, 2012).

Gender. Gender differences in prevalence seem to vary based on age. Research suggests that in childhood, there is a higher prevalence of males with ADHD, specifically, males are approximately 4 times more likely to have ADHD than females in childhood and adolescence (Huang, Weng, & Ho, 2016). In adulthood, prevalence rates appear to be higher among females in both community and clinical samples (Huang et al., 2016). For example, in a study comparing a community and a clinical sample of adults, Almeida Montes and colleagues (2007) found that in a clinical sample, female prevalence was 21.6% compared with 8.5% for males, and in a community sample the prevalence was 7.1% for females and only 4.1% for males. These increases in female prevalence relative to male prevalence in adulthood may be a result of more help seeking among female adults (Huang et al., 2016). Another possible explanation may come from examining changes in presentation prevalence with age. Research suggests that females are more likely to demonstrate inattentive symptoms, whereas males are more likely to demonstrate hyperactive/impulsive symptoms (Biederman et al., 2002; Gaub & Carlson, 1997; Gershon, 2002). As discussed, during early childhood, the most prevalent presentation of ADHD is the hyperactive/impulsive presentation, but with age hyperactive/impulsive symptoms appear to decrease, whereas inattentive symptoms seem to remain relatively constant, making the inattentive presentation the most common presentation in adulthood (Willcutt. 2012; Willcutt et al., 2012). Therefore, the increased prevalence among males in childhood may be explained by the relatively higher rates of hyperactivity/impulsivity that are often observed in childhood. In addition, since females are less likely to display high levels of hyperactivity/impulsivity compared to males, it may be that males are more likely to be referred in childhood due to the disruptive nature of these symptoms in the classroom (Coles, Slavec, Bernstein, & Baroni, 2012;

Gershon, 2002). In fact, research shows that female inattentive symptoms often go unnoticed in the classroom, meaning that girls are often not referred in childhood (Groenewald, Emond, & Sayal, 2009).

ADHD and long term outcomes

ADHD is associated with considerable risk in terms of mental health and long term outcomes (Balazs, Miklosi, Kereszteny, Dallos, & Gadoros, 2014; Wilens, Biederman & Spencer, 2002). For example, children and youth with ADHD are at an increased risk for both internalizing and externalizing problems (Hinshaw et al., 2012). In fact, studies show that comorbid mental health issues in individuals with ADHD are more common than not (Becker, Luebbe, & Langberg, 2012), and children and adolescents with ADHD are at a significantly higher risk for these comorbid disorders than children and adolescents without ADHD (Balazs et al., 2014). A study looking at adults with childhood diagnoses of ADHD found that they were significantly more likely (about 2.6 times more likely) to have a comorbid mental disorder in adulthood compared with those that did not have a diagnosis of ADHD in childhood (Barbaresi, Colligan, Weaver, Voigt, Killian, & Katusic, 2013). Approximately 44% of children with ADHD will have at least one comorbid mental disorder (Barkley, 2006). In terms of specific disorders, individuals with ADHD are at an increased risk of developing externalizing problems such as Oppositional Defiant Disorder (ODD) and also Conduct Disorder (CD). For example, research shows that having ADHD increases the likelihood of having ODD or CD by approximately 10 times (Barkley, 2006). ODD and CD are associated with negative outcomes such as antisocial behaviours, delinquency, and greater problems with substance use and abuse (Barkley, 2006; Becker et al., 2012).

ADHD is also associated with increased risk for internalizing problems such as anxiety and depression. A review by Angold, Costello and Erkanli (1999) of studies examining community samples of children for comorbidity rates found that the odds of ADHD and anxiety disorders being comorbid in children was approximately 3.0, meaning that having an ADHD diagnosis increases the risk of having an anxiety disorder by three times (Barkley, 2006). Similarly, in clinical samples of children with ADHD it was found that 27% had a comorbid anxiety disorder (Xia, Shen, & Zhang, 2015). In terms of depressive disorders, about 15-75% of those with ADHD struggle with some form of depression, and about 9-32% will have MDD (Barkley, 2006). Similarly, Wilens and colleagues (2002) found that in a sample of preschool and school aged children, about 50% of those with ADHD had an MDD diagnosis. Longitudinal research has found similar results. For example, Chronis-Tuscano and colleagues (2010) found that 4-6-year-old children with ADHD combined and predominantly inattentive presentations were at an increased risk of depression at the ages of 9-18 years of age, compared to children without ADHD in childhood, even after controlling for mothers' depression.

In addition to increased likelihood of mental health concerns, research shows that children with ADHD tend to have greater social difficulties (Hoza, 2007; Kok, Groen, Fuermaier, & Tucha, 2016; McQuade & Hoza, 2008). They tend to have fewer close friendships and tend to be rejected by other children more frequently (Becker et al., 2012). In fact, research suggests that approximately 50-80% of children with ADHD are rejected by their peers, and that once these children are rejected it is very difficult to change their peers' perceptions of them (Hoza, 2007). Research shows that other children without ADHD quickly notice that children with ADHD display behaviour that is not socially appropriate or annoying (e.g. intrusive behaviours and rule breaking) (Hoza, 2007; McQuade, Hoza, 2008). A lack of friends and

socialization opportunities places children at risk for decreased self-esteem, victimization, and many negative outcomes long term, such as delinquency and negative psychological outcomes (Hoza, 2007; Kok et al., 2016).

Self-injury and ADHD

Despite increased research on risk factors for NSSI (e.g. Arbuthnott & Lewis, 2015; Ford & Gomez, 2015), one often overlooked risk factor for the development of NSSI is that of ADHD. Although research has examined the association between ADHD and suicidal behavior, self-injury specifically differentiated by non-lethal intent has not received as much research attention. There is mounting evidence that ADHD may be associated with increased suicidal risk (Balazs et al., 2014; Chronis-Tuscano et al., 2010; Impey & Heun, 2012), and preliminary research suggests ADHD also may be relevant in the understanding of NSSI (e.g. Hinshaw et al., 2012; Hurtig et al., 2012; Swanson et al., 2014). It is less clear, however, whether this risk may vary depending on the presentation of ADHD symptoms. An overview of the research on the link between ADHD and self-injury with and without lethal intent will now be reviewed, and the importance of the present study in furthering research on the link between ADHD symptomatology and NSSI will be discussed.

ADHD and Suicidal Behaviour. There is strong evidence to suggest that ADHD increases risk for suicidal behaviour, including both suicidal ideation (i.e., thinking about engaging in behaviours to end one's own life), and suicidal attempts (engaging in behaviours with the intent to end one's own life) (Nock & Favazza, 2009). In terms of suicidal ideation, studies show that individuals with ADHD, across all ages (childhood, adolescence, and adulthood), are at an increased risk for thinking about ending their own life (Balazs et al., 2014; Chronis-Tuscano et al., 2010; Impey & Heun, 2012). In one study, it was found that children and

adolescents with ADHD were at two times greater risk for suicidal ideation, as compared to children and adolescents without ADHD (Impey & Heun, 2012). A longitudinal study by Chronis-Tuscano and colleagues (2010) found that 4-6-year-old children with ADHD were not only at an increased risk for depression at the ages of 9-18 years of age, but were also at a greater risk for suicidal ideation. Their results suggested that children classified as having ADHD combined presentation at the ages of 4-6-years were at a greater risk than control children without ADHD for suicidal ideation; however, those classified as ADHD predominantly hyperactive/impulsive or inattentive were not at a greater risk compared to controls.

Individuals with ADHD are also at an increased risk for suicide attempts. To be specific, the likelihood of death by suicide is approximately 3 times the likelihood for individuals with ADHD compared to individuals without ADHD (James, Lai, & Dahl, 2004; Nigg, 2013). The rate of individuals that complete suicide with ADHD is higher than the general population prevalence of suicide of 5.29%. In fact, individuals whom have completed suicide are 1.7-3.6 times more likely to have an ADHD diagnosis than not have an ADHD diagnosis (Barbaresi et al., 2013; Impey & Heun, 2012). There is some debate in the literature, however, as to whether ADHD is directly associated with suicidal behaviours, or if this increased risk is a result of comorbid disorders that are associated with greater risk for suicidal behaviour (Balazs et al., 2014; James et al., 2004; Nigg, 2013). Balazs and colleagues (2014) investigated the relationship between ADHD and suicidality in a clinical sample of children and adolescents. They found that the relationship between ADHD symptoms and suicidality was fully explained by other comorbid mental disorders. In children, symptoms of anxiety disorders fully mediated the relationship, whereas in adolescents, depressive disorders as well as substance use and abuse mediated this relationship. Similarly, Cho and colleagues (2008) found that ADHD symptoms

were related to depressive symptoms, which in turn were related to suicidal ideation, suggesting that depressive symptoms mediated this relationship. In contrast, other studies have found ADHD to be linked with increased risk for suicidal behaviours outside of the impact of comorbid mental disorders (Galera, Bouvard, Encrenaz, & Fombonne, 2008; Stickley, Koyanagi, Ruchkin, & Kamio, 2016). Galera and collegues (2008) found an association between male hyperactivity and inattention levels in childhood and suicide planning and attempts in young adulthood that was independent of comorbid mental disorders and substance use. Similarly, in a sample of adult men and women, Stickley and colleagues (2016) found that ADHD was significantly associated with lifetime suicide outcomes, even after controlling for comorbid mental disorders. This risk was especially pronounced for those with the highest levels of ADHD symptomatology. Therefore, there seems to be a clear increased risk for suicidal behaviours associated with ADHD that may exist independently of the impact of comorbid disorders, although it is difficult to say definitively.

ADHD and NSSI. Although the link between ADHD and NSSI has received comparatively less attention than the link between ADHD and suicidal behavior, there is emerging evidence that ADHD may also be a risk factor for NSSI. More specifically, two longitudinal studies have found an association between ADHD and self-injury without suicidal intent over time (Hinshaw et al., 2012; Swanson et al., 2014). In one study, Hinshaw and colleagues (2012) found that children with a diagnosis of ADHD in childhood experienced both higher levels of suicide attempts and also NSSI in young adulthood, though this sample was limited to females only. Similarly, Swanson and colleagues (2014) found that a persistent ADHD diagnosis over time (having met the criteria for ADHD both in childhood and in adolescence), was associated with more frequent NSSI, employing more methods of NSSI, and with more

severe methods used than individuals with a transient diagnosis of ADHD, or no ADHD diagnosis. Though, this study employed the same sample as Hinshaw and colleagues (2012), and therefore was limited to females as well.

Akin to the literature examining ADHD and suicide risk, there is question as to whether there is truly a relationship between ADHD and increased risk for NSSI or if this relationship is best accounted for by shared comorbid disorders. For example, Taylor, Boden, and Rucklidge (2014) found an association between higher levels of ADHD symptomatology and greater risk for self-harm (without suicidal intent); though, they found that this relationship was mediated by mental health problems, suggesting that the relationship between ADHD symptoms and self-harm was explained by the higher likelihood of comorbid mental health problems in those with greater ADHD symptomatology. Similarly, Swanson and colleagues (2014) also found a mediation effect, such that the relationship between ADHD in childhood and NSSI severity in young adulthood was partially mediated by externalizing symptoms. Hurtig and colleagues (2012) also found that comorbid disorders such as depression seemed to be associated with increased risk for DSH. Therefore, it is unclear whether ADHD accounts for increased risk in NSSI or whether comorbid mental disorders account for this increased risk.

Another limitation within this literature is that few studies examine differential risk associated with different presentations of symptomatology associated with ADHD (predominantly hyperactivity/impulsivity vs predominantly inattentive symptoms). In the few studies that do consider differential risk based on varying ADHD presentation, there appears to be increased risk associated with symptoms of hyperactivity/impulsivity (Hinshaw et al., 2012; Izutsu et al., 2006; Meza, Owens, & Hinshaw, 2016; Swanson et al., 2014). In terms of presentation differences, research showed significant differences between the combined

presentation and the predominantly inattentive presentation in terms of risk for self-injury, such that greater risk was associated with the combined presentation (Hinshaw et al., 2012; Swanson et al., 2014). Specifically, Swanson and colleagues (2014) found that although having ADHD in general was related to more frequent NSSI engagement, having the combined presentation in childhood was associated with having more severe forms of NSSI and engaging in the greatest variety of forms of NSSI in young adulthood. Other research also seems to suggest that hyperactivity/impulsivity may be associated with increased risk. In a study with Japanese adolescents, Izutsu and colleagues (2006) found that adolescents that disclosed engaging in DSH reported significantly higher levels of hyperactivity/impulsivity in childhood. Adding to these findings, in a longitudinal study of females, Meza and colleagues (2016) found that response inhibition (a measure of impulsivity) in childhood significantly predicted NSSI severity in young adulthood, such that greater impulsivity was associated with greater severity of NSSI. Therefore, although there are few studies, the general trend in existing research shows that there seems to be a relationship between ADHD and increased risk for NSSI, and that this seems to be particularly prominent in individuals with elevated levels of hyperactivity/impulsivity in childhood.

Current Study

Although there is a growing body of literature highlighting the relationship between ADHD and NSSI, little research has examined whether different symptoms of ADHD may be differentially associated with NSSI engagement. ADHD is a heterogeneous disorder that is associated with diverse symptomatology, which is why it is limiting to assume that all individuals with ADHD may be at equivalent risk for NSSI engagement. Some studies seem to show a trend for increased risk with greater hyperactive/impulsive symptoms, however these studies are few in number and the majority were conducted with female participants (e.g.

Hinshaw et al., 2012; Swanson et al., 2014). In addition, there is still question as to whether ADHD is a predictor of NSSI independently, or whether the relationship is a result of other comorbid mental disorders (i.e., unaccounted third variables). Therefore, the present study seeks to address these gaps in the literature by examining ADHD symptomatology and its ability to predict NSSI engagement in a sample of Canadian children and youth (ages 8-18 years old). The predictive ability of selected general ADHD symptomatology will be investigated, but also the predictive ability of selected hyperactivity/impulsivity symptomatology and selected inattentive symptomatology. In addition, the impact of comorbid psychological difficulties such as anxiety and social disengagement symptoms will be considered to see the unique contribution of these selected ADHD symptomatology to NSSI risk.

We hypothesize that the hyperactive/impulsive symptoms selected will be more strongly associated with NSSI engagement than the selected inattentive symptoms not only because of the existing literature that seems to suggest additional risk associated with hyperactivity/impulsivity, but also because there is a wealth of literature underscoring impulsivity as a risk factor for NSSI engagement (e.g. Glenn & Klonsky, 2010; Hamza et al., 2015). Research suggests that individuals who engage in NSSI have higher levels of impulsivity than those that do not engage in NSSI and that higher levels of impulsivity tend to be associated with more frequent NSSI engagement, as well as a wider range of methods used to self-harm (for a review, see Hamza et al., 2015). Individuals who engage in NSSI also seem to differ from those who do not engage in NSSI in urgency, meaning that they tend to act rashly when faced with negative emotions, and often struggle with premeditation and thinking through consequences (Glenn & Klonsky, 2010). These characteristics are also common among individuals who display hyperactive/impulsive

symptoms associated with ADHD (Roberts et al., 2014). Therefore, we believe that the selected symptoms of hyperactivity/impulsivity will be predictive of NSSI engagement.

In contrast it is not clear whether the inattentive symptoms selected will be predictive of NSSI engagement. There is some evidence to suggest that two symptoms of inattention; distraction and low task persistence, may be protective against NSSI engagement (Polanco-Roman et al., 2015). For example, Nock and colleagues (2009) found that one way of decreasing NSSI behaviour was to distract oneself with other thoughts or activities. Therefore, individuals who have difficulty focussing their attention and who tend to be more distractible, as is a characteristic of ADHD inattentive symptoms, these individuals may actually be more protected from NSSI engagement. In addition, difficulty persisting in a painful or unpleasant task has been found to be protective against more severe forms of self-harm, and therefore those who tend to be distractible and who tend to have difficulty persisting in unpleasant tasks may be protected against more severe forms of NSSI (Anestis, Bagge, Tull, & Joiner, 2011). Conversely, despite distraction being a potentially positive coping strategy to avoid NSSI engagement, individuals with ADHD tend to lack attentional control, and therefore may not be able to engage in effortful distraction such as choosing to think of something else, especially in the context of negative emotions (Jonkman, Markus, Franklin, & van Dalfsen, 2017; O'Bryan, Kraemer, Johnson, McLeish, McLaughlin, 2017). Additionally, individuals with higher levels of selected inattentive symptoms may be at greater risk for depression and rumination, since individuals with a predominantly inattentive presentation tend to be at a greater risk than individuals with a predominantly hyperactive/impulsive presentation. This is important to consider as depression and rumination are risk factors for NSSI engagement (Chronis-Tuscano et al., 2010; Jonkman et al., 2017). Therefore, it is unclear whether or not selected inattentive symptoms will be

predictive of risk for NSSI engagement or whether higher levels of the inattentive symptoms selected may even be protective. The current study will seek to address these questions.

Method

Participants

In the present study, 1006 children and youth (34% female), ages 8-18 years-old (Mage = 12.06, SD = 2.80) as well as their caregivers, completed the Child and Youth Mental Health Assessment (ChYMH) at time of intake into clinical care (i.e., a participating mental health agency). Data were collected from 15 mental health facilities across Ontario offering both inpatient and outpatient services as a standard of care. At intake, 42% of children/youth's parents were married, 4% were living with a significant other, 19% were never married, 2% were widowed, 13% were separated, 15% were divorced, and the remaining parent's status' were unknown (5%). Among those children participating, reasons for referral consisted of threat to self (33%) or others (44%), addiction or dependency (4%), specific psychiatric symptoms (68%) or involvement with the justice system (6%).

Measures – ChYMH

The interRAI Child and Youth Mental Health (ChYMH) Instrument (Stewart et al., 2015) was used to collect all data for the current study. The ChYMH is a manualized semi-structured assessment tool, specifically designed to obtain a complete profile of the assessed child/youth. This includes assessment of areas of struggle but also assessment of the individual's strengths and current functioning, in order to inform further tailored assessment or necessary care and intervention. The ChYMH is one of many assessment tools developed by interRAI (i.e., an international collective of researchers and clinicians) with the goal of increasing consistency in care across settings by designing compatible interRAI assessments. Trained assessors complete the ChyMH using data collected from multiple informants such as the child/youth, their

caregiver, observation of the child/youth as well as review of additional documentation from other professionals (e.g. teachers, clinicians). Recent research suggests that the ChYMH including its scales, shows strong inter-item reliability and good criterion validity, meaning it is highly correlated with well-established existing measures of similar constructs (e.g. Child and Adolescent Functional Assessment Scale (CAFAS), Child Behaviour Checklist (CBCL)) (Stewart & Hamza, 2017).

Distractibility/hyperactivity scale. The Distractibility/Hyperactivity Scale was used to assess ADHD symptoms (Stewart et al., 2015). The Distractibility/Hyperactivity Scale is a 4-item scale, used for assessing four dimensions commonly associated with ADHD: 1) impulsivity, meaning acting without thinking first, or failing to stop behaviours that are not appropriate in that moment (e.g. having difficulty waiting their turn); 2) distractibility, meaning how difficult it is for the child/youth to focus and pay attention (e.g. they may not notice when the teacher calls their name); 3) hyperactivity, meaning whether or not the individual is overly active (e.g. running around the room when they are supposed to be sitting); and 4) disorganization, meaning that the individual often has trouble planning and organizing (e.g. may have trouble sticking to a schedule or may lose things often). These 4 dimensions are a subset of the 18 diagnostic symptoms of ADHD, with impulsivity and hyperactivity being two of the nine symptoms of the cluster of hyperactivity/impulsivity symptoms, and distractibility and disorganization being two of the nine symptoms from the cluster of inattentive symptoms. This scale was coded from 0 *(symptoms are not present)* to 4 *(present for the last 3 days with 3 or more episodes occurring, or it occurs constantly).* After each item received a rating, a composite score was calculated with a possible total from 0 to 16, where a higher score indicated higher levels of the selected inattentive and hyperactive/impulsive behaviours (i.e., ADHD Total Score). In the present study,

we also created a composite score for: 1) inattention symptoms (i.e., distractibility, disorganization), as well as a composite score of 2) hyperactive/impulsive symptoms (i.e., impulsivity, hyperactivity). The Distractibility/Hyperactivity scale demonstrated good criterion validity and inter-item reliability in past research (Stewart & Hamza, 2017). Internal consistency reliability for the present study was 0.78.

Severity of self-harm scale. The Severity of Self Harm Scale (SOS) was used to assess whether or not a child/youth had engaged in self-injurious thoughts and behaviors and/or suicidal behaviours (Stewart et al., 2015). First, the recency of any self-harming episodes was measured (regardless of whether or not the intent was suicidal in nature). The recency was assessed as 0 *(never inflected self-injury),* to 5 *(in the last 3 days)*. Next, intention of the self-injury was assessed, 0 *(not a suicide attempt)* or 1 *(a suicide attempt has been previously made)*. Given that NSSI includes only behaviors without lethal intent, only individuals with no previous suicidal attempts were included in the present study. In past research the SOS has demonstrated good inter-rater reliability and also good convergent validity (Hirdes et al., 2003; Hirdes et al., 2008).

Social disengagement scale. Anhedonia symptoms were assessed using the 4-item Social Disengagement Scale (Stewart et al., 2015). This scale assesses the frequency of child's/youth's lack of interest in social interaction, lack of motivation, lack of joy/pleasure in life, and withdrawal from interests. Each symptom was coded from 0 *(not present)* to 4 *(present on each of the last 3 days, with 3 or more episodes or occurring constantly)*, and a total score was created (higher score indicates more symptoms of social disengagement). This scale demonstrated good criterion validity and inter-item reliability in past research (Stewart & Hamza, 2017). Internal consistency reliability for the present study was .79.

Anxiety scale. Symptoms of anxiety were assessed using the 7-item Anxiety Scale (Stewart et al., 2015). This scale assesses the frequency of several anxious symptoms such as repetitive anxious concerns, unrealistic fears, obsessive thoughts, compulsive behaviours, intrusive thoughts/flashbacks, episodes of panic and nightmares. Each symptom was coded from 0 *(not present)* to 4 *(present on each of the last 3 days, with 3 or more episodes or occurring constantly)*. Item scores were totalled to form a composite score from 0 to 28, where a higher score indicated more anxious symptoms present. Past research suggests that this scale demonstrates good criterion validity and inter-item reliability (Stewart & Hamza, 2017). Internal consistency reliability for the present study was 0.71

Procedure

The interRAI ChYMH instrument was used to assess 1006 children/youth at 15 mental health centres across Ontario upon intake for clinical services. Informed consent was received from the child/youth as well as their caregiver to participate. Assessments were conducted by professionals with at least two years of clinical training in mental health who had also undergone a training program on administering the ChYMH. The assessments lasted between 60-90 minutes and involved multiple informants including the child/youth, their caregiver, review of other relevant documentation from other professionals (teacher, clinician), as well as observation of the child/youth. Approval for the study was obtained from The University of Western Ontario Ethics Board.

Results

Preliminary analyses. Prior to running the primary analyses, descriptive analyses were explored for each relevant scale and corresponding item. Frequencies were examined to obtain demographic information across scales (e.g. male to female proportion, age frequencies).

Skewness and kurtosis were examined to test assumptions of normality, and variables were normally distributed. Although there were a few outliers, these data were within the scale range (and indicated high scores on the scales, so cases were retained). In the present sample, 282 children and youth reported engaging in some form of NSSI (28.0%), while 724 reported no history of NSSI (72.0%). Of those who engaged in NSSI 135 were female (48%) and 147 were male (52%). The mean on the ADHD total scale was 9.17 (SD = 4.94).

Binary Logistic Regression

Three binary logistic regression analyses were conducted to examine whether ADHD symptoms (i.e., ADHD total score, ADHD hyperactivity/impulsivity score, ADHD inattention score) could be used to identify the presence of NSSI behavior (0 = not present, 1 = present).

ADHD symptomatology. In the first binary logistic regression analysis, the predictive effect of selected ADHD symptoms (using the total hyperactivity/inattention score) was examined as a predictor of NSSI engagement over and above age and sex, when social disengagement and anxiety were included as covariates. The first model including sex and age alone compared to the constant only model was significant, meaning that age and sex better predicted those who engaged in NSSI than a model without predictors (χ^2= 95.51, $p < .001$, $df =$ 2). The model including ADHD symptoms, social disengagement and anxiety was also significant, indicating that these predictors had additional predictive value over and above age and sex (χ^2 = 15.80, $p = .001$, $df = 3$). The full model was statistically significant (χ^2= 111.31, $p <.001$, $df = 5$). The Hosmer and Lemeshow test was non-significant, indicating that the model was a good fit (χ^2 = 3.05, $p = .93$, $df = 8$). The model including all of the predictors was able to correctly classify 74.2% of cases. With social disengagement and anxiety included as covariates, there was a trend effect for ADHD symptoms (Wald = 3.82, $df = 1$, $p = .05$). Social

disengagement emerged as a significant predictor of NSSI behaviour (Wald = 6.64, *df* = 1, *p* =

.01), and anxiety was not a significant predictor when included in this model (Wald = .71, *df* = 1,

p = .40). The odds ratio for ADHD indicated that as ADHD symptoms increased, individuals

were 1.03 times more likely to engage in NSSI. Regression coefficients, Wald statistics, odds

ratio and 95% confidence intervals for the odds ratios are presented in Table 1.

   Hyperactivity/impulsivity symptoms. In the second binary logistic regression analysis,

the predictive effect of ADHD hyperactivity/impulsivity symptoms (using the composite of

impulsivity and hyperactivity scores) only was examined as a predictor of NSSI engagement

over and above age and sex, when social disengagement and anxiety were included as covariates.

The first model including sex and age alone compared to the constant only model was

significant, meaning that age and sex better predicted those who engaged in NSSI than a model

without predictors (χ^2 = 95.51, *p* < .001, *df* = 2). The model including selected

hyperactivity/impulsivity symptoms, social disengagement and anxiety was also significant,

indicating that these predictors had additional predictive value over and above age and sex (χ^2 =

19.85, *p* < .001, *df* = 3). The full model was statistically significant (χ^2 = 115.37, *p* <.001, *df* =

5). The Hosmer and Lemeshow test was non-significant, indicating that the model was a good fit

(χ^2 = 2.82, *p* = .95, *df* = 8). The model including all the predictors was able to correctly classify

74.4 % of cases. With social disengagement and anxiety as covariates, the symptoms of

hyperactivity/impulsivity selected significantly predicted NSSI behaviour (Wald = 7.79, *df* = 1, *p*

= .01). Social disengagement emerged as a significant predictor of NSSI behaviour (Wald =

7.97, *df* = 1, *p* = .01), and anxiety was not a significant predictor when included in this model

(Wald = .335, *df* = 1, *p* = .56). The odds ratio for hyperactivity/impulsivity symptoms indicated

that as the hyperactivity/impulsivity symptoms selected increased, individuals were 1.08 times

more likely to engage in NSSI. Regression coefficients, Wald statistics, odds ratio and 95% confidence intervals for the odds ratios are presented in Table 1.

Inattentive symptoms. In the third binary logistic regression analysis, the predictive effect of the selected ADHD inattentive symptoms (using the composite of distractibility and disorganization scores) only was examined as a predictor of NSSI engagement over and above age and sex, when social disengagement and anxiety were included as covariates. The first model including sex and age alone compared to the constant only model was significant, meaning that age and sex better predicted those who engaged in NSSI than a model without predictors ($\chi^2 =$ 95.51, $p < .001$, $df = 2$). The model including inattentive symptoms, social disengagement and anxiety was also significant, indicating that these predictors had additional predictive value over and above age and sex ($\chi^2 = 12.28$, $p = .006$, $df = 3$). The full model was statistically significant, meaning that it better predicted those who engaged in NSSI than a model without predictors ($\chi^2 = 107.79$, $p < .001$, $df = 5$). The Hosmer and Lemeshow test was non-significant, indicating that the model was a good fit ($\chi^2 = 3.72$, $p = .88$, $df = 8$). This model correctly classified 74.4% of cases. Though, with anxiety and social disengagement as covariates, the inattentive symptoms selected did not emerge as a significant predictor of NSSI (Wald = .36, $df = 1$, $p = .55$). Social disengagement emerged as a significant predictor of NSSI behaviour (Wald = 6.11, $df = 1$, $p = $ .01), and anxiety was not a significant predictor when included in this model (Wald = 1.58, $df = $ 1, $p = .21$). The odds ratio for the inattentive symptoms selected indicated that as these inattentive symptoms increased, individuals were 1.02 times more likely to engage in NSSI. Regression coefficients, Wald statistics, odds ratio and 95% confidence intervals for the odds ratios are presented in Table 1.

Discussion

Summary of Results

Although there has been increasing interest regarding ADHD as a potential risk factor for NSSI engagement, limited research has considered the heterogeneity of ADHD symptomatology and the possibility of differential risk based on symptom type. The present study sought to address this gap in the literature by examining the ability of selected ADHD symptomatology, selected hyperactivity/impulsivity symptoms, and selected inattentive symptoms individually to predict NSSI engagement in a sample of clinically-referred Canadian children and youth. Overall, study findings were consistent with our original hypothesis. As was predicted, the hyperactivity/impulsivity symptoms selected significantly predicted NSSI engagement even after taking into account age, sex, social disengagement symptoms and anxiety symptoms, whereas the inattentive symptoms selected were not associated with increased risk for NSSI. Another significant finding was that social disengagement symptoms significantly predicted NSSI engagement even after accounting for all types of the ADHD symptomatology selected and anxiety symptoms. In contrast, anxiety did not significantly predict NSSI engagement after accounting for selected ADHD symptoms and social disengagement. It is important to note that significant effect sizes were small for the predictive ability of selected ADHD symptoms, suggesting there are likely other stronger predictors of NSSI. That said, we did account for two significant predictors of NSSI in our analysis; therefore, somewhat smaller effect sizes were expected.

Differential Risk for NSSI

The present findings are consistent with prior studies, which have found that ADHD is associated with increased risk for NSSI (e.g. Hinshaw et al., 2012; Hurtig et al., 2012; Swanson

et al., 2014, Taylor et al., 2014). The present findings extend previous research by further elucidating the relationship between differential ADHD symptomology and NSSI. Specifically, the present findings suggest that increased risk may not be associated with ADHD symptomatology in general, but rather only with hyperactive/impulsive symptoms. Although previous research has explored whether different presentations of ADHD are associated with NSSI, these studies have been limited to predominantly female samples, and have focused on ADHD combined presentation and ADHD inattentive presentation without examining ADHD hyperactive/impulsive symptoms specifically.

For example, Hurtig and colleagues (2012) found that adolescents with ADHD engaged in more DSH than adolescents without ADHD but did not find any differences across presentations. Of the studies that have found differential risk based on presentation, results appear to be consistent with the present study. Both Hinshaw and colleagues (2012) and Swanson and colleagues (2014) found that individuals meeting criteria for the combined presentation were significantly different than those meeting criteria for predominantly inattentive presentation with regards to NSSI. Specifically, Hinshaw and colleagues (2012) found that NSSI was more frequent in those with the combined presentation. In addition, Swanson and colleagues (2014) found that those that were diagnosed with the combined presentation in childhood were at greater risk in terms of higher numbers of NSSI methods used, and greater use of the most severe NSSI methods used in young adulthood compared with those with predominantly inattentive presentation in childhood. However, these studies were both conducted with the same uniquely female sample, and they were unable to investigate individuals diagnosed with the predominantly hyperactive/impulsive presentation due to sample limitations. Therefore, our findings are helpful in that they show the unique predictive ability of increased

hyperactive/impulsive symptoms purely, without the inclusion of inattentive symptoms. This is useful in that it suggests that hyperactive/impulsive symptoms might be driving the effect of the combined presentation being related to increased risk. In addition, our sample included both males and females, as well as children and youth, demonstrating that hyperactive/impulsive symptoms seem to be associated with increased risk regardless of gender and age.

Our findings are consistent with a larger body of literature, which has underscored that impulsivity may be associated with increased risk for NSSI (see Hamza et al., 2015 for a review). Research suggests that higher levels of impulsivity may place an individual at greater risk for NSSI engagement, particularly when individuals have high levels of negative urgency, or the tendency to act without thinking through all of the long term consequences when experiencing negative emotions (Hamza et al., 2015). This may be because NSSI engagement offers an easily accessible and quick means of emotion regulation in times of emotional distress, and those who tend to be more impulsive might be more likely to seek the immediate relief, rather than considering the long term consequences (Hamza et al., 2015; Klonsky, 2007). Research examining clinical samples has found that individuals who engage in NSSI have significantly higher levels of impulsivity compared to those who do not engage in NSSI (e.g. Claes et al., 2013; Evren, Cinar, Evren, & Celik, 2012) and that self-report measures of impulsivity from clinical samples are highly associated with self-reports of NSSI engagement (McCloskey, Look, Chen, Pajoumand, & Berman, 2012). Similarly, among non-clinical samples, differences in urgency have been shown to differentiate those who engage in NSSI and those who do not (Dir, Karyadi, & Cyders, 2013; Glenn & Klonsky, 2010). There is also longitudinal research that suggests that early impulsivity may increase risk for later NSSI engagement. Meza and colleagues (2016) found that a childhood measure of response inhibition was predictive of

NSSI severity in young adulthood, underscoring the importance of impulsivity from a young age in predicting NSSI. Considering the wealth of research that highlights impulsivity as a risk factor for NSSI engagement, this provides further support that risk associated with the combined presentation may be explained by increased risk associated with hyperactive/impulsive symptoms. Therefore, our findings are consistent with prior research and extend prior findings by specifying specific symptomatology that may underlie the increased risk associated with ADHD, with a more varied sample including both male and female participants of both children and youth.

The inattentive symptoms selected were not associated with decreased risk for NSSI, nor were they associated with increased risk of NSSI engagement independently. We did not have a clear prediction as to the relationship between the inattentive symptoms selected and NSSI engagement. On the one hand, considering emerging evidence that suggests that distraction (a symptom of inattention) could be effective in avoiding NSSI engagement (e.g. Nock et al., 2009; Polanco-Roman et al., 2015), and research suggesting that difficulty in persisting in a painful or difficult task might actually reduce risk for severe forms of self-harm (Anestis et al., 2011), we considered that individuals who have difficulty staying on task, may be less likely to engage in NSSI and may even be protected by these symptoms of inattention. Still, we likely did not find a protective effect of inattention against NSSI because choosing to think about or do something else is an effortful distraction which would likely require significant attentional control. This would be especially difficult for individuals with marked impairments in attention, especially considering that research suggests that attentional control may be further reduced in the context of negative emotions when NSSI occurs (Jonkman et al., 2017; O'Bryan et al., 2017). In terms of risk associated with inattentive symptoms, results have differed across studies with

respect to NSSI engagement. Some research suggests that individuals originally diagnosed with a combined presentation appear to be more likely to engage in NSSI than those originally diagnosed with a predominantly inattentive presentation (e.g. Hinshaw et al., 2012), whereas other research suggests that there is no difference in terms of the frequency of NSSI engagement between those who are classified as a predominantly inattentive presentation and those who are classified as a combined presentation, but that there are differences in terms of methods used and severity (Swanson et al., 2014). The current study provides additional support that selected inattentive symptoms do not seem to be significantly predictive of NSSI engagement.

Impact of comorbidity on the relationship between ADHD and NSSI

Another area of interest in the literature concerns whether ADHD is only related to NSSI risk because of comorbidities that often exist between ADHD and internalizing difficulties, since individuals with ADHD are at an increased risk for comorbid disorders (e.g. Barkley, 2006; Chronis-Tuscano et al., 2010). For example, Taylor et al. (2014) found that the association between higher levels of ADHD symptoms and increased self-injury was mediated by mental health difficulties that were comorbid with ADHD, such as anxiety disorders, and mood disorders. Therefore, the current study sought to disentangle this relationship by examining the predictive effect of ADHD symptoms while taking into account symptoms of anxiety and social disengagement, also referred to as anhedonia, which is often considered a key symptom of depression (American Psychiatric Association, 2013). When symptoms of anxiety and social disengagement were taken into account, general selected ADHD symptoms and selected inattentive symptoms no longer significantly predicted NSSI risk, however, selected hyperactive/impulsive symptoms were still predictive of NSSI risk even after controlling for these comorbid risk factors. This finding makes sense in light of previous findings that have

found that individuals classified as combined presentation and predominantly inattentive presentation tend to be at greater risk for depression than individuals classified as predominantly hyperactive/impulsive presentation or without a diagnosis (Chronis-Tuscano et al., 2010; Jonkman et al., 2017). This provides preliminary evidence that perhaps only hyperactive/impulsive symptoms are independently predictive of NSSI risk over and above anxiety and social disengagement symptoms associated with depression. Yet, it is important to remember that this effect was small, and may require replication. Further research should also consider more comorbid risk factors, such as other externalizing problems, and a wider array of depressive symptoms as the predictive ability of hyperactivity/impulsivity may decrease more when depression is more widely considered.

Anhedonia (as assessed by the social disengagement scale) was also a significant predictor of increased risk for NSSI among our sample of clinically referred children and youth. This finding is not surprising as anhedonia is considered a key feature of depression (American Psychiatric Association, 2013) and there is a multitude of studies that report an association between depressive symptoms and NSSI engagement (e.g. Hankin & Abela, 2011; Hoff & Muehlenkamp, 2009; Marshall, Tilton-Weaver, & Stattin, 2013; Muehlenkamp & Gutierrez, 2007; Xavier, Pinto-Gouveia, Cunha, & Dinis, 2017). Evidence from longitudinal studies suggests that depressive symptoms may predict future NSSI engagement, and that there may be a reciprocal relationship between depressive symptoms and engagement in NSSI. Intense negative emotion may increase the likelihood of NSSI engagement, and the resulting relief from these emotions after engaging in NSSI may reinforce using NSSI as a coping mechanism for future depressive symptoms (Marshall et al., 2013; Xavier et al., 2017). Studies examining the relationship between anhedonia and NSSI are less common. However, Muehlenkamp and Gutierrez (2007)

found that although adolescents who engaged in NSSI reported greater depressive symptoms than adolescents who had not engaged in NSSI, individuals who engaged in NSSI who had also attempted suicide reported significantly higher levels of anhedonia than those who had a history of NSSI engagement but had not attempted suicide. Similarly, Zielinski, Veilleux, Winer, and Nadorff (2017) found moderate correlations between NSSI engagement and anhedonia, or loss of pleasure, but they also found that individuals who had engaged in NSSI with previous suicide attempts had significantly higher anhedonia than those who only engaged in NSSI without a history of suicide attempts. Interestingly, they reported that anhedonia was no longer associated with NSSI frequency once suicidality was accounted for (Zielinski et al., 2017). Therefore, it is possible that individuals with high levels of anhedonia represent a group of individuals that may be at greater risk for suicide attempts. Future research should consider anhedonia, but also depressive symptoms more broadly as these may represent distinct categories of risk.

Limitations and Future Directions

Despite the fact that the current study was able to address a gap in the literature by highlighting differential risk associated with selected symptoms of hyperactivity/impulsivity on NSSI while controlling for other risk factors for NSSI in a diverse sample (including both males and females), this study is not without limitations. First, both the hyperactivity/impulsivity and inattentive scales were each only composed of two item ratings of symptomatology. These scales have been previously well validated (Stewart & Hamza, 2017), and recent research has found that individuals meeting criteria for ADHD score significantly higher on the Hyperactivity/Distractibility scale than children that do not meet ADHD criteria, suggesting that this measure has utility for detecting symptoms related to ADHD (Lau, Stewart, Saklofske, Tremblay, & Hirdes, 2018). Though due to the limited symptomology assessed this information

could not be used to obtain a reliable diagnosis. In addition, because the current study only used

selected symptoms for both hyperactivity/impulsivity and inattention, these selected symptoms

are not necessarily representative of the wider cluster of symptoms that is encapsulated by

hyperactivity/impulsivity or inattention. As was mentioned each of these clusters consists of nine

possible symptoms, of which the current study was only able to capture two. Therefore, these

selected symptoms likely are not able to provide a comprehensive picture of the

hyperactive/impulsive cluster nor the inattentive cluster, as these clusters cannot be encapsulated

by merely two symptoms. With this in mind, it is possible that the results of the current study

would have looked very different had different hyperactive/impulsive and inattentive symptoms

been selected or if more symptoms from each cluster had been included. Previous studies such as

Swanson and colleagues (2014) have opted for more comprehensive diagnostic interviews such

as the DISC-IV to provide greater diagnostic information. Another limitation of the present study

was that recency of NSSI was assessed rather than frequency of the behaviour, type of NSSI

method, or severity of method. Therefore, the present study was unable to draw conclusions in

terms of differential risk associated with varying ADHD symptoms with respect to how

frequently these individuals engaged in NSSI and the types of methods that are being used, and if

this differs based on level of hyperactivity/impulsivity or inattentive symptoms. Considering that

Swanson and colleagues (2014) found such differences between those with a combined

presentation and those with a predominantly inattentive presentation, this could be important to

investigate in future research. An examination of the impact of symptom levels in predicting

higher frequencies or more severe methods would be useful in understanding if it is

hyperactive/impulsive symptoms driving the increased risk that Swanson and colleagues (2014)

found for those with the combined presentation. Another limitation that should be noted is that

the study is correlational, and it is possible that the link between hyperactivity/impulsive symptoms and NSSI may be explained by other third variables not accounted for in the current study, such as externalizing problems or other internalizing symptoms associated with depression (Swanson et al., 2014; Taylor et al., 2014). Given that the effect between selected hyperactivity/impulsive symptoms was small, it is likely there may be stronger and more proximal predictors of NSSI. Finally, the current study was cross-sectional in nature rather than longitudinal, meaning that causality and directionality of effects cannot be discerned. Therefore, there is a need for future research of clinical samples to consider longitudinally if children and youth with differing levels of ADHD symptomatology are at differential risk of beginning to engage in NSSI.

In light of these limitations, there are many areas that future research should investigate. Firstly, future research could include more in-depth assessments of all 18 ADHD symptoms with a more comprehensive assessment to include differing diagnostic presentations of ADHD in order to assess differential risk for NSSI associated with all three presentations of ADHD in a sample containing both males and females. It may also be beneficial to investigate effects of the informant providing the information about ADHD symptomatology and whether informant (self, parent, teacher, etc) impacts the relationship with risk for NSSI. Future research could also investigate differences in frequency, severity and method of NSSI engagement, based on ADHD symptom categories to determine if hyperactive/impulsive symptoms are uniquely predictive of higher frequency and riskier methods of NSSI. It will also be important to investigate other third variables that may be accounting for the relationship between hyperactive/impulsive symptoms and increased risk for NSSI engagement that were not included in the present study. Although we were able to control for some, there are other comorbid conditions that may better explain

this relationship, especially considering that the effects found were fairly small. Other studies should consider other comorbid conditions such as externalizing problems, and other symptoms commonly associated with depression considering the high rates of comorbidity with ADHD (Angold et al., 1999; Barkley, 2006; Becker, et al., 2012; Chronis-Tuscano et al., 2010). Finally, future research should investigate the nature of the relationship between inattention and NSSI engagement and what might explain the lack of association between these two, in order to continue to clarify the extent of differential risk across symptom type.

Conclusion

The current study provides preliminary evidence for differences in risk for NSSI associated with selected ADHD symptomatology, such that children and youth with increased levels of selected hyperactivity/impulsivity symptoms may be at increased risk for NSSI engagement. This study adds to the existing literature by providing further evidence for ADHD symptoms as a modest risk factor for NSSI, and extends past research by specifying differential risk associated with selected hyperactive/impulsive symptoms that remains even after considering comorbid anxiety and social disengagement. The current study not only provides new insight about the link between selected ADHD symptomology and NSSI engagement, but also has important implications for practice. Specifically, the present findings highlight the need for a more holistic treatment approach for children with ADHD with high levels of hyperactivity/impulsivity. Clinicians may need to consider more than treating ADHD symptoms, but also consider the broader constellation of risks inferred, such as risk for NSSI. Thus, incorporating preventive and intervention efforts around NSSI, may be beneficial among clinically referred children and youth with ADHD. Additionally, these findings underscore the value of adopting screening assessments such as the CHYMH, which allow for an assessment of

co-morbid mental health concerns that may occur among children and youth with ADHD

symptomology.

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Table 1

Binary Logistic Regression Examining Selected ADHD Symptoms as a Predictor of NSSI

| | Non suicidal self-injury | | | | |
Predictor	*B*	Wald Chi-Square	Odds ratio (ExpB)	*P* value	95% Confidence Interval
Age	.21	54.80	1.23	<.001**	(1.17, 1.31)
Sex	.79	26.12	2.21	<.001**	(1.63, 2.99)
ADHD Total	.03	3.82	1.03	.05	(1.00, 1.07)
Social disengagement	.05	6.64	1.05	.01*	(1.01, 1.09)
Anxiety symptoms	.01	.71	1.01	.40	(.98, 1.04)

*p<.05. **p < .01.

Table 2

Binary Logistic Regression Examining Selected Hyperactive/Impulsive Symptoms as a Predictor of NSSI

Predictor	B	Wald Chi-Square	Odds ratio (ExpB)	P value	95% Confidence Interval
			Non suicidal self-injury		
Age	.22	57.76	1.25	<.001**	(1.18, 1.32)
Sex	.83	27.97	2.28	<.001**	(1.68, 3.10)
Hyperactivity/impulsivity	.08	7.79	1.08	.01*	(1.02, 1.15)
Social disengagement	.05	7.97	1.06	.01*	(1.02, 1.09)
Anxiety symptoms	.01	.34	1.01	.56	(.98, 1.04)

*p<.05. **p < .01.

Table 3

Binary Logistic Regression Examining Selected Inattentive Symptoms as a Predictor of NSSI

Predictor	*B*	Wald Chi-Square	Odds ratio (ExpB)	*P* value	95% Confidence Interval
		Non suicidal self-injury			
Age	.20	52.02	1.22	<.001**	(1.16, 1.29)
Sex	.75	23.83	2.11	<.001**	(1.56, 2.84)
Inattentive symptoms	.02	.36	1.02	.55	(.96, 1.08)
Social disengagement	.05	6.11	1.05	.01*	(1.01, 1.09)
Anxiety symptoms	.02	1.58	1.02	.21	(.99, 1.05)

*p<.05. **p < .01.