Non-Suicidal Self-Injury and Suicidal Behaviours among Children and Adolescents: The Role of Adverse Childhood Experiences and Bullying Victimization

by

Philip Baiden

A thesis submitted in conformity with the requirements for the degree of Doctor of Philosophy
Factor-Inwentash Faculty of Social Work
University of Toronto

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Abstract

This three-paper dissertation examined non-suicidal self-injury among children and adolescents referred to community and inpatient mental health settings in Ontario, and the association between suicidal behaviours and referral for mental health services among children involved in the child welfare system in Ontario. The first paper examined the effect of adverse childhood experiences on non-suicidal self-injury. The results of this paper indicated that children and adolescents who were physically abused had 49% higher odds of engaging in non-suicidal self-injury and children and adolescents who were sexually abused had 60% higher odds of engaging in non-suicidal self-injury, when compared to their non-abused counterparts. The second paper examined the effect of bullying victimization on non-suicidal self-injury and the mediating effect of depressive symptoms on the relationship between bullying victimization and non-suicidal self-injury among adolescents. The results indicated that the effect of bullying victimization on non-suicidal self-injury was partially mediated by depressive symptoms after adjusting for the effect
of demographic characteristics, number of childhood abuse, social support, and mental health diagnoses. The third paper examined the association between suicidal behaviours and referral for mental health services among children involved in the Child Welfare System in Ontario. Data for this paper were obtained from the Ontario Incidence Study of Reported Child Abuse and Neglect 2013. Results indicated that children who expressed suicidal thoughts had more than twice the odds of being referred for mental health services and children who engaged in self-harm behaviour had 44% higher odds of being referred for mental health services. Assessment procedures for indicators of mental health, particularly among children and adolescents with a history of maltreatment, should also take into account non-suicidal self-injury. The dissertation concludes by summarizing the results and implications for social work and children’s mental health research.

*Keywords:* non-suicidal self-injury; adverse childhood experiences; bullying victimization; child abuse and neglect; referral; mental health services
Statement of Contributors and Co-Authors

This dissertation contains three publishable papers. I was responsible for conceptualizing the studies, reviewing the literature, developing the research questions and hypotheses, cleaning and conducting the statistical analyses, interpreting the findings, and preparing and submitting the papers for publication. All the three papers were written in collaboration with my dissertation supervisor, Dr. Barbara Fallon.

The first two papers were prepared in collaboration with Dr. Shannon L. Stewart from Western University who is the principal investigator on the interRAI Child and Youth Mental Health (ChYMH) assessment instrument. Dr. Stewart provided access to the ChYMH data. Dr. Fallon provided support, guidance, and contributed to contextualizing the study findings. Paper three was prepared in collaboration with Dr. Fallon who is the principal investigator on the Ontario Incidence Study of Reported Child Abuse and Neglect 2013 (OIS-2013). Dr. Fallon provided access to the use of the OIS-2013. In addition, Dr. Fallon provided support, guidance, and contributed to contextualizing the study findings.

Although both datasets were not collected for the purpose of my dissertation, they contain relevant measures that I was able to use to address my research questions. All three manuscripts have been submitted for publication in peer-reviewed journals. Paper 1 has been published in Child Abuse & Neglect. Paper 2 has been published in Psychiatry Research. Paper 3 is currently under review with Child Abuse & Neglect.
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List of Abbreviations

ACEs          Adverse Childhood Experiences
ADHD          Attention Deficit-Hyperactivity Disorder
ANOVA         Analysis of Variance
AOR           Adjusted Odds Ratios
APA           American Psychiatric Association
BMLS          Beck’s Medical Lithality Scale
BPD           Borderline Personality Disorder
CBCL          Child Behavior Checklist
CD            Conduct Disorder
ChYMH         Child and Youth Mental Health
CI            Confidence Interval
CIS           Canadian Incidence Study of Reported Child Abuse and Neglect
CWS           Child Welfare System
DIB-R         Diagnostic Interview for Borderlines, Revised
DICA-R        Diagnostic Interview of Children and Adolescents-Revised
DSHI          Deliberate Self-Harm Inventory
DSM           Diagnostic and Statistical Manual of Mental Disorders
DSS           Depressive Symptoms Scale
FASM          Functional Assessment of Self-Mutilation
GOF           Goodness-Of-Fit
HR            Hazard Ratio
ICC           Intraclass Correlation
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>ISAS</td>
<td>Inventory of Statements About Self-Harm</td>
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<tr>
<td>K-SADS-PL</td>
<td>Schedule for Affective Disorders and Schizophrenia for School Aged Children – Present and Lifetime</td>
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<tr>
<td>LCA</td>
<td>Latent Class Analysis</td>
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<tr>
<td>NSSI</td>
<td>Non-Suicidal Self-Injury</td>
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<tr>
<td>OCD</td>
<td>Obsessive-Compulsive Disorder</td>
</tr>
<tr>
<td>ODD</td>
<td>Oppositional Defiant Disorder</td>
</tr>
<tr>
<td>OIS</td>
<td>Ontario Incidence Study of Reported Child Abuse and Neglect</td>
</tr>
<tr>
<td>OLS</td>
<td>Ordinary Least Squares</td>
</tr>
<tr>
<td>OSI</td>
<td>Ottawa Self-injury Inventory</td>
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<tr>
<td>PSU</td>
<td>Primary Sampling Units</td>
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<tr>
<td>PTSD</td>
<td>Posttraumatic Stress Disorder</td>
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<tr>
<td>ROC</td>
<td>Receiver Operating Characteristics</td>
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<tr>
<td>SASII</td>
<td>Suicide Attempt Self-Injury Interview</td>
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<tr>
<td>SBQ</td>
<td>Suicide Behaviour Questionnaire</td>
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<td>SD</td>
<td>Standard Deviation</td>
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<td>SHBQ</td>
<td>Self-Harm Behaviour Questionnaire</td>
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<td>SHI</td>
<td>Self-Harm Inventory</td>
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<td>SHRQ</td>
<td>Self-Harm Reasons Questionnaire</td>
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<td>SIMS</td>
<td>Self-Injury Motivation Scale</td>
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<td>SIQ</td>
<td>Suicide Intent Questionnaire</td>
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<td>SIQ</td>
<td>Self-Injury Questionnaire</td>
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<td>SIS</td>
<td>Suicide Intent Scale</td>
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<td>Abbreviation</td>
<td>Description</td>
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<td>--------------------------------------------</td>
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<tr>
<td>SITBs</td>
<td>Self-Injurious Thoughts and Behaviours</td>
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<tr>
<td>SITBI</td>
<td>Self-Injurious Thoughts and Behaviours Interview</td>
</tr>
<tr>
<td>SNAP</td>
<td>Schedule for Nonadaptive and Adaptive Personality</td>
</tr>
<tr>
<td>SPSS</td>
<td>Statistical Package for the Social Sciences</td>
</tr>
<tr>
<td>SRM</td>
<td>Suicide Risk Measure</td>
</tr>
<tr>
<td>SSHRC</td>
<td>Social Sciences and Humanities Research Council</td>
</tr>
<tr>
<td>SSI</td>
<td>Suicidal Self-Injury</td>
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<tr>
<td>TSI</td>
<td>Trauma Symptom Inventory</td>
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Chapter 1
Introduction

1.1 Background

The phenomenon of non-suicidal self-injury (NSSI) has been a matter of global public health concern for both researchers and practitioners for several decades (Romans, Martin, Anderson, Herbison, & Mullen, 1995; Schwartz, Cohen, Hoffmann, & Meeks, 1989; Suyemoto, 1998). This is partly because NSSI among children and adolescents increases the risk of suicide (Andover, Morris, Wren, & Bruzzese, 2012; Joiner, 2005; Muehlenkamp, 2014; Muehlenkamp & Gutierrez, 2007; Welch, 2001). A study by Nock, Joiner, Gordon, Lloyd-Richardson, and Prinstein (2006) found that close to 70% of adolescents who frequently engaged in NSSI also made at least one suicide attempt, and 55% reported multiple suicide attempts. Esposito, Spirito, Boergers, and Donaldson (2003) also found that compared to adolescents who attempted suicide for the first time, those who made multiple suicide attempts had a more severe history of NSSI.

1.1.1 Defining NSSI

The literature on NSSI is derived from various academic disciplines including education, psychology, psychiatry, and social work. Scholars have defined NSSI differently for the purpose of their research. As is the case with several other mental health disorders, NSSI occupies an unclear boundary between what is considered normal and abnormal behaviour making it difficult to classify (Angelotta, 2015). Nock and Favazza (2009) define NSSI as “the direct, deliberate destruction of one’s own body tissue in the absence of suicidal intent” (p. 9). NSSI is direct given that the eventual outcome happens without any steps coming between the self-injurious act to prevent or alter the act (Nock & Favazza, 2009). Ross, Heath, and Toste (2009) defined NSSI as “the deliberate, self-inflicted destruction of body tissue without suicidal intent and for purposes not socially sanctioned” (p. 83).
Behaviours such as cutting, pinching, poking, scratching, sticking pins and needles into the skin, and hair pulling, that result in self-injury but with no suicidal intent and causes less lethal damage to bodily tissue are classified as NSSI (Nock & Favazza, 2009), whereas behaviours such as self-injury involving fire arms and medication overdose with suicidal intent are classified as suicidal self-injury (SSI) (Messer & Fremouw, 2008; Muehlenkamp, 2014; Posner, Brodsky, Yershova, Buchanan, & Mann, 2014). SSI refers to engaging in self-injurious behaviour with suicidal intent (Nock & Favazza, 2009). Behaviours such as body piercing and tattooing which also results in direct destruction of body tissue are not considered as NSSI in that they are socially and culturally sanctioned (Favazza, 2009). According to the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-V) of the American Psychiatric Association (APA), NSSI can be diagnosed if “in the last year, the individual has, on 5 or more days, engaged in intentional self-inflicted damage to the surface of his or her body of a sort likely to induce bleeding, bruising, or pain (e.g., cutting, burning, stabbing, hitting, excessive rubbing), with the expectation that the injury will lead to only minor or moderate physical harm” (APA, 2013, p. 803).

1.1.2 Prevalence Estimate of NSSI

Prevalence estimates of NSSI reported among children and adolescents varies based on how NSSI was defined and measured, and on the population examined. Within the Canadian context, prevalence estimates typically range from as low as 7% in student samples (Duggan, Heath, & Hu, 2015) to as high as 77% in clinical samples (Preyde et al., 2014). Armiento, Hamza, and Willoughby (2014) examined factors that promote disclosure of NSSI among students from a mid-size Canadian university using non-probability sampling technique and found that close to a third (32%) of the 268 respondents reported a lifetime history of NSSI. The
study by Duggan et al. (2015) assessed NSSI using a single item that asked respondents whether they had ever physically hurt themselves on purpose. Using different instruments in measuring NSSI, other scholars have also reported low lifetime prevalence estimates among college students. Heath, Toste, Nedecheva, and Charlebois (2008) assessed NSSI using the deliberate self-harm inventory (DSHI) among students from a large urban university in Montreal, Quebec and found 11.7% of their student sample reported ever engaging in NSSI.

Cloutier, Martin, Kennedy, Nixon, and Muehlenkamp (2010) examined the co-occurrence of NSSI and suicidal behaviours among 468 adolescents aged 12 to 17 years old who were admitted to an emergency department at a hospital in Eastern Ontario and found that 45.3% had engaged in NSSI in the past 24 hours. Nixon, Levesque, Preyde, Vanderkooy, and Cloutier (2015) examined NSSI among adolescents consecutively admitted to an in-patient psychiatry unit in Southwestern Ontario between July 2012 and January 2013 and found that 45% of the 94 patients engaged in NSSI at least once per week. NSSI was measured using the Ottawa Self-injury Inventory (OSI; Martin et al., 2013). Also, in a study using a longitudinal design, Preyde et al. (2012) examined data on 169 children and adolescents from five mental health agencies in southwestern Ontario and found that 57 (34%) of the participants engaged in NSSI at baseline. Of these 57 participants, 27 (47%) engaged in mild NSSI behaviours (e.g., repeated pinching), 23 (40%) engaged in severe NSSI behaviours (e.g., deep razor cuts), and 7 (12%) engaged in life-threatening NSSI behaviours (Preyde et al., 2012).

Studies from other jurisdictions have also reported wide variation in prevalence estimates of NSSI among adolescents in clinical samples ranging from 40% (Kaess et al., 2013) to 80% (Auerbach et al., 2014). Muehlenkamp, Claes, Havertape, and Plener (2012) undertook a systematic review of studies published between 2005 and 2011 on the prevalence rate of NSSI
among adolescents and found a mean lifetime prevalence of NSSI across studies to be 18% (SD = 7.3%). They also found that assessing NSSI using a single item question often results in a lower prevalence rate than assessment with a specific behaviour checklist.

1.2 Research Rationale

One of the major risk factors for NSSI that continues to receive considerable research attention is adverse childhood experiences (ACEs). ACEs refer to distressing and/or traumatic events that occur during childhood, such as emotional, physical, and sexual abuse; emotional and physical neglect; caregiver factors such as addiction or substance use, mental illness, incarceration, separation or divorce; and violent treatment of the mother (Saul et al., 2014). Although studies from other countries have found that history of ACEs increases the risk of engaging in NSSI (Brausch & Holaday, 2015; Di Pierro, Sarno, Perego, Gallucci, & Madeddu, 2012; Gratz, 2006; Kaess et al., 2013; Weierich & Nock, 2008; Yates, 2004, 2009), few studies in Canada have examined the association between ACEs and NSSI among children and adolescents with mental health problems. Moreover, most of the existing studies on NSSI in Canada are from the general population or relied on student samples where the proportion of individuals with a history of ACEs is much lower than that found in clinical samples or child welfare samples (Heath et al., 2008; Roelofs et al., 2010). Additional research that seeks to understand the association between ACEs and NSSI among children and adolescents with mental health problem is warranted to advance the development of effective prevention and treatment interventions for NSSI. Such an understanding is important given that individuals with a history of ACEs who engage in NSSI often do so years after the adversity, thereby suggesting that ACEs may exacerbate the onset and maintenance of NSSI (Arens, Gaher, & Simons, 2012).
A review of the existing literature also revealed that bullying victimization is a major global public health problem among adolescents (Fekkes, Pijpers, Fredriks, Vogels, & Verloove-Vanhorick, 2006; Finkelhor, Ormrod, Turner, & Hamby, 2005; Swearer & Hymel, 2015; Zhou, Liu, Niu, Sun, & Fan, 2017). Bullying is such a broad term that it sometimes can be difficult to distinguish from other forms of peer aggression (Cornell & Bandyopadhyay, 2009). Salmivalli (2010) defined bullying to mean “a subtype of aggressive behaviour, in which an individual or a group of individuals repeatedly attacks, humiliates, and/or excludes a relatively powerless person” (p. 112). Olweus (1999) suggested three essential criteria in operationalizing bullying: imbalance of power, intentional harm doing, and acts carried out repeatedly over time. First, a bully must exert some sort of power or dominance over the victim. Second, the victim must suffer some form of physical or emotional harm. Teasing of a humorous and somewhat friendly nature that result in no distress would not be classified as bullying. Third, to be considered bullying, the act must be chronic and repetitive over time (Olweus, 1999). An adolescent who pushes his or her peer out of anger or frustration would not be considered a bully unless he or she repetitively does so to the point of humiliation.

Bullying victimization has been linked to a number of behavioural and emotional problems including anxiety (Cohen & Kendall, 2015), depression (Cole et al., 2014; Hamilton et al., 2016), loneliness (Campbell, 2013; Murphy, Murphy, & Shevlin, 2015; Storch & Masia-Warner, 2004), social withdrawal (Dill, Vernberg, Fonagy, Twemlow, & Gamm, 2004; Runions & Shaw, 2013), low self-esteem (Fredstrom, Adams, & Gilman, 2011; Jones, Bilge-Johnson, Rabinovitch, & Fishel, 2014; Tsaousis, 2016), as well as poor psychosocial adjustment (Nansel et al., 2001). Various meta-analytic studies have also found support for the link between bullying victimization and the onset of depressive symptoms and internalizing problems (Reijntjes,
Kamphuis, Prinzie, & Telch, 2010; Ttofi, Bowes, Farrington, & Lösel, 2014). Some recent studies that have investigated NSSI have found that adolescents who were victims of bullying are more likely to engage in NSSI when compared to their non-victimized counterparts (Bakken & Gunter, 2012; Claes, Luyckx, Baetens, Van de Ven, & Witteman, 2015; Heilbron & Prinstein, 2010). Although the stress and trauma that accompany bullying victimization has been linked to mental health problems such as depressive symptoms and psychological distress (Affrunti, Geronimi, & Woodruff-Borden, 2014; Nielsen, Tangen, Idsoe, Matthiesen, & Magerøy, 2015), limited studies have investigated the mediating effect of depressive symptoms on the relationship between bullying victimization and NSSI among adolescents.

Furthermore, studies from Canada have found that children with a history of child abuse and neglect are at significantly higher risk for mental health problems including engaging in suicidal behaviours than their counterparts in the general population (Farand, Chagnon, Renaud, & Rivard, 2004; Hadland et al., 2015; Katz et al., 2011; Rhodes et al., 2012; Rhodes et al., 2013). (Baiden & Fuller-Thomson, 2016). Suicidal behaviour refers to the occurrence of thoughts about killing oneself (ideation) and engaging in self-harm behaviours that has the potential to end one’s life (Nock & Favazza, 2009). A recent Canadian study found that as many as 80% of those who attempted suicide had a history of child abuse (Martin, Dykxhoorn, Afifi, & Colman, 2016). Using data from the At Risk Youth Study, Hadland et al. (2015) found that adjusting for other factors, children with a history of physical abuse, emotional abuse, and emotional neglect were between 3-4 times more likely to have attempted suicide when compared to their non-abused counterparts. Katz et al. (2011) also examined suicide and suicide attempts among 8,279 children in care and a comparison cohort of 353,050 children not in care from Manitoba, Canada and
found that the odds of suicide was three times higher and the odds of suicide attempt was twice higher among children in care when compared to their counterparts who were not in care.

Scholars have found that although children who come into contact with the child welfare system (CWS) have serious mental health problems and are in need of mental health services, many do not receive services when they need them (Bunger, Chuang, & McBeath, 2012; Montoya, Giardino, & Leventhal, 2010; Villagrana, 2010; Wherry, Huey, & Medford, 2015). The extant literature has focused attention on factors associated with mental health service utilization among maltreated children (Bunger et al., 2012; Finno-Velasquez, Cardoso, Dettlaff, & Hurlburt, 2015; Kim & Garcia, 2016). However, one area of research that has received comparatively little attention within the child welfare literature is referral of maltreated children for mental health services (Burns et al., 2004; Staudt, 2003). Referral is the initial pathway towards mental health service utilization.

1.3 Research Questions

This dissertation aims to answer the following research questions:

1) What is the prevalence of NSSI among children and adolescents referred to community and inpatient mental health settings in Ontario?

2) What is the effect of ACEs on NSSI after taking into account demographic factors, depressive symptoms, social support, and mental health diagnoses?

3) Does social support protect against NSSI?

4) Does depressive symptoms mediate the effects of bullying victimization on NSSI?
What is the association between suicidal behaviours (that is, suicidal thoughts and self-harm behaviours) and referral for mental health services among children involved in the CWS in Ontario?

1.4 Specific Aims of This Dissertation

This dissertation contributes to the existing literature by examining: 1) the role of ACEs and bullying victimization as determinants of NSSI among children and adolescents referred to community and inpatient mental health settings in Ontario, and 2) the association between suicidal behaviours and referral for mental health services among children involved in the CWS in Ontario. This dissertation consists of five chapters: an introduction, three publishable peer-reviewed papers, and a conclusion. Chapter 1 introduces the general background and scope of the research problem, provides an overview of NSSI with emphasis on the definition and prevalence estimates of NSSI, how NSSI differs from other forms of self-injurious behaviours such as SSI, measurement of NSSI, and what is known and unknown about the association between ACEs, bullying victimization, and NSSI. The chapter also discusses the aims of the dissertation and the research questions.

Chapter 2 is the first of the three publishable papers and is titled The role of adverse childhood experiences as determinants of non-suicidal self-injury among children and adolescents referred to community and inpatient mental health settings. This paper is in press in Child Abuse & Neglect. Using data from the interRAI Child and Youth Mental Health assessment instrument, the objectives of this study were to: 1) examine the prevalence of NSSI among children and adolescents referred to community and inpatient mental health settings in Ontario, Canada, and 2) determine the effect of ACEs on NSSI after taking into account demographic factors, depression, social support, and mental health diagnoses. Chapter 3 is the second paper
and is titled *The mediating effect of depressive symptoms on the relationship between bullying victimization and non-suicidal self-injury among adolescents: Findings from inpatient and outpatient mental health settings in Ontario, Canada.* Drawing on data from the *interRAI Child and Youth Mental Health assessment instrument*, this study has the following objectives: 1) to examine the effect of bullying victimization on NSSI, and 2) to examine the mediating effect of depressive symptoms on the relationship between bullying victimization and NSSI. The following hypotheses were examined: 1) there will be an association between bullying victimization and NSSI, and 2) the effect of bullying victimization on NSSI will be partially mediated by depressive symptoms, after taking into account demographic characteristics, history of childhood abuse, social support, and mental health diagnoses. This paper is currently under review with *Psychiatry Research*.

Chapter 4 is the third paper and is titled *Examining the association between suicidal behaviours and referral for mental health services among children involved in the Child Welfare System in Ontario, Canada.* This study is based on data obtained from the Ontario Incidence Study of Reported Child Abuse and Neglect 2013 (OIS-2013). The objective of this study was to add to the existing body of literature by examining the association between suicidal behaviours and referral for mental health services among children involved in the CWS in Ontario, after taking into account other known predictors of mental health service utilization, such as child demographic characteristics, maltreatment characteristics, and child functioning concerns. This study also offers an important contribution to the existing literature as it identifies maltreatment characteristics that influence referral for mental health services. This paper is currently under review with *Child Abuse & Neglect*. Chapter 5 provides a general discussion of the unique
contribution of each paper, implications for social work and clinical practice, and suggestions for future research.

1.5 Distinguishing NSSI from SSI

Some scholars have argued that NSSI shares some similarities with SSI, including that: 1) they both involve intentional self-injury, 2) some of the risk factors associated with NSSI are also associated with SSI, and 3) NSSI is a strong predictor of SSI (Andover & Gibb, 2010; Andover et al., 2012; Claes & Vandereycken, 2007; Muehlenkamp, 2014; Muehlenkamp & Gutierrez, 2007; Nock et al., 2006; Posner et al., 2014; Silverman, Berman, Sanddal, O’Carroll, & Joiner, 2007). On the other hand, scholars are also of the opinion that NSSI and SSI have important differences (Jacobson & Batejan, 2014; Muehlenkamp, 2014; Nock & Favazza, 2009).

More importantly, individuals who engage in NSSI do not have the intent to die whereas SSI behaviours are largely motivated by the intent to die (Klonsky, Victor, & Saffer, 2014; Muehlenkamp, 2014; Muehlenkamp et al., 2012; Stewart, Baiden, & Theall-Honey, 2014). Intent, lethality, and repetition/frequency are three important concepts that distinguish NSSI from SSI.

The concept of intent is crucial in distinguishing NSSI from SSI behaviours and is fundamental in choosing the techniques and methods to investigate its presence (Silverman, 2006). Although intent and outcome may be imperfectly linked, without the concept of intent, NSSI cannot be distinguished from other suicide-related behaviours. Silverman et al. (2007) considers the concept of intent so crucial in distinguishing NSSI from other suicide related behaviours that they refer to it as “the first order of business” (p. 255). Rudd (2006) noted that, given the nature of suicide related behaviours, acutely suicidal individuals are unable to provide clinicians with a clearly expressed intent. Thus, clinicians assessing individuals who engage in
NSSI should utilize other tools in determining intent by seeking further clarification and resolution of differences between the reported cognition and the observed self-injurious behaviour (Rudd, 2006). Silverman et al. (2007) also grappled with the relationship between intent and lethality and suggested that intent is present when the following conditions are satisfied: 1) an expressed desire to end one’s own life as a deliberate experience; 2) knowledge and awareness of risk factors associated with the behaviour; 3) awareness of the means and methods to carry out the desired outcome, and 4) knowledge of how to use the means or methods.

Another concept that distinguishes NSSI from SSI is lethality. Lethality refers to the degree of severity and dangerousness inherent in a given act (Berman, Shepherd, & Silverman, 2003). Lethality is often measured using a scale ranging from low through moderate and high with higher scores on the lethality scale indicating less chance of survival. Firearms, hanging, choking/suffocation, and drowning are typically considered the most lethal method whereas intentional misuse of medication, poisoning, ingestion, cutting, and piercing are typically considered less lethal methods on the lethality scale (Berman et al., 2003). One of the widely used lethality scales in the field of suicidology is the Beck’s Medical Lethality Scale (BMLS; Beck, Beck, & Kovacs, 1975). The BMLS is an 8-point Likert rating scale measuring the degree of medical damage. Scores on the BMLS range from 0 to 8, with higher scores indicating greater degree of lethality. Detailed discussion of the BMLS together with its psychometric properties has been reported elsewhere (see e.g., Berman et al., 2003; Zalsman et al., 2006).

One other feature that distinguishes NSSI from SSI behaviours has to do with the frequency or number of times individuals engage in NSSI. Individuals who engage in NSSI often do so on a regular basis, relative to SSI behaviours, with some engaging in NSSI weekly.
Nock and Favazza (2009) therefore suggested modifying how NSSI is categorized based on severity and frequency. They suggested that to establish important distinctions between NSSI and other suicide related behaviours, researchers and clinicians might benefit from the following classification: mild NSSI – consisting of low frequency and low severity, moderate NSSI – consisting of moderate frequency and moderate severity, whereby the injury requires some medical attention, and severe NSSI – consisting of high frequency and severe injury, whereby the injury leads to severe and permanent destruction to the body (Nock & Favazza, 2009). Some studies have provided support for such a distinction (e.g., Howe-Martin, Murrell, & Guarnaccia, 2012; Majid et al., 2015; You & Leung, 2012). However, the categorization suggested by Nock and Favazza (2009) could further be refined to include high frequency but low severity or low frequency but high severity as moderate NSSI.

Based on the review of the literature, the main distinction between NSSI and SSI lies in the intent behind the self-injurious act: that is whether the act was motivated by the desire to end one’s own life. This important distinction has research implications with respect to ascertaining the prevalence of NSSI. From a clinical perspective, distinguishing NSSI from SSI based on intent, lethality, and repetition could help clinicians and social work practitioners in determining appropriate treatment interventions since, as discussed above, asking about intent behind any self-injurious act is the first thing to consider in coming up with treatment intervention.

1.6 Measurement of NSSI

The importance of having a reliable and comprehensive measurement instrument for any health and mental health outcome including NSSI cannot be overemphasized. From a research perspective, having a reliable measurement instrument of NSSI is critical for advancing theory and ensuring consistency in examining future trends. From a clinical perspective, a
comprehensive measurement instrument of NSSI is vital in developing case formulations so as to inform diagnostic decisions and treatment interventions (Klonsky & Lewis, 2014). A number of other scholars have also highlighted the importance of having a reliable and comprehensive instrument to measure NSSI (Linehan, Comtois, Brown, Heard, & Wagner, 2006; Nock, Holmberg, Photos, & Michel, 2007).

Notwithstanding this general consensus, identifying a standardized instrument that is widely accepted among researchers and clinicians has proven to be a difficult task with much controversy and disagreement. Some of the controversy and disagreement has to do with the time since last episode of NSSI, number of NSSI episodes to be endorsed, population examined, as well as the reasons for engaging in NSSI. This has proven to be a major limitation in undertaking NSSI research especially when one attempts to compare and contrast results across multiple studies. Currently, there are a number of instruments that have been developed to measure NSSI. In the following pages, I discuss briefly three of these instruments that are widely used in assessing NSSI and have been proven to have strong psychometric properties. They include: Self-Injurious Thoughts and Behaviours Interview (SITBI; Nock et al., 2007), Suicide Attempt Self-Injury Interview (SASII; Linehan et al., 2006) and Deliberate Self-Harm Inventory (DSHI; Gratz, 2001). A summary of these NSSI instruments including other NSSI instruments has been provided in Table 1.1.

1.6.1 Self-Injurious Thoughts and Behaviours Interview (SITBI)

The SITBI is a structured interview made up of 169 items in five distinct categories that measures the presence, frequency, and features of five different types of SITBs: suicidal ideation, suicide plans, suicide gestures, suicide attempts, and NSSI (Nock et al., 2007). The SITBI defines NSSI to mean any act of “direct, deliberate self-injury in which there is no intent to die”
The NSSI category of the SITBI starts with a screener that asks about lifetime acts of NSSI. Beyond the lifetime presence of NSSI, the SITBI assesses acts of NSSI within the past year, past month, age of onset, severity, precipitating factors contributing to an act of NSSI, and the method of NSSI. With respect to severity, the SITBI assesses whether individuals received medical attention as a result of the NSSI. The SITBI also contains an open-ended question that assesses the self-reported purpose and function of NSSI (e.g., to regulate emotions, seek attention from others) following a series of four questions on a 4-point Likert scale (Nock et al., 2007).

The four questions on the 4-point Likert scale asks individuals about the extent to which their NSSI act resulted in physical pain, the proportion of NSSI episodes in which they had used drugs or alcohol, and the amount of time they usually spend contemplating NSSI behaviour. The SITBI also asks individuals the number of their peers that have engaged in NSSI and to what extent on a 4-point Likert scale do their peers influence their NSSI behaviour. Lastly, the SITBI asks individuals about the likelihood that they would engage in NSSI sometime in the future (Nock et al., 2007). The SITBI takes about 15 minutes to complete and can be administered by a psychologist, trained medical personnel, or by a graduate student under close supervision. The SITBI has both the quantitative and standardized responses as well as qualitative and open-ended responses with suitable wording for both adolescents and adults (Nock et al., 2007).

Nock et al. (2007) assessed the psychometric properties of the SITBI and found strong internal consistency for the SITBI with individual items loading highly on each of the five distinct categories. The inter-rater reliability of the SITBI was assessed using kappa statistic to test how two or more independent assessors of a randomly selected sample could rate the presence or absence of each outcome. The results revealed excellent agreement between the
raters on a number of domain items. Test-retest reliability between reported lifetime presence and the frequency of each individual SITBI item at various time points was also high for suicidal ideation, suicide plan, suicide attempt, and perfect for NSSI (Nock et al., 2007). Only suicide gesture yielded poor test-retest reliability coefficient.

Construct validity of the SITBI, which is the extent to which variables of the SITBI accurately measure the five distinct constructs of the SITBI was also established against the Schedule for Affective Disorders and Schizophrenia for School Aged Children – Present and Lifetime version (K-SADS-PL; Kaufman et al., 1997) which is a highly validated standardized instrument. There was a moderate correlation between measures of the SITBI and the K-SADS-PL with the NSSI category having a strong coefficient value (k = .74). It should be noted that in assessing construct validity, measures such as concurrent, convergent, content, and criterion-related validity are generally employed. However, owing to the difficulty in distinguishing between these types of validity, largely because the procedures for establishing them are similar, Nock et al. (2007) relied on convergent and discriminant validity in assessing the construct validity of the SITBI against the K-SADS-PL. Several other studies have also reported strong psychometric properties of the SITBI (e.g., Dhingra, Boduszek, & O’Connor, 2015; Latimer, Covic, & Tennant, 2012; Trewavas, Hasking, & McAllister, 2010).

1.6.2 Suicide Attempt Self-Injury Interview (SASII)

The SASII is a 31-item semi-structured instrument that seeks to provide a detailed descriptive assessment of NSSI and other self-injurious behaviours (Linehan et al., 2006). One of the goals for the SASII is to measure the context and intent of self-injurious behaviours using definitions and concepts that distinguish self-injurious behaviours with intent to die from self-injurious behaviours with no intent to die. Items in the SASII includes open-ended questions
(e.g., “what were the specific events leading up to the self-injury?”), checklist questions (e.g., “would you say you injured yourself for any of the reasons on this list? Which ones?”), forced-choice questions (e.g., “was the intention of your action to self-injure deliberate, accidental, or somewhere in between?”), 6-point Likert scale type questions (e.g., “rate medical risk of death based on method and on other substances present”), and yes/no questions (e.g., “were you drinking during or prior to your self-injury?”) (Linehan et al., 2006, p. 305).

The SASII has been found to possess strong psychometric properties based on factor analysis using maximum likelihood extraction procedure with varimax rotation and Kaiser normalization. Internal consistency of items using Cronbach’s alpha and inter-rater reliability using intraclass correlations (ICC) has also been reported. Factor analysis performed by Linehan et al. (2006) revealed four distinct factors: Suicide Intent, Lethality, Rescue Likelihood, and Suicide Communication. Linehan et al. (2006) found the four distinct factors yielded excellent (Suicide Intent, \( \alpha = .93 \)) to moderate alpha coefficient values (Suicide Communication, \( \alpha = .63 \)). ICC calculated with measures as fixed effects and raters as random effects also yielded high correlations among nine SASII assessors (Median correlation = .96; range = .87-.98) (Linehan et al., 2006). A number of studies have found the SASII to have strong psychometric properties (Chen, Matthews, Allen, Kuo, & Linehan, 2008; Crowell et al., 2012).

1.6.3 Deliberate Self-Harm Inventory (DSHI)

The DSHI is a 17-item behaviourally based standardized self-report instrument designed to assess NSSI (Gratz, 2001). The DSHI defined NSSI to mean “the deliberate direct, destruction or alteration of body tissue without conscious suicidal intent, but resulting in injury severe enough for tissue damage (e.g., scarring) to occur” (Gratz, 2001, p. 255). The DSHI assesses different aspects of NSSI such as “frequency, severity, duration, and type of self-harm.
behaviour” (Gratz, 2001, p. 255). The DSHI begins with a screening question that asks individuals whether they ever intentionally injure themselves without intending to die. Individuals who answered in the affirmative are further asked questions pertaining to age of onset of NSSI, number of times engaged in NSSI, time since last NSSI, and whether the injury was severe enough to result in hospitalization or to require medical attention (Gratz, 2001). This is then repeated for each of the 17 other specific NSSI acts. From the list of items, a continuous variable is then generated ranging from 1 to 17 with higher scores indicating more and different acts of NSSI.

Gratz (2001) assessed psychometric properties of the DSHI based on internal consistencies, test-retest reliability, and construct validity using data derived from undergraduate college students from Boston, US. The results revealed that the DSHI had a strong internal consistency value (Cronbach α = .82). Test-retest reliability of the DSHI over a two- to four-week period revealed adequate test-retest reliability coefficient (ϕ = .68). To establish construct validity of the DSHI, the correlation between the DSHI and other measures of NSSI such as the Suicide Behaviour Questionnaire (SBQ; Linehan, 1981) and the Diagnostic Interview for Borderlines, Revised (DIB-R; Zanarini, Gunderson, Frankenburg, & Chauncey, 1989) was examined. The results show moderate correlation between measures of the DSHI and the SBQ NSSI item (r = .35, p < .001) and the DIB-R NSSI item (r = .43, p < .001) (Gratz, 2001). Other studies have found the DSHI to have strong psychometric properties (Arens et al., 2012; Bjärehed & Lundh, 2008; Gratz, Conrad, & Roemer, 2002).
Table 1.1
Summary of Instruments for Assessing Non-Suicidal Self-Injury (NSSI)

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Type</th>
<th>No. of Items</th>
<th>History Method</th>
<th>Freq./Repetition</th>
<th>Lethal Intent/Function</th>
<th>History of Suicidality</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Omnibus measure</strong></td>
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<tr>
<td>SASII</td>
<td>I</td>
<td>31</td>
<td>X X X</td>
<td>X X X</td>
<td>X X</td>
<td>X X</td>
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<tr>
<td>SITBI</td>
<td>I</td>
<td>169</td>
<td>X X X</td>
<td>X X X</td>
<td>X X</td>
<td>X</td>
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<tr>
<td>SBQ</td>
<td>S</td>
<td>90</td>
<td>X X X</td>
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<td>SHBQ</td>
<td>S</td>
<td>32</td>
<td>X X</td>
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<tr>
<td><strong>Functional measures</strong></td>
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<tr>
<td>FASM</td>
<td>S</td>
<td>22</td>
<td>X X X</td>
<td>X X X</td>
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<tr>
<td>ISAS</td>
<td>S</td>
<td>39</td>
<td>X X</td>
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<tr>
<td>SIQ</td>
<td>S</td>
<td>30</td>
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<td>SIMS</td>
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<td>SHRQ</td>
<td>S</td>
<td>21</td>
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<td><strong>Behavioural measures</strong></td>
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<tr>
<td>DSHI</td>
<td>S</td>
<td>17</td>
<td>X X</td>
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<tr>
<td>SHI</td>
<td>S</td>
<td>22</td>
<td>X X</td>
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<tr>
<td><strong>Brief measures</strong></td>
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<tr>
<td>SNAP items</td>
<td>S</td>
<td>2</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>TSI item</td>
<td>S</td>
<td>1</td>
<td>X</td>
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</tbody>
</table>

SASII, Suicide Attempt Self-Injury Interview; I, Interview; S, Self-report; SITBI, Self-Injurious Thoughts and Behaviours Interview; SBQ, Suicide Behaviour Questionnaire; SHBQ, Self-Harm Behaviour Questionnaire; FASM, Functional Assessment of Self-Mutilation; ISAS, Inventory of Statements About Self-Harm; SIQ, Self-Injury Questionnaire; SIMS, Self-Injury Motivation Scale; SHRQ, Self-Harm Reasons Questionnaire; DSHI, Deliberate Self-Harm Inventory; SHI, Self-Harm Inventory; SNAP, Schedule for Nonadaptive and Adaptive Personality, 375 items in total measure; TSI, Trauma Symptom Inventory, 100 items in total measure (Klonsky & Lewis, 2014).

1.7 Theoretical Framework

This dissertation is guided by the theory of affect regulation. The concept of affect is defined according to the DSM-V to mean “a pattern of observable behaviours that is the expression of a subjectively experienced feeling state (emotion)” (APA, 2013, p. 817). The theory of affect regulation has its roots in attachment theory (Bowlby, 1958). The theory of affect regulation hypothesizes that engaging in NSSI stems from the need to control past experiences of trauma, or anger and pain that cannot be expressed verbally or through other
means (Suyemoto, 1998). Various studies, both cross-sectional and longitudinal, have found support for the theory of affect regulation in explaining NSSI among adolescents with a history of trauma and childhood adversities (Joiner et al., 2007; Klonsky & Moyer, 2008; Nock & Prinstein, 2005). Brown, Comtois, and Linehan (2002) examined reasons for suicide attempts versus NSSI among 75 suicidal women meeting the criteria for BPD and found that the desire to express anger, punish oneself, generate normal feelings, and distract oneself were the most common reasons cited for engaging in NSSI whereas the desire to make others better off was the most common reason cited for attempting suicide.

Additionally, Nock and Prinstein (2004) examined the functions of NSSI among adolescents and found that more than half (53%) of the adolescents engaged in NSSI as a way of regulating their affect (other reasons cited include: to relieve numbness or emptiness, to punish oneself, and to feel relaxed). Bureau et al. (2010) investigated specific aspects underlying the association between early parent–child relationships and NSSI among university students from Eastern Canada. The relationship between the NSSI group and their parents, compared to the parent-child relationships in the non-NSSI group was associated with more failed protection, fear, overprotection, alienation, and less care, less trust, and less communication (Bureau et al., 2010).

1.8 Summary

In summary, although extensive research attention has been devoted to understanding the effects of ACEs on NSSI, few studies within the Canadian context have examined the effects of ACEs on NSSI among children and adolescents with mental health problems. Most of the existing studies on NSSI among children and adolescents in Canada are from the general population or relied on student samples where the proportion of individuals with a history of
ACEs is much lower than that found in clinical samples (Heath et al., 2008; Roelofs et al., 2010). Moreover, there is a dearth in the amount of research conducted to understand the association between suicidal behaviours and referral for mental health services among children involved in the CWS. There is the need to further our understanding on the referral pattern of children who engage in suicidal behaviours so as to enhance their access to mental health services and other treatment interventions.
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consciousness, depression and emotion dysregulation. *Child and Adolescent Psychiatry and Mental Health, 9*(1), 1-12.


CHAPTER 2

THE ROLE OF ADVERSE CHILDHOOD EXPERIENCES AS DETERMINANTS OF NON-SUICIDAL SELF-INJURY AMONG CHILDREN AND ADOLESCENTS REFERRED TO COMMUNITY AND INPATIENT MENTAL HEALTH SETTINGS

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A link to the published paper can be found at:

Abstract

The objectives of this study were to examine the prevalence of, and determine the effect of adverse childhood experiences on non-suicidal self-injury among children and adolescents referred to community and inpatient mental health settings. Data for this study were obtained from the interRAI Child and Youth Mental Health dataset. A total of 2038 children and adolescents aged 8-18 years ($M = 12.49; SD = 2.88, 61.1\%$ males) were analyzed. Binary logistic regression was fitted to identify predictors of non-suicidal self-injury as a function of adverse childhood experiences, depression, and social support while simultaneously controlling for age, gender, type of patient, legal guardianship, marital status of parents/caregivers, history of foster family placement, and mental health diagnoses. Of the 2038 children and adolescents examined, 592 (29\%) of this clinical sample engaged in non-suicidal self-injury. In the multivariate logistic regression model, children and adolescents who were physically abused had 49\% higher odds of engaging in non-suicidal self-injury and children and adolescents who were sexually abused had 60\% higher odds of engaging in non-suicidal self-injury, when compared to their non-abused counterparts. Other predictors of non-suicidal self-injury include: older age, female gender, inpatient status, depression, attention deficit-hyperactivity disorder, disruptive behavior disorder, and mood disorders. Children and adolescents who had some form of social support had a 26\% decrease in the odds of engaging in non-suicidal self-injury. Assessment procedures for indicators of mental health, particularly among children and adolescents with a history of adverse childhood experiences, should also take into account non-suicidal self-injury. In addition to bolstering social support networks, addressing depression and related emotion regulation skills in childhood may help prevent future non-suicidal self-injury behaviors.
Keywords: Adverse Childhood Experiences; Non-Suicidal Self-Injury; Children; Adolescents;

interRAI
1.0 Introduction

The phenomenon of non-suicidal self-injury (NSSI), which is generally defined as “the direct, deliberate destruction of one’s own body tissue in the absence of suicidal intent” (Nock & Favazza, 2009, p. 9), is now recognized globally as a major public health issue, with up to 70% of children and adolescents with mental health problems engaging in NSSI (Kaess et al., 2013; Thomassin, Shaffer, Madden, & Londino, 2016; Weismoore & Esposito-Smythers, 2010; Zetterqvist, Lundh, & Svedin, 2014). Historically, NSSI has been considered primarily as a symptom of borderline personality disorder (BPD) such that in the third edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-III) of the American Psychiatric Association (APA, 1980), it was classified as one of the defining symptoms of BPD and included behaviors such as “physically self-damaging acts, e.g., suicidal gestures, self-mutilation, recurrent accidents or physical fights” (American Psychiatric Association, 1980, p. 323). However, over time, NSSI has begun to be understood more broadly as a behavior requiring its own diagnostic category (Claes & Vandereycken, 2007; Muehlenkamp, 2005, 2014; Posner, Brodsky, Yershova, Buchanan, & Mann, 2014). In the DSM-5, NSSI was considered as an autonomous diagnostic category where it was listed in the appendix as one of the mental health conditions requiring further study. The authors of the DSM-5 have proposed the following definition of NSSI “in the last year, the individual has, on 5 or more days, engaged in intentional self-inflicted damage to the surface of his or her body of a sort likely to induce bleeding, bruising, or pain (e.g., cutting, burning, stabbing, hitting, excessive rubbing), with the expectation that the injury will lead to only minor or moderate physical harm” (American Psychiatric Association, 2013, p. 803).

Behaviors such as cutting, pinching, poking, scratching, sticking pins and needles into the skin, and hair pulling, that result in self-injury but with no suicidal intent and causes less lethal
damage to bodily tissue are classified as NSSI (Nock & Favazza, 2009), whereas behaviors, such as self-injury involving firearms and medication overdose with suicidal intent are classified as suicidal self-injury (SSI) (Messer & Fremouw, 2008; Muehlenkamp, 2014; Posner et al., 2014). Intent, lethality, and repetition/frequency are three important constructs that distinguish NSSI from SSI. For a detailed discussion of these constructs, the reader is referred to the following papers: Hamza, Stewart, and Willoughby (2012), Silverman, Berman, Sanddal, O’Carroll, and Joiner (2007a) and Silverman, Berman, Sanddal, O’Carroll, and Joiner (2007b).

1.1. Prevalence estimates of NSSI among children and adolescents

Prevalence estimates of NSSI among children and adolescents vary widely as a result of a number of factors including the time since last episode of NSSI, number of NSSI episodes to be endorsed, population examined, as well as reasons for engaging in NSSI. Within the Canadian context, prevalence estimates typically range from as low as 7% in student samples (Duggan, Heath, & Hu, 2015), to as high as 77% in clinical samples (Preyde et al., 2014). Using the Deliberate Self-Harm Inventory (DSHI), Heath, Toste, Nedecheva, and Charlebois (2008) assessed NSSI among students from a large urban university in Montreal, Quebec, and found 11.7% of the students reported engaging in NSSI at some point in their life. In a longitudinal study, Preyde et al. (2012) examined data on 169 children and adolescents from five mental health agencies in southwestern Ontario and found that 57 (34%) of the participants engaged in NSSI at baseline. Of these 57 participants, 27 (47%) engaged in mild NSSI behaviors (e.g., repeated pinching), 23 (40%) engaged in severe NSSI behaviors (e.g., deep razor cuts), and 7 (12%) engaged in life-threatening NSSI behaviors (Preyde et al., 2012).

Studies from other jurisdictions have also reported wide variation in prevalence estimates of NSSI among adolescents in clinical samples ranging from 40% (Kaess et al., 2013) to 80%
(Auerbach et al., 2014). A systematic review performed by Swannell, Martin, Page, Hasking, and St John (2014) to investigate the effect of methodological factors on NSSI in non-clinical samples found a pooled NSSI prevalence estimate among adolescents to be 17.2%. Swannell et al. (2014) also found that methodological factors contributed to more than half of the heterogeneity in prevalence estimates. In addition, Muehlenkamp, Claes, Havertape, and Plener (2012) undertook a systematic review of studies published between 2005 and 2011 on the prevalence rate of NSSI among adolescents and found the mean lifetime prevalence of NSSI across studies to be 18% (SD = 7.3%). They also found that assessing NSSI using a single item often results in a lower prevalence rate than assessment with a specific behavior checklist.

1.2. Factors associated with NSSI

One consistent factor that has been identified as a significant predictor of NSSI among adolescents is adverse childhood experiences (ACEs) (Franzke, Wabnitz, & Catani, 2015; Glassman, Weierich, Hooley, Deliberto, & Nock, 2007; Gratz, 2006; Kaess et al., 2013; Zetterqvist et al., 2014). Yates (2009) observed that as much as 80% of those who engaged in NSSI reported having a history of ACEs. ACEs refer to distressing and/or traumatic events that occur during childhood, such as emotional, physical, and sexual abuse; emotional and physical neglect; caregiver risk factors such as addiction or substance use, mental illness, incarceration, separation or divorce; and violent treatment of the mother (Saul et al., 2014).

Estimates based on data from the Canadian Incidence Study of Reported Child Abuse and Neglect (CIS) suggest that the number of children and adolescents with investigated incidents of child abuse and neglect in Canada is on the rise (Trocmé et al., 2010). For instance, an estimated 135,261 investigated incidents of child abuse and neglect were conducted in Canada in 1998 representing a rate of 21.57 per 1,000 children investigations. By 2008, this rate has increased to
39.16 investigations per 1,000 children (235,842 child abuse and neglect related investigations) (Trocmé et al., 2010). According to the CIS-2008, more than two-thirds of the substantiated child maltreatment investigations were related to either witnessing domestic violence (34%) or neglect (34%), followed by physical abuse (20%), emotional abuse (9%), and sexual abuse (3%).

The extant literature has found a history of ACEs to be associated with increased likelihood of a number of negative outcomes later in life, including anxiety and depression (Coohey, Dirks-Bihun, Renner, & Baller, 2014; Greger, Myhre, Lydersen, & Jozefiak, 2015; Larkin, Felitti, & Anda, 2014), suicide attempt (Dube et al., 2001), alcohol, tobacco, and illicit drug use (Braciszewski & Colby, 2015; Traube, James, Zhang, & Landsverk, 2012), poor self-esteem (Arslan, 2016), and risky sexual behavior (Anda et al., 2006; Noll, Haralson, Butler, & Shenk, 2011). Other longitudinal studies (e.g., Lewis et al., 2011), systematic reviews and meta-analyses (Agnew-Blais & Danese, 2016; Maniglio, 2010, 2012) have also found a strong relationship between ACEs and mental health problems. Using data from the longitudinal study of child abuse and neglect, Lewis et al. (2011) found that history of ACEs predicted internalizing behavior problems at age 14 and cigarette smoking at age 16. Furthermore, Maniglio (2010, 2012) conducted systematic reviews and found that having a history of childhood sexual abuse was a significant risk factor for developing both depression and anxiety disorder, regardless of gender of the victim and severity of the abuse.

With respect to the association between ACEs and NSSI, various systematic reviews and meta-analyses (Ford & Gómez, 2015; Lang & Sharma-Patel, 2011; Maniglio, 2011; Smith, Kouros, & Meuret, 2014) have shown that adolescents with a history of ACEs are more likely to engage in NSSI, even after adjusting for demographic and known mental health factors. Similar results have been found among adolescent inpatients (e.g., Bifulco et al., 2014; Kaess et al.,
History of foster placement has also been linked to NSSI (Grenville, Goodman, & Macpherson, 2012). Shenk, Noll, and Cassarly (2010) examined data on 129 maltreated and 82 non-maltreated adolescent females aged 14 to 18 years in the Midwest region of the US and found that adolescents who were sexually abused, neglected, or experienced multiple abuses were significantly more likely to report engaging in NSSI. A burgeoning number of studies have found that children and adolescents exposed to indirect forms of childhood adversities, such as parental addiction or mental health problems or witnessed domestic violence, are at increased risk of engaging in NSSI (Armiento, Hamza, Stewart, & Leschied, 2016). However, some studies have failed to find a significant association between having a history of ACEs, specifically physical abuse and neglect, and NSSI (Auerbach et al., 2014; Glassman et al., 2007).

Studies that have found a relationship between NSSI and history of ACEs have noted that adolescents with a history of ACEs are likely to have trouble coping with their past traumatic experiences and as a result may engage in NSSI as a means to regulate their affect and emotion, which is referred to as the theory of affect regulation (Messer & Fremouw, 2008; Suyemoto, 1998). The theory hypothesizes that engaging in NSSI stems from the need to control past experiences of trauma, or anger and pain that cannot be expressed verbally or through other means (Suyemoto, 1998). Various studies, both cross-sectional and longitudinal, have found support for the theory of affect regulation in explaining NSSI among children and adolescents with a history of ACEs (Joiner et al., 2007; Nock & Prinstein, 2005; Noll, Horowitz, Bonanno, Trickett, & Putnam, 2003). Brown, Comtois, and Linehan (2002) examined reasons for suicide attempts versus NSSI among 75 suicidal women meeting criteria for BPD and found that the desire to express anger, punish oneself, generate normal feelings, and distract oneself were the
most common reasons cited for engaging in NSSI, whereas the desire to make others better off was the most common reason cited for attempting suicide.

Additionally, Nock and Prinstein (2004) examined the functions of NSSI among adolescents and found that more than half (53%) of their sample engaged in NSSI as a way of regulating their affect (other reasons cited include: to relieve numbness or emptiness, to punish oneself, and to feel relaxed). Bureau et al. (2010) investigated specific aspects underlying the association between early parent–child relationships and NSSI among university students from Eastern Canada. The relationship between the NSSI group and their parents, in comparison to the parent-child relationships in the non-NSSI group, was associated with more failed protection, fear, overprotection, alienation, less care, less trust, and less communication (Bureau et al., 2010). Also, Tatnell, Kelada, Hasking, and Martin (2014) analyzed longitudinal data on 2,637 adolescents from 40 high schools across Australia and found that students who grew up in families with insecure attachment had 11% higher odds of engaging in NSSI at follow-up.

The existing literature has also shown that mental health problems such as anxiety (Claes, Luyckx, Bijttebier et al., 2015), depression (Bentley, Cassiello-Robbins, Vittorio, Sauer-Zavala, & Barlow, 2015; Tuisku et al., 2006), and alcohol and substance use problems (Brausch & Boone, 2015; Gratz & Tull, 2010; Rossow et al., 2007) are significant predictors of NSSI among children and adolescents. Bentley et al. (2015) conducted a meta-analysis on 56 studies that examined NSSI among individuals with and without emotional disorders and found that those diagnosed with emotional disorders, such as mood disorders, anxiety disorders, posttraumatic stress disorder (PTSD), and obsessive-compulsive disorder (OCD), were significantly more likely to report engaging in NSSI than their counterparts with no such diagnosis.

1.3. Study objective
Whereas studies from other countries have investigated the effect of ACEs on NSSI among adolescent inpatients (see e.g., Kaess et al., 2013; Thomassin et al., 2016), to date, few studies within the Canadian context have examined the effect of ACEs on NSSI among clinical samples of children and adolescents with mental health problems. Most of the existing studies on NSSI among children and adolescents in Canada are from the general population or relied on student samples where the proportion of individuals with a history of ACEs is much lower than that found in clinical samples or child welfare samples (Heath et al., 2008). Thus, using data from the interRAI Child and Youth Mental Health Assessment, the objectives of this study were to: 1) examine the prevalence of NSSI among children and adolescents referred to community and inpatient mental health settings in Ontario, Canada, and 2) determine the effect of ACEs on NSSI after taking into account demographic factors, depression, social support, and mental health diagnoses.

2. Data and Methods

2.1. Participants

This study used data from the interRAI Child and Youth Mental Health dataset (ChYMH; Stewart, Hirdes et al., 2015), which was collected from 24 mental health agencies in Ontario from November of 2012 to June 2016. A detailed description of the interRAI ChYMH including measurements of variables has been provided elsewhere by the authors (Baiden, Stewart, & Fallon, 2017), in previous publications (Armiento et al., 2016; Stewart & Hamza, 2017; Stewart, Hirdes et al., 2015), and is also available from interRAI’s website at http://www.interrai.org/child-and-youth-mental-health.html. The interRAI ChYMH is a comprehensive instrument comprising of approximately 400 clinical elements covering various behavioral and mental state indicators, stress and trauma, child maltreatment history, strength
and resilience, social support, substance use, medication history, DSM-IV diagnostic information, cognitive and executive functioning, health, nutritional status, and a number of scales that can be used for outcome measurement, as well as care planning protocols that can be used to identify areas of imminent concern or risk. Clinicians are trained to complete the instrument using information from various sources including the family, child or youth, other service providers, and clinical records.

The interRAI suite of assessments was designed to be used by researchers and clinicians to assist vulnerable populations and is currently being used internationally. Numerous studies have found items and scales embedded in the ChYMH to have strong psychometric properties (Phillips et al., 2012; Phillips & Hawes, 2015; Stewart, Currie, Arbeau, Leschied, & Kerry, 2015; Stewart & Hamza, 2017). The sample analyzed in this study consisted of 2038 children and adolescents aged 8-18 years ($M = 12.49; SD = 2.88$). The majority (61.1%) of the children and adolescents were males and 239 (11.7%) were inpatients. About 55% of the children and adolescents lived with both parents, 33.6% lived with their mother only or their father only, 6.5% lived alone or lived with other relatives, and the other 5.4% were from child protection agencies. About 17% of the children and adolescents had a history of foster family placements. In terms of marital status, 44.1% of the parents/caregivers were married or lived with a partner, 29.5% were formerly married, 21.1% were never married, and 5.4% were unknown. Of the various mental health diagnoses, 47.4% had diagnosis of attention-deficit/hyperactivity disorder (ADHD), 38.0% were diagnosed with anxiety disorders, 24.7% were diagnosed with disruptive behavior disorders, 23.8% were diagnosed with learning/communication disorders, 15.1% were diagnosed with mood disorders, and 11.2% were diagnosed with autism spectrum disorder. Less than 3.5% of the children and adolescents had diagnoses of sleep disorders, adjustment disorders, reactive
attachment disorder, substance related disorders, eating disorders, and schizophrenia and other psychotic disorders. Ethics approval was sought for analysis of the de-identified data and was approved by the Research Ethics Board of Western University.

2.2. Measures

2.2.1. Outcome variable

The outcome variable investigated in this study was NSSI; it was assessed using two items that asked for history of self-injurious behavior and the intent behind the self-injurious behavior. Self-injurious behavior was defined as the deliberate and intentional act of self-injury that requires awareness on the part of the child that his or her actions may have a harmful outcome to him or herself. Assessors were asked to evaluate the recency of any self-injurious behavior by the child, including both lethally motivated suicidal behavior and behavior that inflicts self-injury without suicidal intent (e.g., self-cutting, self-mutilation, burning, head-banging, etc.) on a six-point scale ranging from “0 = Never”, “1 = More than a year ago”, “2 = 31 days - 1 year ago”, “3 = 8 – 30 days ago”, “4 = 4 – 7 days ago”, to “5 = In the last 3 days”. For the purposes of this item, non-intentional, accidental, or unconscious self-destructive behaviors that may lead to injury or premature death are not considered self-injurious behaviors. Those with a history of self-injury were coded as 1 and those with no history of self-injury were coded as 0. Assessors were also asked to enquire whether the child had ever intentionally engaged in lethally motivated self-injurious behavior with the intent to kill him or herself. This variable was also coded as “0 = No” and “1 = Yes”. For the purposes of this study, those who engaged in self-injurious behavior with the intent to kill themselves were excluded from the analyses since NSSI includes self-injurious behavior with no suicidal intent. A similar method
has been used by past studies in measuring NSSI (see e.g., Armiento et al., 2016; Muehlenkamp & Gutierrez, 2004).

2.2.2. Explanatory variables

Explanatory variables examined in this study include a history of emotional abuse, physical abuse, sexual abuse, neglect, witnessing domestic violence, and parental addiction or substance abuse. The recency of occurrence of these stressful and traumatic life events were assessed from child/youth report, teacher report, parent/guardian report, and clinical charts, with the following coding options: “0 = Never”, “1 = more than a year ago”, “2 = 31 days to a year ago”, “3 = 8 to 30 days ago”, “4 = 4-7 days ago”, and “5 = in last 3 days”. In the ChYMH assessment manual, emotional abuse refers to placing a child in a pervasively hostile emotional environment created by an abuser for the purpose of control, such that the abused child’s self-esteem, identity, energy, ability to feel and question his or her wants and needs are invalidated by the abuser. Physical abuse refers to any incident resulting in non-accidental injury, physical confinement, or excessive physical discipline experienced by the child regardless of his or her age when the incident(s) occurred. Sexual abuse was defined to mean any form of exposure of genitals, sexual touching or coercion, rape experienced by the child regardless of his or her age when the incident(s) occurred. Neglect was defined in reference to failure to provide for basic emotional needs (e.g., primary caregiver not providing sufficient affection, warmth, or sensitivity to the child), physical needs (e.g., inadequate winter clothing), or safety needs (e.g., child left in car in summer heat). Witnessing domestic violence refers to the child having an awareness of, or knowledge of, or witnessing physical or verbal actions or threats toward another family member. Parental addiction or substance abuse was defined to mean, parent or primary caregiver having a
repetitive and persistent use of alcohol or drugs (Stewart, Hirdes et al., 2015). These variables were coded as binary variables “0 = Never” versus “1 = Ever”.

This study also takes into account social support and measures of depression. Social support was measured based on the availability of support that a child has that he or she can rely on for his or her emotional needs or can draw on in times of crisis. Children who need support but do not have family members (outside the nuclear family) or close friends willing and able to provide consistent support were coded as 0 and compared to their supported counterparts who were coded as 1.

Lastly, depression was measured as an interval/ratio variable using the interRAI ChYMH Depression Symptoms Scale (DSS) which is a 9-item standardized and validated scale for measuring depression (Stewart & Hamza, 2017). Assessors were asked to code on a five-point Likert scale (ranging from “0 = Not present”, “1 = present but not exhibited in last 3 days”, “2 = Exhibited on 1-2 of last 3 days”, “3 = Exhibited daily in the last 3 days, 1-2 episodes”, and “4 = Exhibited daily in last 3 days, 3 or more episodes or continuously”) the presence of the following mental state indicators: sad, pained, or worried facial expressions (e.g., furrowed brow, constant frowning); crying, tearfulness; made negative statements (e.g., nothing matters, no one likes me, I hate my life, would rather be dead, what’s the use, let me die); self-deprecation (I’m stupid, I’m bad, I can’t do anything right, I’m nothing, I’m of no use to anyone); expressions of guilt or shame (e.g., I’ve done something awful, this is my fault, I’m a terrible person); expressions of hopelessness (there’s no hope for the future, nothing is going to change for the better); irritability (marked increase in being short-tempered or easily upset); lack of motivation; and withdrawal from activities of interest (Stewart, Hirdes et al., 2015). Scores on the DSS range from 0 to 36, with higher scores indicating severe symptoms of depression. A receiver operating
characteristics (ROC) curve analysis conducted on the DSS yielded the following clinical cut-off values: 0 (none), 1-8 (low), 9-14 (moderate), 15-18 (high), and 19-36 (very high) (Stewart, Fadiya, & Hirdes, 2016). The DSS has been used among children and adolescents with mental health problems and has been found to have strong psychometric properties (Stewart & Hamza, 2017). Internal consistency of the 9-items was assessed using Cronbach’s alpha to determine the extent to which the items correlate with each other. In the present study, internal consistency (Cronbach’s α) for the DSS was α = 0.81, suggesting that all the nine items are strongly correlated and measure one construct.

2.2.3. Control variables

The study also controlled for the following variables: age, gender, type of patient, legal guardianship, marital status of parents/caregivers, and history of foster family placement. Age was measured as a continuous variable whereas gender was coded as a binary variable with male as the reference category. Children and adolescents from inpatient mental health clinics were coded as 1 and compared with children and adolescents from outpatient mental health clinics who were coded as 0. Both legal guardianship and marital status of parents/caregivers were measured as nominal variables. Children and adolescents with a history of foster family placement were coded as 1 and compared with their counterparts with no history of foster family placement who were coded as 0.

2.3. Data analyses

Descriptive statistics for all the variables were first conducted using percentages for the categorical variables. Mean, standard deviation, and range were computed for age and depression. The bivariate association between NSSI and the categorical variables was examined using Pearson chi-square test of association and one-way analysis of variance (ANOVA) was
used to compare the average age and depression score among children and adolescents who engaged in NSSI versus children and adolescents who did not engage in NSSI. Binary logistic regression was then fitted to identify predictors of NSSI as a function of ACEs, depression, and social support while simultaneously controlling for age, gender, type of patient, legal guardianship, marital status of parents/caregivers, history of foster family placement, and mental health diagnoses. Binary logistic regression was chosen as it is more robust in predicting binary dependent variables with independent variables that could be measured as continuous or categorical variables (Hosmer & Lemeshow, 2000; Tabachnick & Fidell, 2007). All the variables were entered in the model using the enter method. A number of model fitness indexes were employed to assess the general fit of the model including the Hosmer-Lemeshow Goodness-Of-Fit (G.O.F.) test statistic whereby a nonsignificant chi-square test statistic indicates good fit (Hosmer & Lemeshow, 2000). The Omnibus Tests of Model Coefficients, which follows a chi-square distribution, was also used to evaluate the statistical significance of the logistic regression model. The proportion of variance in NSSI that could be explained by the predictors was assessed based on the Nagelkerke pseudo R square, whereas the proportion of children and adolescents correctly classified as having engaged in NSSI versus having not engaged in NSSI was assessed based on the classification table. Variables were considered significant if the p-value was less than 0.05. Adjusted odds ratios (AOR) and 95% C.I. were reported. All statistical analyses were executed using SPSS Version 23 for Windows (SPSS, Inc., Chicago, IL, USA).

3. Results

3.1. Sample characteristics

Table 2.1 shows the general distribution of the variables examined in this study. Of the 2038 children and adolescents examined, 592 representing 29% indicated that they had engaged
in NSSI. Approximately four out of five children and adolescents (79.1%) had some family members or close friends who are able to provide consistent support when needed. With respect to ACEs, more than one in four children and adolescents were emotionally abused (26.5%) and/or had witnessed domestic violence (26.6%), 19.7% had parents with addiction or substance abuse issues, 17.6% had a history of neglect, 16.1% were physically abused, and 8.1% were sexually abused. The average depression score among the sample fell within the moderate range ($M = 11.13 \ (SD = 7.37); \ range = 0-36$).
<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency (%)</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at assessment</td>
<td></td>
<td>12.49</td>
<td>2.88</td>
</tr>
<tr>
<td>Depression score</td>
<td></td>
<td>11.13</td>
<td>7.37</td>
</tr>
<tr>
<td>Engaged in NSSI</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>1,446 (71.0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>592 (29.0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>1,246 (61.1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>792 (38.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type of patient</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outpatient</td>
<td>1,799 (88.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inpatient</td>
<td>239 (11.7)</td>
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<td></td>
</tr>
<tr>
<td>Legal guardianship</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Both parents</td>
<td>1,110 (54.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mom/Dad alone</td>
<td>685 (33.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other caregivers</td>
<td>133 (6.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child Protection Agency</td>
<td>110 (5.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marital status of parents/caregivers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married/Living with partner</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Formerly married</td>
<td>600 (29.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never married</td>
<td>430 (21.1)</td>
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<td></td>
</tr>
<tr>
<td>Unknown</td>
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<tr>
<td>History of foster family placement</td>
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</tr>
<tr>
<td>None</td>
<td>1,701 (83.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>At least once</td>
<td>336 (16.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child/adolescent has social support</td>
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<td></td>
</tr>
<tr>
<td>No</td>
<td>426 (20.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>1,611 (79.1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotional abuse</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>1,497 (73.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>541 (26.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical abuse</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>1,709 (83.9)</td>
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<tr>
<td>Yes</td>
<td>329 (16.1)</td>
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<td></td>
</tr>
<tr>
<td>Sexual abuse</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>1,872 (91.9)</td>
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<td></td>
</tr>
<tr>
<td>Yes</td>
<td>166 (8.1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neglect</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>1,678 (82.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>359 (17.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Witnessed domestic violence</td>
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<td></td>
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</tr>
<tr>
<td>No</td>
<td>1,496 (73.4)</td>
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<td></td>
</tr>
<tr>
<td>Yes</td>
<td>542 (26.6)</td>
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</table>

54
<table>
<thead>
<tr>
<th>Disorder</th>
<th>No</th>
<th>(Percentage)</th>
<th>Yes</th>
<th>(Percentage)</th>
</tr>
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<tbody>
<tr>
<td>Reactive attachment disorder</td>
<td>1,636</td>
<td>(80.3)</td>
<td>402</td>
<td>(19.7)</td>
</tr>
<tr>
<td>ADHD</td>
<td>1,072</td>
<td>(52.6)</td>
<td>966</td>
<td>(47.4)</td>
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<tr>
<td>Disruptive behaviour disorder</td>
<td>1,535</td>
<td>(75.3)</td>
<td>503</td>
<td>(24.7)</td>
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<td>Learning or communication disorder</td>
<td>1,552</td>
<td>(76.2)</td>
<td>486</td>
<td>(23.8)</td>
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<td>Autism spectrum disorder</td>
<td>1,809</td>
<td>(88.8)</td>
<td>229</td>
<td>(11.2)</td>
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<tr>
<td>Substance-related disorders</td>
<td>1,992</td>
<td>(97.7)</td>
<td>46</td>
<td>(2.3)</td>
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<tr>
<td>Schizophrenia and other psychotic disorders</td>
<td>2,023</td>
<td>(9.93)</td>
<td>15</td>
<td>(0.7)</td>
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<td>Mood disorders</td>
<td>1,730</td>
<td>(84.9)</td>
<td>308</td>
<td>(15.1)</td>
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<td>Anxiety disorders</td>
<td>1,263</td>
<td>(62.0)</td>
<td>775</td>
<td>(38.0)</td>
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<td>Eating disorders</td>
<td>1,999</td>
<td>(98.1)</td>
<td>39</td>
<td>(1.9)</td>
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<tr>
<td>Sleep disorders</td>
<td>1,974</td>
<td>(96.9)</td>
<td>64</td>
<td>(3.1)</td>
</tr>
<tr>
<td>Adjustment disorders</td>
<td>1,977</td>
<td>(97.0)</td>
<td>61</td>
<td>(3.0)</td>
</tr>
</tbody>
</table>
3.2. Bivariate results

As shown in Table 2.2, the average age among children and adolescents who engaged in NSSI was significantly greater than the average age among children and adolescents who did not engage in NSSI ($M_{\text{no NSSI}} = 12.01$ versus $M_{\text{NSSI}} = 13.66$, $F(1, 2037) = 146.82$, $p < 0.001$). Also, the average depression score among children and adolescents who engaged in NSSI was significantly greater than the average depression score among children and adolescents who did not engage in NSSI ($M_{\text{no NSSI}} = 10.24$ versus $M_{\text{NSSI}} = 13.31$, $F(1, 2037) = 75.55$, $p < 0.001$).

<table>
<thead>
<tr>
<th>Variables</th>
<th>No NSSI Mean (SD)</th>
<th>NSSI Mean (SD)</th>
<th>F value (df)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at assessment</td>
<td>12.01 (2.82)</td>
<td>13.66 (2.69)</td>
<td>146.82 (1, 2036)**</td>
</tr>
<tr>
<td>Depression</td>
<td>10.24 (7.10)</td>
<td>13.31 (7.55)</td>
<td>75.55 (1, 2036)**</td>
</tr>
</tbody>
</table>

*** $p < 0.001$

A number of variables examined were significantly associated with NSSI at the bivariate level in Table 2.3. About 42% of females compared to 21% of males engaged in NSSI ($\chi^2 = 102.09$, df = 1, $p < 0.001$). The proportion of adolescent inpatients that engaged in NSSI (40.6%) was significantly greater than the proportion of adolescent outpatients that engaged in NSSI (27.5%; $\chi^2 = 17.49$, df = 1, $p < 0.001$). More than one third of adolescents with a history of foster family placement engaged in NSSI (35.4%) compared to 27.8% of adolescents with no history of foster family placement that engaged in NSSI ($\chi^2 = 7.88$, df = 1, $p = 0.005$). A little over one in three children and adolescents who do not have social support (34.3%) compared to a little over one in four children and adolescents who have social support (27.6%) engaged in NSSI ($\chi^2 = 7.23$, df = 1, $p < 0.001$). Children and adolescents were more likely to engage in NSSI if they: were emotionally abused (39.6% vs. 25.3%, $\chi^2 = 39.46$, df = 1, $p < 0.001$), were physically abused (41.9% vs. 26.6%, $\chi^2 = 31.66$, df = 1, $p < 0.001$), were sexually abused (53.6% vs. 26.9%,
\( \chi^2 = 52.92, \text{df} = 1, p < 0.001 \), were neglected (34.3\% vs. 27.9\%, \( \chi^2 = 5.72, \text{df} = 1, p = 0.017 \)), witnessed domestic violence (33.9\% vs. 27.3\%, \( \chi^2 = 8.6, \text{df} = 1, p = 0.003 \)), or had parents with addiction or substance abuse issues (35.6\% vs. 27.4\%, \( \chi^2 = 10.34, \text{df} = 1, p < 0.001 \)).
Table 2.3
Bivariate association between NSSI and predictors (N = 2,038)

<table>
<thead>
<tr>
<th>Variables</th>
<th>History of NSSI</th>
<th>Chi-square (sig.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>985</td>
<td>261</td>
</tr>
<tr>
<td>Female</td>
<td>461</td>
<td>331</td>
</tr>
<tr>
<td>Type of patient</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outpatient</td>
<td>1,305</td>
<td>495</td>
</tr>
<tr>
<td>Inpatient</td>
<td>142</td>
<td>97</td>
</tr>
<tr>
<td>Legal guardianship</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Both parents</td>
<td>808</td>
<td>302</td>
</tr>
<tr>
<td>Mom/Dad alone</td>
<td>485</td>
<td>200</td>
</tr>
<tr>
<td>Other caregivers</td>
<td>86</td>
<td>47</td>
</tr>
<tr>
<td>Child Protection Agency</td>
<td>67</td>
<td>43</td>
</tr>
<tr>
<td>Marital status of parents/caregivers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married/Living with partner</td>
<td>661</td>
<td>237</td>
</tr>
<tr>
<td>Formerly married</td>
<td>411</td>
<td>189</td>
</tr>
<tr>
<td>Never married</td>
<td>299</td>
<td>131</td>
</tr>
<tr>
<td>Unknown</td>
<td>74</td>
<td>35</td>
</tr>
<tr>
<td>History of foster family placement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>1,228</td>
<td>437</td>
</tr>
<tr>
<td>At least one</td>
<td>217</td>
<td>119</td>
</tr>
<tr>
<td>Social support</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>1,166</td>
<td>445</td>
</tr>
<tr>
<td>Yes</td>
<td>280</td>
<td>146</td>
</tr>
<tr>
<td>Emotional abuse</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>1,119</td>
<td>378</td>
</tr>
<tr>
<td>Yes</td>
<td>327</td>
<td>214</td>
</tr>
<tr>
<td>Physical abuse</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>1,255</td>
<td>454</td>
</tr>
<tr>
<td>Yes</td>
<td>191</td>
<td>138</td>
</tr>
<tr>
<td>Sexual abuse</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>1,369</td>
<td>503</td>
</tr>
<tr>
<td>Yes</td>
<td>77</td>
<td>89</td>
</tr>
<tr>
<td>Neglect</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>1,209</td>
<td>469</td>
</tr>
<tr>
<td>Yes</td>
<td>236</td>
<td>123</td>
</tr>
<tr>
<td>Witnessed domestic violence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>1,088</td>
<td>408</td>
</tr>
<tr>
<td>Yes</td>
<td>358</td>
<td>184</td>
</tr>
<tr>
<td>Parental addiction/substance abuse</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>1,187</td>
<td>449</td>
</tr>
<tr>
<td>Yes</td>
<td>259</td>
<td>143</td>
</tr>
</tbody>
</table>
Table 2.4 shows the distribution of ACEs by type of patient (inpatient versus outpatient).

The proportion of ACEs among adolescent inpatients was significantly greater than the proportion of ACEs among adolescent outpatients, except sexual abuse which was not statistically significant.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Type of patient</th>
<th>Chi-square (sig.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Outpatient</td>
<td>Inpatient</td>
</tr>
<tr>
<td>Emotional abuse</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>1,346 (74.8)</td>
<td>151 (63.2)</td>
</tr>
<tr>
<td>Yes</td>
<td>453 (25.2)</td>
<td>88 (36.8)</td>
</tr>
<tr>
<td>Physical abuse</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>1,524 (84.7)</td>
<td>185 (77.4)</td>
</tr>
<tr>
<td>Yes</td>
<td>275 (15.3)</td>
<td>54 (22.6)</td>
</tr>
<tr>
<td>Sexual abuse</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>1,658 (92.2)</td>
<td>214 (89.5)</td>
</tr>
<tr>
<td>Yes</td>
<td>141 (7.8)</td>
<td>25 (10.5)</td>
</tr>
<tr>
<td>Neglect</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>1,512 (84.0)</td>
<td>166 (69.7)</td>
</tr>
<tr>
<td>Yes</td>
<td>287 (16.0)</td>
<td>72 (30.3)</td>
</tr>
<tr>
<td>Witnessed domestic violence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>1,348 (74.9)</td>
<td>148 (61.9)</td>
</tr>
<tr>
<td>Yes</td>
<td>451 (25.1)</td>
<td>91 (38.1)</td>
</tr>
<tr>
<td>Parental addiction/substance abuse</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>1,458 (81.0)</td>
<td>178 (74.5)</td>
</tr>
<tr>
<td>Yes</td>
<td>341 (19.0)</td>
<td>61 (25.5)</td>
</tr>
</tbody>
</table>

3.3. Multivariate results

Although most of the variables were significantly associated with NSSI at the bivariate level, because the bivariate results did not control for the effect of other predictors, we could not ascertain the net effect of each variable on NSSI. The multivariate results adjusted for the effect of all the other predictors. History of foster family placement, legal guardianship, emotional abuse, neglect, witnessing domestic violence, and parental addiction were reduced to non-
significance once we adjust for other factors in the multivariate model. Results shown in Table 2.5 indicate that each additional increase in age by 1 year increased the odds of engaging in NSSI by 21% (AOR = 1.21, 95% C.I. = 1.16-1.27). Odds were more than two times higher for females to engage in NSSI, when compared to their male counterparts (AOR = 2.43, 95% C.I. = 1.92-3.06). Inpatients had 40% higher odds of engaging in NSSI when compared to their outpatient counterparts (AOR = 1.40, 95% C.I. = 1.01-1.95). Each additional increase in symptoms of depression increase the odds of engaging in NSSI by 6%, net the effect of all the other predictors (AOR = 1.06, 95% C.I. = 1.04-1.07). Children and adolescents with diagnosis of ADHD (AOR = 1.31, 95% C.I. = 1.01-1.69), disruptive behavior disorder (AOR = 1.52, 95% C.I. = 1.15-2.01), or mood disorders (AOR = 1.78, 95% C.I. = 1.33-2.39) also had higher odds of engaging in NSSI. Children and adolescents diagnosed with a learning or communication disorder had lower odds of engaging in NSSI (AOR = 0.56, 95% C.I. = 0.43-0.75). Children and adolescents who had some form of social support had a 24% decrease in the odds of engaging in NSSI when compared to their counterparts who did not have some form of social support (AOR = 0.76, 95% C.I. = 0.58-0.99).

Of the various ACEs variables examined, only physical abuse and sexual abuse emerged as significant predictors of NSSI in the multivariate model. Children and adolescents who were physically abused had 49% higher odds of engaging in NSSI (AOR = 1.49, 95% C.I. = 1.06-2.09) and children and adolescents who were sexually abused had 60% higher odds of engaging in NSSI (AOR = 1.60, 95% C.I. = 1.09-2.34), when compared to their non-abused counterparts.
Table 2.5
Logistic regression analysis predicting NSSI (N = 2,038)

<table>
<thead>
<tr>
<th>Variables</th>
<th>β</th>
<th>OR</th>
<th>95% C.I.</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at assessment</td>
<td>0.193</td>
<td>1.21</td>
<td>1.16-1.27</td>
<td>0.001</td>
</tr>
<tr>
<td>Gender – Female</td>
<td>0.886</td>
<td>2.43</td>
<td>1.92-3.06</td>
<td>0.001</td>
</tr>
<tr>
<td>Type of patient – Inpatient</td>
<td>0.338</td>
<td>1.40</td>
<td>1.01-1.95</td>
<td>0.045</td>
</tr>
<tr>
<td>Legal guardianship</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Both parents (RC)</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mom/Dad alone</td>
<td>-0.149</td>
<td>0.86</td>
<td>0.67-1.10</td>
<td>0.249</td>
</tr>
<tr>
<td>Other caregivers</td>
<td>0.182</td>
<td>1.20</td>
<td>0.76-1.90</td>
<td>0.435</td>
</tr>
<tr>
<td>Child Protection Agency</td>
<td>0.070</td>
<td>1.07</td>
<td>0.61-1.90</td>
<td>0.811</td>
</tr>
<tr>
<td>Marital status of parents/caregivers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married/Living with partner (RC)</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Formerly married</td>
<td>0.073</td>
<td>1.08</td>
<td>0.80-1.45</td>
<td>0.628</td>
</tr>
<tr>
<td>Never married</td>
<td>0.272</td>
<td>1.31</td>
<td>0.93-1.86</td>
<td>0.123</td>
</tr>
<tr>
<td>Unknown</td>
<td>-0.005</td>
<td>0.99</td>
<td>0.58-1.72</td>
<td>0.986</td>
</tr>
<tr>
<td>History of foster family placement</td>
<td>0.126</td>
<td>1.14</td>
<td>0.78-1.65</td>
<td>0.509</td>
</tr>
<tr>
<td>Depression</td>
<td>0.056</td>
<td>1.06</td>
<td>1.04-1.07</td>
<td>0.001</td>
</tr>
<tr>
<td>Social support</td>
<td>-0.271</td>
<td>0.76</td>
<td>0.58-0.99</td>
<td>0.047</td>
</tr>
<tr>
<td>Emotional abuse</td>
<td>0.061</td>
<td>1.06</td>
<td>0.78-1.45</td>
<td>0.700</td>
</tr>
<tr>
<td>Physical abuse</td>
<td>0.396</td>
<td>1.49</td>
<td>1.06-2.09</td>
<td>0.023</td>
</tr>
<tr>
<td>Sexual abuse</td>
<td>0.467</td>
<td>1.60</td>
<td>1.09-2.34</td>
<td>0.017</td>
</tr>
<tr>
<td>Depression</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical abuse</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotional abuse</td>
<td>0.061</td>
<td>1.06</td>
<td>0.78-1.45</td>
<td>0.700</td>
</tr>
<tr>
<td>History of foster family placement</td>
<td>0.126</td>
<td>1.14</td>
<td>0.78-1.65</td>
<td>0.509</td>
</tr>
<tr>
<td>Diagnosis</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reactive attachment disorder</td>
<td>0.532</td>
<td>1.70</td>
<td>0.87-3.34</td>
<td>0.122</td>
</tr>
<tr>
<td>ADHD</td>
<td>0.270</td>
<td>1.31</td>
<td>1.01-1.69</td>
<td>0.040</td>
</tr>
<tr>
<td>Disruptive behaviour disorder</td>
<td>0.421</td>
<td>1.52</td>
<td>1.15-2.01</td>
<td>0.003</td>
</tr>
<tr>
<td>Learning or communication disorder</td>
<td>-0.573</td>
<td>0.56</td>
<td>0.43-0.75</td>
<td>0.001</td>
</tr>
<tr>
<td>Autism spectrum disorder</td>
<td>0.073</td>
<td>1.08</td>
<td>0.76-1.53</td>
<td>0.684</td>
</tr>
<tr>
<td>Substance-related disorders</td>
<td>0.657</td>
<td>1.93</td>
<td>0.98-3.82</td>
<td>0.059</td>
</tr>
<tr>
<td>Schizophrenia and other psychotic disorders</td>
<td>0.855</td>
<td>2.35</td>
<td>0.74-7.53</td>
<td>0.150</td>
</tr>
<tr>
<td>Mood disorders</td>
<td>0.577</td>
<td>1.78</td>
<td>1.33-2.39</td>
<td>0.001</td>
</tr>
<tr>
<td>Anxiety disorders</td>
<td>-0.035</td>
<td>0.97</td>
<td>0.77-1.22</td>
<td>0.769</td>
</tr>
<tr>
<td>Eating disorders</td>
<td>0.662</td>
<td>1.94</td>
<td>0.91-4.13</td>
<td>0.086</td>
</tr>
<tr>
<td>Sleep disorders</td>
<td>-0.181</td>
<td>0.84</td>
<td>0.45-1.56</td>
<td>0.570</td>
</tr>
<tr>
<td>Adjustment disorders</td>
<td>0.202</td>
<td>1.22</td>
<td>0.67-2.22</td>
<td>0.507</td>
</tr>
</tbody>
</table>

Note: RC = Reference category
Hosmer-Lemeshow G.O.F. test statistic = 8.34 (0.401)
Omnibus chi-square = 403.38 (0.001)
Nagelkerke pseudo R square = 0.257
Overall percent correctly classified = 71.7%
Examination of the Hosmer-Lemeshow G.O.F. test statistic indicates that the overall fit of the model was good and, together, the variables made a significant contribution to the model ($\chi^2 = 7.37$, df = 8, $p = 0.498$). The Omnibus Tests of Model Coefficients produced a chi-square value of 403.61, which was statistically significant, $p < 0.001$. Together, all the predictors in the model explained 25.7% of the variance in NSSI and 71.6% of the children were correctly classified as having engaged in NSSI or not engaged in NSSI.

4. Discussion

This study sought to examine the prevalence of NSSI among children and adolescents referred to community and inpatient mental health settings in Ontario, Canada, and determine the effect of ACEs on NSSI after controlling for the effect of other known predictors. We found that 29% of the children and adolescents engaged in NSSI. This proportion is fairly consistent with that found by Preyde et al. (2012) among children and adolescents accessing mental health services in southwestern Ontario but much higher than that found among college students in Canada (e.g., Duggan et al., 2015; Heath et al., 2008). The proportion of adolescents who experienced ACEs and engaged in NSSI may be underestimated and appears to be relatively lower than what has been found in other clinical samples (see e.g., Kaess et al., 2013; Thomassin et al., 2016). The fact that our sample was made up of 8-year-olds (mean sample age = 12.49) could play a role in the proportion of individuals reporting NSSI. In the multivariate logistic regression model, the following factors emerged as predictors of NSSI: older age, female gender, inpatient status, depression, diagnosis of ADHD, disruptive behavior disorder, mood disorders, as well as physical abuse and sexual abuse. Having social support was negatively associated with NSSI.
The finding that older adolescents are more likely to engage in NSSI corroborate past studies that have found NSSI typically begins in adolescence between the ages of 12 and 17 (Claes, Luyckx, Baetens, Van de Ven, & Witteman, 2015; Muehlenkamp & Gutierrez, 2004; Sornberger, Heath, Toste, & McLouth, 2012), although some cases begin after age 18 (Whitlock, Eckenrode, & Silverman, 2006). Muehlenkamp and Gutierrez (2004) found that by age 13, 15% of their respondents had engaged in NSSI, 26% had engaged in NSSI by age 14, and 17% had engaged in NSSI by age 15. In a longitudinal study, Sourander et al. (2006) examined data on 839 adolescents and 738 parents and found a significant increase in acts of NSSI from age 12 to age 15. They found that at age 12, 2.7% of adolescent males compared to 3.1% of adolescent females engaged in NSSI. At age 15, 4.6% of males compared to 12.6% of females engaged in NSSI. They also found that compared to children under age 12, adolescents aged 12 to 15 years old were three times more likely to have engaged in NSSI during the study duration. This finding was maintained even after the researchers had controlled for gender, Child Behavior Checklist (CBCL) internalizing and externalizing behavior scores, nervousness, family structure, and mother’s and father’s self-perceived health (Sourander et al., 2006).

The finding that adolescent females are more likely to engage in NSSI than their male counterparts both corroborates and contradicts previous research on NSSI. Whereas some scholars (e.g., Christoffersen, Møhl, DePanfilis, & Vammen, 2015; Heilbron & Prinstein, 2010; Sornberger et al., 2012; Zetterqvist et al., 2014) have found prevalence rates of NSSI to be higher among adolescent females than their male counterparts, others (e.g., Heath et al., 2008; Hilt, Nock, Lloyd-Richardson, & Prinstein, 2008; Lloyd-Richardson, Perrine, Dierker, & Kelley, 2007; Muehlenkamp & Gutierrez, 2004) failed to find any significant association between gender and NSSI. Sornberger et al. (2012) found that one in three adolescent females compared
to one in six adolescent males engaged in NSSI. They also found that among adolescents who reported ever engaging in NSSI, 23% of females compared to 17.9% of males engaged in NSSI more frequently.

The manner in which males and females respond to stress (Altemus, 2006; Kuehner, 2003) or regulate emotions (Nolen-Hoeksema, 2012) could be one of the reasons for the gender differences in NSSI prevalence rates. For instance, whereas females are likely to use more internally focused and passive responses such as rumination to regulate emotions, males are more likely to rely on suppression or avoidance such as turning to alcohol to regulate emotions (Nolen-Hoeksema, 2012). As a result, some studies that have found higher NSSI rates among females have also found higher rates of depression among females than males (Andover, Pepper, Ryabchenko, Orrico, & Gibb, 2005).

We found that although both history of foster family placement and legal guardianship were associated with NSSI at the bivariate level, this effect disappears once we adjust for other factors in the multivariate model. Often, the reason why a child is placed in foster care is due to safety conditions in their family of origin (e.g., abuse, neglect). Once the type of abuse was controlled for in the model, foster placement was no longer significant. This is likely due to the fact that physical and sexual abuse accounted for that effect within our model.

Research has consistently identified the importance of social support and having a confidant as protective factors against NSSI (Christoffersen et al., 2015; Claes, Bouman et al., 2015; Heath, Baxter, Toste, & McLouth, 2010). Tseng and Yang (2015) found an inverse association between family support and NSSI for both boys and girls as well as between family support and thoughts of NSSI in girls. Andover, Pepper, and Gibb (2007) examined NSSI and coping strategies among 44 adolescents who engaged in NSSI and 44 adolescents as controls and
found that those who engaged in NSSI sought support significantly less often from their parents and used avoidance coping strategies more frequently. Having some amount of support provides adolescents with the ability to deliberate on their stressful life situation and avoid taking actions that might be deleterious to their mental health and well-being (Hay & Meldrum, 2010).

After controlling for demographic factors, depression, and social support, we found that the experience of adversity directed to the child (physical and sexual abuse) predicted NSSI whereas adversities indicative of parental risk such as parental mental health issues and domestic violence were not predictive of NSSI. Although research suggests that direct and indirect abuse often co-occur (Brownridge et al., 2016), our findings corroborates some past studies that have found that only direct abuse toward the child predicts psychopathology (Diamond & Muller, 2004; McKee & Payne, 2014). A study by Kulkarni, Graham-Bermann, Rauch, and Seng (2011) also failed to find any significant association between witnessing domestic violence and current and lifetime diagnosis of posttraumatic stress disorder, although direct child abuse was. Additional studies are needed to fully understand the effect of indirect abuse on NSSI.

Sexual abuse has consistently been identified as a risk factor for NSSI (Ford & Gómez, 2015; Shenk et al., 2010). Bolen, Winter, and Hodges (2013) examined various attachment styles as moderators of the relationship between childhood sexual abuse and NSSI among survivors of childhood sexual abuse entering treatment in the US and found that participants engaged in NSSI as a way to balance their neurophysiological posttraumatic symptoms. Additionally, physical abuse was a significant predictor of NSSI but has not been consistently associated with NSSI in the literature (Auerbach et al., 2014; Glassman et al., 2007). Physical and sexual abuse are two types of abuse that are direct and involve attack on the physical body whereas witnessing domestic violence, emotional abuse, and parental addiction/substance abuse are indirect forms of
abuse. It is possible that feelings related to violation of one’s body increase the likelihood of engaging in NSSI.

The non-significant findings relating to witnessing domestic violence, neglect, emotional abuse, and parental addiction appears to contradict some past studies (e.g., Bifulco et al., 2014; Kaess et al., 2013; Thomassin et al., 2016). A recent study by Armiento et al. (2016) found exposure to indirect child maltreatment was the only predictor of NSSI after controlling for participants’ age and gender. Severity (frequency, intensity, and duration) and recency of direct and indirect abuse may be important to consider in future research to tease apart current findings. Longitudinal research would also be helpful in clarifying the timing of ACEs and age at onset of NSSI.

Depression and mood disorders among adolescents are known predictors of NSSI (Bentley et al., 2015; Duggan et al., 2015; Tuisku et al., 2006), and have also been found in this study. The finding does lend support to the affect regulation theory. Depression is one indication that an individual is having difficulty coping with his/her life situation and being depressed can severely impact one’s ability to regulate emotions and focus almost exclusively on the negative aspect of life. Depression can also manifest itself as emotional pain, for which NSSI can be an outlet. Negative statements, feelings of shame/guilt, and expression of sense of hopelessness (e.g., I hate my life, I’m of no use to anyone, I’ve done something awful, this is my fault, there’s no hope for the future, and nothing is going to change for the better) have been observed particularly among survivors of sexual abuse (Aakvaag et al., 2016; Feiring & Taska, 2005; Gorey, Richter, & Snider, 2001). The fact that adolescents with ADHD and disruptive behavior disorder are more likely to engage in NSSI is also consistent with other past studies that suggest that adolescents who have difficulty controlling their own behavior or lack planning or insight
into their actions may engage in risk-taking behaviors that put the safety of themselves and others at risk (Allely, 2014; Hinshaw et al., 2012; Meza, Owens, & Hinshaw, 2016).

As a result of this, it is important for clinicians and mental health service professionals to understand that the impact of mental health on life-threatening behaviors, such as NSSI, may be compounded by ACEs, particularly the experience of direct abuse. These findings are in line with past studies outside Canada that have investigated the link between ACEs and NSSI among adolescents drawing on clinical samples (Glassman et al., 2007) and non-clinical samples (Gratz, 2006; Zetterqvist et al., 2014). The finding that physical abuse predicts NSSI however, contradicts some past studies that found only sexual abuse and not physical abuse predicted NSSI among their clinical sample of adolescents (Auerbach et al., 2014; Kaess et al., 2013). It is important to note however, that the studies by Auerbach et al. (2014) and Kaess et al. (2013) were hampered by small sample size and lower statistical power (194 and 125 adolescents, respectively).

4.1. Study limitations

There are some limitations with this study that should be noted. First, this study relied on cross-sectional data; hence, no causal inferences could be drawn regarding the association between some of the factors associated with NSSI. Additional studies that rely on longitudinal data are needed to tease apart some of the nuances between ACEs and NSSI and some of the inconsistencies in the literature. Second, although the sample was large, and representative of the population of children and adolescents receiving clinical care in Ontario, future studies should examine clinical populations in different geographical regions of Canada. Third, the extant literature on ACEs has acknowledged the importance of measurement in understanding outcomes and specificity. However, the dichotomous nature of the questions examined only
whether ACEs occurred or not does not permit for further examination of ‘dosage’ effects. Future studies that examine the ‘dosage’ effects of ACEs on NSSI and the underlying mechanism through which risk and protective factors influence NSSI may assist in the identification of children and adolescents with a history of ACEs who are more or less likely to engage in NSSI. Additional studies are also needed to ascertain how generalizable the findings of the present study would be to other mental health settings outside Canada. Lastly, cross-cultural studies using the ChYMH would provide additional evidence of the impact of ACEs on NSSI.

4.2. Clinical Implications

The findings of this study have implications for child and adolescent mental health delivery in Ontario. Children and adolescents who experienced physical and sexual abuse are at higher risk of engaging in NSSI. Assessment procedures that incorporate indicators of mental health issues particularly among children and adolescents with a history of ACEs should also take into account NSSI. Children and adolescents with a history of ACEs and depression are at an even greater risk of engaging in NSSI. From a clinical perspective, understanding the mechanism through which NSSI may occur can inform clinicians and social workers working with formerly abused children and adolescents in preventing future NSSI behaviors. A combination of ACEs and symptoms of depression among children and adolescents who engage in NSSI can also alert clinicians to develop interventions aimed at helping these individuals and their caregivers with emotion regulation skills so as to cope with past trauma and consequently enhance their mental health well-being. Teaching emotion regulation skills in childhood for those who have experienced physical or sexual abuse may also help prevent future NSSI behaviors. Social support is a protective factor and adds to the literature that advocates for a focus on resilience and increasing support as a way to improve functioning. Interventions
targeting children and adolescents with a history of ACEs should also consider ways to help them establish early in life a close tie with at least one family member or peer who will be sensitive to their emotions and also take their needs into account.
References


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CHAPTER 3

THE MEDIATING EFFECT OF DEPRESSIVE SYMPTOMS ON THE RELATIONSHIP BETWEEN BULLYING VICTIMIZATION AND NON-SUICIDAL SELF-INJURY AMONG ADOLESCENTS: FINDINGS FROM COMMUNITY AND INPATIENT MENTAL HEALTH SETTINGS IN ONTARIO, CANADA

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Abstract

Although bullying victimization has been linked to a number of behavioral and emotional problems among adolescents, few studies have investigated the potential mechanism through which bullying victimization affect non-suicidal self-injury. The objectives of this study were to investigate the effect of bullying victimization on non-suicidal self-injury and the mediating effect of depressive symptoms on the relationship between bullying victimization and non-suicidal self-injury among adolescents. Data for this study came from the *interRAI Child and Youth Mental Health* dataset. A total of 1,650 adolescents aged 12-18 years (M = 14.56; SD = 1.79; 54.2% males) were analyzed. Binary logistic and Poisson regression models were conducted to identify the mediating effect of depressive symptoms on the relationship between bullying victimization and non-suicidal self-injury. Of the 1,650 adolescents studied, 611 representing 37% engaged in non-suicidal self-injury and 26.7% were victims of bullying. The effect of bullying victimization on non-suicidal self-injury was partially mediated by depressive symptoms after adjusting for the effect of demographic characteristics, history of childhood abuse, social support, and mental health diagnoses. The contribution of bullying victimization and depression to non-suicidal self-injury adds to the case for the development of trauma-focused interventions in reducing the risk of non-suicidal self-injury among adolescents.

*Keywords:* bullying victimization; non-suicidal self-injury; depressive symptoms; adolescents
1.0 Introduction

Non-suicidal self-injury (NSSI) refers to “the direct, deliberate destruction of one’s own body tissue in the absence of suicidal intent” (Nock and Favazza, 2009, p. 9). It involves acts such as cutting one’s own skin with a sharp razor, scratching, hair pulling, hitting, pinching, and burning oneself (Nock and Favazza, 2009). NSSI has become a serious global public health concern, particularly among adolescents (Heath et al., 2008; Muehlenkamp, 2014; Muehlenkamp et al., 2012; Nock, 2010). Various studies from Asia (You and Leung, 2012), Australia (Tanner et al., 2015), Canada (Armiento et al., 2014), Europe (Claes et al., 2015), and the US (Brausch and Gutierrez, 2010; Sornberger et al., 2012) have found lifetime prevalence rates of NSSI among adolescent students ranges between 10-32%. Higher rates have been reported among adolescents from clinical settings ranging from 24% in Canada (Armiento et al., 2016), to 40% in Europe (Kaess et al., 2013), and 63-80% in the US (Auerbach et al., 2014; Victor et al., 2012; Weismoore and Esposito-Smythers, 2010). Swannell et al. (2014) conducted a systematic review of published studies on NSSI across the globe and found a pooled lifetime prevalence estimate of NSSI among adolescents to be 17.2%.

To date, various studies have investigated NSSI among adolescents with most showing that adolescents with a history of childhood abuse have a higher risk of engaging in NSSI (Brausch and Holaday, 2015; Ford and Gómez, 2015; Franzke et al., 2015; Gratz, 2006; Smith et al., 2014). However, few studies have examined the relationship between bullying victimization and NSSI among adolescents (e.g., Bakken and Gunter, 2012; Claes et al., 2015; Heilbron and Prinstein, 2010). Therefore, our study sought to add to the extant literature by investigating the effect of bullying victimization on NSSI among adolescents referred to community and inpatient mental health settings in Ontario, Canada.
Bullying is such a broad term that it sometimes can be difficult to distinguish from other forms of peer aggression (Cornell and Bandyopadhyay, 2009). Salmivalli (2010) defined bullying to mean “a subtype of aggressive behavior, in which an individual or a group of individuals repeatedly attacks, humiliates, and/or excludes a relatively powerless person” (p. 112). Olweus (1999) suggested three essential criteria in operationalizing bullying: imbalance of power, intentional harm doing, and acts carried out repeatedly over time. First, a bully must exert some sort of power or dominance over the victim. Second, the victim must suffer some form of physical or emotional harm. Teasing of a humorous and somewhat friendly nature that result in no distress would not be classified as bullying. Third, to be considered bullying, the act must be chronic and repetitive over time (Olweus, 1999). An adolescent who pushes his or her peer out of anger or frustration would not be considered a bully unless he or she repetitively does so to the point of humiliation.

Conservative estimates show that as many as 16-38% of children of school-going age will experience bullying at some point (Due and Holstein, 2008; Fekkes et al., 2005; Nansel et al., 2001). Using data from the Developmental Victimization Survey, Finkelhor et al. (2005) investigated victimization experiences in a nationally representative sample of children and adolescents from the US and found that about one in four children and adolescents were teased and harassed repeatedly in the last year. The majority of studies on bullying have reported that adolescent males are more likely to be bullies whereas adolescent females are more likely to be victims of bullying (Claes et al., 2015; Due and Holstein, 2008; Viljoen et al., 2005).

Bullying victimization is a major global public health problem among adolescents that has been linked to a number of behavioral and emotional problems including anxiety (Cohen and Kendall, 2015), depression (Cole et al., 2014; Hamilton et al., 2016), loneliness (Campbell,
2013; Murphy et al., 2015; Storch and Masia-Warner, 2004), social withdrawal (Dill et al., 2004; Runions and Shaw, 2013), low self-esteem (Fredstrom et al., 2011; Jones et a., 2014; Tsaousis, 2016), as well as poor psychosocial adjustment (Nansel et al., 2001). Various meta-analytic studies have also found support for the link between bullying victimization and the onset of depressive symptoms and internalizing problems (Reijntjes et al., 2010; Ttofi et al., 2014).

The issue of causality between bullying victimization and depressive symptoms is not yet firmly resolved. Currently, there is a healthy debate in the bullying and mental health literature regarding the direction between bullying victimization and depressive symptoms among adolescents. On the one hand, some researchers have argued and found that adolescents who are depressed are more likely to engage in bullying behavior as a way of dealing with the underlying negative feelings of depression (Papadaki and Giovazolias, 2015). Papadaki and Giovazolias (2015) in their study of school children aged between 10 and 12 years from Crete, Greece found that depressive symptoms was significantly positively associated with both bullying victimization and bullying others. On the other hand, other researchers have found that adolescents with internalizing behavior problems such as depression and negative mood state are more likely to be victimized than their counterparts who do not have such problems (Fekkes et al., 2006; McLaughlin et al., 2009). McLaughlin et al. (2009) followed 1,065 grades 6-8 students from central Connecticut over a four-year period and found that bullying victimization at baseline significantly predicted emotion dysregulation at follow-up. Some of these researchers have noted that victims of bullying show strong emotional reactions and give the impression of being unable to stand up for themselves, thereby making themselves easier targets for bullies (Fekkes et al., 2006; Papadaki and Giovazolias, 2015).
One consistent finding within the literature on NSSI among adolescents has been the association between depressive symptoms and NSSI (Heath et al., 2016; Marshall et al., 2013; You and Leung, 2012), particularly among adolescents in clinical settings (Burke et al., 2015; Tuisku et al., 2012). Burke et al. (2015) followed 110 adolescents from the US who are at risk for onset of bipolar disorder for 6-months and found that NSSI co-occur with higher levels of depressive symptoms and interpersonal stressful life events at baseline and follow-up. Another longitudinal study by Marshall et al. (2013) found that depressive symptoms at Time 1 significantly predicted NSSI at Times 2 and 3. For a detailed review of the literature on the association between depressive symptoms and NSSI among adolescents, we refer the reader to Plener et al. (2015).

The psychological distress that accompanies bullying victimization has also been linked to NSSI (Claes et al., 2015; Klomek et al., 2008). van Geel et al. (2015) conducted a meta-analysis on nine studies with fourteen independent samples (n = 20,898) to identify the relationship between bullying victimization and NSSI among adolescents. The authors found a significant positive relationship between bullying victimization and NSSI with adolescents who were bullied more than twice as likely to report engaging in NSSI than their counterparts who were not victimized. Indeed, some scholars have speculated that individuals with a history of trauma may engage in NSSI as a cry for help, as a form of self-punishment, or to release the stress associated with being traumatized (Hamza et al., 2012; Long et al., 2015; Nock, 2010).

This study is informed by vulnerability-stress theory (Hankin and Abela, 2005). Vulnerability-stress theory asserts that the development of internalizing and externalizing behavior problem is as a result of the combination of predisposing individual cognitive vulnerabilities and environmental hardships, stressors, or adversities (Lazarus, 1993). One’s
experience of adverse life events and perceptions about those events contributes to psychopathology (Swearer and Hymel, 2015). Various studies have found support for vulnerability-stress theory in understanding adolescent stress and depressive symptoms (Hankin, 2008; Hankin et al., 2015; Paredes and Zumalde, 2015). Studies have also found that the experience of adverse life events such as childhood abuse is related to the onset of depressive symptoms (Paul and Eckenrode, 2015; Widom et al., 2007), which in turn leads to more adverse life events and later depressive symptoms in a cyclical fashion (Ben-David et al., 2015; Stange et al., 2013). Based on vulnerability-stress theory, we conceptualize bullying victimization as an adverse life event that further places adolescents at risk for psychopathology and NSSI.

Notwithstanding the association between bullying victimization and depressive symptoms among adolescents, few studies have investigated the mediating effect of depressive symptoms on the relationship between bullying victimization and NSSI among adolescents from community and inpatient mental health settings. The relatively few studies on the topic are from non-clinical settings where the prevalence of depression and mental health problems are not as high as they are in clinical settings (Roelofs et al., 2010). A study by Hay and Meldrum (2010) examined the effect of bullying victimization on adolescent NSSI behavior using data on 426 students from selected schools in Southeastern US. In a series of multiple regressions, the authors found that bullying victimization was positively related to NSSI. This relationship was partially mediated by negative emotions among those who were victims of bullying (Hay and Meldrum, 2010). Another study by Claes et al. (2015) that utilized data from high school students from Belgium and the Netherlands found that the relationship between bullying victimization and NSSI was partially mediated by depressive symptoms.
Although studies have investigated factors associated with NSSI among adolescents, to the best of our knowledge, few studies within the Canadian context have investigated the mediating effect of depressive symptoms on the relationship between bullying victimization and NSSI among adolescents with mental health problems. Drawing on a large dataset on adolescents referred to community and inpatient mental health settings in Ontario, Canada, and based on vulnerability-stress theory (Hankin and Abela, 2005), this study has the following objectives: 1) To examine the effect of bullying victimization on NSSI, and 2) To examine the mediating effect of depressive symptoms on the relationship between bullying victimization and NSSI. Accordingly, the following hypotheses were examined: 1) there will be an association between bullying victimization and NSSI, and 2) the effect of bullying victimization on NSSI will be partially mediated by depressive symptoms, after taking into account demographic characteristics, history of childhood abuse, social support, and mental health diagnoses. Given that depressive symptoms tend to be more prevalent in clinical settings than non-clinical settings, we expect strong association for our findings. Moreover, given that NSSI is also predicted by various factors, it was hypothesized that depressive symptoms would significantly decrease the effect of bullying victimization on NSSI rather than completely eliminate the relationship.

2. Data and Methods

2.1. Participants

This study used data from the interRAI Child and Youth Mental Health dataset (ChYMH; (Stewart et al., 2015a), which was collected from 24 mental health agencies in Ontario from November of 2012 to September 2016. Detailed description of the interRAI ChYMH including measurements of variables has been provided elsewhere by the authors (Baiden et al., 2017), in previous publications (Armiento et al., 2016; Stewart and Hirdes, 2015; Stewart et al., 2015a,
2015b), and is also available from interRAI’s website at [http://www.interrai.org/child-and-youth-mental-health.html](http://www.interrai.org/child-and-youth-mental-health.html). In brief, the interRAI ChYMH is a comprehensive instrument comprising approximately 400 clinical elements covering various behavioral and mental state indicators, stress and trauma, child maltreatment history, strength and resilience, family and social support, substance use, medication history, diagnostic information, cognitive and executive functioning, health, nutritional status, and a number of scales that can be used for outcome measurement, as well as care planning protocols that can be used to identify areas of imminent concern or risk. Clinicians are trained to complete the instrument using information from various sources including the family, child or youth, other service providers, and clinical records.

The sample analyzed in this study consisted of 1,650 adolescents between the ages of 12 and 18 years ($M = 14.56; SD = 1.79$). The majority (54.2%) of the adolescents were male. About 54% of the adolescents lived with both parents, 33.9% lived with either their mother only or their father only, 5.6% did not live with their mother or father but lived with other relatives, and the remaining 6.4% were from child protection agencies. The majority of the adolescents (42.7%) had parents/caregivers who were married/living with a partner, 33.6% were formerly married, 17.3% were never married, and the marital status of the remaining 6.4% of the parents were unknown. A little over 15% of the adolescents had at least one foster family placement. Ethics approval was sought for analysis of the de-identified data and was approved by the Ethics Review Board of Western University.

2.2. Measures

2.2.1. Dependent variable

The dependent variable investigated in this study was NSSI and was assessed using two items that asked for history of self-injurious behavior and the intent behind the self-injurious
behavior. Self-injurious behavior was defined as the deliberate and intentional act of self-injury (e.g., self-cutting, self-mutilation, burning, head-banging, etc.) that requires awareness on the part of the child that his or her actions may have a harmful outcome to him or herself. Those with a history of self-injury were coded as 1 and those with no history of self-injury were coded as 0. Assessors were also asked to enquire as to whether the child had ever intentionally engaged in lethally motivated self-injurious behavior with the intent to kill him or herself (Stewart et al, 2015a). This was also coded as “0 = No” and “1 = Yes”. For the purposes of this study, those who engaged in self-injurious behavior with the intent to kill themselves were excluded from the analyses since NSSI includes self-injurious behavior with no suicidal intent. A similar method has been used by past studies in measuring NSSI (e.g., Armiento et al., 2016; Muehlenkamp and Gutierrez, 2004).

2.2.2. Independent variable

The independent variable examined in this study was history of bullying victimization and was measured as a binary variable. This was assessed from child/youth report, teacher report, parent/guardian report, and clinical charts, with the following coding options: “0 = Never”, “1 = more than a year ago”, “2 = 31 days to a year ago”, “3 = 8 to 30 days ago”, “4 = 4-7 days ago”, and “5 = in last 3 days”. In the interRAI ChYMH assessment manual, bullying victimization was defined to mean a child or youth subjected to repeated acts of teasing or harassment, rumours spreading about him or her, physical assault, theft of money or items, intimidation, and/or racial slurs or negative comments about his or her religion, sexual orientation, disability, body type, or socioeconomic status (Stewart et al., 2015a). Bullying victimization may take the form of any one or a combination of these acts as long as it occurs over multiple time points and is perpetrated by someone with physical or social power over the
child or youth. In the present study, we conceived of bullying victimization as having a long-term cumulative effect on depressive symptoms and NSSI hence, bullying victimization was measured in reference to lifetime as opposed to past year or past month. Those who were coded as 1 through 5 experienced bullying victimization and were consequently recoded as 1, and compared to those who were coded as 0.

2.2.3. Mediator variable

The mediator variable examined in this study was depressive symptoms and was measured as an interval/ratio variable using the interRAI ChYMH Depressive Symptoms Scale (DSS; Stewart et al., 2015a, 2015b). The DSS is a 9-item standardized and validated scale measuring depressive symptoms. Assessors were asked to code on a five-point Likert scale ranging from “0 = Not present” to “4 = Exhibited daily in last 3 days, 3 or more episodes or continuously” the presence of the following mental state indicators: sad, pained, or worried facial expressions; crying, tearfulness; negative statements (e.g., no one likes me, I hate my life, I would rather be dead); self-deprecation (I’m stupid, I can’t do anything right, I’m of no use to anyone); expressions of guilt or shame (e.g., I’ve done something awful, this is my fault, I’m a terrible person); expressions of hopelessness (there’s no hope for the future, nothing is going to change for the better); irritability; lack of motivation; and withdrawal from activities of interest (Stewart et al., 2015a). Scores on the DSS range from 0 to 36, with higher scores indicating severe symptoms of depression. The DSS has been used among children and adolescents with mental health problems and has been found to have strong psychometric properties (Stewart and Hamza, 2017). A receiver operating characteristics (ROC) curve analysis conducted on the DSS yielded the following clinical cut-off values: 0 (none), 1-8 (low), 9-14 (moderate), 15-18 (high), and 19-36 (very high) (Stewart et al., 2016). In the present study, internal consistency
(Cronbach’s $\alpha$) for the DSS was $\alpha = 0.81$, suggesting that all the nine items are strongly correlated and measure one construct.

2.2.4. Control variables

The study controlled for age, gender, type of patient (inpatient versus outpatient), legal guardianship, marital status of parents/caregivers, history of foster family placement, history of childhood abuse, social support, and mental health diagnoses given that these control variables can confound the relationship between bullying victimization and NSSI. Age was measured as a continuous variable whereas gender was coded as a binary variable with male as the reference category. History of childhood abuse was measured based on the experience of emotional abuse, physical abuse, sexual abuse, neglect, witnessing domestic violence, and parental addiction or substance abuse.

In the ChYMH assessment manual, emotional abuse refers to placing a child in a pervasively hostile emotional environment created by an abuser for the purpose of control, such that the abused child’s self-esteem, identity, energy, ability to feel and question his or her wants and needs are invalidated by the abuser. Physical abuse refers to any incident resulting in non-accidental injury, physical confinement, or excessive physical discipline experienced by the child regardless of his or her age when the incident(s) occurred. Sexual abuse was defined to mean any form of exposure of genitals, sexual touching or coercion, rape experienced by the child regardless of his or her age when the incident(s) occurred. Neglect was defined in reference to failure to provide for basic emotional needs (e.g., primary caregiver not providing sufficient affection, warmth, or sensitivity to the child), physical needs (e.g., inadequate winter clothing), or safety needs (e.g., child left in car in summer heat). Witnessing domestic violence refers to the child having an awareness of, or knowledge of, or witnessing physical or verbal actions or
threats toward another family member. Parental addiction or substance abuse referred to situations where a parent or primary caregiver engaging in repetitive and persistent use of alcohol or drugs (Stewart et al., 2015a). These variables were coded as binary variables “0 = Never” versus “1 = Ever.” A sum of childhood abuse was computed by summing the six childhood abuse variables.

Social support was measured based on the availability of support that the adolescent can rely on for his or her emotional needs or can draw on in times of crisis. Adolescents who need support but do not have family members (someone outside the nuclear family) or close friends willing and able to provide consistent support were coded as 0 and compared to their supported counterparts who were coded as 1. Adolescents were also assessed for up to four mental health diagnoses (or actual diagnoses, if available at the time of assessment), as determined by a psychiatrist, psychologist, or attending physician. The following mental health diagnoses were assessed and coded as binary variables (0 = not diagnosed versus 1 = diagnosed): reactive attachment disorder, attention-deficit/hyperactivity disorder (ADHD), disruptive behavior disorder, learning or communication disorder, Autism spectrum disorder, substance-related disorders, schizophrenia and other psychotic disorders, mood disorders, anxiety disorders, eating disorders, sleep disorders, and adjustment disorders.

2.3. Data analyses

Descriptive statistics were first performed using percentages for the categorical variables and mean and standard deviation for age and depressive symptoms. Internal consistency of the nine items measuring depressive symptoms was then examined using Cronbach’s alpha coefficient and the corrected item-total correlation, to ascertain the relative contribution of each item to the corrected total score. To test the hypothesis of whether depressive symptoms mediate
the effect of bullying victimization on NSSI, we constructed three regression models following the procedure recommended by Baron and Kenny (1986) and Iacobucci (2008). Figure 1 presents the three regression models. First, in Model A, we regressed the dependent variable (NSSI) on the independent variable (bullying victimization) to establish that indeed bullying victimization is a significant predictor of NSSI. Second, in Model B, we regressed NSSI on the mediator variable (depressive symptoms). Third, in Model C, we regressed the mediator variable (depressive symptoms) on the independent variable (bullying victimization). In all three models, we controlled for the effect of demographic characteristics, history of childhood abuse, social support, and mental health diagnoses. According to Baron and Kenny (1986), the following three conditions must be satisfied in order to establish mediation: 1) the independent variable must be associated with both the dependent and mediator variables, 2) the mediator variable must be associated with the dependent variable, and 3) the magnitude of the effect of the independent variable on the dependent variable must be either eliminated (full mediation) or attenuated (partial mediation) with the inclusion of the mediator variable. In other words, the coefficient of the independent variable must decrease and the p-value must also decrease. The Sobel test was used to assess whether the reduction in the coefficient of bullying victimization was significant (Baron and Kenny, 1986). Indirect effect mediated was calculated as a product of the two regressions as follows (coefficient for bullying victimization when the dependent variable is depressive symptoms) x (coefficient for depressive symptoms when the dependent variable is NSSI).

Models A and B were estimated using binary logistic regression whereas Model C was estimated using Poisson regression with the log-link function. Binary logistic regression was chosen for Models A and B given that the dependent variable (NSSI) was measured as a binary
variable. For Model C, we opted for Poisson regression over linear regression given that Poisson regression is ideal for modeling count data and our mediator variable (depressive symptoms) had a Poisson distribution. A final model was fitted using binary logistic regression to identify the effect of bullying victimization on NSSI over and above depressive symptoms, demographic characteristics, history of childhood abuse, social support, and mental health diagnoses. Variables were considered significant if the $p$-value was less than 0.05. All statistical analyses were executed using SPSS Version 23 for Windows (SPSS, Inc., Chicago, IL, USA).

3. Results

3.1. Sample characteristics

Overall, 37% ($n = 611$) of the 1,650 adolescents engaged in NSSI. A little over one in four (26.7%) adolescents were victims of bullying and 79.7% had someone they could turn to for their emotional needs and support. On average, adolescents experienced 1.21 childhood abuse (50.7% had no history of childhood abuse, 16.4% experienced one childhood abuse, 12.4% experienced two types of childhood abuse, 8.3% experienced three types of childhood abuse, and the remaining 12.2% experienced four or more types of childhood abuse).

Of the various mental health diagnoses examined, 42.2% of adolescents were diagnosed with anxiety disorders, 40.2% had a diagnosis of ADHD, 23.3% were diagnosed with learning or communication disorders, 21.3% were diagnosed with mood disorders, 21.1% were diagnosed with disruptive behavior disorders, 10.7% were diagnosed with autism spectrum disorder, 3.5% were diagnosed with sleep disorders, and 3.4% were diagnosed with substance-related disorders. Less than 3% of the adolescents had adjustment disorders, eating disorders, reactive attachment disorder, and schizophrenia and other psychotic disorders. The average depressive symptoms score among the sample was moderate with a mean of 10.56 ($SD = 7.27$; range = 0-36). Based on
the established cut-off values, 4.4% of the adolescents had no symptoms of depression, 41% had low symptoms of depression, 27.9% had moderate symptoms of depression, 12.1% had high symptoms of depression, and 14.6% had very high symptoms of depression. See Table 3.1 for the distribution of the other variables examined in the analysis.
<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency (%)</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at assessment</td>
<td>14.56</td>
<td>1.79</td>
<td></td>
</tr>
<tr>
<td>Depression score</td>
<td>10.56</td>
<td>7.27</td>
<td></td>
</tr>
<tr>
<td>Number of childhood abuse</td>
<td>1.21</td>
<td>1.59</td>
<td></td>
</tr>
<tr>
<td>Engaged in NSSI</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>1,039 (63.0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>611 (37.0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Victim of bullying</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>1,210 (73.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>440 (26.7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>894 (54.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>756 (45.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type of patient</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outpatient</td>
<td>1,458 (88.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inpatient</td>
<td>192 (11.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Legal guardianship</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Both parents</td>
<td>893 (54.1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mom/Dad alone</td>
<td>560 (33.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other caregivers</td>
<td>92 (5.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child Protection Agency</td>
<td>105 (6.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marital status of parents/caregivers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married/Living with partner</td>
<td>704 (42.7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Formerly married</td>
<td>555 (33.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never married</td>
<td>285 (17.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unknown</td>
<td>106 (6.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>History of foster family placement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>1,398 (84.7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>At least one</td>
<td>252 (15.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adolescent has social support</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>335 (20.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>1,315 (79.7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reactive attachment disorder</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>1,614 (97.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>36 (2.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADHD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>986 (59.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>664 (40.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disruptive behaviour disorder</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>1,302 (78.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>348 (21.1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Learning or communication disorder</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>1,266 (76.7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>384 (23.3)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Autism spectrum disorder
  No 1,474 (89.3)
  Yes 176 (10.7)
Substance-related disorders
  No 1,594 (96.6)
  Yes 56 (3.4)
Schizophrenia and other psychotic disorders
  No 1,632 (98.9)
  Yes 18 (1.1)
Mood disorders
  No 1,298 (78.7)
  Yes 352 (21.3)
Anxiety disorders
  No 954 (57.8)
  Yes 696 (42.2)
Eating disorders
  No 1,606 (97.3)
  Yes 44 (2.7)
Sleep disorders
  No 1,593 (96.5)
  Yes 57 (3.5)
Adjustment disorders
  No 1,604 (97.2)
  Yes 46 (2.8)

3.2. Internal consistency of the DSS

Table 3.2 below shows the scale mean if an item is deleted and corrected item-total correlation, that is, the correlation of each item with the sum of the remaining items. We followed the recommendation of Field (2013) who suggested that any item with a correlation of less than 0.3 suggests that a particular item does not correlate very well with the overall scale. In this study, corrected item-total correlation ranges from 0.37 to 0.67. Cronbach’s alpha coefficient of the DSS was $\alpha = 0.81$, indicating high internal consistency among the nine items, and the results indicates that deleting items from the scale would not improve the overall Cronbach’s alpha coefficient.
Table 3.2
Reliability test for DSS \(^a\) (N = 1,650)

<table>
<thead>
<tr>
<th>Items</th>
<th>Scale mean if item deleted</th>
<th>Corrected item-total correlation</th>
<th>Cronbach’s alpha if item deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sad, pained, or worried facial</td>
<td>8.96</td>
<td>0.545</td>
<td>0.785</td>
</tr>
<tr>
<td>expressions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crying, tearfulness</td>
<td>9.51</td>
<td>0.471</td>
<td>0.795</td>
</tr>
<tr>
<td>Made negative statements</td>
<td>9.33</td>
<td>0.670</td>
<td>0.768</td>
</tr>
<tr>
<td>Self-deprecation</td>
<td>9.39</td>
<td>0.624</td>
<td>0.775</td>
</tr>
<tr>
<td>Expressions of guilt or shame</td>
<td>9.81</td>
<td>0.480</td>
<td>0.774</td>
</tr>
<tr>
<td>Expressions of hopelessness</td>
<td>9.70</td>
<td>0.621</td>
<td>0.778</td>
</tr>
<tr>
<td>Irritability</td>
<td>8.56</td>
<td>0.419</td>
<td>0.803</td>
</tr>
<tr>
<td>Lack of motivation</td>
<td>9.33</td>
<td>0.367</td>
<td>0.811</td>
</tr>
<tr>
<td>Withdrawal from activities of interest</td>
<td>9.91</td>
<td>0.399</td>
<td>0.802</td>
</tr>
</tbody>
</table>

\(^a\) Cronbach’s alpha for DSS = 0.81

3.3. Mediation analysis between bullying victimization, depression and NSSI

Figure 1.1 shows the mediation model described earlier.

Figure 1.1
Mediation model predicting NSSI

\[ \text{Bullying victimization} \quad \rightarrow \quad \text{Depressive symptoms} \quad \rightarrow \quad \text{NSSI} \quad \text{AOR} = 1.63^{***} \]

\[ \text{AOR} = 1.63^{***} \]

*** \( p < 0.001 \).

All paths adjusted for age, gender, type of patient, legal guardianship, marital status of parents/caregivers, history of foster family placement, number of childhood abuse, social support, and mental health diagnoses. These results are not shown.

Table 3.3 shows the results of the mediation analysis. In Model A, adolescents who were bullied had 63\% higher odds of engaging in NSSI (AOR = 1.63, \( p < 0.001 \), 95\% C.I. = 1.26-
2.11), controlling for demographic characteristics, history of childhood abuse, social support, and mental health diagnoses. This significant effect was attenuated upon the inclusion of depressive symptoms in the final model where the adjusted odds ratio went from 1.63 to 1.50 (95% C.I. = 1.16-1.95) and the p-value increased moderately from $p < 0.001$ to $p = 0.002$. In Model B, a unit increase in scores on depressive symptoms increased the odds of engaging in NSSI by 5% (AOR = 1.05, $p < 0.001$, 95% C.I. = 1.03-1.07). This significant effect remained unchanged in the final model. A number of control variables were significantly associated with NSSI in the final model. For age, the odds of engaging in NSSI increased by 21% for each increase in age by 1 year (AOR = 1.21, $p < 0.001$, 95% C.I. = 1.13-1.30). Compared to males, odds were 3.02 times higher for females to engage in NSSI (AOR = 3.02, $p < 0.001$, 95% C.I. = 2.37-3.85). Each additional type of childhood abuse experienced increased the odds of NSSI by 11% (AOR = 1.11, $p = 0.018$, 95% C.I. = 1.02-1.20). Social support had a protective effect on NSSI such that adolescents who had someone they could turn to for their emotional needs had 26% lower odds of engaging in NSSI, net all other factors included in the model (AOR = 0.74, $p = 0.038$, 95% C.I. = 0.55-0.98).

To test whether the reduction in the coefficient of bullying victimization was actually significant, we used the parameter estimates and corresponding standard errors to compute the Sobel test, a two-tailed z-test of the hypothesis that the mediated effect equals zero in the population (Sobel, 1982). There was a significant mediation effect indicating that the relationship between bullying victimization and NSSI decreased significantly when depressive symptoms was included in the model (Sobel test statistic = 5.14, $p < 0.001$). The indirect effect of bullying victimization on NSSI mediated by depressive symptoms was 0.02328. Thus, the percentage of indirect effect equals $(0.02328/0.169) \times 100 = 13.8\%$. 
Table 3.3
Logistic regression analyses predicting NSSI (N = 1,650)<sup>b</sup>

<table>
<thead>
<tr>
<th>Variables</th>
<th>Model A</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AOR</td>
<td>p-value</td>
<td>95% C.I.</td>
<td>AOR</td>
<td>p-value</td>
<td>95% C.I.</td>
<td>AOR</td>
<td>p-value</td>
<td>95% C.I.</td>
<td>AOR</td>
<td>p-value</td>
<td>95% C.I.</td>
<td></td>
</tr>
<tr>
<td>Age at assessment</td>
<td>1.20</td>
<td>0.001</td>
<td>1.12-1.28</td>
<td>1.19</td>
<td>0.001</td>
<td>1.11-1.27</td>
<td>1.21</td>
<td>0.001</td>
<td>1.13-1.30</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender – Female</td>
<td>3.15</td>
<td>0.001</td>
<td>2.48-4.01</td>
<td>3.07</td>
<td>0.001</td>
<td>2.41-3.91</td>
<td>3.02</td>
<td>0.001</td>
<td>2.37-3.85</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of childhood abuse</td>
<td>1.13</td>
<td>0.004</td>
<td>1.04-1.23</td>
<td>1.12</td>
<td>0.008</td>
<td>1.03-1.22</td>
<td>1.11</td>
<td>0.018</td>
<td>1.02-1.20</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social support</td>
<td>0.69</td>
<td>0.012</td>
<td>0.52-0.92</td>
<td>0.71</td>
<td>0.020</td>
<td>0.53-0.95</td>
<td>0.74</td>
<td>0.038</td>
<td>0.55-0.98</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bullying victimization</td>
<td>1.63</td>
<td>0.001</td>
<td>1.26-2.11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.50</td>
<td>0.002</td>
<td>1.16-1.95</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depression</td>
<td></td>
<td></td>
<td></td>
<td>1.05</td>
<td>0.001</td>
<td>1.03-1.07</td>
<td>1.05</td>
<td>0.001</td>
<td>1.03-1.06</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<sup>b</sup> The model also adjusted for the following variables: type of patient, legal guardianship, marital status of parents/caregivers, history of foster family placement, and mental health diagnoses.

Model fitness statistics:

Model A: Omnibus Tests of Model Coefficient: 300.53 (p-value < 0.001); Nagelkerke pseudo R square = 22.7%; Overall percent correctly classified = 68.1%
Model B: Omnibus Tests of Model Coefficient: 322.30 (p-value < 0.001); Nagelkerke pseudo R square: 24.2%; Overall percent correctly classified: 68.8%
Final Model: Omnibus Tests of Model Coefficient: 331.61 (p-value < 0.001); Nagelkerke pseudo R square = 24.9%; Overall percent correctly classified = 69.2%
3.4. Predictors of depressive symptoms

Table 3.4 shows the results of the Poisson regression model predicting depressive symptoms. We found that the difference in the logs of expected depressive symptoms score was 0.169 unit higher for adolescents who were bullied compared to adolescents who were not bullied, while holding the other variables in the model constant. Age and social support were both inversely associated with depressive symptoms. However, female gender and history of childhood abuse were both positively associated with depressive symptoms.

<table>
<thead>
<tr>
<th>Variables</th>
<th>β</th>
<th>Exp(β)</th>
<th>p-value</th>
<th>95% C.I.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at assessment</td>
<td>-0.016</td>
<td>0.98</td>
<td>0.001</td>
<td>0.97-0.99</td>
</tr>
<tr>
<td>Gender – Female</td>
<td>0.140</td>
<td>1.15</td>
<td>0.001</td>
<td>1.11-1.19</td>
</tr>
<tr>
<td>Number of childhood abuse</td>
<td>0.045</td>
<td>1.05</td>
<td>0.001</td>
<td>1.03-1.06</td>
</tr>
<tr>
<td>Social support</td>
<td>-0.135</td>
<td>0.87</td>
<td>0.001</td>
<td>0.77-0.91</td>
</tr>
<tr>
<td>Bullying victimization</td>
<td>0.169</td>
<td>1.19</td>
<td>0.001</td>
<td>1.15-1.23</td>
</tr>
</tbody>
</table>

The model also adjusted for the following variables: type of patient, legal guardianship, marital status of parents/caregivers, history of foster family placement, and mental health diagnoses.

Deviance statistic = 7736.20, df = 1624, Value/df = 4.76; Omnibus test statistic: Likelihood Chi-square value = 870.41 (p-value < 0.001)

As shown in Tables 3.3 and 3.4, all the goodness-of-fit indices suggest that the models fit the data reasonably well. For instance, in the final model in Table 3, all the variables explained 24.9% of the variance in NSSI and 69.2% of the adolescents were correctly classified as having engaged in NSSI versus not engaged in NSSI. Also, in Table 4, the Omnibus test result was statistically significant suggesting that the Poisson regression model is fit and the estimated coefficients are significantly different from zero.

4. Discussion

The objectives of this study were to examine the effect of bullying victimization on NSSI and the mediating effect of depressive symptoms on the relationship between bullying
victimization and NSSI, after taking into account demographic characteristics, history of childhood abuse, social support, and mental health diagnoses. We found that more than one in three adolescents (37%) engaged in NSSI and more than one in four were victims of bullying (26.7%). Given that more than one-third of adolescents with mental health needs engaged in NSSI, additional efforts to understand why adolescents with mental health needs engage in NSSI is needed. These efforts are especially critical given that NSSI is a strong predictor of suicide-related behaviors including attempted and completed suicides (Kessler et al., 2005; Lofthouse and Yager-Schweller, 2009) and suicide is the second leading cause of death among adolescents aged 10-24 years in Canada (Statistics Canada, 2009). NSSI has also been identified as one of the leading reasons for emergency room visits by adolescents in Canada (Eggertson, 2013).

Three important findings emerged from the present study. First, supporting our hypothesis, bullying victimization was a significant predictor of NSSI. Second, corroborating past research, bullying victimization was a significant predictor of depressive symptoms and depressive symptoms was a predictor of NSSI. Third, extending prior research, depressive symptoms partially mediate the effect of bullying victimization on NSSI, over and above demographic characteristics, history of childhood abuse, social support, and mental health diagnoses. Next, we discuss these findings in relation to the extant literature as well as their implications for clinical practice, policy, and suicide prevention.

Based on the findings reported herein, the first conclusion was that bullying victimization predicted NSSI. This finding corroborates emerging past studies that relied on student samples and have found that bullying victimization has an important relationship with not only aggression directed towards others but also with aggression directed towards oneself (Claes et al., 2015; Hay and Meldrum, 2010). Our findings add to the extant literature and underscore the
harmful effect of bullying (Finkelhor et al., 2005; Storch and Ledley, 2005). The desire to regulate mood and affect is one consistent reason that has been adduced in explaining adolescent NSSI behavior (Nock, 2010; Noll et al., 2003; Stewart et al., 2014). A qualitative study undertaken by Long et al. (2015) shows that many of their participants engaged in NSSI as a means to manage the traumatic life experience and emotional distress. Viewed this way, NSSI becomes a maladaptive coping mechanism to deal with past trauma.

The second conclusion from this study was that adolescents who were victims of bullying were more likely to experience depressive symptoms even after controlling for age, gender, history of childhood abuse, social support, and mental health diagnoses. Bullying victimization has been consistently linked to a number of externalizing and internalizing behavior problems in community and school-based samples of adolescents (Nansel et al., 2001). Storch and Ledley's (2005) review of cross-sectional and longitudinal studies on the effect of bullying victimization on psychological adjustment among adolescents found that bullying victimization during childhood predicts a number of internalizing problems later in life. A meta-analysis of longitudinal studies on the effect of bullying victimization on internalizing problems by Reijntjes et al. (2010) also concluded that bullying victimization serves both as a predictor of, and an outcome of depressive symptoms, suggesting a vicious cycle that contributes to the high stability of bullying victimization. Similar to recent findings from a normative sample of 355 adolescents with baseline and follow-up data, those who reported bullying victimization were also at risk of developing depressive symptoms (Hamilton et al., 2016).

Third, support emerged for our hypothesis that depressive symptoms partially mediate the effect of bullying victimization on NSSI. This finding extends past research that has found a significant effect of bullying victimization on NSSI (Bowes et al., 2014; Claes et al., 2015;
The main contribution of the present study was that the effect of bullying victimization on NSSI was attenuated by depressive symptoms. Specifically, 13.8% of the effect of bullying victimization was mediated by depressive symptoms. It is important to also point out that this was after adjusting for the effect of age, gender, history of childhood abuse, and mental health diagnoses, all of which are well established predictors of NSSI (Franzke et al., 2015; Smith et al., 2014). Given that the onset of depression typically occurs during the period of adolescence (Kessler et al., 2005; Schwartz et al., 2012) and bullying victimization peaks during the age of middle school (Kljakovic and Hunt, 2016), interventions aimed at reducing NSSI among adolescents should also take into account how bullying exacerbates depressive symptoms and consequently NSSI.

The finding that depressive symptoms partially mediate the effect of bullying victimization on NSSI offers important clinical implications for clinicians, psychologists, school social workers, and other mental health care professionals towards suicide prevention. Assessment of adolescents who present with mental health problems should also include a brief evaluation to assess any history of bullying victimization. Endorsements of peer victimization and expressions of guilt, shame, self-deprecation, or feelings of sadness, and hopelessness should guide clinicians in conducting a more thorough assessment or refer the adolescent to a mental health care professional for further consultation and treatment.

Ideally, peer relations are socially rewarding (Holland et al., 2007; Sletten, 2011) and serve as an important protective factor against a variety of mental health problems including NSSI (Andover et al., 2007; Heath et al., 2010). However, peer victimization serves as a significant source of stress (Rosen et al., 2012; Storch and Ledley, 2005), and consequently a risk factor for NSSI (Baetens et al., 2014; Gandhi et al., 2015; Hankin and Abela, 2011;
Zetterqvist et al., 2014). Bullying victimization might also prevent victimized youth from reaching out for help or prevent them from developing appropriate social and coping skills (Bandyopadhyay et al., 2009; Hunter and Borg, 2006; Leach and Rickwood, 2009), all of which are known to reduce the risk of engaging in NSSI (Frost et al., 2015; Long et al., 2015).

The results of this study indicate that adolescents who experienced multiple childhood abuse are more likely to engage in NSSI. This corroborates many past studies that have also found the debilitating effect of childhood abuse and its relationship to internalizing and externalizing behavior problems including NSSI (Brausch and Holaday, 2015; Gratz, 2006; Smith et al., 2014). Scholars have tried to explain the underlying mechanisms by which childhood abuse may relate to long-term emotional dysfunction and have observed that adolescents with a history of childhood abuse are more likely to have trouble regulating their affect and emotions and experience a sense of insecurity (Briere and Jordan, 2009), which consequently leads to NSSI (Santangelo et al., 2016).

That adolescents who had a confidant or someone they could turn to for emotional needs are less likely to engage in NSSI underscores the protective effect of social support. Various studies (Rothon et al., 2012; Smokowski and Bacallao, 2007) and systematic reviews (Bigby, 2012; Jennings et al., 2014) have documented the positive effect of social support in enhancing mental health and well-being of adolescents. Hay and Meldrum (2010) found that a combination of social support and self-control provides adolescents with the ability to deliberate on their stressful life situation and avoid taking actions that might be deleterious to their mental health and well-being. Efforts aimed at preventing NSSI should first identify and reduce risk factors for NSSI while at the same time identifying and increasing factors found to be associated with a diminished likelihood of engaging in NSSI. Instead of concentrating solely on identifying
adolescents who are at risk of engaging in NSSI, future studies could attempt to identify protective factors that reduce the risk of NSSI among specific subgroups of adolescents with childhood abuse histories or who are victims of bullying.

4.1. Implications

A number of clinical and policy implications as well as avenues for future research emerged particularly as they relate to the prevention of NSSI among adolescents. Given that adolescents with a history of bullying victimization are more likely to engage in NSSI, it might be beneficial for clinicians, teachers, and school social workers to use information obtained about adolescent’s bullying history to target NSSI prevention and intervention efforts. At the classroom and institutional level, teachers and principals should be educated on the long-term effect of bullying on NSSI particularly given that the majority of bullying occurs in school where adolescents spend a greater portion of their time (Arseneault et al., 2010). Clinicians and school social workers can then use this knowledge to not only inform their practice but also inform schools about the risk and protective factors associated with engaging in NSSI. In addition to universal prevention programs, targeted evidence-based interventions based on identified risk would be of benefit. Adolescents who were victims of bullying might benefit from trauma-focused interventions such as cognitive behavior therapy and cognitive processing therapy, evidence-based interventions that are known to alleviate symptoms through overcoming avoidance behavior (Ekman and Hiltunen, 2015).

Our findings have implications for public health as well, particularly given the rising incidence of bullying and suicide related behaviors among adolescents in Canada. Bullying intervention programs that are aimed at addressing internalizing symptomatology are only as effective as the manner in which they are delivered. The use of brief solution-focused therapy in
dealing with trauma arising from bullying (Carney, 2008) could be therapeutically effective when combined with other trauma-focused interventions such as supportive counseling and cognitive behavior therapy. In addition, expanding coping strategies of adolescents would be helpful for those dealing with trauma arising from bullying and also help in reducing future anxiety-provoking thoughts (Carney, 2008).

4.2. Limitations

This study has some limitations that deserve mentioning. First, this study relied on cross-sectional data; hence, no causal inferences could be drawn regarding the association between some of the factors examined and NSSI. Additional studies that follow adolescents who have been bullied are needed in order to tease apart some of the nuances between bullying victimization and NSSI, including the onset of depression and NSSI. A longitudinal study would also allow for the examination of the effect bullying victimization on NSSI across different developmental ages. Second, the use of secondary data limits the analysis of other important factors relating to adolescent NSSI behaviors that would be interesting to examine. For instance, we were unable to examine race/ethnicity in this study. Third, although the sample was large, and representative of the population of adolescents receiving clinical care in Ontario, future studies should examine clinical populations in different geographical regions of Canada. Additionally, cross-cultural studies that use the interRAI ChYMH would provide additional evidence of the impact of bullying victimization on NSSI.

4.3. Conclusion

In conclusion, the findings presented in this study offer some important understanding about the mechanism through which bullying victimization affects NSSI. The contribution of bullying victimization and depressive symptoms to NSSI adds to the case for the development of
trauma-focused interventions in reducing the risk of NSSI among adolescents. Obtaining information about history of bullying victimization from adolescents who present with mental health needs could help in the identification of adolescents who might be at risk of engaging in NSSI. School authorities and mental health practitioners should also consider the broad range of trauma experienced by adolescents who are victims of bullying. These adolescents are at risk of developing mental health symptoms including engaging in NSSI.
References


depression inventory in clinical and nonclinical youths. Psychological Assessment 22(4), 866-877.


CHAPTER 4

EXAMINING THE ASSOCIATION BETWEEN SUICIDAL BEHAVIORS AND REFERRAL FOR MENTAL HEALTH SERVICES AMONG CHILDREN INVOLVED IN THE CHILD WELFARE SYSTEM IN ONTARIO, CANADA

Philip Baiden and Barbara Fallon

This chapter has been submitted to *Child Abuse & Neglect*:

Abstract

Although various studies have investigated factors associated with mental health service utilization, few studies have examined factors associated with referral for mental health services among maltreated children. The objective of this study was to examine the association between suicidal behaviors and referral for mental health services among children involved in the Child Welfare System in Ontario, Canada. Data for this study were obtained from the Ontario Incidence Study of Reported Child Abuse and Neglect 2013. A sample of children (n = 57,798) aged 8-15 years was analyzed using binary logistic regression with referral for mental health service as the outcome variable and suicidal thoughts and self-harm behavior as the main explanatory variables. Of the 57,798 cases, 4,709 (8.1%) were referred for mental health services. More than seven out of ten maltreated children who engaged in self-harm behavior and two out of three maltreated children who expressed suicidal thoughts were not referred for mental health services. In the multivariate logistic regression model, children who expressed suicidal thoughts had more than double the odds of being referred for mental health services (OR = 2.39, 95% C.I. = 2.05-2.77) and children who engaged in self-harm behavior had 44% higher odds of being referred for mental health services (AOR = 1.44, 95% C.I. = 1.24-1.67), after controlling for child demographic characteristics, maltreatment characteristics, and child functioning concerns. Given that referral is the initial step towards mental health service utilization, it is important that child welfare workers receive the necessary training so as to carefully assess and refer children in care who expressed suicidal thoughts or engaged in self-harm behavior for needed mental health services. The paper discusses the results and their implications for both the child welfare system and mental health service utilization.
Keywords: referral for mental health service; suicidal behaviors; suicidal thoughts; self-harm behavior; child maltreatment; child welfare
1.0 Introduction

Various studies from Canada have found that children with a history of child abuse and neglect are at significantly higher risk for mental health problems including engaging in suicidal behaviors than their counterparts in the general population (Farand, Chagnon, Renaud, & Rivard, 2004; Hadland et al., 2015; Katz et al., 2011; Rhodes et al., 2012, 2013). Suicidal behavior refers to the occurrence of thoughts about killing oneself (ideation) and engaging in self-harm behaviors that has the potential to end one’s life (Nock & Favazza, 2009). A recent Canadian study found that as many as 80% of those who attempted suicide had a history of child abuse (Martin, Dykxhoorn, Afifi, & Colman, 2016). Using data from the At Risk Youth Study, Hadland et al. (2015) found that controlling for other factors, children with a history of physical abuse, emotional abuse, and emotional neglect were between 3-4 times more likely to have attempted suicide when compared to their non-abused counterparts. Katz et al. (2011) also examined suicide and suicide attempts among 8,279 children in care and a comparison cohort of 353,050 children not in care from Manitoba, Canada and found that the odds of suicide was 3.54 times greater and the odds of suicide attempt was 2.11 times greater among children in care when compared to their counterparts who were not in care.

Scholars have found that although children who come into contact with the child welfare system (CWS) have serious mental health problems and are in need of mental health services, many do not receive services when they need them (Bunger, Chuang, & McBeath, 2012; Lee & Jonson-Reid, 2009; Marcenko, Hook, Romich, & Lee, 2012; Montoya, Giardino, & Leventhal, 2010; Villagrana, 2010a; Wherry, Huey, & Medford, 2015). Drawing on data from the National Survey of Child and Adolescent Well-Being, Burns et al. (2010) followed 2,959 families involved in the CWS and found that only 44% of maltreated children received the needed mental health services.
health services. Available research suggests that referring individuals who exhibit suicidal behaviors to mental health care can aid in recovery (Christofferson, Hamlett-Berry, & Augustson, 2015; Gardner et al., 2010). Katz et al. (2011) also found that hospital admissions and visits to a physician after entry into care significantly decreased the likelihood of suicide attempts by 73%.

The extant literature has focused attention on factors associated with mental health service utilization among maltreated children (Bunger et al., 2012; Finno-Velasquez, Cardoso, Dettlaff, & Hurlburt, 2015; Kim & Garcia, 2016). One area of research that has received comparatively little attention within the child welfare literature is referral of maltreated children for mental health services (Burns et al., 2004; Staudt, 2003). Referral is the initial pathway towards mental health service utilization. A systematic review conducted by Staudt (2003) found that gateway providers, such as child welfare workers and school counselors, demonstrated a lack of awareness of adolescents’ mental health service needs, suggesting that adolescents who need mental health services might not be referred for appropriate services. Some scholars have found that children placed in care as a result of neglect are less likely to receive mental health services than their counterparts not in care (Leslie et al., 2000). Other scholars have found that sexually abused children are more likely to receive therapy and counseling, regardless of their level of mental health needs (Burns et al., 2004), whereas mental health services for physical abuse children are more likely to target caregivers (Kolko, Selelyo, & Brown, 1999).

In terms of mental health factors, Fitzgerald et al. (2015) found that the proportion of maltreated children screened for trauma-related, internalizing, and externalizing behavior problems and referred for trauma-informed and evidence-based practice mental health was much greater than their counterparts in the wait-list control group. Conn, Szilagyi, Alpert-Gillis,
Baldwin, and Jee (2016) found that youth in care with mental health problems had almost three times higher odds of participating in mental health therapy/counselling than their counterparts not in care. Whereas some scholars have noted that continued engagement in services may be more difficult for youth from poor households and youth in out-of-home placement (Kerns et al., 2014), others have reported that youth in out-of-home placement tends to present with more mental health and behavior problems, hence are more likely to utilize mental health service whilst in care (Brown, Courtney, & McMillen, 2015; McMillen et al., 2004; Pecora, White, Jackson, & Wiggins, 2009).

1.1 Current study

This study draws on the Gateway Provider Model developed by Stiffman, Pescosolido, and Cabassa (2004). Drawing on the core variables of Andersen's (1995) Behavioral Model of Health Service Use, the Gateway Provider Model argues that child welfare workers perceptions of client need, enabling, and predisposing factors directly influence mental health service utilization (Stiffman et al., 2004). As a result, child welfare workers must be able to assess maltreated children for mental health need and refer them for effective treatment (Stiffman et al., 2000, 2004). The model has received support from a number of studies (see e.g., Dorsey et al., 2012; Garcia, Circo, DeNard, & Hernandez, 2015).

Given that children involved in the CWS are at significant risk of engaging in suicidal behaviors (e.g., Anderson, 2011; Hadland et al., 2015; He, Fulginiti, & Finno-Velasquez, 2015; Katz et al., 2011; Vinnerljung, Hjern, & Lindblad, 2006), understanding the association between suicidal behaviors and referral for mental health service is an important first step toward providing appropriate mental health treatment. To this end, the objective of the current study was to add to the existing body of literature by examining the association between suicidal behaviors
and referral for mental health services among children involved in the CWS in Ontario, Canada, after taking into account other known predictors of mental health service utilization, such as child demographic characteristics, maltreatment characteristics, and child functioning concerns. This study also offers an important contribution to the existing literature as it identifies maltreatment characteristics that influence referral for mental health services.

2.0 Data and Methods

2.1 Participants

This study is based on data obtained from the Ontario Incidence Study of Reported Child Abuse and Neglect 2013 (OIS-2013). The OIS-2013 is the fifth cycle of the child abuse and neglect incidence study to be conducted in Ontario, Canada (Fallon et al., 2015). The primary objective of the OIS-2013 was to provide reliable estimates of the scope and characteristics of reported child abuse and neglect in Ontario. Specifically, the OIS-2013 sought to:

determine rates of investigated and substantiated physical abuse, sexual abuse, neglect, emotional maltreatment, exposure to intimate partner violence, and risk of maltreatment, as well as multiple forms of maltreatment; investigate the severity of maltreatment as measured by forms of maltreatment, duration, and physical and emotional harm; examine selected determinants of health that may be associated with maltreatment; monitor short-term investigation outcomes, including substantiation rates, out-of-home placements, use of child welfare court and criminal prosecution; and compare rates of substantiated maltreatment with that of past OIS cycles (Fallon et al., 2015).

The OIS-2013 utilized a three-stage multi-cluster sampling design in which the primary sampling units (PSU) was child welfare agencies. In the first stage, a representative sample of 17 out of 46 child welfare agencies from across Ontario was selected for inclusion using a simple
random sampling technique, with the exception of agencies in the largest metropolitan region, that were sampled with certainty. Given that the child population in the largest metropolitan region is very large, failure to include these child welfare agencies in the sample would result in unreliable estimates. In the second stage, cases that opened between October 1, 2013 and December 31, 2013 within the selected agencies were selected for inclusion. Cases that opened more than once during the study period were counted as one case (Fallon et al., 2015). Child investigation cases that were as a result of maltreatment were then sampled. Excluded are children over 15 years, siblings who were not investigated, and children who were investigated for non-maltreatment concerns. The sampling approach was developed in consultation with a statistician. Three months was considered to be the optimum period to ensure high participation rate and good compliance with study procedure by selected agencies. Data were collected using a comprehensive three-page assessment instrument designed to gather information on various domains of child maltreatment (Fallon et al., 2015). Ethics approval for the OIS-2013 was granted by the University of Toronto Ethics Review Board.

Within the three month period, 5,265 investigations took place, of which 4,132 (78.5%) were maltreatment investigations and 1,133 (21.5%) were risk investigation only. While investigating maltreatment is central to the mandate of child protection authorities, their mandates can also apply to situations where there is no specific concern about past maltreatment but where the risk of future maltreatment is being assessed. Risk investigation only refers to situations in which no allegation of maltreatment was made, and no specific incident of maltreatment was suspected at any point during the investigation (e.g., referrals for parent-teen conflict; child behavior problems; parent behavior such as substance abuse, where there is a risk of future maltreatment but no concurrent allegations of maltreatment) (Fallon et al., 2015).
The OIS-2013 is weighted by applying a composite regionalization and annualization weight in order to obtain provincial and annual incidence estimates. The regionalization weight was computed to adjust for variations in the size of sampled agencies included in data collection. The annualization weight adjusts for the number of investigations conducted by the sampled agencies throughout the entire year (Fallon et al., 2015). This study is based on children aged 8-15 years (n = 2,442; Weighted n = 57,798) with complete data on all the variables included in the analysis. All analyses are based on the weighted data.

2.2 Variables

2.2.1 Outcome variable

The outcome variable investigated in this study was referral for mental health services. Child protection services (CPS) workers were asked to indicate referrals that had been made to programs designed to offer services beyond the parameters of “on-going child welfare services” including referrals made internally to special programs as well as referrals made externally to other agencies/services. CPS workers were asked to indicate whether a referral was made and was part of the case plan and not whether the young person or family had actually started to receive services. For the purposes of this study, cases that were referred for psychiatric or psychological services (e.g., trauma, high risk behavior or intervention) were coded as 1 and compared with cases that were not referred that were coded as 0.

2.2.2 Explanatory variables

The main explanatory variable examined in this study was suicidal behavior and was measured using two variables: suicidal thoughts and self-harm behavior. Suicidal thoughts were defined to include a child having expressed thoughts of suicide, ranging from fleeting thoughts to a detailed plan. Children who expressed suicidal thoughts were coded as 1 and children who did
Self-harm behavior was defined to include a child engaging in high-risk or life-threatening behavior, such as suicide attempts and physical mutilation or cutting. Children who engaged in self-harm behavior were coded as 1 and children who did not were coded as 0.

The study also takes into account the following factors which are known to influence mental health service utilization by children involved in the CWS: age, gender, type of maltreatment, multiple substantiated incidents of maltreatment, physical harm, previous investigation for maltreatment, placement during maltreatment investigation, household source of income, as well as child functioning problems, such as depression/anxiety and attention-deficit/hyperactivity disorder (ADHD). Age was measured as a continuous variable in years whereas gender was coded as a binary variable with male as the reference category.

Type of maltreatment was measured as a nominal variable and coded as “0 = physical abuse”, “1 = sexual abuse”, “2 = neglect”, “3 = emotional maltreatment”, “4 = exposure to intimate partner violence (IPV)”, and “5 = risk investigation only”. Type of maltreatment was measured from a list of 32 maltreatment typologies. Physical abuse was defined as a child being physically harmed as a result of the behavior of the caregiver (e.g., shaked, pushed, or grabbed; hit with a hand or an object; punched, kicked or bitten; or choked, poisoned, stabbed). Sexual abuse was defined as a child being sexually molested or sexually exploited. This includes oral, vaginal, or anal sexual activity; attempted sexual activity; sexual touching or fondling; exhibitionism; voyeurism; involvement in prostitution or pornography; or verbal sexual harassment. Neglect was defined as a child who suffered harm or was at a greater risk of suffering harm as a result of a failure to provide for or protect the child. Emotional maltreatment was defined as a child having suffered, or is at substantial risk of suffering, emotional harm at the hands of the caregiver (e.g., terrorizing or threat of violence; verbal abuse or belittling;
isolation/confinement; or inadequate nurturing or affection). Exposure to IPV was defined as a child physically witnessing violence between intimate partners or a child hearing violence between intimate partners or witnessing some immediate consequences of the assault (e.g., injuries to the mother).

Multiple substantiated maltreatment was measured as a nominal variable and coded as “0 = no substantiated maltreatment”, 1 “one substantiated maltreatment”, and “2 = multiple substantiated maltreatment”. Child maltreatment that results in physical harm to the child was coded as 1; otherwise it was coded as 0. Previous investigation for maltreatment was also measured as a binary variable and coded 1 if the child was previously investigated by child welfare for alleged maltreatment; otherwise it was coded as 0. CPS workers were also asked to indicate whether an out-of-home placement was made during the investigation. Children that were placed during the investigation were coded as 1 and children that were not placed were coded as 0. CPS workers were also asked to indicate the caregiver’s source of income. This variable was treated as a nominal variable with the following categories: “0 = full-time employment”, “1 = part-time employment”, “2 = social assistance”, and “3 = no income.”

Depression/anxiety was defined to mean feelings of depression or anxiety that persist for most of the day, every day for two weeks or longer, and interfere with the child’s ability to manage at home or at school. ADHD was defined to mean persistent pattern of inattention and/or hyperactivity/impulsivity that occurs more frequently and more severely than is typically seen in children at comparable stages of development. Symptoms are frequent and severe enough to have a negative impact on the child’s life at home, at school, or in the community. Both of these variables were coded 1 if the concern was noted, otherwise they were coded as 0.

2.3 Data analyses
Data was analyzed using descriptive, bivariate, and multivariate analytic techniques. Descriptive statistics of the outcome variable (referral for mental health services) and the explanatory variables were first conducted using percentage for categorical variables and mean and standard deviation for age. The bivariate relationship between referral for mental health services and age was examined using one-way ANOVA whereas Pearson chi-square was used to examine the association between referral for mental health services and the categorical explanatory variables. The main analysis involved the use of binary logistic regression to examine the association between suicidal behaviors and referral for mental health services while at the same time controlling for the effect of other predictors. We opted for logistic regression over Ordinary Least Squares (OLS) regression given that the outcome variable was measured as a binary variable and the explanatory variables were measured as continuous and categorical variables.

Two logistic regression models were built following the hierarchical approach described by Cohen, Cohen, West, and Aiken (2003). Suicidal thoughts and self-harm behavior were both entered in Model 1. Model 2 consists of suicidal thoughts and self-harm behavior plus all the other explanatory variables to determine how much the coefficients for suicidal thoughts and self-harm behavior change with the addition of the other explanatory variables. Nagelkerke pseudo R-square, -2 log likelihood value, and omnibus test of model coefficients were employed to assess the overall fit of the model. Given the large sample size, alpha level was set at $p < .01$ instead of the traditional value of $p < .05$. This was done to guard against interpreting statistical effects that are mainly the result of a large sample size. All analyses were conducted using SPSS Version 24 for windows (SPSS Inc., Chicago, IL, USA).

3.0 Results
3.1 Sample characteristics

Table 4.1 shows the general distribution of the variables examined in this study. Of the 57,798 estimated weighted cases examined, 4,709, representing 8.1%, were referred for mental health services. A little more than 7% of the children engaged in self-harm behavior, whereas 6.5% expressed suicidal thoughts. The average age was 11.40 (SD = 2.28) and the sample was almost evenly split between males (51.7%) and females (48.3%). Exposure to IPV (22.6%), physical abuse (22.1%), and neglect (21.8%) represent the most common forms of maltreatment investigations. One in five cases (20.1%) were due to a risk only investigation. In 9.3% of the cases, emotional maltreatment was noted as the primary concern, and sexual abuse was identified as the primary form of maltreatment in 4.1% of the cases investigated. The majority (64.3%) of the cases had no substantiated maltreatment, whereas in 30% of the cases, only one type of substantiated maltreatment was noted, and multiple types of substantiated maltreatment were noted in the remaining 5.6% of the cases. Physical harm was noted in 3.2% of the cases investigated. About two-thirds (66.1%) of the children had previously been investigated for maltreatment related incidents. With respect to household source of income, close to two-thirds (63.5%) of the children had caregivers who were employed full-time, 20.7% caregivers depended on social assistance/other benefits, 8.3% were employed part-time, and the remaining 7.5% had no income. A little over 4% of the children were placed in out-of-home care during the maltreatment investigation. About 23% of the children had mental health concerns relating to depression/anxiety and 16.6% had mental health concerns relating to ADHD.
Table 4.1
Sample characteristics (unweighted N = 2,442; weighted N = 57,798)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Outcome variable</strong></td>
<td></td>
</tr>
<tr>
<td>Referred for mental health services</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>53,089 (91.9)</td>
</tr>
<tr>
<td>Yes</td>
<td>4,709 (8.1)</td>
</tr>
<tr>
<td><strong>Explanatory variables</strong></td>
<td></td>
</tr>
<tr>
<td>Self-harm behavior</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>53,629 (92.8)</td>
</tr>
<tr>
<td>Yes</td>
<td>4,169 (7.2)</td>
</tr>
<tr>
<td>Suicidal thoughts</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>54,027 (93.5)</td>
</tr>
<tr>
<td>Yes</td>
<td>3,771 (6.5)</td>
</tr>
<tr>
<td><strong>Child characteristics</strong></td>
<td></td>
</tr>
<tr>
<td>Child’s age, $M (SD)$</td>
<td>11.40 (2.28)</td>
</tr>
<tr>
<td>Child’s gender</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>29,893 (51.7)</td>
</tr>
<tr>
<td>Female</td>
<td>27,905 (48.3)</td>
</tr>
<tr>
<td>Type of maltreatment</td>
<td></td>
</tr>
<tr>
<td>Physical Abuse</td>
<td>12,747 (22.1)</td>
</tr>
<tr>
<td>Sexual Abuse</td>
<td>2,391 (4.1)</td>
</tr>
<tr>
<td>Neglect</td>
<td>12,595 (21.8)</td>
</tr>
<tr>
<td>Emotional Maltreatment</td>
<td>5,400 (9.3)</td>
</tr>
<tr>
<td>Exposure to IPV</td>
<td>13,049 (22.6)</td>
</tr>
<tr>
<td>Risk investigation</td>
<td>11,617 (20.1)</td>
</tr>
<tr>
<td>Multiple substantiated maltreatment</td>
<td></td>
</tr>
<tr>
<td>No substantiated maltreatment</td>
<td>37,167 (64.3)</td>
</tr>
<tr>
<td>One substantiated maltreatment</td>
<td>17,407 (30.1)</td>
</tr>
<tr>
<td>Multiple substantiated maltreatment</td>
<td>3,224 (5.6)</td>
</tr>
<tr>
<td>Physical harm</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>55,948 (96.8)</td>
</tr>
<tr>
<td>Yes</td>
<td>1,850 (3.2)</td>
</tr>
<tr>
<td>Previous investigation for alleged maltreatment</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>19,584 (33.9)</td>
</tr>
<tr>
<td>Yes</td>
<td>38,214 (66.1)</td>
</tr>
<tr>
<td>Placement during investigation</td>
<td></td>
</tr>
<tr>
<td>No/not considered</td>
<td>55,360 (95.8)</td>
</tr>
<tr>
<td>Yes</td>
<td>2,438 (4.2)</td>
</tr>
<tr>
<td>Depression/anxiety/withdrawal</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>44,769 (77.5)</td>
</tr>
<tr>
<td>Yes</td>
<td>13,029 (22.5)</td>
</tr>
<tr>
<td>ADD/ADHD</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>48,216 (83.4)</td>
</tr>
<tr>
<td>Yes</td>
<td>9,582 (16.6)</td>
</tr>
<tr>
<td>Source of household income</td>
<td></td>
</tr>
<tr>
<td>Employment Status</td>
<td>Count (Percentage)</td>
</tr>
<tr>
<td>---------------------------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>Full-time employment</td>
<td>36,729 (63.5)</td>
</tr>
<tr>
<td>Part-time employment</td>
<td>4,782 (8.3)</td>
</tr>
<tr>
<td>Other benefits/Social assistance</td>
<td>11,961 (20.7)</td>
</tr>
<tr>
<td>No income/unknown</td>
<td>4,326 (7.5)</td>
</tr>
</tbody>
</table>

3.2 Bivariate results

All the variables examined were significantly associated with referral for mental health services at the bivariate level (see Table 4.2). About 27% of children who engaged in self-harm behavior were referred for mental health services compared to 6.7% of children who did not engage in self-harm behavior ($\chi^2 = 2157.74$, df = 1, $p < .001$). Similarly, about one in three children who expressed suicidal thoughts (32.5%), compared to 6.4% of children with no suicidal thoughts, were referred for mental health services ($\chi^2 = 3199.97$, df = 1, $p < .001$). The average age among children who were referred for mental health services was greater than the average age among children who were not referred for mental health services ($M_{referred} = 11.84$ versus $M_{not\ referred} = 11.36$; $F(1, 57796) = 190.54$, $p < .001$). The proportion of females who were referred for mental health services (9.1%) was slightly greater than the proportion of males who were referred for mental health services (7.2%; $\chi^2 = 68.24$, df = 1, $p < .001$). The proportion of sexual abuse cases that were referred for mental health services (12.7%) was significantly greater than the proportion of other types of maltreatment cases that were referred for mental health services (e.g., risk only investigation (9.4%), neglect (9.1%), emotional maltreatment (8.1%), and physical abuse or exposure to IPV (6.7%)). Children were also more likely to be referred for mental health services if they had multiple substantiated maltreatment, experienced physical harm, had previously been investigated, were placed during maltreatment investigation, or had issues relating to depression/anxiety or ADHD.
Table 4.2
Bivariate association between referral for mental health services and categorical explanatory variables (weighted N = 57,798)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Referred for mental health services</th>
<th>Test statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not referred</td>
<td>Referred</td>
</tr>
<tr>
<td>Self-harm behavior</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>50,050 (93.3)</td>
<td>3,579 (6.7)</td>
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<td></td>
<td>11.36 (2.27)</td>
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<td>27,729 (92.8)</td>
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<tr>
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<td>25,360 (90.9)</td>
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<tr>
<td>Physical Abuse</td>
<td>11,898 (93.3)</td>
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<td>2,043 (83.8)</td>
<td>394 (16.2)</td>
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### Depression/anxiety/withdrawal

<table>
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</thead>
<tbody>
<tr>
<td></td>
<td>42,567 (95.1)</td>
<td>10,522 (80.8)</td>
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</table>

$\chi^2 = 2766.58; p < .001$

### ADD/ADHD

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<th></th>
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<td></td>
<td>44,700 (92.7)</td>
<td>8,389 (87.5)</td>
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$\chi^2 = 283.94; p < .001$

### Source of household income

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<th>Full-time employment</th>
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<td>4,085 (94.4)</td>
<td>11,130 (93.1)</td>
<td>4,237 (11.4)</td>
<td>33,637 (8.4)</td>
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</tbody>
</table>

$\chi^2 = 131.76; p < .001$

### 3.3 Multivariate results

Table 4.3 shows the multivariate results from the logistic regression analyses predicting referral for mental health services. In Model 1, compared to children with no suicidal thoughts, children who expressed suicidal thoughts had four times higher odds of being referred for mental health services (AOR = 4.52, $p < .001$, 99% CI = 3.92-5.22). The odds decreased to 2.39 with the addition of other predictors in Model 2 (AOR = 2.39, $p < .001$, 99% CI = 2.05-2.77). Similarly, odds were 90% higher for children who engaged in self-harm behavior to be referred for mental health services when compared to children who did not engage in self-harm behavior (AOR = 1.90, $p < .001$, 99% CI = 1.64-2.20). The odds ratio decreased slightly from 1.90 in Model 1 to 1.44 in Model 2 (AOR = 1.44, $p < .001$, 99% CI = 1.24-1.67). In Model 2, each additional increase in one year of age decreased the odds of referral for mental health services by 2% (AOR = 0.98, $p < .01$, 99% CI = 0.96-1.00). Females had 16% higher odds of being referred for mental health services when compared to their male counterparts (AOR = 1.16, $p < .001$, 99% CI = 1.06-1.26). Controlling for all other factors, sexual abuse cases had double the odds of being referred for mental health services when compared to physical abuse cases (AOR = 2.56, $p < .001$).
and cases with multiple substantiated maltreatment had almost double the odds of being referred for mental health services (AOR = 1.99, p < .001, 99% CI = 2.10-3.12). Maltreatment cases that resulted in physical harm had 2.45 times higher odds of being referred when compared to maltreatment cases that resulted in no physical harm (AOR = 2.45, p < .001, 99% CI = 2.05-2.94). Compared to children with caregivers whose household source of income was from full-time employment, children with caregivers whose household source of income was from part-time employment had 18% higher odds of being referred for mental health services (AOR = 1.18, p < .01, 99% CI = 1.03-1.35). Social assistance/other benefits and no income were associated with lower odds of referral for mental health services. Other significant predictors of referral for mental health services include: placement during investigation and child functioning issues relating to depression/anxiety or ADHD.

In terms of model fit, the omnibus tests of model coefficients, which follows a chi-square distribution, was statistically significant in both models. Based on the Nagelkerke pseudo R square, suicidal thoughts and self-harm behavior explained 8.5% of the variance in referral for mental health services. Adding variables in Model 2 increased the explained variance to 14.4%. The classification table in Model 2 indicated that 80% of cases were correctly classified into referred and non-referred groups.
Table 4.3
Multivariate logistic regression predicting referral for mental health services (weighted N = 57,798)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Model 1</th>
<th></th>
<th>Model 2</th>
<th></th>
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<tr>
<td></td>
<td>OR</td>
<td>99% C.I.</td>
<td>OR</td>
<td>99% C.I.</td>
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<td>Self-harm behavior</td>
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<td>No</td>
<td>1.00</td>
<td></td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>1.90***</td>
<td>1.64-2.20</td>
<td>1.44***</td>
<td>1.24-1.67</td>
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<td>Suicidal thoughts</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>1.00</td>
<td></td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>4.52***</td>
<td>3.92-5.22</td>
<td>2.39***</td>
<td>2.05-2.77</td>
</tr>
<tr>
<td>Child’s age</td>
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<td></td>
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</tr>
<tr>
<td></td>
<td>0.98**</td>
<td>0.96-1.00</td>
<td></td>
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<tr>
<td>Child’s gender</td>
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<tr>
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</tr>
<tr>
<td>Female</td>
<td>1.16***</td>
<td>1.06-1.26</td>
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<td>Type of maltreatment</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Physical Abuse</td>
<td>1.00</td>
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<tr>
<td>Sexual Abuse</td>
<td>2.56***</td>
<td>2.10-3.12</td>
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<tr>
<td>Exposure to IPV</td>
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<tr>
<td>No substantiated maltreatment</td>
<td>1.00</td>
<td></td>
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<tr>
<td>One substantiated maltreatment</td>
<td>1.31***</td>
<td>1.17-1.46</td>
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<td>Multiple substantiated maltreatment</td>
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<td>Physical harm</td>
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<tr>
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<tr>
<td></td>
<td>Sample 1</td>
<td>Sample 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------------</td>
<td>----------</td>
<td>----------</td>
<td></td>
<td></td>
</tr>
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<td>Pseudo R square</td>
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</tr>
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<td>52.4</td>
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### 4.0 Discussion

This study sought to examine the association between suicidal behaviors and referral for mental health services and identify maltreatment characteristics that influence referral for mental health services among children involved in the CWS in Ontario, Canada. We found that 7% of the sample engaged in self-harming behaviors and 7% of the sample had suicidal thoughts. Within this maltreated sample of children in Ontario, Canada, less than 10% were referred for mental health services. This proportion is much lower than what has been reported in some other studies from the US (Montoya et al., 2010; Villagrana, 2010b; Wherry et al., 2015). In their study examining the criteria for referring maltreated children for treatment, Wherry et al. (2015) found that, on average, 70% of children receiving child welfare services were referred for therapy and assessment either internally or externally to mental health service providers in the community.

Given the increasingly recognized strong association between child abuse and suicidal behaviors, it is worrying to find that, in the current study, more than seven out of ten maltreated children who engaged in self-harm behavior and two out of three maltreated children who expressed suicidal thoughts were not referred for mental health services. In contrast to the 10% referral rate found in this study, earlier research examining children involved in the CWS in Canada (den Dunnen, 2017) and the US (Burns et al., 2010) has found that about 40% of these children access mental health services. It is possible that many of the children in the current
sample, especially those who had suicidal thoughts or engaged in self-harm behaviors were already accessing mental health services within the community, which would eliminate the need for an additional referral for mental health services and result in an underestimation in this study of referrals. It would be beneficial for future research to identify the number of children who were already receiving mental health services and those who were referred as part of the investigation to determine a more accurate representation of the number of children who have access to mental health services.

Although the number of children who endorsed suicidal thoughts and self-harm behavior and were referred for mental health services was lower than expected, it is promising to note that these children were more likely to be referred for mental health services than maltreated children without these behaviors, net the effect of maltreatment characteristics and child functioning concerns. This suggests that there is recognition within the CWS that suicidal thoughts and self-harming behaviors are of sufficient concern to warrant a referral to mental health services. As discussed in the introduction, maltreatment history is associated with self-harm and suicide risk (Farand et al., 2004; Hadland et al., 2015; Katz et al., 2011; Rhodes et al., 2012, 2013). In addition, the literature has found a strong association between suicidal thoughts and self-harm and other mental health concerns among maltreated children (Anderson, 2011; Coohey, Dirks-Bihun, Renner, & Baller, 2014; Dunn, McLaughlin, Slopen, Rosand, & Smoller, 2013). Given the extant literature, when the presence of suicide risk/self-harm is identified within a child welfare population, it should be identified as a concern that requires appropriate service involvement. Additional research is needed to determine how well the CWS is assessing these areas of risk and to obtain a more accurate representation of how many youth involved with the CWS who have these concerns receive mental health services.
Contrary to past studies, we found that females were more likely to be referred for mental health services (Burns et al., 2004; Villagrana, 2010b). One plausible explanation for this finding is the idea that females tend to display more internalizing symptoms and suicidal behaviors and thus are more likely to be deemed to be in need of mental health services. Indeed numerous studies have established higher rate of depression, anxiety, and suicidal behaviors among maltreated females (Brensilver, Negriff, Mennen, & Trickett, 2011; Kerr, DeGarmo, Leve, & Chamberlain, 2014; Leslie et al., 2010). We found that children who experienced sexual abuse were more likely to be referred than children who experienced physical abuse. A similar finding has been reported by Villagrana (2010b) who found that maltreated children with a history of sexual abuse were 16 times more likely to be referred for mental health services during their time in care. The findings that children with multiple substantiated maltreatment or children placed out-of-home during maltreatment investigation are more likely to be referred for mental health services could be as a result of their experiencing more severe forms of maltreatment or maltreatment that results in physical harm.

4.1 Study limitations

Although the findings of the present study make some important contributions to enhance our understanding of factors related to referrals for mental health service among children involved in the CWS in Ontario, Canada, there are some limitations that are worth mentioning. First, we were unable to examine of the 8% of maltreated children referred for mental health services to determine how many actually received services and whether the mental health needs of those who received services were actually met. This is an important area of research that warrants further investigation. Second, the literature on self-harming behavior has made important distinction between suicidal self-injury (SSI) and non-suicidal self-injury (NSSI).
However, we were unable to tease apart those who engaged in self-harming behavior with the intent to die from those who engaged in self-harming behavior with no intent to die. This is another area of research for future consideration. Third, the cross-sectional nature of the study precludes us from drawing any causal inferences between the studied variables. Hence, only associations can be inferred. Lastly, the study only examined cases opened for a short period of time in Ontario, thereby limiting the generalizability of the findings to other contexts.

4.2 Conclusion

This study provided descriptive information about incidence of suicidal thoughts and self-harm behavior among children involved in the CWS in Ontario, Canada. More research is needed to understand the lower rate of referrals and determine increased awareness of the high rates of self-harm and suicidal thoughts in child abuse populations as well as the association between these symptoms and child functioning. The findings of the present study have implications for both the CWS and mental health service utilization. Given that referral is the initial step towards mental health service utilization, it is important that child welfare workers receive the necessary training so as to identify and refer children in care who need mental health services. Child welfare workers need to carefully assess and refer maltreated children who engage in suicidal behaviors to appropriate mental health treatment. Also, early recognition of mental health symptoms in maltreated children would go a long way in ensuring that children are referred to appropriate mental health services in a timely fashion. Moreover, child welfare workers knowledge about symptoms of trauma, depression, anxiety, behavior problems, suicide-related behaviors has been identified as critical in meeting the child’s well-being needs (Kerns et al., 2016).
References


5.0 Discussion and Conclusion

The aim of this three-paper dissertation was to examine: 1) the role of ACEs and bullying victimization as determinants of NSSI among children and adolescents referred to community and inpatient mental health settings in Ontario, and 2) the association between suicidal behaviours and referral for mental health services among children involved in the CWS in Ontario. This research contributes to our understanding of the impact of ACEs and bullying victimization on NSSI, the role of depressive symptoms in mediating the effect of bullying victimization on NSSI, and the association between suicidal behaviours and referral for mental health services among children involved in the CWS. The findings of this dissertation contribute to the existing bodies of literature on NSSI among children and adolescents in Canada (Hamza, Willoughby, & Good, 2013; Preyde et al., 2012; Turner, Arya, & Chapman, 2015) and that of mental health needs of maltreated children (Brown, Rodgers, Ivanova, Mehta, & Skrodzki, 2014; Katz et al., 2011).

5.1 The Unique Contribution of Each Paper

One important contribution of Paper 1 to the existing literature is that although the proportion of children and adolescents with a history of each of the ACEs who engaged in NSSI was significant and much greater than their counterparts who did not experienced ACEs, only physical and sexual abuse maintained their significant effect once other demographic factors, social support, and mental health diagnoses were accounted for. The existing literature has identified both physical abuse and sexual abuse as important predictors of internalizing and externalizing behaviour problems (Cicchetti, Rogosch, Gunnar, & Toth, 2010; Jones et al., 2013;
Nalavany, Ryan, & Hinterlong, 2009) and NSSI (Glassman, Weierich, Hooley, Deliberto, & Nock, 2007; Martin, Bergen, Richardson, Roeger, & Allison, 2004). The nonsignificant finding relating to the other ACEs and NSSI contradict some past studies (Bifulco et al., 2014; Thomassin, Shaffer, Madden, & Londino, 2016). However, this finding is consistent with other studies that suggests that although direct and indirect abuse often co-occur, direct abuse often leads to more severe psychopathology (Diamond & Muller, 2004; Kulkarni, Graham-Bermann, Rauch, & Seng, 2011; McKee & Payne, 2014).

The phenomenon of aggression and sadomasochism towards oneself is common particularly among individuals with a history of sexual abuse and is consistent with the interpersonal theory of NSSI which suggests that those who engage in NSSI sometimes do so a means of gaining control over their body (Messer & Fremouw, 2008). Parfitt (2005) discussed the case of a 17-year-old adolescent girl from an outpatient mental health facility from the UK who was sexually abused when she was 15 years old. This patient repeatedly engaged in NSSI by cutting sensitive and private parts of her body. The desire to punish herself and make herself look ugly and disgusting was the main reason cited for her engaging in NSSI. To quote the patient, “I’ve been cutting myself so that if someone does try anything they’ll see my body, and think what a freak, she’s disgusting, she’s ugly” (Parfit, 2005, p. 161). Another study by Jacobs-Kayam, Lev-Wiesel, and Zohar (2013) that examined NSSI among a convenience sample of 92 adolescent girls from Israel found that those with a history of sexual abuse had the tendency of engaging in NSSI as a form of re-enacting the victimization they had previously experienced.

Another important contribution that emerged from Paper 1 is the protective effect of social support against NSSI. Our finding that children and adolescents who has someone they could confide in or turn to for their emotional needs are less likely to engage in NSSI is
consistent with some past studies (Claes et al., 2015; Heath, Baxter, Toste, & McLouth, 2010). Although social support has been identified as an important buffer against health and mental health outcomes among adolescents (Rothon, Goodwin, & Stansfeld, 2012; Wight, Botticello, & Aneshensel, 2006; Wong, 2008), the existing literature on NSSI is heavily rooted in an individual risk and vulnerability perspective. As noted by scholars, efforts aimed at preventing health and mental health behaviours should first identify and reduce risk factors for those behaviours while at the same time identifying and increasing factors found to be associated with a lower likelihood of those behaviours (Coie et al., 1993; Hawkins, 2006). Instead of concentrating solely on identifying adolescents who are at risk of engaging in NSSI, future studies might benefit from identifying protective factors that could reduce the risk of NSSI. Such identification may allow researchers to develop a predictive model with robust discriminatory power that classifies children and adolescents with certain characteristics as being more or less likely to engage in NSSI, given certain factors. Also, by identifying factors that are protective against NSSI, social work practitioners and clinicians may be able to prevent NSSI by increasing those protective factors among adolescents in need.

Building on the findings in Paper 1, Paper 2 examined the mechanism through which bullying victimization affect NSSI. The results revealed that more than a third of adolescents aged 12-18 years engaged in NSSI and more than one in four were victims of bullying. The main contribution of Paper 2 is that depressive symptoms partially mediate the effect of bullying victimization on NSSI. Specifically, 13.8% of the effect of bullying victimization was mediated by depressive symptoms. This finding extends past research that has found a significant effect of bullying victimization on NSSI (Heilbron & Prinstein, 2010) and on depressive symptoms (Cole et al., 2014; Hamilton et al., 2016). Depressive symptoms has often been theorized as a
significant factor underlying the onset and maintenance of NSSI (Bentley, Cassiello-Robbins, Vittorio, Sauer-Zavala, & Barlow, 2015; Duggan, Heath, & Hu, 2015), and other suicidal behaviours such as suicidal ideation (Chavez-Hernandez et al., 2017; Coohey, Dirks-Bihun, Renner, & Baller, 2014), suicide plan (Liu et al., 2006), and suicide attempt (Kerr, Reinke, & Eddy, 2013; Tuisku et al., 2014) among adolescents. Depression can severely impact one’s ability to regulate emotions and can also manifest itself as emotional pain, for which NSSI can be an outlet.

Similar to Paper 1, the findings in Paper 2 shows that social support is inversely related to engaging in NSSI such that adolescents who had someone they could turn to for their emotional needs were 26% less likely to have engaged in NSSI. Social support was also negatively associated with depressive symptoms. Also, controlling for other factors, each additional childhood abuse experienced significantly increased the odds of engaging in NSSI. This finding adds to the existing literature and underscores the harmful effect of multiple maltreatment on psychopathology (Berzenski & Yates, 2011; Finkelhor, Ormrod, & Turner, 2007; Herrenkohl & Herrenkohl, 2009).

Paper 3 provides insight into the association between suicidal behaviours (suicidal thoughts and self-harm behaviour) and referral for mental health services among children involved in the CWS in Ontario. Whereas Paper 1 and 2 examined the role of ACEs and bullying victimization on NSSI, Paper 3 focus is on understanding referral for mental health service and identifying maltreatment characteristics that influence referral for mental health services. The findings of Paper 3 reveal that, 7% of maltreated children engaged in self-harming behaviours and 7% expressed suicidal thoughts. Within this maltreated sample of children, less than 10% were referred for mental health services. One crucial finding from Paper 3 was that more than
seven out of ten maltreated children who engaged in self-harm behaviour and two out of three maltreated children who expressed suicidal thoughts were not referred for mental health services. Perhaps it is possible that many of the children examined in Paper 3, especially those who had suicidal thoughts or engaged in self-harm behaviours were already accessing mental health services within the community, which would eliminate the need for an additional referral for mental health services.

Although the number of children who expressed suicidal thoughts or engaged in self-harm behaviour and were referred for mental health services was lower than expected, it is promising to note that these children were more likely to be referred for mental health services, net the effect of maltreatment characteristics and child functioning concerns. This perhaps suggests that there is recognition within the CWS that suicidal thoughts and self-harming behaviours are of sufficient concern to warrant a referral to mental health services. Given the extant literature, when the presence of suicide risk/self-harm is identified within a child welfare population, it should be identified as a concern that requires appropriate service involvement. Additional research is needed to determine how well the CWS is assessing these areas of risk and to obtain a more accurate representation of how many youth involved with the CWS, who have these concerns receive mental health services.

5.2 Implications for Social Work and Clinical Practice

The phenomenon of NSSI and suicidal behaviours is prevalent among children and adolescents with mental health problems and those involved in the CWS. Between one in four and one in three children and adolescents with mental health problems engaged in NSSI. The findings of this dissertation have implications for the child welfare population. Children and adolescents who experienced physical and sexual abuse are at higher risk of engaging in NSSI.
Assessment procedures that incorporate indicators of mental health issues particularly among children and adolescents with a history of ACEs should also take into account NSSI. From a clinical perspective, understanding the mechanism through which NSSI may occur can inform clinicians and social workers working with formerly abused children and adolescents in preventing future NSSI behaviours. A combination of ACEs and symptoms of depression among children and adolescents who engage in NSSI can also alert clinicians to develop interventions aimed at helping these individuals and their caregivers with emotion regulation skills so as to cope with past trauma and consequently enhance their mental health well-being. In addition to teaching sexual abuse survivors emotional regulation skills, social workers and clinicians might also want to consider teaching sexual abuse survivors how direct aggression towards some object as opposed to directing the aggression towards themselves. Social support is a protective factor and adds to the literature that advocates for a focus on resilience and increasing support as a way to improve functioning. Interventions targeting children and adolescents with a history of ACEs should also consider ways to help them establish early in life a close tie with at least one family member or peer who will be sensitive to their emotions and also take their needs into account.

Given that adolescents with a history of bullying victimization are more likely to engage in NSSI, it might be beneficial for clinicians, teachers, and school social workers to use information obtained about adolescent’s bullying history to target NSSI prevention and intervention efforts. At the classroom and institutional level, teachers and principals should be educated on the long-term effect of bullying on NSSI particularly given that the majority of bullying occurs in school where adolescents spend a greater portion of their time (Arseneault, Bowes, & Shakoor, 2010). Clinicians and school social workers can then use this knowledge to not only inform their practice but also inform schools about the risk and protective factors
associated with engaging in NSSI. The findings of this dissertation have implications for public health as well, particularly given the rising incidence of bullying and suicide related behaviours among adolescents in Canada (Saewyc & Chen, 2013). Expanding coping strategies of adolescents would be helpful for those dealing with trauma arising from bullying and also help in reducing future anxiety-provoking thoughts (Carney, 2008).

Given that referral is the initial step towards mental health service utilization, it is important that child welfare workers receive the necessary training so as to identify and refer children in care who need mental health services. Child welfare workers need to carefully assess and refer maltreated children who engage in suicidal behaviours to appropriate mental health treatment. Also, early recognition of mental health symptoms in maltreated children would go a long way in ensuring that children are referred to appropriate mental health services in a timely fashion. Moreover, child welfare workers knowledge about symptoms of trauma, depression, anxiety, behaviour problems, suicide-related behaviours has been identified as critical in meeting the child’s well-being needs (Kerns et al., 2016).

5.3 Future Research

Given that this dissertation relied on cross-sectional data, additional studies that use longitudinal design are needed to fully understand the link between ACEs, bullying victimization and NSSI. For instance, the use of longitudinal data would enable us to follow individuals who experienced ACEs to examine age at first NSSI behaviour, including the onset of depressive symptoms. Additional studies are also needed to ascertain how generalizable the findings of the present study would be to other mental health settings outside Ontario, Canada. With respect to referrals for mental health services, additional research is needed to better understand why the rate of referrals are so low.
References


PHILIP BAIDEN

Curriculum Vitae
July 2017

CONTACT INFORMATION
Factor-Inwentash Faculty of Social Work
University of Toronto
246 Bloor Street West
Toronto, Ontario, M5S 1V4, Canada
Email: philip.baiden@mail.utoronto.ca

CITIZENSHIP
Canadian

EDUCATION
2013
PhD in Social Work
July 2017
University of Toronto
Factor-Inwentash Faculty of Social Work
Dissertation: Non-Suicidal Self-Injury and Suicidal Behaviours among Children and Adolescents: The Role of Adverse Childhood Experiences and Bullying victimization

2007-2009
M.A. in Sociology
University of Western Ontario
Department of Sociology
Thesis: Factors influencing the practice of safe sex among women in Ghana in the context of HIV/AIDS prevalence

2001-2005
B.A. in Sociology with Philosophy
University of Ghana
Honors: Summa Cum Laude

PARTICIPATION IN SUMMER SCHOOL(S)
June 1st-7th, 2014
Summer student at the joint 2014 European Association for Research on Adolescence – Society for Research on Adolescence (EARA-SRA) Summer School funded by the Jacobs Foundation. Utrecht University, The Netherlands

May 19th-23rd, 2009
Western Summer Institute on Longitudinal Data Analysis, University of Western Ontario. London, Ontario, Canada

PROFESSIONAL SUMMARY
I have strong skills in working with large secondary data sets, designing and conducting rigorous intervention research, and evaluating the impact of social intervention programs that seeks to enhance the well-being of children and adolescents with a history of adverse childhood experiences.

171
AREAS OF RESEARCH INTERESTS
Non-suicidal self-injury
Suicide prevention and intervention development
Adverse childhood experiences
Child welfare research
Social determinants of health and mental health
Quantitative research methodology and statistical analysis

AREAS OF TEACHING INTERESTS
Social work practice with children and adolescents
Child welfare perspectives and practice
Designing and implementing quantitative social work research
Research for evidence-based social work practice
Survey and instrument development
Statistics and data analysis

ACADEMIC AWARDS AND SCHOLARSHIPS
Total Scholarships and Awards: $259,500

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<td>2014-2017</td>
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<td>Royal Bank of Canada Graduate Fellowship in Applied Social Work Research, Factor-Inwentash Faculty of Social Work, University of Toronto Project: Neighbourhoods: Inequality, Diversity, and Change</td>
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<td>2015-2016</td>
<td>$10,000</td>
<td>Royal Bank of Canada Graduate Fellowship in Applied Social Work Research, Factor-Inwentash Faculty of Social Work, University of Toronto Project: Inter- and intra-organizational factors predicting collaborative partnerships for socially innovative initiatives: A pilot study</td>
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<tr>
<td>2014-2015</td>
<td>$3,000</td>
<td>Junior Lupina Fellow in Comparative Program on Health and Society (CPHS), Munk School of Global Affairs, University of Toronto Project: Multilevel Analysis of neighbourhood contextual effects on unmet mental health needs in Canada</td>
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2014-2015 $2,000 Building Research Capacity (BRC) Fellowship, Centre for Research on Children and Families (CRCF), McGill University Project: *Building Research Capacity with First Nations and Mainstream Youth Protection Services in Quebec*

2013-2014 $15,000 University of Toronto Fellowship

2010 $500 Came 2nd in the Best Student Paper Awards at the 2010 International Conference on Urban Health, New York Academy of Medicine

2010 $400 International Young Scholar, Society for Research on Adolescence, Jacobs Foundation

2009 $800 Travel Grant, University of Western Ontario, Department of Sociology

2008 $800 Travel Grant, University of Western Ontario, Department of Sociology

2007-2009 $22,000 Western Graduate Research Scholarship

### PUBLICATIONS

#### Summary

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#### Citation Count Summary

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#### Peer-reviewed Journal Articles


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1 Citation counts from Google Scholar ([https://scholar.google.ca/citations?user=1Qy2XtAAAAAJ&hl=en](https://scholar.google.ca/citations?user=1Qy2XtAAAAAJ&hl=en)), including citations in articles, conference presentations, and reports, July 7, 2017.


**Book Chapter(s)**


**Research Report(s)**

**Articles Under Review**


Work-In-Progress

PEER-REVIEWED PRESENTATIONS

Submitted


2017


2016


2015


2014


2013


2011


2010


2009

Meeting of the Canadian Population Society, Carleton University, May 27th – 29th 2009, Ottawa, Canada.


OTHER PRESENTATIONS


COURSE DEVELOPMENT
Summer 2015 Course Content Development, Department of Statistical Sciences, University of Toronto
Course Title: The Practice of Statistics I
Course Level: Graduate This course provides an intuitive introduction to fundamental statistical concepts and reasoning. The course covered: methods of data collection; constructing effective graphical and numerical displays; estimating and describing the natural variability in data; and the key ideas in how statistical tests can be used to separate significant differences from those that are only a reflection of the natural variability in data.
TEACHING EXPERIENCE
Summer, 2017  Graduate Teaching Assistant, Factor-Inwentash Faculty of Social Work, University of Toronto
Course Title: SWK 4658: Social Work with Immigrants and Refugees
Course Level: Graduate
Number of Students: 13

Fall, 2015  Guest Lecturer, Factor-Inwentash Faculty of Social Work, University of Toronto
Course Title: Advanced Practice-based Research in Mental Health
Course Topic: Measurement and Sampling
Course Level: Graduate
Number of Students: 25

September 2007 to April 2009  Graduate Teaching Assistant, University of Western Ontario, London Ontario, Canada.

Fall, 2008  Guest Lecturer, University of Western Ontario, London Ontario, Canada
Course Title: Population and Development in Africa
Course Topic: Africa in Context of World Population Growth: Past and Future
Course Level: Undergraduate
Number of Students: 50

WORK EXPERIENCE
Research Assistant: Early Childhood Adversities Project
Factor-Inwentash Faculty of Social Work, University of Toronto, Toronto, Ontario
May 2014 to date

Responsibilities: Conduct statistical analyses on the impact of early childhood adversities on various health and mental health outcomes among Canadians, conduct statistical analyses on the impact of early childhood adversities on chronic conditions later in adulthood, participate in drafting manuscript(s) for publication, attend and present findings at local, national, and international academic conferences

Research Assistant: Human Papillomavirus (HPV) Vaccine Acceptability
Factor-Inwentash Faculty of Social Work, University of Toronto, Toronto, Ontario
October 2013 to date

Responsibilities: perform statistical analyses and meta-analyses on HPV vaccine acceptability, conduct systematic literature reviews and collaborate in review of study quality and risk of bias, collaborate in drafting manuscript for publication, attend and present findings at local, national, and international academic conferences

Research Consultant
World Health Organization (WHO)/Public Health Agency of Canada (PHAC)/Canadian Institute for Health Research (CIHR)-Institute for Population and Public Health (IPPH) Technical Meeting on the Framework for Global Monitoring of Progress in Implementing the Rio Political Declaration on Social Determinants of Health
March 2016 to May 2016

*Responsibilities:* Assisted and developed the content towards proposing a basket of a total of 15-25 core indicators for monitoring action on the social determinants of health, including:
- Conducted background research to support:
  - Development of measurement concepts (e.g., for valid and reliable indicators);
  - Identification of most suitable candidate indicators for consideration by the Working Group
  - Consider the needs of key users of the indicators, including national governments, international organizations and civil society;
  - Development of key measurement concepts for each of the 5 action areas of the RPD-SDH;
  - Complete the records of decisions from related teleconference calls with the Working Group; and
  - Complete draft and final Progress Report of Working Group recommendations

**Research Assistant: Department of Statistical Sciences**
University of Toronto, Toronto, Ontario
June 2015 to August 2015

*Responsibilities:* Obtaining research articles and conducting data analysis to illustrate statistical concepts, developing case studies and discussion problems, and practice problems on statistical concepts to incoming MSW students in Social Work

**Research Assistant: Ontario Child Abuse and Neglect Data System (OCANDS)**
Factor-Inwentash Faculty of Social Work, University of Toronto, Toronto, Ontario
October 2013 to August 2014

*Responsibilities:* Harmonize and map the Ontario Child Abuse and Neglect Data Sets (OCANDS) variables, Clean OCANDS data, direct communication with participating agencies Secondary data analyses of OCANDS, and assist IT programmers with SAS related request

**Research Coordinator/Data Analyst: Applied Research and Education Department**
Child and Parent Resource Institute (CPRI)/Ministry of Children and Youth Services (MCYS), London, Ontario
May 2011 to August 2013

*Responsibilities:* Took a lead role in implementing and coordinating multiple projects involving children and youth with mental health, evaluating methods to reduce the use of seclusion and restraints among children and youth in residential care, performing statistical analyses and producing reports and manuscripts for publication
Research Assistant: Ghana Housing and Health Project  
Department of Geography, University of Western Ontario, London, Ontario  
May 2008 to December 2010

Responsibilities: I helped in designing the questionnaire and performed statistical analyses for the project.

Research Assistant: Institute for Catastrophic Loss Reduction  
University of Western Ontario, London, Ontario  
June 2010 to September 2010

Responsibilities: I was part of a team of Researchers that distributed 1,000 surveys to residents in Sherwood Forest Neighbourhood in London, Ontario.

Research Assistant: Migration and Transnationalism in Asia  
Department of Sociology, University of Western Ontario, London, Ontario  
June 2008 to July 2008

Responsibilities: I helped in conducting literature review on Asian Migrants in Canada and performed statistical analyses for the project.

PRACTICE EXPERIENCE  
Project Director  

Responsibilities:
- Supervised multiple projects on HIV/AIDS, malaria, tuberculosis prevention in deprived communities
- Mobilized community members on how to use insecticide treated mosquito nets
- Worked in educating Junior and Senior High School students on safe sex practices, HIV/AIDS, and other sexually transmitted diseases (STDs)
- Worked with Junior and Senior High School students STDs to build their self-esteem and help them plan and develop their careers
- Prepared grant proposals
- Presented research findings to community members and donor agencies

STATISTICAL SKILLS AND KNOWLEDGE
I have advance statistical knowledge and skills in Ordinary Least Squares (OLS) Regression, Logistic Regression, Survival Analysis, Reliability Analysis, Factor Analysis, Path Analysis, Hierarchical Linear Modeling, and Structural Equation Modeling. Further skills in:
- Grant application writing
- Conducting literature review
- Composing executive summaries
- Ethics submissions
- Creating and managing large databases
SPECIALIZED SKILLS
I have advanced skills in using statistical programs such as SPSS, STATA, SAS, HLM, LISREL, and MPlus

PROFESSIONAL/ACADEMIC AFFILIATIONS
Member, American Public Health Association (APHA)
Member, Society for Social Work and Research (SSWR)
Member, Society for Research on Adolescence (SRA)
Member, Society for Research in Child Development (SRCD)
Member, International Society for the Study of Self-Injury (ISSS)
Member, American Educational Research Association (AERA)
Member, Canadian Association for Social Work Education (CASWE),

SERVICE TO PROFESSIONAL ASSOCIATIONS
Chair of a session on “Changing Population and Health in Europe and Canada” at the 2010 Annual Meeting of the Association of American Geographers, April 14th – 18th 2010, Washington, DC, USA.

Reviewer:
Aggressive Behavior
AIDS and Behaviour
Child Abuse and Neglect
Children and Youth Services Review
Cities
Drug and Alcohol Dependence
Health Behavior and Education
Health Promotion International
International Journal of Child and Adolescent Resilience
International Journal of Forensic Mental Health
Journal of Affective Disorders
Journal of Epidemiology and Community Health
Journal of Infection and Public Health
Journal of Mental Health
Journal of Substance Use
Psychiatric Research
Psychiatry Research

MEDIA COVERAGE OF RESEARCH (BY PUBLICATION)

Source Article: Factors associated with achieving complete mental health after suicidal ideation (2016)
La Presse
UofT News
The enduring effect of early childhood adversities and troubled sleep among Canadian adults: a population-based study (2015)

Source Article: The enduring effects of early childhood adversities and troubled sleep among Canadian adults: a population-based study (2015)
Source Article: The role of sense of community belonging on unmet health care needs in Ontario, Canada: Findings from the 2012 Canadian Community Health Survey (2014)

Community Health and Wellbeing
http://www.communityhealthandwellbeing.org/belonging

UNIVERSITY SERVICE (UNIVERSITY OF TORONTO)

2013-Present  President, Factor-Inwentash Faculty of Social Work PhD Students’ Association
As the President of the PhD Students’ Association, I:
1. Act as the spokesperson of the Association to the administration and governing bodies in the faculty, the University of Toronto, the University of Toronto Graduate Students’ Union, and any other student associations or external organizations
2. Advocate for and mobilize PhD students particularly on issues of equity and access to education
3. Conduct the official correspondence of the Association and report any such correspondence to the Faculty Council
4. Monitor the day-to-day operations of the Association and perform such duties as may from time to time be prescribed by the Association

2014-Present  Co-chair, Civics Committee
1. To coordinate efforts to deal with issues of civic engagement in all its forms
2. To engage in campaigns to increase member, campus and community involvement in democratic governance within the wider society

2013-Present  Member, Policy and Operations Committee
1. To coordinate efforts to deal with policy implementation and oversight of services
2. To empower and make recommendations to General Council on matters of policy and bylaw changes

2014-2016  Executive, University of Toronto Graduate Students’ Union (Academics and Funding Commissioner for Humanities and Social Sciences)
I represent and take decisions on behalf of over 16,000 graduate students on various decision making bodies including the University of Toronto Library Advisory Committee and the Council of Athletics and Recreation. I, together with my colleague executives, also hold regular meetings with the Vice-President and Provost and Dean of the School of Graduate Studies.

2015-2016  Member, University of Toronto Library Advisory Committee,
To review, on an ongoing basis, policies with respect to the University Library system in the light of the University's general and divisional objectives, and make appropriate recommendations to the office of the Vice-President and Provost.

To advice on:

1. Policy matters relating to collection building, bibliographical control and technical services, reader services and library automation
2. The resources required for the operation of the library system and the priorities in the allocation of these resources
3. The relationships among libraries in the University of Toronto
4. The relationships of the University of Toronto Library system to other libraries in Ontario and beyond

2014-2016

Member, Council of Athletics and Recreation

The Council of Athletics and Recreation (CAR) is one of the oldest continuing student governance bodies at the University of Toronto with jurisdiction over co-curricular programs. CAR is composed of students, administrative staff, alumni, and facility users, and is responsible for overall athletics and recreation policy, including the allocation of funds to program areas, staffing policy, and rental and fees policy.

2013-2015

Member, Factor-Inwentash Faculty of Social Work Teaching Awards Committee

The Teaching Awards Committee seeks to recognize and celebrate a faculty member who makes exceptional contribution to teaching and education scholarship, innovation and leadership in social work education. Through a rigorous adjudication process, the Factor-Inwentash Faculty of Social Work’s Teaching Awards Committee makes nomination recommendations to the Dean of Social Work.