

Running head: NSSI AND ATTACHMENT STYLES

Attachment Styles and Functions of Self-Harm in Adults with Nonsuicidal Self-Injury

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Abstract

Nonsuicidal self-injury (NSSI) is a direct and deliberate act that involves damage to one's body tissues without suicidal intent. Research shows that it is maintained by four reinforcement processes (automatic positive and negative, social positive and negative) and to be related to insecure types of attachment styles. However, whether there is a relationship between attachment styles and the reinforcement functions is unknown. Participants ($N = 753$; age $M = 36.01$ years, $SD = 12.58$) recruited from the general community of Canada and USA were classified into the NSSI group (participants with at least one NSSI act in their lifetime; $n = 358$) and the Control group (participants with no history of NSSI; $n = 395$). Results indicated that participants in the NSSI group endorsed anxious attachment style to a greater degree than the Control group. In contrast, the Control group endorsed secure attachment style to a greater degree than the NSSI group. Those with anxious attachment style reported that they engaged in NSSI for reasons related to automatic negative reinforcement and automatic positive reinforcement, indicating that self-harming among these individuals serves an emotional regulation purpose. Besides anxious attachment, sex was found to be another critical factor to consider in predicting the function of NSSI. Women and those with anxious attachment style were more likely to endorse NSSI automatic positive and negative functions, while the men and those with depression were more likely to endorse NSSI social negative functions. Overall, the findings point to the importance of anxious attachment style in predicting the reasons for nonsuicidal self-harm. These findings and their implications are discussed with limitations of the study in mind.

Keywords: Nonsuicidal self-injury, NSSI reinforcement processes, attachment style

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Introduction

Nonsuicidal Self-Injury (NSSI)

Nonsuicidal self-injury (NSSI), sometimes also referred to in the literature as self-injury, self-harm, deliberate self-harm, self-mutilation, or parasuicide, is a direct and deliberate act that involves damage to one's body tissues without suicidal intent (Nock, 2010). Although NSSI goes against human's basic survival instincts, the act can be found throughout history (Favazza, 1998; Nock, 2010). For example, some of the earliest records of NSSI can be found in the Bible, where individuals cut their bodies to show their devotion to their pagan gods (1 Kings 18:26-28). Besides being portrayed as the product of cultural or spiritual practices, descriptions of NSSI have also appeared in clinical case studies (Favazza, 1998; Nock, 2010). Initially, NSSI was viewed as a symptom of psychiatric disorders (e.g., a criterion for borderline personality disorder; Favazza, 1992, 1998). However, research has revealed the presence of NSSI in many disorders, such as substance abuse disorders, eating disorders, posttraumatic stress disorder and affective disorders (Briere & Gil, 1998; Ford & Gómez, 2015; Herpertz, 1995; Kleespies et al., 2011; Kuipers et al., 2016; Langbehn & Pfohl, 1993; Zlotnick et al., 1999; Nocks et al., 2006; Stanley et al., 2001; Weierich & Nock, 2008), which challenges the view that it is a symptom of any one particular disorder (Nock, 2009). In 1987, Favazza and Favazza published the first book (*Bodies Under Siege: Self-Mutilation in Culture and Psychiatry*) that comprehensively explored NSSI; in the book, they urged experts to look at NSSI as a distinct syndrome that warrants further investigation (Favazza & Favazza, 1987).

Despite many early references, NSSI started to gain attention only fairly recently. Researchers have identified the early 2000s as the turning point for NSSI research (Klonsky et al., 2014; Nock, 2010); the number of scientific papers published annually between 1998 and

2008 on NSSI had more than tripled (from 117 in 1998 to 386 in 2008). One possible reason for this increase is the publication of a self-report questionnaire, the Deliberate Self-Harm Inventory (DSHI; Gratz, 2001) which was designed to assess NSSI and provided an important foundation for subsequent research on NSSI (Klonsky et al., 2014).

NSSI has attracted the attention of researchers and clinicians because of the possibility of severe consequences to the self-injurers, and the emotional distress that it could cause to people around them. Physical damage caused by NSSI may require medical treatment; severe injuries may even lead to death (Klonsky, 2007). Family and friends of the person who engaged in NSSI are often distressed over the self-harming acts (Nock, 2010). Furthermore, healthcare professionals who treat individuals who engage in NSSI find their work to be stressful as they often struggle to understand and treat these behaviours (Thompson et al., 2008). Intense negative emotions from the self-injurer such as panic, hopelessness, anger, and hate, can also hinder the delivery of consistent therapeutic responses from healthcare professionals (Allen, 1995). The expansion of studies focusing on NSSI after the 2000s has led to significant advances in the knowledge of NSSI.

Epidemiology of NSSI

Lifetime rates of NSSI are estimated to range from 2.2-17% (Bebbington et al., 2010; Klonsky, 2011; Plener et al., 2016; Ross & Heath, 2002; Whitlock et al., 2006). The wide variation in NSSI prevalence rates is likely due to the methodological variations across studies, including sample population, measurement tools, and time frame assessed (Nock, 2010; Swannell et al., 2014). In a meta-analysis of studies across the world that reported on the prevalence rates of NSSI within non-clinical populations, Swannell and colleagues (2014) found that 51.6% of the variance in prevalence estimates could be accounted by methodological

factors. After adjusting for those factors, the pooled prevalence of NSSI in the non-clinical population was reported to be 17.2% for adolescents (aged 10-17 years), 13.4% for young adults (aged 18-24 years), and 5.5% for adults (aged ≥ 25), indicating decreasing prevalence with age. The rate of NSSI is higher in clinical population; studies have found about 50% of adolescents (Asarnow et al., 2011; Glenn & Klonsky, 2013; Jacobson et al., 2008), and 11-21% of adults have engaged in NSSI (Briere & Gil, 1998; Claes et al., 2010; Selby et al., 2012). Studies have also found differences between clinical and non-clinical samples in the number of NSSI incidents. Community or school-based samples reported lower lifetime episodes (e.g., <10 lifetime episodes; Whitlock et al., 2008) while inpatients report much higher number of NSSI incidents (e.g., >50 episodes in the past year; Nock & Prinstein, 2004).

As mentioned in the previous paragraph, the prevalence rate of NSSI is highest among adolescents and declines with increasing age (Asarnow et al., 2011; Glenn & Klonsky, 2013; Jacobson et al., 2008; Swannell et al., 2014). Age of onset for NSSI is reported to be around 12-15 years old (Ammerman et al., 2018; Hawton et al., 2012; Klonsky et al., 2014; Klonsky & Muehlenkamp, 2007) and proposed to be related to puberty, which signals the start of the transitional phase between childhood and adulthood (Barrocas et al., 2011; Hawton et al., 2012; Whitlock & Selekman, 2014). Significant cognitive, social and physical changes take place during adolescence; adolescents develop self-regulation with the maturation of the frontal lobe, their peer-relationships take on more importance, and they experience hormonal changes which may contribute to mood instability, heightened interpersonal sensitivity, and low self-regulatory competence (Hawton et al., 2012; Natsuaki et al., 2009; Romine & Reynolds, 2005; Steinberg, 2004; Whitlock & Selekman, 2014). For some adolescents, going through these transformations may be emotionally distressing (Alsaker, 1992; Ge et al., 2001; Graber, Seeley

et al., 2004), which may explain adolescence to be the most common period of onset for major mental disorders (Kessler et al., 2005; Natsuaki et al., 2009). It is therefore plausible that some adolescents, who have not developed adequate cognitive capacity to control their emotions, might engage in NSSI as a way to reduce their heightened negative affect (Barrocas et al., 2011; Whitlock & Selekman, 2014).

The most commonly used method of NSSI is cutting or carving oneself with sharp objects (such as a knife or razor), with majority of the wounds located on the arms, hands, wrists, legs, and stomach (Briere & Gil, 1998; Klonsky & Muehlenkamp 2007; Langbehn & Pfohl, 1993; Nock & Prinstein 2004; Whitlock et al., 2006; Whitlock et al., 2008). Other common methods include hitting oneself, burning oneself, biting oneself, scratching or scraping the skin until bleeding, inserting objects under the skin, and picking at wounds (Klonsky & Muehlenkamp 2007; Nock, 2010; Nock & Prinstein 2004). Many individuals who engage in NSSI report using more than one method (Gratz, 2001; Nock, 2010; Whitlock et al., 2008). Researchers have used different ways to measure NSSI severity. Some based it on the number of NSSI incidents (Hu & Watson, 2018; Paul et al., 2015), number of methods (Anestis et al., 2015; Hu & Watson, 2018; Victor & Klonsky, 2014), a combination of NSSI incidents and number of methods (Arthurs & Tan, 2017; MacLaren & Best, 2010), types of methods depending on the expected degree of tissue damage (Armiento et al., 2014; Kaess et al., 2012, 2013), and whether or not medical intervention was required (Victor et al., 2015). Others have determined severity through a number of different criteria. For example, the American Psychiatric Association (2013) uses the Clinician-Rated Severity of Nonsuicidal Self-Injury to classify four levels of NSSI severity that ranges from level 0 (none) to level 4 (severe). At severity level 4, one needs to have at least one NSSI act that required surgical treatment, or

engaged in NSSI acts on 12 or more days using one single method, or engaged in NSSI acts on 8 or more days using more than one method. Ammerman and colleagues (2018) considered lifetime and past-year NSSI frequency, number of NSSI methods used, and number of hospital visits due to NSSI acts to determine NSSI severity. Whitlock and colleagues (2008) classified participants into superficial NSSI, moderate NSSI, and severe NSSI according to lifetime NSSI incidents, number of methods used in NSSI, and degree of tissue damage.

Generally, men and women do not appear to differ with respect to the number of episodes, duration of NSSI history, or number of different methods used (Beiere & Gil, 1998; Gratz, 2001; Klonsky, 2011; Nock et al., 2006; Whitlock et al., 2006). However, some studies have reported that women are more likely than men to have a history of NSSI (Madge et al., 2008; Ross & Heath, 2002). A clearer gender difference in the number of NSSI episodes is seen among younger individuals where girls outnumber boys by a ratio of 8:1 among the 10-14 years olds, and the gender ratio decreases but still remains significant at 3:1 among the 15-19 years olds (Hawton & Harriss, 2008). It is thought that the gender difference among the young is attributable to the onset of NSSI during puberty when girls typically enter into puberty at a younger age than boys, and the gender gap closes during the older teenage years as more boys enter puberty (Boeninger et al., 2010; Hawton et al., 2003; Hawton & Harriss, 2008). Gender differences have been reported in the methods used in NSSI; women are more likely to cut themselves, while men are more likely to hit or burn themselves (Claes et al., 2007; Laye-Gindhu & Schonert-Reichl, 2005). Compared to women, men are more likely to self-harm under the influence of drugs or alcohol (Madge et al., 2008), and are at a higher risk for eventually committing suicide (Hawton & Harriss, 2008; Zahl & Hawton, 2004). NSSI also seems to be

more common among people who identified as sexual minorities (e.g., LBGTO; Sornberger et al., 2013; Whitlock et al., 2011).

Research has found a high co-occurrence between NSSI and suicide. Studies estimate that 4-25% of the people who engage in NSSI have also made prior suicide attempts (Andover & Gibb, 2010; Brausch & Gutierrez, 2010; Bebbington et al., 2010; Hilt et al., 2008; Wilcox et al., 2012; Whitlock & Knox, 2007). The percentage is even higher in the clinical population, with 33-37% of adolescent outpatients and 70% of adolescent inpatients with a history of NSSI reporting having made at least one suicide attempt (Asarnow et al., 2011; Jacobson et al., 2008; Nock et al., 2006). Evidence suggests that a history of NSSI is one of the strongest predictors of suicide attempts (Edmondson et al., 2016; Hamza et al., 2012; Muehlenkamp, 2005). One study reported that individuals with a history of NSSI are 25 times more likely to attempt suicide than those without a history of NSSI (Glenn & Klonsky, 2009). More extended history of NSSI, more frequent engagement, more methods used, and the absence of physical pain during NSSI are found to be positively associated with the number of suicide attempts (Andover & Gibb, 2010; Hamza et al., 2012; Nock et al., 2006).

As previously mentioned, NSSI was once conceptualized primarily within the context of borderline personality disorder (BPD). An examination by the current author revealed that self-harm made its first appearance as one of the BPD diagnostic criteria in the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 1994). Indeed, research does indicate a strong likelihood of self-harm in BPD with approximately 65-80% of individuals with BPD engaging in NSSI (Brickman et al., 2014; Clarkin, et al., 1983; Soloff et al., 1994). However, NSSI might be transdiagnostic given its association with several other clinical conditions, including substance abuse disorders (Langbehn

& Pfohl, 1993; Kleespies et al., 2011; Nock et al., 2006; Zlotnick et al., 1999), eating disorders (Herpertz, 1995; Kuipers et al., 2016), posttraumatic stress disorder (Ford & Gómez, 2015; Weierich & Nock, 2008), affective disorders (Briere & Gil, 1998; Kleespies et al., 2011; Nock et al., 2006; Stanley et al., 2001), and a range of personality disorders (Haw et al., 2001; Nock et al., 2006). NSSI is currently listed in the DSM-5 as a clinical condition that requires further study (American Psychiatric Association, 2013; p. 803-806).

Assessment of NSSI

Given its co-occurrence in a wide range of different mental disorders, assessment for the presence of NSSI is recommended in clinical populations (Nock, 2010). Detection of NSSI can be carried out via clinical interviews or self-report measures as described below.

The Suicide Attempt Self-Injury Interview (SASII) is a structured interview that is designed to provide the interviewer with comprehensive information regarding the topography, context, intent, medical severity, social context, precipitating and concurrent events, and outcomes of NSSI and suicide (Linehan et al., 2006). The Self-Injurious Thoughts and Behaviors Interview (SITBI) is another structured interview that can assess the presence and frequency of NSSI, and classify individuals by five types of self-harming behaviours: (1) suicidal ideation (“Have you ever had thoughts of killing yourself?”), (2) suicide plans (“Have you ever actually made a plan to kill yourself?”), (3) suicide gestures (“Have you ever done something to lead others to believe you wanted to kill yourself when you really had no intention of doing so?”), (4) suicide attempts (“Have you ever made an actual attempt to kill yourself in which you had at least some intent to die?”), and (5) NSSI (“Have you ever done something to purposely hurt yourself without intending to die?”). Both interviews have demonstrated strong interrater

reliability (.95 for the SASII, .99 for the SITBI) and concurrent validity (Linehan et al., 2006; Nock et al., 2007).

The DSHI is a self-report questionnaire that lists 16 self-injuring methods (Gratz, 2001) and assesses whether respondents have ever used each of the methods. There is also an open-ended option at the end of the questionnaire for respondents to indicate self-harm methods that are not covered in the questionnaire. If the respondents' answer is affirmative for a particular method, they are asked detailed follow-up questions that tap into the age at which the act was first undertaken, the number of times that method has been used, the most recent time it was employed, the number of years the respondents have engaged in that form of self-harm, and whether hospitalization or medical attention was ever required as a result of the act. The DSHI has high internal consistency ($\alpha = .82$) and adequate test-retest reliability over a 2 to 4-week period ($r = .68, p < .001$), as well as good convergent validity with other measures of NSSI (Fliege et al., 2006). As this study will be assessing participants using DSHI, a more detailed description of the measure will be presented in the Method section.

There are other NSSI questionnaires that are less widely used in the literature such as the Inventory of Statements About Self-Injury (ISAS; Klonsky & Glenn, 2009), Self-Harm Inventory (SHI; Sansone et al., 1998), and the Direct and Indirect Self-Harm Inventory (DISH; Green et al., 2017), to name a few. Each of them yields somewhat different types of information. For example, the ISAS taps into the reasons for NSSI, the SHI assesses for the presence of different types of self-harm behaviours, and the DISH which was developed for use with military veterans included some items (e.g., hurting self as part of a stunt or a dare) that are not commonly found in other NSSI measures.

Explanations of NSSI

Affect regulation is the most frequently reported reason for engaging in NSSI (Edmondson et al., 2016; Klonsky, 2007; Klonsky & Muehlenkamp, 2007). For example, 96% of women with BPD report using NSSI to "stop bad feelings" and "relieve anxiety or terror" (Brown et al., 2002). Research found that negative emotions (e.g., anger, anxiety, frustration or tension) usually precedes NSSI, and that these intense and overwhelming negative feelings, thoughts, or arousals are often alleviated following NSSI, leaving the individuals feeling calm and relieved (Favazza, 1992; Gratz, 2003; Haines et al., 1995). Qualitative studies have found individuals describing NSSI as a way to "relieve emotional pain" (Holm & Seveinsson, 2010), or "to calm myself down" (Chandler, 2014; Klonsky & Glenn, 2009).

Gunderson (1984) suggested that NSSI might serve an anti-dissociation function, i.e., individuals engage in NSSI to end feelings of dissociation or depersonalization that might occur as a result of intense emotions, or to end feelings of abandonment or isolation such as during times when loved ones are absent. Self-reports from individuals reveal that the physical injury from NSSI helps to interrupt dissociative episodes (Brown et al., 2002; Himber, 1994; Herpertz, 1995; Horne & Csipke, 2009; Laye-Gindhu & Schonert-Reichl, 2005). For example, in a sample of women with BPD, 54% reported engaging in NSSI to "stop feeling numb or dead," or "to feel something, even if it is pain (Brown et al., 2002)." Two studies used the adolescent population (one inpatient sample while the other examined a non-clinical sample) and found that about a third of the adolescents reported engaging in NSSI for anti-dissociation reasons (Laye-Gindhu & Schonert-Reichl, 2005; Nock & Prinstein, 2004). The sight of blood (Simpson, 1975) or physical sensation (Gunderson, 1984) while engaging in NSSI is thought to interrupt the dissociative episode. The scars resulting from NSSI also serve as reminders to the individuals that they are alive (Miller & Bashkin, 1974). In other words, NSSI can help

individuals generate emotional and physical sensations, and even physical scars, that allow them to feel alive again (Klonsky, 2007).

It has also been proposed that NSSI serves an anti-suicide function. Some individuals use it to resist their suicidal urges; for instance, some studies reported that NSSI is used by individuals to stop them from killing themselves (Laye-Gindhu & Schonert-Reichl, 2005; Martin et al., 2010; Polk & Liss, 2009). Researchers proposed that NSSI could be a means of expressing suicidal thoughts without risking death, and that it replaces the desire to commit suicide (Suyemoto, 1998). Engaging in NSSI as a way to prevent the self from committing suicide is also related to regulating affect, since NSSI may help to reduce the intense negative emotions that lead one to feel suicidal (Klonsky & Muehlenkamp, 2007).

NSSI has also been used to affirm the boundaries of the self, or to create a boundary between the self and others (Briere & Gil, 1998; Horne & Csipke, 2009; Klonsky & Glenn, 2009). In Horne and Csipke's qualitative study (2009), one person stated that "(w)hen the emotions are too much it feels as though my body shuts down like I couldn't tell where the edges of my body were ... self-harming kinda defined the edges of my body." Additionally, Briere and Gil (1998) reported that 26% of psychiatric patients endorsed "ownership of body" as a reason for NSSI. Thus, some individuals engage in NSSI to affirm and distinguish themselves from others, and to assert their identity (Klonsky, 2007).

Interpersonal influence is another reason for engaging in NSSI. Allen (1995) describes NSSI as a way for communicating unmet needs; some individuals might engage in NSSI to elicit sympathy from others that seems unobtainable in any other way. For example, in a study of adult inpatient samples, Briere and Gil (1998) found that 40% of patients identified "get attention, or ask for help" as the reason for engaging in NSSI. Similarly, NSSI has also been

used by some individuals to influence others by showing others their pain (Klonsky & Glenn, 2009; Laye-Gindhu & Schonert-Reichl, 2005) or how bad things are for them (Allen, 1995). For example, "I wanted other people to see how desperate I was" was selected by 30% of adolescents from a non-clinical sample of self-injurers as a reason for undertaking NSSI (Laye-Gindhu & Schonert-Reichl, 2005).

Many individuals reported engaging in NSSI to punish themselves; 83% of inpatients selected "self-punishment" (Briere & Gil, 1998) while 63-70% of the adolescent in the community reported "I did not like myself," "I felt like a failure," or "I was angry at myself" (Laye-Gindhu & Schonert-Reichl, 2005). These self-diminishing thoughts may be related to painful early experiences, where many individuals describe a history of abuse in childhood (Allen, 1995). Shapiro (1987) noticed in case studies that many sexually abused children blame themselves for the painful and confusing incidents, and proposed that the feeling of self-blame may accumulate into self-punishing acts of NSSI. Besides self-punishing, NSSI could also be used as a way of punishing others (e.g., look what you made me do), or seeking criticism from others (Edmondson et al., 2016). In the latter case, NSSI can be conceptualized as a way to express anger toward oneself (Klonsky, 2007), which is in line with studies that have identified self-directed anger as a prominent characteristic of individuals who engage in NSSI (Herpertz et al., 1997; Klonsky et al., 2003).

Sensation-seeking is yet another reason for NSSI. Some studies have found that some individuals use NSSI as a way to generate excitement or exhilaration (Klonsky & Glenn, 2009; Bennett & Moss, 2013; Taylor, 2003). For these individuals, the feeling of the adrenaline rush from NSSI is similar to skydiving or bungee jumping; one person reported that "I just do it for the adrenaline. You can get addicted to it" (Bennett & Moss, 2013). However, relatively few

individuals engage in NSSI for sensation seeking. For instance, only 5% of women with BPD select "to provide a sense of excitement or stimulation that feels exhilarating" as one of their top three reasons for NSSI (Shearer, 1994), while fewer than 10% of adolescent inpatient identify "for excitement" as a reason for NSSI.

The Four-Function Model (FFM)

As previously mentioned, research has identified different reasons for engaging in NSSI. Quite recently, Nock and colleagues developed a model that looks at NSSI from a functional perspective, i.e., how NSSI is caused and maintained by the events that immediately precede and follow the self-harm acts (Bentley et al., 2014; Nock, 2009, 2010; Nock & Prinstein, 2004). In that respect, their model focuses on the underlying reinforcing mechanisms of self-harm regardless of the subjective explanations that self-harming individuals might offer for their behavior.

According to the Four-Function Model (FFM) by Nock and colleagues, NSSI is maintained via four possible reinforcement processes; the processes differ according to whether the reinforcement is positive (increase in desired events) or negative (decrease in undesired events), and whether the contingencies are automatic (i.e., intrapersonal) or social (i.e., interpersonal). NSSI may be maintained by automatic negative reinforcement, where the engagement in NSSI is followed by decrease or reduction of aversive thoughts or feelings (e.g., tension relief); affect regulation would fall into this category. NSSI may be maintained by automatic positive reinforcement, where the engagement in NSSI is followed by an increase in desired thoughts or feelings (e.g., feeling of sensation); anti-dissociation and sensation-seeking could both be considered as the automatic positive function of NSSI. As well, NSSI can be maintained by social positive reinforcement, in which NSSI is followed by increased desired social events (e.g.,

attention from others). Lastly, NSSI may also be maintained by social negative reinforcement, which NSSI is followed by a decrease or cessation of some social event (e.g., avoid unwanted social interactions). Both social positive and social negative reinforcement can also be thought of as asserting interpersonal influence to achieve particular types of social outcomes.

Studies have provided empirical support for the FFM (e.g., Brown et al., 2002; Haines et al., 1995; Lloyd-Richardson et al., 2007; Nock & Mendes, 2008; Nock & Prinstein, 2004, 2005). Reviews have also shown that most of those who engage in NSSI endorsed function related to automatic reinforcement, indicating that affect regulation is the primary reason for the NSSI behaviours (Edmondson et al., 2016; Klonsky, 2007; Klonsky & Muehlenkamp, 2007). In particular, laboratory-based studies provide additional evidence for the automatic negative reinforcement, with self-injurers showing decreased physiological arousal following imaginal exposure to NSSI (i.e., listening to prerecorded scripts of self-harm episodes; Haines et al., 1995; Welch et al., 2008). Even though not endorsed as frequently as the automatic reinforcement, social reinforcement has also received empirical support, and is considered an influential factor for the occurrence of NSSI (Hilt et al., 2008; Lloyd-Richardson et al., 2007; Nock & Prinstein, 2004, 2005; Nock, 2010).

Risk Factors for NSSI

Research on risk factors for NSSI have found that early trauma, especially childhood sexual abuse, is a critical factor that predicts later self-injurious behaviours (van der Kolk et al., 1991; Gratz et al., 2002). Retrospective findings from both clinical and community samples show that up to 79% of self-injurers reporting a childhood history of abuse or neglect (Gratz et al., 2002; Low et al., 2000; van der Kolk et al., 1991). Michelson and Bhugra (2012) reviewed the literature and found that families with self-injuring adolescents are characterized by family

dysfunction; these families are prone to domestic violence, and are usually deficient in family communication, cohesion, and nurturance. Research has also found less extreme forms of negative parenting to be associated with NSSI. Yates and colleagues (2008) observed that perceived parental criticism was associated with increased likelihood of NSSI among 9th to 12th graders, and that it also predicted later the onset of NSSI among 6th graders who were followed over a period of six years. The researchers also noted that the relationship between perceived parental criticism and NSSI was mediated by parental alienation, which indicates poor attachment between parent and child. The link between disrupted parent-child attachment and NSSI has been reported in a sample of patients diagnosed with BPD or bipolar II disorders where parental separations during childhood was associated with self-harm behaviours (van der Kolk et al., 1991). In sum, poor relationship with caregivers, insecure attachment, or disrupted attachment is one of the strongest predictors for developing and engaging in NSSI later in life.

Physiological predisposition for emotional and cognitive reactivity is also a risk factor for the development of NSSI (Groschwitz & Plener, 2012). Studies found that those who engage in NSSI have lower levels of endogenous opioids, hypo-responsive hypothalamic-pituitary-adrenal (HPA) axis, and reduced cortisol secretion in stressful situations (Kaess et al., 2012, 2013; Sher & Stanley, 2008). The HPA axis can be thought of as the body's "stress system"; the HPA axis controls the levels of cortisol secretion, and it is generally active when people are under stress. In healthy individuals, HPA axis activation will increase the levels of cortisol in the blood during times of stress, which will lead to the release of glucose into the bloodstream in order to prepare the person for "flight or fight." However, individuals who engage in NSSI are considered to be living with heightened and prolonged experiences of psychosocial stress, which then leads to the observed hypo-responsive HPA axis (Groschwitz & Plener, 2012). As a result of the hypo-

responsive HPA axis, reduced secretion of cortisol may make the individuals more vulnerable to acute stress and the continual use of NSSI as a maladaptive strategy to manage the stress (Groschwitz & Plener, 2012; Kaess et al., 2012, 2013). Lower levels of endogenous opioids can also be seen in individuals with NSSI (Sher & Stanley, 2008). The opioid system is involved in pain-perception, reward, and addictive behaviours; chronic stress can alter, or even permanently damage endogenous opioid response to acute stress. In other words, opioid deficiency could result from chronic and severe childhood stress and trauma (e.g., neglect or abuse; Stanley et al., 2010). Therefore, individuals with abuse and neglect histories may require increased levels of endorphins to cope with stress as adults, and NSSI may serve to increase the endogenous opioids to restore homeostasis.

Nock considered childhood maltreatment, familial hostility and criticism, and genetic predisposition for high emotional and cognitive reactivity as distal risk factors for NSSI (Nock, 2009). These risk factors lead to the development of interpersonal (e.g., poor communication skills) and intrapersonal (e.g., poor distress tolerance) vulnerability factors, possibly due to abnormal neurobiological development or compromised acquisition of effective problem-solving skills. These vulnerability factors make it difficult for these individuals to respond to stressful situations effectively because of affective or social dysregulation, which then creates a need to use NSSI behaviours to regulate themselves.

Attachment Theory

As mentioned previously, childhood maltreatment and the disruption of attachment between child and caregivers are considered to play a prominent role in increasing the risk for developing NSSI later in life. So, what is attachment? Bowlby (1969) proposed that children are biologically predisposed to seek physical proximity to their caregivers in order to ensure the

safety of the child, and for the child to feel secure and protected. Over time and repeated interactions between the child and caregiver, the child develops an attachment with their caregiver. Attachment can be thought of as reflecting an internal working model (IWM) of the self, of the others, and the relationship between the self and others (Bowlby, 1969, 1973). The development of the IWM is determined by the quality of the relationship between the child and the caregiver, and over time, influences the attachment style that the child will have with others in his or her social environment in childhood and adulthood (Bowlby, 1969, 1973).

The quality of caregivers' reactions to children's proximity-seeking behaviour influences the attachment styles that the children eventually develop (Ainsworth et al., 1987, 2015; Bartholomew & Horowitz, 1991; Bowlby, 1973). The literature generally identifies four types of attachment styles: secure and three forms of insecure attachment, namely anxious, avoidant, and fearful (Bartholomew & Horowitz, 1991). Children whose caregiver provides them with protection, reassurance, comfort, and a "secure base" to explore the environment will develop a secure attachment style where the children have a positive image of the self (positive self-model), and are confident that others will be available and responsive in times of difficulties (positive others-model).

However, children whose caregiver is rejecting, distant, and unresponsive will over time reduce contact with the caregiver to avoid rejection, and will develop an avoidant attachment style. The children will have a positive self-image (positive self-model), but will distrust others (negative others-model). The experience of having emotionally distant or unresponsive caregiving will make the children uncomfortable with closeness in relationships and overvalue independence.

Children whose caregivers provide inconsistent or unpredictable care will learn to magnify their distress to increase the likelihood of a response from the caregiver. Over time, these children will develop an anxious attachment style where they see others as capable of looking after their needs (positive others-model), but do not see themselves as worthy of care (negative self-model), and will develop a persistent fear of being abandoned by others. Anxious attachment is characterized by attention-seeking behaviours; the individual desires close relationships, but often perceives others not being as close to them as they desire, and they often wonder whether or not they are truly liked by other people.

Children who exhibit both avoidant and anxious attachment styles are deemed to have a fearful attachment style. These children are negative on both self-model and others-model; they desire emotionally close relationships but find it difficult to trust others completely, and they often show confusion or contradictory behaviours upon the emotional feedback of the caregivers. Main and Hesse (1990) proposed that the caregivers of these children are either frightening (e.g., abusive), frightened (e.g., depressed), or lacking sensitivity or communication regarding the child's needs.

Insecure attachment style is a general risk factor for psychopathology (Stepp et al., 2008). Studies have found that insecure attachment in both childhood and adulthood are linked to mental disorders, including BPD (Agrawal et al., 2004), eating disorder (Dias et al., 2011), and mood disorders (Ross & Heath, 2002; Pianta et al., 1996). Disruptions of relationships and social bonds are suggested to be one of the main causes of suicidal thoughts and behaviours (Sheftall et al., 2013). Studies have also shown that early childhood stressors, including psychological trauma and poor relationship with caregivers, can lead to the development of

insecure attachment, which then leads to engagement in NSSI and suicide attempts later in life (Wrath & Adams, 2019).

The attachment style developed in childhood will influence relationships with others in adulthood. In other words, the early caregiver-child relationship serves as a prototype for later relationships. Attachment styles are relatively stable across time, and how individuals view themselves and others tend to persist through life, making their IWM increasingly resistant to change over time (Bowlby, 1973; Mikulincer & Shaver, 2016). Nevertheless, change in attachment style is possible; Bowlby (1973) hypothesized that attachment style could be modified through the influence of a new emotional relationship (e.g., new romantic partner).

Adults usually form attachments with family members, romantic partner, and close friends (Ainsworth, 1989). When an adult is under stress, the individual's internal working model of attachment would be activated, leading to the presentation of behaviours related to their attachment style. However, not all relationships would trigger attachment-related behaviours; one study found that adults are less likely to form attachment with acquaintances and colleagues, and therefore these relationships would not activate the attachment system even when the individual is in distress (Doherty & Feeney, 2004).

NSSI and Attachment

As reviewed in the previous sections, negative parenting and childhood maltreatment are considered risk factors for developing NSSI later in life. These adverse childhood experience have also been linked to the development of insecure attachment styles (Mikulincer & Shaver, 2016; Wrath & Adams, 2019). Linehan (1993) theorized that individuals who grew up in an invalidating environment may not have had the opportunity to learn how to cope with distress, and therefore might be prone to use maladaptive strategy (e.g., NSSI) in an attempt to manage

their negative affect. Linehan's theory has received support from studies that found problems with affect regulation following early childhood trauma in those with insecure attachment styles as well as those who engage in NSSI (Barbosa et al., 2014; Bifulco et al., 2002; Bifulco et al., 2006; Dimitrova et al., 2010; Dube et al., 2001; Muller et al., 2000; van der Kolk et al., 1991). In other words, the quality of early experience with caregivers influences how individuals acquire strategies for self-regulating emotions. Therefore, the early caregiver-child relationship is not only critical in shaping how a person relates and response to others, it also relates to how the person responds to distress. Examining NSSI from a developmental approach, Yates and colleagues (2008) concluded that the caregiving environment is one of the most influential factors related to the engagement of NSSI.

Several studies that examined the link between adult attachment styles and NSSI have found a significant correlation between general insecure attachment and NSSI (Braga & Gonçalves, 2014; Critchfield et al., 2008; Gormley & McNiel, 2010; Gratz et al., 2002; Hallab & Covic, 2010; Kimball & Diddams, 2007; Kharsati & Bhola, 2016; Kuipers et al., 2016; Levesque et al., 2010; Stepp et al., 2008). Research that further distinguishes between the types of insecure attachment have shown anxious attachment to be significantly and positively associated with the presence of NSSI (Braga & Gonçalves, 2014; Critchfield et al., 2008; Gormley & McNiel, 2010; Kharsati & Bhola, 2016; Kimball & Diddams, 2007; Levesque et al., 2010; Stepp et al., 2008), and the relationship to be mediated by interpersonal sensitivity (Stepp et al., 2008). Three studies reported a significant relationship between avoidant attachment style and NSSI (Critchfield et al., 2008; Gormley & McNiel, 2010; Stepp et al., 2008) which was mediated by depressive symptoms in one study (Gormley & McNiel, 2010) and by interpersonal sensitivity in another (Stepp et al., 2008). Critchfield and colleagues (2008) found in their sample of BPD

patients that adult fearful attachment style is related to a general tendency for aggression such as self-harm and suicidality. Two studies did not find a relationship between attachment styles and NSSI (Bedi et al., 2014; Heath et al. 2008).

Recently, two studies (Buckmaster et al., 2019; Wrath & Adams, 2019) that reviewed the relationship between family factors, attachment styles, and self-harm in adults showed insecure attachment to be associated with self-harm. Buckmaster and colleagues found that overprotective and disempowering parenting styles, as well as lack of cohesion and flexibility within the family unit, are associated with self-harm in adults. Their study also revealed that abusive behaviours in parent-adult child relationships and in romantic relationships are linked with adult self-harm. Wrath and Adams looked at the types of insecure attachment, and identified anxious attachment style to be closely related to NSSI in adults.

Gap in the Existing Literature

Currently, the majority of the studies reveal significant links between NSSI and insecure attachment styles among adults (Braga & Gonçalves, 2014; Critchfield et al., 2008; Gratz et al., 2002; Gormley & McNiel, 2010; Hallab & Covic, 2010; Kharsati & Bhola, 2016; Kimball & Diddams, 2007; Kuipers et al., 2016; Levesque et al., 2010; Stepp et al., 2008). However, the study samples consist of clinical patients (Critchfield et al., 2008; Gormley & McNiel, 2010; Kuipers et al., 2016), university students (Braga & Gonçalves, 2014; Gratz et al., 2002; Hallab & Covic, 2010; Kharsati & Bhola, 2016; Kimball & Diddams, 2007; Levesque et al., 2010), or a mix of both (Stepp et al., 2008). Clinical patients and university students are not representative of the general population; clinical patients have psychiatric problems that are serious enough to warrant clinical attention and university students tend to represent a quite homogenous group of

young adults whose age are within the high teens to the twenties. The degree to which findings from these selective samples can be generalized to the general population is not known.

Another gap in the literature is that some studies only looked at two broadly classified attachment styles, i.e., secure and insecure attachment (Gratz et al., 2002; Kuipers et al., 2016; Hallab & Covic, 2010). Many studies that have looked at specific types of insecure attachment have established positive association between NSSI and anxious attachment style (Braga & Gonçalves, 2014; Critchfield et al., 2008; Gormley & McNiel, 2010; Kharsati & Bhola, 2016; Kimball & Diddams, 2007; Levesque et al., 2010; Stepp et al., 2008), while some studies found a positive relationship between NSSI and avoidant attachment style (Critchfield et al., 2008; Gormley & McNiel, 2010; Stepp et al., 2008). Furthermore, to the best of the author's knowledge, Critchfield and colleagues (2008) is currently the only study that has looked into fearful attachment style, and they found adult fearful attachment style to be related to NSSI.

Currently, relatively little is known about the link between the characteristics of NSSI (e.g., method, severity, frequency) and attachment styles. Of all the research reviewed in this study, Kimball and Diddams (2007) was the only one that further analyzed the characteristics of NSSI in relation to attachment styles. They found insecure attachment styles to be associated with the variability and frequency of NSSI; in particular, anxious attachment style was significantly correlated with the frequency of self-harm ($r = .20, p < .01$), whereas avoidant attachment style was not ($r = .05$). It is therefore possible that individuals with different attachment styles will exhibit various patterns of NSSI. More studies are needed to determine whether attachment style is related to characteristics of NSSI.

Last but not least, there has been little to no research to date that looks into the relationship between attachment styles and the different functions of NSSI. This might be an area of

importance because individuals with different attachment styles might self-harm for different reasons. In other words, attachment style might predict the function served by NSSI. For example, individuals with anxious attachment styles are sensitive to relationship dynamics, and their fear of abandonment will lead them to engage in frantic attempts to avoid it by engaging in attention-seeking behaviours (Critchfield et al., 2008; Gormley & McNiel, 2010). Perhaps for these individuals, NSSI serves a social positive reinforcement function. On the other hand, those with avoidant attachment style might use all means to prevent interpersonal closeness in order to lower the risk of rejection (Critchfield et al., 2008). In this instance, NSSI might serve a social negative reinforcement function where the individual gets out of unwanted social situations.

Summary

Nonsuicidal self-injury (NSSI) is a direct and deliberate act that involves damage to one's body tissues without suicidal intent. According to the Four Function Model or the FFM, the self-harming behaviours are thought to be maintained via four reinforcement processes. Childhood maltreatment is considered to be one of the most salient risk factors that predict later self-harm behaviours. Adverse childhood experience has also been linked to the development of insecure attachment styles. Studies have indicated that problems related to affect regulation following early childhood trauma can be found in those who have insecure attachment styles as well as those who engage in NSSI. In particular, anxious attachment style is significantly and positively linked with NSSI. To date, there has been little to no research that looks into the relationship between attachment styles and NSSI within adult community population, and no study has examined the link between attachment styles and the different functions of NSSI. Since individuals with different attachment styles respond to stressful situations differently, it is

possible that NSSI might serve different functions for self-harming individuals with different attachment styles.

The Present Study

The present study examined the link between attachment styles and NSSI among adults in the general community. Individuals with at least one act of NSSI in their lifetime (NSSI group) were compared with those without history of NSSI (Control group) on their attachment styles (secure, anxious avoidant, fearful). It is hypothesized that the NSSI group will endorse anxious and avoidant attachment styles to a greater degree than Control (hypothesis 1).

The present study also examined the link between attachment styles and the functions of NSSI. Since attachment styles lead individuals to respond to stressful situations differently, it is feasible that individuals with different attachment styles might engage in NSSI for its different reinforcing functions. Consequently, it is hypothesized that within the NSSI group, anxious attachment style will be positively associated with social positive reinforcement (hypothesis 2) and avoidant attachment style will be positively associated with social negative reinforcement (hypothesis 3).

Supplementary analyses were also performed to examine the relationship between characteristics of NSSI (e.g., method, severity, frequency), different attachment styles, and the functions of NSSI.

Method

Sample Description

One thousand and eighty-eight participants were recruited for the study. After excluding 19 participants who did not meet the recruitment criteria (one under the age of 18 years old; 18 resided outside of Canada and USA), and 316 participants who failed the infrequency scale that

detects participants' inattentiveness (see Materials section titled *Infrequency Scale*), the study was left with 753 participants (mean age = 36.01 years, $SD = 12.58$) of whom slightly more than half (51.13%) were women. As can be seen from Table 1 that displays the demographic characteristics of the sample, most individuals identified themselves as White (71.45%), their sexual orientation as straight (81.67%), married (47.14%), and having an undergraduate degree (49.00%).

Group Classification

All 753 participants completed a self-harm inventory (see Materials section titled *Deliberate Self-Harm Inventory*), which assessed self-injury behaviours and permitted each individual to be assigned to one of the two groups. Those with no history of NSSI were assigned to the Control group ($n = 395$) while those who indicated that they have engaged in at least one NSSI act in their lifetime were assigned to the NSSI group ($n = 358$). The NSSI group ($M = 33.55$ years, $SD = 11.00$) was significantly younger than the Control group, ($M = 38.24$ years, $SD = 13.49$), $t(750) = 5.25, p < .001$. A series of chi-square tests revealed a significant association between group membership and sex ($\chi^2 [1, N = 752] = 7.09, p = .008$), sexual orientation ($\chi^2 [6, N = 722] = 46.47, p < .001$), marital status ($\chi^2 [5, N = 753] = 18.54, p = .002$), and ethnicity ($\chi^2 [6, N = 753] = 20.95, p = .002$).

Materials

The materials that were used in this study include cover page, consent form, demographics questionnaire, COVID-19 mental health questionnaire, Infrequency scale, and five research questionnaires.

Cover Page and Informed Consent

The cover page contained information regarding the general purpose and procedure in the

study, the type of questions asked in the study, the expected amount of time required to complete the research questionnaire, the risks and benefits of participating in the study, the voluntary nature of the task, confidentiality, and the option to receive a summary of findings after the project has been completed. Participants were also informed that the data they provide would be collected by SurveyMonkey[®], which is hosted in the US, and as such is subjected to the US Patriot Act that allows the American authorities to access the records of internet service providers. Finally, individuals were notified that if they chose to proceed further in the study, it will be interpreted as a sign that they have read and understood the information provided and that they have given their informed consent to participate in the study. There were two versions of the cover page and consent form; one for participants who accessed the study via standard recruitment (Appendix A) and the other for participants who were recruited through MTurk (Appendix B). The only difference between the two versions was that individuals recruited through MTurk were informed that they would receive a small compensation (\$0.30 USD) for their participation which is in accordance with MTurk policy. However, all participants were eligible to enter a random prize draw to win one of three \$100 USD Amazon gift cards. Prize draws have been shown to boost survey response rate (Laguille et al., 2011).

Demographics Questionnaire

The demographics questionnaire (see Appendix C) was designed to collect basic demographic and background information on the characteristics of the participant sample. The demographics questionnaire asked the participants to report their basic information, including age, sex, ethnicity, education level, and marital status. The questionnaire also asked about participants' mental health history, including past and present psychological diagnoses as well as past suicidal ideation and suicide attempts.

COVID-19 Mental Health Questionnaire

As this study was conducted during the early phase of the COVID-19 pandemic, a COVID-19 mental health questionnaire (see Appendix D) was created to better understand the impact of COVID-19 on the lives and psychological functioning of the study participants. As such, the questionnaire asked the participants to compare their mental health before and during the pandemic (e.g., “In general, how would you rate your mental health currently before/ during the COVID-19 pandemic?”). Participants were also asked to rate how the pandemic is impacting their lives in multiple domains; for example, their ability to maintain social ties, financial obligations, and personal hygiene. For participants in the NSSI group, the questionnaire also inquired about their NSSI behaviours during the pandemic. For example, participants were asked to rate the degree to which the frequency, method, severity of their NSSI behaviours have changed since the start of the COVID-19 pandemic.

Infrequency Scale

The infrequency scale (Huang et al., 2015; see Appendix E) is an 8-item scale that was used to detect research participants’ lack of motivation to comply with study instruction or inattentiveness, which is known as insufficient effort responding (IER). All items are statements that deviates from common sense, or improbable events. For example, “I work twenty-eight hours in a typical working day,” “I am interested in pursuing a degree in parabanjology,” “I can teleport across time and space.” The items were administered using a 7-point Likert scale (1= strongly disagree, 7=strongly agree). If an individual agrees with the statement (slightly agree/ somewhat agree/ strongly agree), the individual is considered to be inattentive.

The infrequency scale has been shown to be a reliable and valid measure for IER with high

internal consistency, and high convergent validity (Huang et al., 2015). Respondents who tend to agree with the improbable statements also tend to spend less time completing the survey, and type relatively fewer words when asked to describe certain aspects of themselves. Surveys that contained infrequency items did not lead to more negative reactions than did surveys that did not contain such items. Therefore, the infrequency scale is considered an effective and feasible approach to detect IER, and is suitable to incorporate into survey (Curran, 2016; Huang et al., 2015). It is recommended that individuals with 50% of inaccuracy (i.e., agreeing to four out of eight items on this scale) be considered as failing the attention test (Curran, 2016). Consequently, those who endorsed four or more improbable statements were excluded from the analysis.

Research Questionnaires

Five questionnaires were included in this study; descriptions of each of the questionnaires, as well as the construct of the measure are detailed below.

Hospital Anxiety and Depression Scale. The Hospital Anxiety and Depression Scale (HADS; see Appendix F) was developed by Zigmond and Snaith (1983) to detect possible and probable cases of anxiety and depression patients in medical outpatient clinics. It was used in the current study to provide a fuller description of the mental health functioning of the participants.

HADS is a 14-item self-report screening questionnaire with two scales: anxiety subscale (HADS-Anxiety) and depression subscale (HADS-Depression). HADS-Anxiety is composed of the odd-numbered items whereas HADS-Depression consists of the even-numbered items. Participants indicated severity of difficulty by responding to each item on a 4-point Likert scale that ranges from 0 to 3. Subscale total score was calculated by summing the scores of the items

that load on the subscale, and can range from 0-21 where higher scores indicate greater severity of anxiety (for the HADS-Anxiety) and depression (for the HADS-Depression). Interpretative guidelines (Snaith, 2003; Zigmond & Snaith, 1983) are as follows: scores between 0-7 are considered to be within the normal range (noncase), scores that range from 8-10 suggests the possibility of anxiety or depression (borderline case), and scores of 11 or higher indicate definite presence of anxiety or depression disorder (caseness).

Bjelland and colleagues (2002) conducted a literature review for the psychometric properties of the HADS. After reviewing 747 studies, Bjelland and colleagues (2002) concluded that HADS performs well in assessing the presence and symptoms severity in both anxiety and depression in somatic, psychiatric and primary care patients as well as general population. The reliability of HADS is good, with Cronbach's α ranging from .68-.93 for HADS-Anxiety, and .67-.90 for HADS-Depression. HADS-Anxiety and HADS-Depression have good sensitivity and specificity with a threshold of scoring 8 or above as possible case of anxiety or depression; both sensitivity and specificity for both scales were found to be approximately .80. Concurrent validity was also achieved since the HADS exhibited medium to strong correlations ($r = .60-.90$) with other questionnaires for anxiety and depression in common use, such as Beck's Depression Inventory (BDI), Spielberger State-Trait Anxiety Inventory (STAI), Clinical Anxiety Scale (CAS), and Symptom Checklist 90 Scale (SCL-90) Anxiety and Depression subscales.

Attachment Style Questionnaire. The Attachment Style Questionnaire (ASQ; Hofstra, 2009; Hofstra et al., 2005 see Appendix G) is a 24-item self-report questionnaire that measures non-specific relationship attachment styles for adults (Mosterman & Hofstra, 2015). The ASQ assesses four attachment styles: secure, fearful, dismissing, and preoccupied. Even though the

terminology used in the ASQ is somewhat different from those found in the research literature, dismissing attachment style is the equivalent of avoidant attachment style, and preoccupied attachment style is the same as anxious attachment style. The secure style is measured by items 1 to 7 (e.g., item 5 “I feel at ease in intimate relationships.”). The fearful attachment style is measure by items 8 to 12 (e.g., item 8 “I would like to be open to others, but I feel I can’t trust other people.”) The preoccupied (anxious) attachment style is measure by items 13 to 19 (e.g., item 13 “I often wonder whether people like me.”). Finally, the dismissing (avoidant) attachment style is measured by items 20 to 24 (e.g., item 23 “I like to be self-sufficient.”) Participants responded to all attachment items by answering on a 5-point scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*); scores on the scales were computed by summing up the scores on the items (items 2 and 17 need to be reverse scored) and dividing the sum score by the number of items of the scale, thereby yielding four separate average scores for the four attachment styles. Higher scores on a particular attachment style indicate that the individuals are more inclined towards that specific attachment style.

The ASQ has adequate internal consistency, with Cronbach’s α of .73-.75 for the secure attachment style, .79-.87 for the fearful attachment scale, .62-.78 for the dismissing (avoidant) attachment scale, and .80-.84 for the preoccupied (anxious) attachment scale (Chui & Leung, 2016; Hofstra, 2009). The ASQ also has good adequate test–retest reliability over a one-year interval, with stability coefficients ranging from .59 to .76 across the four attachment style scales (Hofstra, 2009). Construct validity of the ASQ was also studied, and Hofstra (2009) found that ASQ correlated highly with Relationship Questionnaire (RQ; Bartholomew & Horowitz, 1991), which is another measure of attachment style.

The ASQ is suitable for use in the present study for two reasons. First, it measures general

attachment, which allows for the assessment of the general sociability of a respondent, as opposed to many other attachment measures that assess attachment within specific relationships. For example, the Adult Attachment Scale (Collins & Read, 1990) is developed to measure attachment in adult romantic relationships. Second, the ASQ assesses all four attachment styles that are of focus in the current investigation.

The Relationship Questionnaire. The Relationship Questionnaire (RQ; Bartholomew & Horowitz, 1991; see Appendix H) has four short paragraphs that provide prototypical descriptions of the four adult attachment styles, i.e., secure, fearful, dismissing/avoidant, and preoccupied/anxious. The respondent is first asked to choose one style that best describes how they generally feel about their relationships with others; the answer identifies the respondent's primary attachment style. The respondent is then asked to rate on a 7-point scale the degree to which they agree that each of the paragraphs describe their general interactional style; the answer allows for a comparison of the four styles within an individual. The RQ was used in the current study solely for the purpose of identifying the primary attachment style and the respondents' ratings was not used.

The RQ has demonstrated test-retest reliability over 8-month (Scharfe & Bartholomew, 1994) and 6-year period (Zhang & Labouvie-Vief, 2004) with stability coefficients ranging from .47-.64 for the secure attachment style, .49-.57 for dismissing (avoidant) attachment, .68-.70 for preoccupied (anxious) attachment, and .72- .83 for fearful attachment. Construct, convergent, and discriminant validity of the RQ were established (Bartholomew & Horowitz, 1991; Griffen & Bartholomew, 1994; Bäckström & Holmes, 2001). However, the internal reliability of the measure cannot be established because each attachment style is assessed with only one item.

Deliberate Self-Harm Inventory. Deliberate Self-Harm Inventory (DSHI; Gratz, 2001; see Appendix I) is a 17-item self-report questionnaire that evaluates the frequency, severity, duration, type of NSSI, as well as the onset and the last occurrence of NSSI. Respondents spend, on average, 4.2 minutes to complete the DSHI, with a median time of 2.7 minutes; less than 5% of the patients require more than 10 minutes to finish (Fliege et al., 2006).

Items 1 to 16 ask participants to report their history of NSSI using different self-harm methods. Participants answer “Yes” or “No” to each question; if participants answer “Yes” to any of the item, they are then asked to indicate the age at which the act was first performed, the number of times they used that method, the most recent episode, the number of years they have used that method, and whether the behaviour ever resulted in the need for medical intervention. Item 17 is an open-ended option to include behaviours not previously listed (“Done anything else to hurt yourself that was not asked about in this questionnaire? If yes, what did you do to hurt yourself?”). Those who indicated at least one instance of self-harm will be considered to have a positive NSSI history and classified as the NSSI group, while those who do not indicate any instances of self-harm will be considered to have a negative NSSI history and classified as the Control group.

Gratz (2001) used an undergraduate population to test the psychometric properties of DSHI, and this initial testing revealed that DSHI has high internal consistency ($\alpha = 0.82$), and adequate test-retest reliability over a 2 to 4-week period ($r = .68, p < .001$). The number of NSSI items endorsed on the first and second administrations was also highly correlated ($r = .92, p < .001$). DSHI also has adequate construct, convergent, and discriminant validity (Gratz, 2001). These results have been replicated by Fliege and colleagues (2006) using psychiatric inpatients, suggesting DSHI is a reliable and useful tool to evaluate NSSI in both clinical and nonclinical

populations.

The Functional Assessment of Self-Mutilation. The Functional Assessment of Self-Mutilation (FASM; Lloyd, 1997; see Appendix J) is a self-report questionnaire that evaluates the methods and functions of NSSI. The FASM consists of two parts. The first part asks questions that are similar to the DSHI and will not be used in the present study to avoid redundancy.

The second part which is of interest in the current study contains a list of 23 reasons for engaging in self-harm (e.g., “to punish yourself,” “to stop bad feelings”). Participants were asked to indicate how often those reasons apply to them by responding on a 4-point Likert scale that ranges from 0 (never) to 3 (often). These 23 items map on the FFM (Nock & Prinstein, 2004): items 2 and 14 tap into automatic negative reinforcement (e.g., “to stop bad feelings”); items 4, 10, and 22 assess automatic positive reinforcement (e.g., “To punish yourself”); items 1, 5, 9, and 13 reflect social negative reinforcement (e.g., “To avoid being with people”); and items 3, 6, 7, 8, 11, 12, 15, 16, 17, 18, 19, 20, 21 tap into social positive reinforcement (e.g., “To get attention”). Higher scores on any of these functions indicate that the participant’s NSSI behaviour is more often motivated by the reinforcing consequences characterized by that particular function.

The FASM has been used in studies with both nonclinical (e.g., Hilt et al., 2008; Lloyd-Richardson et al., 2007) and psychiatric samples (e.g., Guertin et al., 2001; Lloyd, 1997; Nock & Prinstein, 2004), which have yielded support for its psychometric properties. It has moderate to high internal consistency reliability for each of the four subscales, with Cronbach’s α ranging from .62 for automatic-negative reinforcement to .85 for social-positive reinforcement (Nock & Prinstein, 2004). There is also empirical support for the concurrent validity of the FASM

(Guertin et al., 2001; Lloyd, 1997; Lloyd-Richardson et al., 2007; Nock & Prinstein, 2005). For example, Lloyd-Richardson and colleagues (2007) found that compared to individuals with NSSI history but without suicide attempts, individuals who reported a history of NSSI plus suicide attempts were more likely to report a greater number of reasons to engage in NSSI, and were more likely to endorse all four functions of NSSI. Researchers also reported the FASM to be significantly related to measures of suicide attempts (Guertin et al. 2001; Nock & Prinstein, 2005), suicide ideation (Guertin et al. 2001), hopelessness and depressive symptoms (Nock & Prinstein, 2005).

Procedure

Recruitment Procedure

Participants were recruited from across Canada, including the local vicinity (Thunder Bay), and the United States. Due to the COVID-19 pandemic, all recruitments were undertaken online. Study flyers (see Appendix K) were posted on the Lakehead University Student Union weekly newsletter, Facebook, and Amazon Mechanical Turk (MTurk).

MTurk is a crowdsourcing marketplace that allows individuals and businesses to outsource their projects to a global workforce who can perform these tasks virtually. Crowdsourcing refers to the process of obtaining content by soliciting contributions from large online communities; in other words, crowdsourcing platforms (e.g., MTurk) allow researchers to gather large-scale data from a diverse pool of people, which is hard to achieve within physical labs (Chambers & Nimon, 2019; Paolacci & Chandler, 2014). The use of crowdsourcing for academic research has increased over the past decade (Harms & DeSimone, 2015), with MTurk being one of the most popular crowdsourcing platform used by social science researchers (Buhrmester et al., 2011). In 2014, the MTurk workforce consisted of more than 500,000

individuals from 190 countries (Paolacci & Chandler, 2014). Participants recruited from MTurk are considered to be more diverse than the college population (Paolacci & Chandler, 2014). When the MTurk sample is restricted to English-speaking countries, the data collected through MTurk is as good or better than data collected using undergraduate or organizational samples, suggesting the use of MTurk to be an efficient and appropriate recruitment avenue (Behrend et al., 2011; Feitosa et al., 2015). However, it is also important to keep in mind that some studies have pointed out that the participants recruited through MTurk tend to be around 30-year-old, overeducated, underemployed, less religious, and more liberal than the general population (Berinsky et al., 2012; Paolacci et al., 2010; Shapiro et al., 2013).

In this study, MTurk was only used as a recruitment and payment platform; the actual data collection was carried out with research questionnaires hosted on SurveyMonkey[®], which is an online software and hosting site commonly used for constructing surveys, collecting data, and analyzing data.

Main Study Procedure

Participants were directed to SurveyMonkey[®] via two different links, one for standard recruitment, and one for MTurk. Individuals who accessed the study web links were presented with the cover page and consent form (Appendix A for standard recruitment, Appendix B for MTurk recruitment), demographics questionnaire (Appendix C), COVID-19 Questionnaire (Appendix D), Infrequency Scale (Appendix E), and main research questionnaires (Appendix F, G, H, I, J). Upon completion of the research questionnaires, participants were directed to the debriefing form which contains information regarding the purpose of the study, invitation to obtain a summary of the study once it is completed, contact information of the researchers, as well as instructions for receiving their compensation from MTurk or entering the prize draws.

Standard recruitment participants were presented with one version of the debriefing form (Appendix L) while the MTurk recruitment participants were presented with another version (Appendix M). The difference between the two versions was that the MTurk recruitment participants were provided with a code that they can use for claiming their \$0.30 USD compensation through MTurk. Both debriefing forms contain a url address that took participants to a separate web link where they can enter their contact information for the prize draw, and request for a summary of the study once it is completed (See Appendix N). Participants were also given a list of therapeutic and counseling services available in Thunder Bay, as well as COVID-19 and mental health resources available to the online community in Canada and the United States (see Appendix O).

Software Used in the Statistical Analyses

The computer software program, Statistical Package for the Social Sciences – Version 25.0 (SPSS-25.0) was used to assess pre-analyses issues with the original database (see section titled *Pre-Analysis Issues* below) as well as the main analyses (see section titled *Main Analyses*), which included multivariate analysis of covariance (MANCOVA) and hierarchical linear regression.

Analytic Plan

The variables examined in the present study were the four attachment styles (secure, fearful, anxious, avoidant) from ASQ and RQ, the four reinforcement functions (automatic positive reinforcement, automatic negative reinforcement, social positive reinforcement, social negative reinforcement) from FASM, participant's demographic background, NSSI history, and their anxiety and depression scores from HADS. Prior to the analyses, data screenings were carried out (e.g., examining missing data, outliers), then correlations among all variables were examined

to identify covariates that the present study would control for.

To examine the first hypothesis that the NSSI group will endorse insecure attachment styles (fearful, anxious, avoidant) to a greater degree than the Control group, a one-way MANCOVA with the two groups as the independent variable and the four ASQ attachment styles as the dependent variables was conducted. Four separate ANCOVAs were then conducted to follow up with the significant multivariate effect to determine which of the four ASQ attachment styles are accounted for the group differences. To control for Type 1 error, the Bonferroni correction was used so that each ANCOVA was assessed at $\alpha = .05/4 = .0125$. The second and third hypothesis which look at the relationship between avoidant and anxious attachment style, respectively, and the four NSSI functions will be examined using hierarchical linear regression. Four sets of hierarchical linear regression were run with the four ASQ attachment styles as predictors and each of the four NSSI functions obtained from FASM as the criterion. In each regression, covariates were entered at step 1 to control for their effects, and the four ASQ attachment styles were entered as predictors at step 2.

Supplementary analyses were also carried out to examine the congruence between the two attachment style questionnaires (RQ and ASQ) on participants' primary attachment style. The relationship between ASQ attachment styles and five NSSI characteristics (number of NSSI methods used, age of NSSI onset, number of lifetime NSSI incidents, and the average length of NSSI history across methods), as well as the relationship between FASM functions and NSSI characteristics, were also carried out using hierarchical linear regression. The criterion variables were the four ASQ attachment styles, and the four FASM functions. In each regression, covariates were entered at step 1 to control for their effects, and the five NSSI characteristics were entered as predictors at step 2.

Results

Pre-Analysis Issues

Missing Values

A dataset can tolerate 5% of missing values (Tabachnick & Fidell, 2013). In the present study, one missing value within any research questionnaire will exceed the 5% of the total items on that particular scale or subscale of interest. Therefore, cases with any missing values on any given subscale were excluded from further analyses on that particular subscale. The following shows the number of participants excluded from analyses on each subscale: 22 participants on HADS-Anxiety subscale, 22 participants on HADS-Depression subscale, 1 participant on RQ, 28 participants on ASQ Secure subscale, 14 participants on ASQ Fearful subscale, 23 participants on ASQ Anxious subscale, 24 participants on ASQ avoidant subscale, 3 participants on FASM Automatic Negative Reinforcement subscale, 7 participants on FASM Automatic Positive Reinforcement subscale, 5 participants on FASM Social Negative Reinforcement subscale, and 7 participants on FASM Social Positive Reinforcement subscale.

Univariate and Multivariate Outliers

The data was screened for both univariate and multivariate outliers to eliminate or reduce the influence of these outlying cases on the results. For univariate outliers, the guideline of a z-score greater than ± 3.29 standard deviations was used to identify univariate outliers (Tabachnick & Fidell, 2013). In the current study, one outlier was identified on the HADS-Depression scale, one on the ASQ Avoidant subscale, four on the FASM Social Negative Reinforcement subscale, and two on the FASM Social Positive Reinforcement subscale. These outliers had their scores moved to a raw score that was equivalent to just under a z score of ± 3.29 to preserve the “extremeness” of those cases within their respective distributions (Mowbray et al., 2019;

Tabachnick & Fidell, 2013).

An examination for influential multivariate outliers among predictor variables (four ASQ attachment styles and four FASM reinforcements functions) was also carried out. Multivariate outliers were identified as cases having a Mahalanobis distance with a significant χ^2 value at $p < .001$ (Pituch & Stevens, 2015; Tabachnick & Fidell, 2013) and influential outliers were those determined to have a Cook's distance > 1 (Pituch & Stevens, 2015). Two multivariate outliers were identified on account of their significant Mahalanobis distance but had a Cook's distance < 1 , which means they were not influential outliers. Therefore, both cases were retained in the analyses.

Normality

Normality is the assumption that each variable, and all linear combinations of the variables, are normally distributed around a central mean. To determine whether the distribution of variability in the dataset had significant problems with skewness or kurtosis, both were assessed by first visually inspecting the distribution of scores and then by the skewness statistic and kurtosis statistic. Skewness is a measure of the asymmetry of the distribution of a variable; kurtosis is a measure of the heaviness of the tails of a distribution.

For this study, the criteria that skewness or kurtosis divided by the standard error be less than 3.29 was used to discern whether the variables were normally distributed within each group (Kim, 2013; Tabachnick & Fidell, 2013). While some variables were normally distributed, many exhibited violations to the assumption of normality. The variables that deviated from normality include the ASQ Fearful subscale, ASQ Anxious subscale, FASM Automatic Negative Reinforcement subscale, FASM Social Negative Reinforcement subscale, and FASM Social Positive Reinforcement subscale. Variables of the ASQ scale were negatively skewed, while

variables of the FASM scales were positively skewed. One approach to managing violations of the normal distribution would be to transform the data (Kim, 2013). However, transforming data may lead to difficulties in the interpretation of the data. Since the sample size of this study is large, minor deviations in normality often do not have a substantial impact on the analyses (Tabachnick & Fidell, 2013). Subsequently, no data transformations were undertaken for the present study. It is important to note that the validity of the results may be less robust due to some deviations from normality for some of the variables.

Linearity and Homoscedasticity

Linearity is an assumption which states that there should be a linear relationship between the dependent and independent variables. Homoscedasticity is the assumption that the variance of error terms is similarly distributed across the values of the independent variables. Both linearity and homoscedasticity were assessed by plotting bivariate scatterplots between pairs of variables, and by observing the resulting trends. Generally, assumptions of linearity and homoscedasticity were met with mild to moderate violations. Violations in linearity was observed in scatterplots between FASM Social Positive Reinforcement scale and all four ASQ attachment styles, the FASM Social Negative Reinforcement and all four ASQ attachment styles, and the FASM Automatic Negative Reinforcement subscale and the ASQ avoidant attachment style. Violations in homoscedasticity were observed in Social Positive Reinforcement and secure, fearful, and avoidant attachment styles, as well as Social Negative Reinforcement and all four attachment styles. The results were not surprising since three FASM subscales (Social Negative Reinforcement, Social Positive Reinforcement, and FASM-Automatic Negative Reinforcement) were not normally distributed. Violations in linearity and homoscedasticity would reduce the power of the analysis but given that the violations were mild to moderate, it

was not deemed necessary to transform the variables (Tabachnick & Fidell, 2013).

Multicollinearity

All variables were also checked for multicollinearity and singularity as this can cause problems with respect to interpretation of results. Multicollinearity and singularity were detected through correlations that are greater than .90 (Tabachnick & Fidell, 2013). There were no correlations greater than .90 between variables in the present study. Therefore, no variables were excluded from analyses. Multicollinearity was also assessed using the Variance Inflation Factor (VIF). The VIF estimates the degree that the variance of a regression coefficient is inflated due to multicollinearity in the model. VIF values higher than 10 indicate that there are some concerns regarding multicollinearity (Pituch & Stevens, 2015). All VIF of the predictor variables in the main analyses (the four FASM subscales) were under 2.5, meaning there is no multicollinearity.

Internal Consistency of Scales

Cronbach's α was used to assess the internal consistency of the scales used in the study. Both subscales of HADS showed high internal consistency, with HADS-Anxiety Cronbach's $\alpha = .88$ and HADS-Depression Cronbach's $\alpha = .83$. High internal consistency was also observed in ASQ secure ($\alpha = .85$), fearful ($\alpha = .90$), and anxious ($\alpha = .90$) subscales with the exception of avoidant subscale whose α value fell in the moderate range ($\alpha = .64$). The FASM also showed moderate to high internal consistency with α values falling in the moderate range for automatic negative reinforcement ($\alpha = .70$) and automatic positive reinforcement ($\alpha = .57$), and high range for social negative reinforcement ($\alpha = .84$) and social positive reinforcement ($\alpha = .92$). The Cronbach's α across all scales and subscales found in the current study are consistent with those reported in previous literature (Bjelland et al., 2002; Chui & Leung, 2016; Hofstra, 2009; Nock

& Prinstein, 2004).

Participants' Mental Health Presentation

The two groups were compared on a number of different mental health presentations (see Table 2). The NSSI group was more likely than the Control group to have a history of accessing mental health services, ($X^2 [1, N=752] = 73.10, p < .001$), be currently receiving mental health care, ($X^2 [1, N=751] = 27.33, p < .001$), have a current mental health diagnosis ($X^2 [1, N=749] = 61.27, p < .001$), and be currently taking prescribed medication for mental health reasons ($X^2 [1, N=747] = 27.21, p < .001$). The NSSI group was also more likely to have a history of suicidal ideation ($X^2 [1, N=748] = 155.27, p < .001$), suicidal ideation within the past 12 months ($X^2 [1, N=748] = 99.42, p < .001$), a history of suicide attempts ($X^2 [1, N=746] = 79.35, p < .001$), and suicidal attempts within the past 12 months ($X^2 [1, N=750] = 19.30, p < .001$); however, the two group did not differ in the number of lifetime suicide attempts.

The two groups were also compared on their HADS-Anxiety and Depression scores. The NSSI group had a mean score of 10.22 ($SD=4.56$) for anxiety, and 7.27 ($SD=4.11$) for depression; the Control group had a mean score of 6.68 ($SD=4.76$) for anxiety, and 5.18 ($SD=4.15$) for depression. The NSSI group scored significantly higher on both anxiety ($t [729] = -10.26, p < .001$) and depression ($t [729] = -6.85, p < .001$). The HADS scales can also identify 'caseness' defined as having definite presence of anxiety or depression disorder. Roughly half of the participants in the NSSI group ($n=170$; 47.49%) met the caseness criterion for anxiety, and 21.79% ($n=78$) for depression. On the other hand, 20.25% ($n=80$) and 10.63% ($n=42$) of participants in the Control group met the caseness criterion for anxiety and depression, respectively. Two chi-square tests were performed to examine the relation between group and caseness for anxiety and depression. The relation between these variables was

significant: Participants in the NSSI group were more likely to be classified as having met the caseness criterion for anxiety ($X^2 [3, N=753] = 80.40, p < .001$) and depression ($X^2 [3, N=753] = 38.23, p < .001$).

NSSI Behaviour

Table 3 presents information on the self-harm behaviours reported by the NSSI group. The three most common methods employed were cutting ($n = 178; 49.86\%$), scratching ($n = 125; 35.51\%$), and sticking pins or sharp objects into the body ($n = 68; 19.37\%$). The age for the first act of self-harm across all methods ranged from 13.59 to 20.33 years with a mean of 16.17 years ($SD = 8.21$). Participants indicated having used anywhere from 1 to 14 methods of self-harm, with a mean of 2.36 methods ($SD = 1.61$). All NSSI methods listed on DSHI were endorsed at least once, including the more severe NSSI methods; for example, five participants broke their own bones, four participants rubbed glass into their skin, and three participants dripped acid on their skin. Forty-three participants also described other methods of self-harm not listed in the DSHI, including rubbing skin with objects, punching solid objects to harm oneself, pulling out hair, and blocking blood circulation to certain body parts. Sixty (16.76%) participants also reported that their NSSI behaviours resulted in hospitalization or injury severe enough to require medical treatment.

Impact of COVID-19 on Mental Health

Of the 753 participants, 685 participants (90.97%) completed the COVID-19 mental health questionnaire. Participants were asked to first rate how their mental health was before the pandemic and how it is now during the pandemic on a five-point Likert scale. The difference in the two scores indicated the change of their mental health due the pandemic. More than half of the participants reported that their mental health status did not change during the pandemic

(54.01%; $n = 370$), while 36.20% ($n = 248$) reported a deterioration and 9.34% ($n = 64$) reported an improvement. A t -test revealed no significant difference between the NSSI group ($M = 0.35$, $SD = 0.73$) and Control group ($M = 0.35$, $SD = 0.97$) in their change in mental health status.

When asked to rate their level of stress before and during the pandemic; 42.34% ($n = 290$) of the participants reported that COVID-19 did not have an impact on their stress level, while 41.17% ($n = 282$) reported increased stress and 15.33% ($n = 105$) reported decreased stress. Compared to the Control group, participants in the NSSI group reported significantly higher stress during the pandemic than before, $t(675) = 2.31$, $p = .023$. As for a change in their sense of hopefulness for the future from pre-COVID to during the pandemic, 36.79% ($n = 252$) reported a decrease, 32.12% ($n = 220$) reported an increase, and 30.66% ($n = 210$) reported no change. Compared to the Control group ($M = 3.07$, $SD = 1.11$), participants in the NSSI group ($M = 2.86$, $SD = 1.18$) were significantly less hopeful about the future, $t(680) = 2.34$, $p = .017$. The top three areas of heightened concerns (identified by participants as “very or extremely concerned”) were health of the vulnerable population (59.56%; $n = 408$), family members’ health (51.97%; $n = 356$), and the ability of the health system to meet health needs (53.87%; $n = 369$). In comparison, only 37.96% ($n = 260$) of the participants were very or extremely worry about their personal health.

The overall impact of COVID-19 on mental health was calculated by averaging the scores on the 21 areas of concern, with higher scores indicating higher level of concerns. An average score of 2.92 was obtained from all participants indicating moderate levels of concern. A t -test revealed no significant difference between the NSSI group ($M = 3.00$, $SD = 0.84$) and Control group ($M = 2.85$, $SD = 0.88$).

Of the 358 participants in the NSSI group, 260 (72.6%) completed the questions regarding

the impact of COVID-19 pandemic on their self-harm behaviours (see Table 4). More than half (54.23%; $n = 141$) reported no change to their desire to engage in NSSI, while 18.08% ($n = 47$) reported stronger desire and 27.69% ($n = 72$) reported weaker desire. Forty participants (15.38%) reported that they had engaged in self-harm during the pandemic. Half of them (50.00%; $n = 20$) reported an increase in the frequency of self-harm, while 32.50% ($n = 13$) reported no change and 15.00% ($n = 6$) reported decrease in frequency of self-harm. Almost all of them (97.5%; $n = 39$) noted that their reasons for self-harming during the pandemic were the same as those for self-harming before the pandemic; one participant reported that she self-harmed “completely out of frustration and boredom. I can't help but focus on my inadequacies and failures because there's nothing to distract me.” As can be seen in Table 4, more than half reported no change in the number of methods used, severity of injuries, or the degree of desired outcome from the self-harm behaviours. Responses to the question about the length of time spent thinking about self-harm before engaging in the act (a proxy for impulsivity) showed variability with more than half indicating either no change or less time. Four participants reported other changes in self-harm behaviours in the open-ended question section, including taking longer to stop themselves from self-harming, caring less about hiding their self-harming behaviours, starting to self-harm in front of family members, and decrease in skin picking behaviours due to worries of COVID-19.

Main Analyses

Bivariate Correlations

Pearson correlational analyses were performed on the four ASQ attachment styles and on the four FASM reinforcement functions (see Table 5). These two sets of variables constitute the dependent variables to be used in the multivariate analysis of covariance.

The ASQ attachment styles were significantly associated with one another with correlations ranging from $r = -.63, p < .001$ (between secure and fearful attachment style) to $r = .50, p < .001$ (between anxious and fearful attachment style). The correlations among FASM functions were also significant, ranging from $r = .24, p < .001$ (between automatic negative reinforcement and social positive reinforcement) to $r = .79, p < .001$ (between social negative reinforcement and social positive reinforcement).

Pearson correlational analyses were also performed to ascertain the relationship between the four ASQ attachment styles and the four FASM functions. Both automatic negative reinforcement and automatic positive reinforcement were significantly associated with secure, fearful, and anxious attachment styles, with correlations ranging from $r = -.18, p = .004$ (between automatic negative reinforcement and secure attachment style) to $r = .36, p < .001$ (between automatic positive reinforcement and anxious attachment style). Social negative reinforcement was significantly correlated with fearful attachment style ($r = .14, p = .037$), while social positive reinforcement was significantly correlated with anxious attachment style ($r = .17, p = .010$). Avoidant attachment style was not found to be significantly correlated with any of the FASM functions.

A covariate, or control variable, is any variable that is significantly correlated with the dependent variable; variables that theoretically should correlate with the dependent variable, or variables that have been shown to correlate for similar types of participants should be considered as covariates (Pituch & Stevens, 2015). Previous studies have found affective disorders, younger age, women, and sexual minorities to be closely associated with self-harm (Asarnow et al., 2011; Briere & Gil, 1998; Claes et al., 2007; Glenn & Klonsky, 2013; Hawton & Harriss, 2008; Herpertz, 1995; Jacobson et al., 2008; Langbehn & Pfohl, 1993; Laye-Gindhu & Schonert-

Reichl, 2005; Madge et al., 2008; Nocks et al., 2006; Ross & Heath, 2002; Stanley et al., 2001; Swannell et al., 2014; Weierich & Nock, 2008; Zlotnick et al., 1999). Therefore, a series of correlations were performed between the four ASQ attachment styles, the four FASM functions, participant's demographics (age, sex, sexual orientation, marital status, ethnicity, level of education) and HADS subscales to help identify potential covariates for the main analyses.

Firstly, Pearson correlational analyses were performed among participants' age, HADS subscales, the four ASQ attachment styles, and the four FASM functions (see Table 5). The HADS-Anxiety subscale was significantly correlated with all variables, while HADS-Depression subscale was significantly correlated with all variables except ASQ avoidant. Participants' age was also found to be significantly correlated with all four ASQ attachment styles, and FASM automatic positive and negative reinforcement subscales. Both HADS subscales and participants' age were included as covariates.

Secondly, point biserial correlation was performed between participant's sex, the four ASQ attachment styles, and the four FASM functions. Participant sex was significantly correlated with anxious attachment style, avoidant attachment style, automatic negative and positive reinforcement, and social negative reinforcement (see Table 5). Therefore, sex was also included as a covariate.

Lastly, eta correlational analyses were performed to examine the association between multi-level categorical demographic characteristics of the participants (sexual orientation, marital status, ethnicity, and level of education) and the ordinal variables (four ASQ attachment styles and four FASM functions). All eta correlations were small (see Table 6), ranging from $r = .06$, $p = .892$ (between secure attachment style and ethnicity) to $r = .26$, $p = .202$ (between social negative reinforcement and sexual orientation), $r = .26$, $p = .161$ (between social positive

reinforcement and sexual orientation). Therefore, none of the multi-level categorical domestic characteristics were included as covariates.

Table 7 displays for the mean and standard deviation of the two HADS subscales, the four ASQ attachment subscales and the four FASM functions. Pooled and within-group statistics are provided.

Comparing Groups on ASQ Attachment Styles

A one-way MANCOVA with group as the independent variable and the four ASQ attachment styles as the dependent variables was conducted to test the hypothesis that individuals who engage in NSSI will endorse insecure (anxious, avoidant, fearful) attachment styles to a greater degree than those who do not engage in NSSI. HADS-Anxiety and Depression subscale scores, participant's age and sex were included as covariates. Box's M , a test for the assumption of homogeneity of variance-covariance matrices, was found to be significant, $p < .001$. Though the results indicated a violation of the assumption, the multivariate analysis is still considered to be robust if the groups sizes are greater than 30 (Allen & Bennett, 2008), a number that is exceeded substantially in the current study. Nevertheless, Pillai's trace (V) instead of Wilks' lambda (λ) will be reported since the former is more robust to heterogeneous variances (Ates et al, 2019). A significant MANCOVA effect was found, Pillai's trace (V) = .03, $F(4, 652) = 4.20$, $p = .002$, showing a statistically significant difference between the groups on the ASQ attachment styles after controlling for anxiety, depression, and age. The multivariate effect size (η^2) was estimated at 0.025, indicating that 2.5% of the variance in the dependent variable was accounted for by group classification.

The significant multivariate effect was then followed up with four separate ANCOVAs to determine which of the four ASQ attachment styles are accounted for the group differences.

Each ANCOVA was interpreted at $\alpha = .0125$ to keep the overall Type I error rate at .05.

Secure Attachment. An ANCOVA test showed a significant group effect for secure attachment style, $F(1, 699) = 9.13, p = 0.003, \eta_p^2 = 0.013$, Cohen's $d = .23$. The NSSI group mean ($M = 3.32, SD = 0.78$) was lower than the Control group mean ($M = 3.70, SD = 0.70$). In other words, individuals in the NSSI group endorsed secure attachment style to a lesser degree than individuals in the Control group.

Fearful Attachment. No significant difference was found between NSSI ($M = 3.34, SD = 0.90$) and Control ($M = 2.85, SD = 1.00$).

Anxious Attachment. An ANCOVA test showed a significant group effect for anxious attachment style, $F(1, 701) = 8.34, p = 0.004, \eta_p^2 = 0.012$, Cohen's $d = .22$. The NSSI group mean ($M = 3.37, SD = 0.82$) was higher than the Control group mean ($M = 2.83, SD = 0.86$). Therefore, individuals in the NSSI group endorsed anxious attachment style to a greater degree than individuals in the control group.

Avoidant Attachment. No significant difference was found between NSSI ($M = 3.60, SD = 0.60$) and Control ($M = 3.65, SD = 0.58$).

Relationship Between ASQ Attachment Styles and Functions of NSSI

To determine whether the four ASQ attachment styles predicted the four FASM functions, four sets of hierarchical linear regressions were conducted with the four attachment styles as predictor variables, and each of the four functions as the criterion variable. In each regression, participants' age, sex, and HADS-Anxiety and Depression subscale scores were entered as covariates at step 1 to control for their effects, and the four attachment styles were entered as predictors at step 2. The results are reported below.

Criterion FASM-Automatic Negative Function. At step 1, Sex and HADS-Anxiety

contributed significantly to the regression model, $\Delta R^2 = .20$, $F(4, 233) = 14.81$, $p < .001$ (see Table 8). At step 2, adding the four ASQ attachment styles resulted in a significant model, $F(8, 229) = 8.68$, $p = .004$, where ASQ-Anxious and Sex were the two variables making significant contributions to the variance. However, the increment in amount of variance explained from step 1 to step was not significant, $\Delta R^2 = .03$, $F(4, 229) = 2.23$, $p = .066$.

Criterion FASM-Automatic Positive Function. At step one, Sex and HADS-Depression contributed significantly to the regression model, $\Delta R^2 = .16$, $F(4, 229) = 11.25$, $p < .001$ (see Table 9). At step 2, adding the four ASQ attachment styles also resulted in a significant model, $F(8, 225) = 7.73$, $p < .001$, with ASQ-Anxious and Sex making significant contributions to the variance. The increment in amount of variance explained from step 1 to step was significant, $\Delta R^2 = .05$, $\Delta F(4, 225) = 3.69$, $p = .006$.

Criterion FASM-Social Negative Function. At step 1, Sex and HADS-Depression contributed significantly to the regression model, $\Delta R^2 = .09$, $F(4, 231) = 5.82$, $p < .001$ (see Table 10). At step 2, adding the four ASQ attachment styles resulted in a significant model, $F(8, 227) = 2.91$, $p = .004$, with Sex and HADS-Depression as making significant contributions to the variance. The increment in the amount of variance explained from step 1 to step 2 was extremely negligible and not statistically significant, $\Delta R^2 = .00$, $F(4, 227) = .09$, $p = .987$.

Criterion FASM-Social Positive Function. In step 1, entering the four covariates resulted in a significant model, $\Delta R^2 = .07$, $F(4, 229) = 3.98$, $p = .004$. However, none of the covariates contributed significantly to the variance (see Table 11). Adding the four attachment styles at step 2 resulted in a significant model, $F(8, 225) = 2.54$, $p = .012$, and a slight increment in the amount of variance explained which was not statistically significant, $\Delta R^2 = .02$, $F(4, 225) = 1.09$, $p = .363$. None of the variables in step 2 were found to contribute significantly to the

variance in the model.

Supplementary Analysis

Attachment style on the RQ

A chi-square test of independence to determine whether there is an association between the self-identified RQ attachment style and history of NSSI revealed a significant result, $X^2(3, N = 752) = 32.31, p < .001$. In the NSSI group, 145 (40.50%) self-identified as having fearful attachment style, followed by secure attachment style ($n = 91$; 25.42%), then avoidant attachment style ($n = 67$; 18.72%), and lastly anxious attachment style ($n = 55$, 15.36%). In the Control group, 165 (41.77%) self-identified as having secure attachment style, followed by fearful attachment style ($n = 96$; 24.30%), then avoidant attachment style ($n = 85$; 21.52%), and lastly anxious attachment style ($n = 48$, 12.15%). Chi-square tests revealed that individuals in the NSSI group were more likely than the Control group to self-identify as having fearful attachment style ($X^2 [1, N = 753] = 22.65, p < .001$), while individuals in the Control group were more likely to self-identify as having secure attachment style ($X^2 [1, N = 753] = 22.38, p < .001$). There was no significant association between groups and anxious or avoidant attachment style.

Congruence between RQ and ASQ on Primary Attachment Style

The present study assessed whether the participants' self-identified attachment style in RQ was congruent with their primary attachment style on the ASQ. The primary attachment style on the ASQ was identified by individuals' highest score across the four attachment styles. A little over half of the participants (51.66%; $n = 389$) self-identified attachment style on the RQ matched the primary attachment style on the ASQ while the rest did not. A chi-square revealed that there was no significant association between the amount of attachment style mismatches and the two groups; the ability to accurately self-identifying primary attachment style is the same

across both groups.

Relationship Between ASQ Attachment Styles and Characteristics of NSSI

Pearson correlations were performed to examine the relationships between the four ASQ attachment styles, and NSSI characteristics which included number of NSSI methods used, age of NSSI onset (i.e., age of first NSSI incident), number of lifetime NSSI incidents, and the average length of NSSI history across methods (the sum of years one spent engaging in self-harm across methods divided by number of methods used). The result showed that secure attachment style was significantly and negatively correlated with number of NSSI methods used ($r = -.19, p < .001$) and number of lifetime NSSI incidents ($r = -.16, p = .006$), while fearful attachment style ($r = .17, p = .001$) and anxious attachment style ($r = .29, p < .001$) both significantly and positively correlated with the number of NSSI methods used. Point biserial correlations were performed to examine the relationship between the four ASQ attachment styles, and whether participants have ever required medical attention due to NSSI. Fearful attachment style ($r = .12, p = .028$), anxious attachment style ($r = .16, p = .003$), and avoidant attachment style ($r = -.15, p = .004$) significantly correlated with NSSI related medical attention.

To examine the relationship between the NSSI characteristics and the four ASQ attachment styles, four sets of hierarchical linear regression were conducted with the five NSSI characteristics (number of NSSI methods used, number of lifetime NSSI incidents, age of NSSI onset, average length of NSSI history across methods, and medical attention for NSSI) as predictor variables, and each of the four attachment styles as the criterion variable. In each regression, individuals' age, biological sex, and HADS-Anxiety and Depression subscale scores were entered as covariates at step 1 to control for their effects, and the five NSSI characteristics were entered as predictors at step 2. The results are reported below.

Secure Attachment Style. At step 1, HADS-Anxiety and Depression contributed significantly to the regression model, $\Delta R^2 = .28$, $F(4, 285) = 28.05$, $p < .001$. At step 2, adding the five NSSI characteristics resulted in a significant model, $F(9, 280) = 13.30$, $p < .001$, with HADS-Anxiety ($B = -.03$, $SE_B = .01$, $\beta = -.15$, $p = .025$) and Depression ($B = -.08$, $SE_B = .01$, $\beta = -.40$, $p < .001$) making significant contributions to the variance. The change in amount of variance explained from step 1 to step 2, $\Delta R^2 = .02$, $\Delta F(5, 280) = 1.36$, $p = .238$, was not statistically significant.

Fearful Attachment Style. At step 1, HADS-Anxiety and Depression contributed significantly to the regression model, $\Delta R^2 = .25$, $F(4, 280) = 28.05$, $p < .001$. At step 2, adding the five NSSI characteristics yielded a significant model, $F(9, 275) = 10.33$, $p < .001$, with HADS-Anxiety ($B = .08$, $SE_B = .01$, $\beta = .38$, $p < .001$) and Depression ($B = .04$, $SE_B = .02$, $\beta = .17$, $p = .019$) making significant contributions to the variance. The change in the amount of variance explained from step 1 to step 2 was negligible and not significant, $\Delta R^2 = .00$, $\Delta F(5, 275) = 0.22$, $p = .952$.

Anxious Attachment Style. At step 1, Age and HADS-Anxiety contributed significantly to the regression model, $\Delta R^2 = .28$, $F(4, 277) = 26.74$, $p < .001$. At step 2, adding the five NSSI characteristics yielded a significant model, $F(9, 272) = 13.12$, $p < .001$, with HADS-Anxiety ($B = .07$, $SE_B = .01$, $\beta = .37$, $p < .001$) and the average length of NSSI history across methods ($B = -.02$, $SE_B = .01$, $\beta = -.12$, $p = .040$) making significant contributions to the variance. The change in amount of variance explained from step 1 to step 2 was not significant, $\Delta R^2 = .02$, $\Delta F(5, 272) = 1.89$, $p = .097$.

Avoidant Attachment Style. At step 1, none of the covariates made significant contributions to the model, $\Delta R^2 = .03$, $F(4, 279) = 2.31$, $p = .058$. At step 2, adding the five

NSSI characteristics resulted in a significant model, $F(9, 274) = 2.58, p = .007$, with sex ($B = -.22, SE_B = .08, \beta = -.18, p = .003$) and medical attention for NSSI ($B = -.19, SE_B = .06, \beta = -.20, p = .002$) contributing significantly to the variance. The change in variance explained from step 1 to step 2 was significant, $\Delta R^2 = .05, \Delta F(5, 274) = 2.74, p = .019$.

Lastly, in order to examine the relationship between self-identified attachment style and NSSI characteristic, a multinomial logistic regression was performed with self-identified attachment style (RQ) as criterion variables, and five NSSI characteristics as predictor variables. Participants' age, sex, and HADS-Anxiety and Depression subscale scores were entered as covariates. The likelihood ratio chi-square test of the model was significant [$\chi^2(543) = 640.54, p = 0.002$]. Compared to those who self-identified as having a secure attachment style, those who self-identified as having insecure attachment styles scored higher on HADS-Anxiety (fearful: $B = .52, SE_B = .18, p = .005$; anxious: $B = .57, SE_B = .23, p = .013$; avoidant: $B = .66, SE_B = .29, p = .024$).

Relationship Between FASM Functions and NSSI Characteristics

Pearson correlational analyses were performed on the four NSSI reinforcement functions, the number of NSSI methods used, age of NSSI onset, number of lifetime NSSI incidents, and the average length of NSSI history across methods. The result showed that both automatic reinforcements were significantly and positively correlated with number of NSSI methods used (automatic negative: $r = .49, p < .001$; automatic positive $r = .48, p < .001$), number of lifetime NSSI incidences (automatic negative: $r = .27, p < .001$; automatic positive $r = .34, p < .001$), and the average length of NSSI history across methods (automatic negative: $r = .14, p = .035$; automatic positive $r = .19, p = .003$). Both social reinforcements were significantly and positively correlated with the age of NSSI onset (social negative: $r = .17, p = .007$; social

positive $r = .18, p = .005$).

Point biserial correlational analyses were performed to examine the relationship between the four FASM functions, and whether participants have ever required medical attention due to NSSI. All four functions were significantly and positively correlated with medical attention due to NSSI (automatic negative: $r = .20, p = .001$; automatic positive $r = .19, p = .003$; social negative: $r = .31, p < .001$; social positive $r = .37, p < .001$)

To examine the relationship between the NSSI characteristics and the four FASM functions, four sets of hierarchical linear regression were conducted with the five NSSI characteristics (number of NSSI methods used, number of lifetime NSSI incidents, age of NSSI onset, average length of NSSI history across methods, and medical attention for NSSI) as predictor variables, and each of the four functions as the criterion variable. For each regression, participants' age, sex, and HADS-Anxiety and Depression subscales scores were entered as covariates at step 1 of the regression to control for their effects, and the five NSSI characteristics were entered as predictors at step 2 of the regression. The results are reported below.

Automatic Negative Reinforcement. At step 1, Sex and HADS-Anxiety contributed significantly to the regression model, $\Delta R^2 = .16, F(4, 186) = 8.77, p < .001$. At step 2, adding the five NSSI characteristics resulted in a significant regression model, $F(9, 181) = 9.55, p < .001$, with Sex ($B = .37, SE_B = .13, \beta = .19, p = .004$) and number of NSSI methods used ($B = .21, SE_B = .05, \beta = .31, p < .001$) making significant contributions to the variance. The increment in variance from step 1 to step 2 was significant, $\Delta R^2 = .16, F(5, 181) = 8.72, p < .001$.

Automatic Positive Reinforcement. At step 1, none of the covariates made significant contributions to the model, $\Delta R^2 = .13, F(4, 182) = 7.06, p < .001$. At step 2, adding the five

NSSI characteristics resulted in a significant regression model, $F(9, 177) = 11.08, p < .001$. The significant contributors to the variance were age ($B = -.02, SE_B = .01, \beta = -.21, p = .004$), the number of NSSI methods used ($B = .17, SE_B = .04, \beta = .32, p < .001$), age of NSSI onset ($B = .02, SE_B = .01, \beta = .17, p = .012$), number of lifetime NSSI incidents ($B = .001, SE_B = .00, \beta = .17, p = .017$), and the average length of NSSI history across methods ($B = .02, SE_B = .01, \beta = .21, p = .008$). The change in variance from step 1 to step 2 was significant, $\Delta R^2 = .23, F(5, 177) = 12.50, p < .001$

Social Negative Reinforcement. At step 1, sex contributed significantly to the regression model, $\Delta R^2 = .10, F(4, 186) = 5.28, p < .001$. At step 2, adding the five NSSI characteristics revealed a significant regression model, $F(9, 181) = 5.21, p < .001$. Age of NSSI onset ($B = .01, SE_B = .01, \beta = .15, p = .042$), and medical attention for NSSI ($B = .24, SE_B = .07, \beta = .25, p = .001$) contributed significantly to the variance. The change in variance from step 1 to step 2 was significant, $\Delta R^2 = .10, \Delta F(5, 181) = 4.73, p < .001$

Social Positive Reinforcement. At step 1, the regression model was significant, $F(4, 182) = 3.36, p = .011$, although none of the covariates contributed significantly to the variance. At step 2, adding the five NSSI characteristics resulted in a significant model, $F(9, 177) = 7.20, p < .001$, with age of NSSI onset ($B = .02, SE_B = .01, \beta = .18, p = .010$), and medical attention for NSSI ($B = .36, SE_B = .07, \beta = .38, p < .001$) being the significant contributors. The change in variance from step 1 to step 2 was significant, $\Delta R^2 = .20, \Delta F(5, 177) = 9.63, p < .001$.

Discussion

The objective of the present study was to investigate the relationship between attachment styles (secure, fearful, anxious, and avoidant) and the reinforcement pathways (automatic negative, automatic positive, social negative, and social positive) that underlie nonsuicidal self-

harm (NSSI) behaviours among adults in the general community. Participants were categorized into either the NSSI or Control group. Those in the NSSI group had engaged in at least one NSSI act in their lifetime whereas those in the Control group had no NSSI history.

The two groups differed in a number of ways. The NSSI participants were younger, and more likely to be women. They were also more likely to have a history of accessing mental health services, and to be currently receiving mental health care, have a mental health diagnosis, and take prescribed medication for mental health reasons. They reported more severe levels of anxiety and depression, and were more likely to meet the criterion for definite presence of anxiety and depression disorders. Finally, the NSSI group was also more likely to have suicidal ideation (lifetime and within the past 12 months) and suicidal attempts (lifetime and within the past 12 months). In sum, individuals in the NSSI group were generally facing more challenges in their mental health than the Control group.

The findings of differences between the two groups are consistent with previous research. Although some studies have found that men and women are similar with respect to the number of episodes, duration of NSSI history, or number of different methods used (Briere & Gil, 1998; Gratz, 2001; Klonsky, 2011; Nock et al., 2006; Whitlock et al., 2006), other studies have reported that women are more likely than men to have a history of NSSI (Madge et al., 2008; Ross & Heath, 2002). The finding of the present study supported sex differences as more women were found in the NSSI group than the Control group. Additionally, NSSI has been linked to many disorders, such as substance abuse disorders, eating disorders, posttraumatic stress disorder and affective disorders (Briere & Gil, 1998; Ford & Gómez, 2015; Herpertz, 1995; Kleespies et al., 2011; Kuipers et al., 2016; Langbehn & Pfohl, 1993; Nocks et al., 2006; Stanley et al., 2001; Weierich & Nock, 2008; Zlotnick et al., 1999). Therefore, it is not

surprising that individuals in the NSSI group were more likely to require mental health services and have mental health diagnoses than the Control group. Lastly, research has found a high co-occurrence between NSSI and suicide (Andover & Gibb, 2010; Brausch & Gutierrez, 2010; Bebbington et al., 2010; Hilt et al., 2008; Wilcox et al., 2012; Whitlock & Knox, 2007). The present study also found that individuals in the NSSI group were more likely than the Control group to have suicidal ideation and suicide attempts, both in their lifetime and in the past 12 months.

In an effort to prevent group differences in influencing the results of the present study, the participants' age, sex, anxiety, and depression levels were controlled for in the data analyses. The primary study findings are discussed below.

NSSI Behaviour

The most common self-harm methods reported in the present study were cutting, scratching, and sticking pins or sharp objects into the body; the findings generally aligned with previous studies (Klonsky & Muehlenkamp 2007; Nock, 2010; Nock & Prinstein 2004). On average, participants used 2.36 methods to self-harm, which supported the previous finding that many individuals reported using more than one method to self-harm (Gratz, 2001; Nock, 2010; Whitlock et al., 2008). The mean age for the first act of self-harm across all method was 16.17, which was slightly older than previously reported 12-15 years old (Ammerman et al., 2018; Hawton et al., 2012; Klonsky et al., 2014; Klonsky & Muehlenkamp, 2007). Since the present study recruited adults, it is possible that the discrepancy between the present study and the literature on age onset may be the product of errors related to recalling distance memories; participants may have a harder time recalling when they started self-harming. The present study also found a wide range of onset age across different methods, ranging from 13.59 to 20.33

years old. Overall, even though the age of onset in the current study fall on the older side compared to the literature, the age range corresponds to adolescence and emerging adulthood. Significant cognitive, social and physical changes occur during this time of development, making individuals more vulnerable to mental health issues, including the engagement of NSSI. Different age onset of NSSI observed in the present study is potentially related to the choice of NSSI methods. For example, a study conducted by Ammerman and colleagues (2018) found a relationship between NSSI age of onset and NSSI behaviours; in particular, those who started to engaged in NSSI younger reported greater NSSI frequency, using more NSSI methods, and having more NSSI-related hospital visits. However, this is beyond the present study's scope and may require future studies to examine the link between the age of onset and NSSI methods more closely.

Attachment Styles

Attachment style represents the relationship pattern that was developed through time and repetitive interactions between the child and the caregiver (Bowlby, 1969). Attachment style not only represents the quality of the relationship between the child and the caregiver, it also influences the relationships the child will have with others in his or her social environment through all stages of life (Bowlby, 1969). Four types of attachment styles have been identified (secure, fearful, anxious and avoidant), and they can be thought of as reflecting two internal dimensions: the self-model, and the other-model (Bartholomew & Horowitz, 1991; Bowlby, 1969, 1973). Secure attachment style consists of positive self- and positive other-model, with fearful attachment style being its opposite with negative self- and negative other-model. Anxious attachment style consists of negative self- and positive other-model, while avoidant attachment style is the opposite, with positive self- and negative other-model.

All participants answered the ASQ and the RQ to determine their attachment styles. Both questionnaires examined four attachment styles. The ASQ allowed the present study to see the degree to which a participant endorsed the four attachment styles, whereas RQ allowed the participant to self-identify their primary attachment style.

Associations Among the Attachment Styles

Using the scores obtained by ASQ, the present study found that secure attachment style is negatively associated with all three insecure attachment styles (fearful, anxious, and avoidant); a person with a high score on secure attachment style is likely to obtain low scores for insecure attachment styles. Fearful attachment style was found to be positively associated with anxious and avoidant attachment styles; a person who scored high on fearful attachment styles is also likely to score high on anxious and avoidant attachment styles. Lastly, anxious and avoidant attachment styles were negatively associated with each other; in other words, a person who obtained a high score on anxious attachment style is likely to have a low score for avoidant attachment style, and vice versa.

As secure attachment style consists of positive self- and positive other-model, there was no surprise that secure attachment style is the opposite of fearful (negative self- and negative other-model), anxious (negative self- and positive other-model), and avoidant (positive self- and negative other-model) attachment style. On the other hand, fearful attachment style (negative self- and negative other-model) is naturally linked with anxious and avoidant attachment styles since the former consists of negative self-model, and the latter has a negative-other model. Lastly, anxious and avoidant attachment styles were negatively associated with each other, which can be explained by the fact that anxious and avoidant attachment styles have the exact oppositional self- and other-model. In sum, the results of the present study reflected the construct

of self- and other-model in attachment styles; the findings were aligned with previous studies.

Group Differences in Attachment Styles

The responses on the ASQ indicated partial support for the first hypothesis which stated that the NSSI group would endorse anxious and avoidant attachment styles to a greater degree than the Control group. A more anxious attachment style was associated with the NSSI group which is congruent with previous findings (Braga & Gonçalves, 2014; Critchfield et al., 2008; Gormley & McNiel, 2010; Kharsati & Bhola, 2016; Kimball & Diddams, 2007; Levesque et al., 2010; Stepp et al., 2008; Wrath & Adams, 2019). No group differences were found with respect to the avoidant attachment style. The NSSI group also reported having less secure attachment styles than the Control group.

Overall, the study results were consistent with previous research, stressing the influential role of anxious attachment style in the development of NSSI behaviours. The results of the study also supported structure of self-model and other-model of attachment styles. Extending upon the construct of attachment style, as individuals in the NSSI group were more likely to report endorsing anxious attachment style consisting negative self-model, the results suggest that a negative self-model may be the risk factor to the development of NSSI. Meanwhile, a positive self-model (e.g., secure attachment style) may be a protective factor from NSSI. According to Griffin and Bartholomew (1994), individuals with a positive self-model often have a positive sense of self-worth, whereas individuals with negative self-model often experience feelings related to self-blame. This literature review showed that self-punishment, which is related to self-blaming, is the second most endorsed reason for NSSI (Klonsky, 2007). Researchers have linked these self-diminishing thoughts to adverse childhood, where many individuals blame themselves for the painful experience they've lived through as a child; the

feeling of self-blame may accumulate into self-punishing acts of NSSI (Allen, 1995; Shapiro, 1987). In other words, individuals' self-model might be one predictor for the development of NSSI. More studies are needed to establish the relationship between negative self-model and NSSI.

Past research has linked adverse childhood experience with the development of insecure attachment styles and NSSI (van der Kolk et al., 1991; Gratz et al., 2002). For instance, one study found that childhood physical abuse is associated with adult avoidant attachment to a greater degree than anxious attachment style (Unger & De Luca, 2014). Two other studies found that childhood emotional abuse is associated in particular with anxious and fearful attachment styles (Riggs & Jacobvitz, 2002; Riggs & Kaminski, 2010). In other words, different adverse childhood experiences might have different impact on the development of attachment styles. Combining the past findings with the results of the present study, it is possible that those who suffered from emotional abuse as a child will have a harder time regulating their emotions, which lead to the development of both anxious attachment style, and using NSSI as a maladaptive coping strategy. However, as the current study did not inquire about participants' adverse childhood experience, the establishment of such association will have to be examined in future studies.

The present study also looked at self-identified attachment style by asking participants to indicate which of the four attachment styles described in the RQ best characterizes their primary attachment style. Individuals in the NSSI group were more likely than the Control group to self-identify as having fearful attachment style. In contrast, individuals in the Control group were more likely to self-identified as having secure attachment style. The two groups did not differ in anxious or avoidant attachment style.

Thus, both the RQ and the ASQ showed the NSSI group to have a less secure attachment style than the Control group. However, NSSI was linked to a fearful attachment style on the RQ and to an anxious attachment style on the ASQ. This discrepancy in findings between RQ and ASQ led to an examination of congruency between the two attachment style questionnaires.

Congruence between the RQ and ASQ on Primary Attachment Style

The examination of congruence between RQ and ASQ was carried out by looking at the primary attachment style: individual's highest score in ASQ, and the self-identified attachment style on RQ. Only half of the participants' self-identified attachment styles on the RQ matched the primary attachment style indicated by the ASQ, and there was no significant difference in the degree of congruency between the two groups.

The fact that only half of the participants' self-identified attachment styles on the RQ matched the primary attachment style indicated by the ASQ was unexpected. When the ASQ was developed, its author examined the construct validity and found it to correlate highly with RQ (Hofstra, 2009). However, since the present study used the RQ solely to identify the participants' self-identifying primary attachment style instead of relying on the respondents' self-ratings across the four attachment styles, the present study could not examine the correlation between RQ and ASQ.

It is possible that the discrepancy could have arisen from the manner that the primary attachment style was assessed. The RQ, as used in the present study, adopted a qualitative approach where the participants read narrative descriptions of four attachment styles and were forced to choose one as their primary style. In contrast, the ASQ adopted a quantitative approach where the primary attachment style was determined by the style with the highest score. A difference of one point or less between two competing styles would have resulted in a different

outcome. Whether the RQ or the ASQ serves as a better tool to assess primary attachment styles in future studies is open to question. Both have been tested psychometrically. The RQ is more widely used because it is an older scale whereas the ASQ is more recent addition to the field. The ASQ is reported to be highly correlated with the RQ (Hofstra, 2009). Perhaps had the RQ been used in present study with its rating scale where the participants could indicate the degree to which each style applied to them, the discrepancy between RQ and ASQ might have been smaller in magnitude.

Attachment Style and Functions of NSSI

Attachment styles have been linked to mood disorders and different emotional regulation strategies. Mikulincer and colleagues (2003) suggested that individuals with anxious attachment styles tend to use hyper-activating strategies to elicit support, care, and attention of others as a way to help regulate their emotions. In contrast, individuals with avoidant attachment often use deactivating strategies to avoid closeness and intimacy and emphasize self-reliance and independence as their emotion regulation strategies. Therefore, the present study predicted that those with anxious attachment styles would be more likely to engage in social positive reinforcement (hypothesis 2), and those with avoidant attachment style would be more likely to engage in social negative reinforcement (hypothesis 3). Neither hypothesis was supported. Rather, the findings indicated that more anxious attachment style was associated with greater use of automatic negative and automatic positive reinforcement functions. In other words, individuals with anxious attachment were more likely to engage in NSSI to regulate their internal affective state, either to reduce negative internal states (automatic negative function) or to induce a desired internal state (automatic positive function). It was surprising that neither anxious nor avoidant attachment style relate to either social reinforcement functions of NSSI.

Social reinforcement functions of NSSI might be linked to factors other than attachment style, e.g., sex and depression. Although both sex and depression were treated as confounding variables in the analyses, sex was shown to be significantly associated with automatic negative function, automatic positive function, and social negative function; depression was found to be significantly linked to social negative function. Thus, women and those with an anxious attachment style were associated with the endorsement of NSSI automatic positive and negative reinforcement, while men and those with depression symptoms were associated with the use of NSSI social negative reinforcement. These results underscore the potential role that sex and psychiatric status might have in the reasons individuals engage in NSSI, and suggest the need for future investigations to be undertaken in this area.

Other Findings

Attachment Style, Anxiety, and Depression

Insecure attachment styles have been found to be a general risk factor for psychopathology; mainly, insecure attachment is linked to depression and anxiety symptoms (Marganska et al., 2013; Stepp et al., 2008). All three insecure attachment styles (fearful, anxious, and avoidant) have been related to depressive and anxious symptoms (Marganska et al., 2013; Pianta, et al., 1996; Ross & Heath, 2002; Simonelli et al., 2004). Between the three insecure attachment styles, individuals with anxious and fearful attachment styles reported more depressive symptoms than those with secure and avoidant attachment styles (Simonelli et al., 2004). With respect to anxiety, individuals with fearful, anxious, and avoidant attachment styles reported more anxiety symptoms than securely attached individuals (Simonelli et al., 2004).

The present study found similar results. The results revealed that participants who scored higher on fearful and anxious attachment styles reported feeling more anxious and depressed.

Participants who scored higher on secure and avoidant attachment styles reported feeling less anxious. Participants who scored higher on secure attachment style also reported feeling less depressed. The present study confirmed that attachment styles are associated with individuals' depressive and anxious symptoms. Since individuals with a greater inclination towards insecure attachment are more likely to experience anxiety and depression, these individuals have more occasions to moderate their emotions therefore putting them at greater risk than those with secure attachment for engaging in maladaptive emotional regulation strategies. In particular, those with anxious and fearful attachment styles are at greater risk for anxiety and depression, and therefore may have a more significant risk to engage in maladaptive emotional regulation strategies like NSSI.

Attachment Styles and NSSI Characteristics

The present study examined the relationships between the four attachment styles and five NSSI characteristics, i.e., number of NSSI methods used, number of lifetime NSSI incidents, age of NSSI onset, average length of NSSI history across methods, and whether medical attention was sought for the NSSI acts. Data showed no significant relationships except that those with more anxious attachment style reported a shorter length of NSSI history, and those with more avoidant attachment style were less likely to seek medical attention for their self-harm. The study found significant covariate effects: those with more secure attachment reported less depression, those with more anxious attachment reported more anxiety, and those with more fearful attachment reported more depression and more anxiety. This is in line with research showing that secure attachment is linked to better psychological functioning whereas insecure attachment (which includes anxiety and fearful attachment styles) are linked to more psychological symptoms (Kemp & Neimeyer, 1999; Marganska et al., 2013). Finally, the

avoidant attachment style was linked more strongly to men than women, which is not surprising in view of previous works that linked the male gender role to avoidance of attachment and intimacy (Mahalik et al., 2001; O'Neil et al., 1995)

NSSI Functions and NSSI Characteristics

The present study examined the links between the four NSSI functions and five NSSI characteristics. It was found that those who used NSSI for automatic negative reinforcement reasons (e.g., to reduce psychological pain) used more NSSI methods. It is possible that different methods bring about different levels of stimulation, and therefore individuals are more likely to use multiple methods to regulate their emotions to reach the optimal result.

As well, those who endorsed automatic positive reinforcement reasons (e.g., to elicit desired sensations) reported an older age of onset, employed more methods, had a higher number of incidents, and had engaged in NSSI for a longer period of time. All these suggest a more severe NSSI history. One potential hypothesis is whether trying to induce a desired state of internal affect is more challenging than trying to alleviate existing internal psychological pain, and that this contributes to a more severe NSSI presentation.

Finally, those who used NSSI for either social negative (e.g., to avoid social closeness with other) or social positive (e.g., to draw attention from others) reinforcement reasons reported an older age of onset and medical intervention for at least one of their self-harm incidents. The findings relating to social positive reinforcement brings to mind the phenomenon of social contagion. Literature review has listed social contagion as one of the biggest risk factors in the development of NSSI (Jarvi, 2013). Individuals often started engaging in NSSI after observing their close friends engaging in self-harming behaviours; they are also more likely to identify with their peers. In other words, these individuals engaged in NSSI purely for its social functions.

Since the desired outcomes of their NSSI are related to eliciting reactions of others, they are more likely to cause more severe wounds that require medical attention, or presenting their wounds to others (e.g., going to the hospital) to fulfill their social needs. However, not all social positive reinforcement reasons are linked to social contagion. Some individuals might undertake NSSI to express their internal psychological pain and subsequently engage interpersonally with others.

Impact of COVID-19

The present study was conducted during a global pandemic. The time of the data collection coincided with the first phase of lockdown in Canada and the United States (May-June, 2020). Policies related to lockdown included country borders closed down and implementation of various public health laws (e.g., mandatory facemasks, limited amount of person for indoor gathering) to cease the spread of the disease, although the type and extent of public health actions varied greatly between countries and regions.

With the extremely high infection rate and relatively high mortality, it is only natural for people to worry about the COVID-19 Corona virus. Excessive fear and apprehension about the spread of infection can cause acute stress, anxiety, and depression in vulnerable individuals, leading to an increase in self-harm behaviours (Sahoo et al., 2020). In particular, prolonged periods of social isolation, fear of unemployment, economic loss due to lockdown, death of family members and significant others have been proposed to be risk factors of self-harm behaviours during the pandemic (Sahoo et al., 2020).

To better contextualize the present study, a COVID-19 mental health questionnaire was created to understand how the pandemic has impacted participants' mental health and NSSI behaviours. The result showed that participants in the two groups did not differ in the degree of

how their mental health was impacted by the pandemic. However, compared to the Control group, those in the NSSI group reported experiencing a greater increase in perceived stress and a greater decrease in hopefulness for the future from before to during the pandemic. Even so, the two groups did not differ in the degree to which they perceived the impact that the pandemic had on their mental health or in different areas of their lives (e.g., physical functioning, health of the family, etc.).

The impact of the COVID-19 pandemic on NSSI behaviours was also explored. About half of the NSSI participants reported no change to their desire to engage in NSSI, while a little under a fifth reported stronger desire and a little more than a quarter reported weaker desire. There were 40 participants who reported that they had engaged in self-harm during the pandemic. Half of them reported an increase in the frequency of self-harm, about a third reported no change, and about one sixth reported a decrease in the frequency of self-harm. Almost all the participants who had self-harmed during the pandemic reported that they did so for the same reasons that they engaged in self-harm prior to the pandemic. Lastly, more than half reported no change in the number of methods used, the severity of injuries, time spent thinking about self-harm before engaging in the act (a proxy for impulsivity), or the degree of the desired outcome from the self-harm behaviours.

Overall, the COVID-19 pandemic seems to have limited impact on the presentation of NSSI behaviours aside from increased frequency of self-harm in about half of the NSSI respondents. As the present study was conducted during start of the first phase of lockdown in Canada and the United States (May-June, 2020), the impact of COVID-19 might not have fully set in at the time of the data collection. Additionally, the relatively small sample size ($n = 40$) of those reported that they have engaged in NSSI since the start of the pandemic might not be an adequate

representation of those who self-harmed since the lockdown started, thereby limiting the generalizability of the results.

Summary and Conclusions

Findings from the present study showed that those with a history of self-harm (NSSI group) endorsed anxious attachment style to a greater degree than those who had never engaged in self-harm (Control group). In contrast, the Control group endorsed secure attachment style to a greater degree than the NSSI group. Those with anxious attachment reported that they engaged in NSSI for reasons related to automatic negative reinforcement and automatic positive reinforcement, indicating that self-harming among these individuals serves an emotional regulation purpose. Anxious attachment style also predicted shorter length of NSSI history while avoidant attachment style predicted less likelihood to seek medical attention for the self-harm acts. Those who engaged in NSSI for emotional regulation reasons (automatic positive and negative reinforcement) indicated using more NSSI methods. Notably, those who endorsed automatic positive reinforcement reasons seem to have a more severe NSSI history characterized by higher number of NSSI incidents and longer length of NSSI history; they also reported a later age of onset. Both social positive and negative reinforcement functions were linked to later age of onset and NSSI severity as indicated by a need for medical attention from the self-harm acts. Besides anxious attachment, sex was found to be another critical factor to consider while predicting the function of NSSI. Women and those with anxious attachment style were more likely to endorse NSSI automatic positive and negative functions, while the men and those with depression were more likely to endorse NSSI social negative functions. Overall, the findings point to the importance of anxious attachment style in predicting the reasons for nonsuicidal self-harm.

Strengths and Limitations

The present study is the first to examine adult attachment style and NSSI behaviours in an adult non-clinical population. The sample was recruited from the general community instead of university students, which increases the generalizability of the findings to the population. The study had an adequate sample size with near equal number of participants in both groups. A screening test (the infrequency scale) was employed to screen out participants who were not paying attention to ensure the data's quality. The measures used in the study had been tested psychometrically, and subscales in the measures showed decent internal consistency. The present study examined all aspects of NSSI and attachment styles, and is the first to examine the function of NSSI with attachment styles.

The interpretations of the findings have to be kept with a few limitations in mind. First of all, the present study was conducted during the COVID-19 pandemic. Though the study provides unique insights into mental health, NSSI behaviours, and its relationship with attachment styles during the pandemic, the study results might not be generalized to a time outside of the pandemic. In particular, the NSSI group perceived greater stress, and feeling less hopeful for that future than the Control group. However, the impact of the pandemic on the psychological functioning of the participants seem to be minimal given that data collection was carried out soon after the first pandemic lockdown began. The study results might not be generalized to other periods of time during the pandemic as the present study was conducted in the relatively early phase of COVID-19. Participants' mental health, as well as NSSI presentation, might be more severely impacted as the pandemic continues.

The second limitation of the present study would be related to participant recruitment. The majority of our participants were from MTurk, which past literature has pointed out that

participants recruited through MTurk tend to be around 30-year-old, highly educated, underemployed, less religious, and more liberal than the general population (Berinsky et al., 2012; Paolacci et al., 2010; Shapiro et al., 2013). It is possible that participants from MTurk may be less affected by the pandemic since being older and more educated may result in higher job security during the pandemic. Participants who were unemployed before the pandemic may also experience less impact since they would not have to worry about losing their jobs. A study found that across the 17 countries that participated in the World Health Organization world mental health survey, individuals' age, sex, income, and education level influence their access to mental health services (Wang et al., 2007). In particular, individuals in the middle years of their life, women, and those with higher education are more likely to access mental health services. Therefore, MTurk workers' characteristics may also mean that they are less likely to engage in self-harm since they may have more knowledge and resources regarding mental health, and they are more likely to access mental health services when needed. If such is true, self-harming behaviours, as well as the impact of COVID-19 on mental health, might be more severe in other segments of the community than indicated by the findings of the present study.

Another potential criticism is the use of the COVID-19 mental health questionnaire that was created for the present study. At the time of data collection, there were no published COVID-19 questionnaires that could have been used. Since then, there are two validated scales that measure the impact of COVID-19 on mental health: the Fear of COVID-19 Scale (Ahorsu et al., 2020) and the COVID Stress Scales (Taylor et al., 2020). Both of the scales have been validated; the Fear of COVID-19 Scale has also been translated and validated across several countries and populations (Bitan et al., 2020; Martínez-Lorca et al., 2020; Pang et al., 2020; Perz et al., 2020; Reznik et al., 2020; Sakib et al., 2020; Soraci et al., 2020). However, neither

questionnaire looks at the change in mental health or NSSI behaviours before and during the pandemic. To the best of the author's knowledge, there is no validated COVID-19 questionnaire that focuses on NSSI behaviours at this time. Therefore, even though this study used an untested questionnaire to explore the impact of COVID-19, the questionnaire captured the essence of change in the studied population, which helped to contextualize the findings of the current study. Nevertheless, future studies that wish to take a closer look at participants' fear and stress level during the pandemic are still recommended to use psychometrically sound and validated tools like the Fear of COVID-19 Scale (Ahorsu et al., 2020) or the COVID Stress Scales (Taylor et al., 2020).

Another limitation of our study would be related to the use of HADS to measure the severity of anxiety and depression symptoms. The HADS is a short self-report questionnaire that has been proven to have excellent psychometric properties. However, HADS does not cover all of the diagnostic criteria of DSM-5 for anxiety nor depression. One review study revealed that the HADS scale covers 50% of the DSM-5 diagnosis criteria of anxiety; the scale misses items that assess fatigue, concentration, irritability, and sleep disturbances (Shunmugasundaram et al., 2020). As to depression, HADS only covers 42% of the DSM-5 diagnosis criteria of depression; the scale misses items that assess change in weight, change in sleep, feelings of worthlessness/guilt, indecisiveness, suicidal ideation, concentration and appetite. Therefore, it is no longer suitable to use HADS to indicate whether an individual has anxiety or depression disorder. However, the present study only used HADS to assess the severity of study participants' anxiety and depression symptoms, not for diagnostic purposes; the misalignment with DSM-5 criteria does not impact the present study's results. Nevertheless, future studies may want to use a more up-to-date instrument; for instance, the Zung Self-rating

Depression and Zung Self-rating Anxiety Scales have good content coverage of the DSM-5 diagnostic criteria while exhibiting excellent psychometric properties (Shunmugasundaram et al., 2020).

Another limitation of the present study is related to the fact that participants of the study were recruited exclusively from Canada and the United States, which are largely individualistic societies. This renders the findings of this study potentially inapplicable to collectivistic societies. For instance, studies conducted in collectivistic societies have shown that NSSI behaviour is not primarily endorsed for automatic functions, but rather for social functions (Gholamrezaei et al., 2015; Jamil, 1990). Attachment styles are also susceptible to cultural differences, and what is considered to be a healthy form of attachment varies (Rothbaum et al., 2000; Wang & Mallinckrodt, 2006). For example, Taiwanese (an Eastern and collectivistic society) viewed avoidant adult attachment as more ideal than their U.S. counterparts who favour secure attachment (Wang & Mallinckrodt, 2006). Therefore, even though the present study found that secure attachment style to be negatively related to NSSI or that NSSI behaviours are related to emotion regulation, the findings might not be generalizable to non-Western, collectivistic societies.

Directions for Future Research

Since the present study found a significant relationship between anxious attachment style and NSSI, future studies could further examine factors that may explain the association. A potential candidate could be the negative self-model as a risk factor in NSSI and a positive self-model as a protective factor. Even though past literature has linked adverse childhood experiences with the development of NSSI and insecure attachment style, the present study did not inquire about participants' past history. Therefore, the study results can only be inferred from

participants' presentation of attachment styles and NSSI behaviours, not its relation to past childhood experience. Future research could include questionnaires that examine participants' adverse experiences in their childhood. For instance, the Adverse Childhood Experiences International Questionnaire (ACE-IQ; World Health Organization, 2018) is a tool that measures adverse childhood experience in all countries, covering all possible negative experience including family dysfunction; physical, sexual and emotional abuse and neglect by parents or caregivers; peer violence; witnessing community violence, and exposure to collective violence. Past studies have found that different adverse childhood experiences may lead to the development of different insecure attachment styles. Including measurements such as ACE-IQ allows researchers to examine the relationship between various types of adverse childhood experiences, insecure attachment styles, and NSSI behaviours and functions. Such investigations will not only further the understanding of the development of insecure attachment style, but also the functions and presentation of NSSI behaviours. Future studies could also look into factors that might be more specifically related to the engagement of NSSI, including individual's degree of body protection, and their NSSI social contagion history.

The present study did not identify any factors that would explain the use of NSSI for reasons related to social positive reinforcement. Much of the NSSI literature has focused on emotion regulation (automatic positive and negative reinforcement). Consequently, social reinforcement functions have been overlooked. Social contagion of NSSI among peers may be one fruitful avenue to pursue.

Sex turned out to be an influential factor in predicting the function of self-harm in the current study. In particular, women are more likely to engage in NSSI for reasons related to automatic functioning. Future research may want to look into the association between sex,

emotion regulation, and NSSI.

Even though the present study did not distinguish the Canadian data from that obtained from the United States because the two countries share many similarities in their culture, politics, and economics, Canada does provide its residents with universal health insurance whereas the United States does not. Blendon and colleagues (2002) compared health care systems across five English-speaking countries (Australia, Canada, New Zealand, the United Kingdom, and the USA). They found that low-income USA residents reported more problems obtaining care than the other four countries. Their study also found that due to universal health insurance in Canada, socioeconomic inequalities in health care are less stark in Canada compared to the United States. Similarly, Lasser and colleagues (2006) found that United States residents are less able to access care than are Canadians; they are less likely to have a regular doctor, more likely to have unmet health needs, and less likely to go for needed treatment. Therefore, future studies may be interested in looking into the differences in NSSI presentation across the two countries, especially in their help seeking behaviours.

Lastly, future research should examine attachment style and the function of NSSI across different countries, various cultures and at multiple time points. As previously mentioned, both attachment style and the function of NSSI are culturally sensitive. The current study only revealed a snapshot of the relationship between attachment style and NSSI function in Canada and the United States during the first phase of lockdown during the COVID-19 pandemic. More studies are needed to unveil the whole picture, and it can only be achieved by conducting multiple research across the world under various times and conditions.

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Table 1
Sample Characteristics

Sample Characteristic	NSSI Group (<i>n</i> =358)	Control Group (<i>n</i> =395)	Pooled (<i>N</i> =753)
Age (years)			
<i>M</i> (<i>SD</i>)	33.55 (11.00)	38.24 (13.49)	36.01 (12.58)
Range	18-73	18-82	18-82
Unknown ^a	1	-	1
Sex (%)			
Male	156 (43.58)	211 (53.42)	367 (48.74)
Female	201 (56.15)	184 (46.58)	385 (51.13)
Unknown ^a	1 (0.27)	-	1 (0.13)
Sexual Orientation (%)			
Straight	267 (74.58)	348 (88.10)	615 (81.67)
Gay/ Lesbian	14 (3.91)	6 (1.52)	20 (2.66)
Bisexual	45 (12.57)	15 (3.80)	60 (7.97)
Other ^b	11 (3.07)	2 (0.51)	13 (1.73)
I don't know/ prefer not to say	7 (1.96)	7 (1.77)	14 (1.86)
Unknown ^a	14 (3.91)	17 (4.30)	31 (4.11)
Ethnicity (%)			
White, not of Hispanic origin	262 (73.18)	276 (69.87)	538 (71.45)
Black, not of Hispanic origin	25 (6.98)	28 (7.09)	53 (7.04)
Latino or Hispanic	6 (1.68)	13 (3.29)	19 (2.52)
East Asian	17 (4.75)	38 (9.62)	55 (7.30)
South Asian or South East Asian	18 (5.03)	28 (7.09)	46 (6.11)
Other ^c	6 (1.68)	5 (1.27)	11 (1.46)
Mixed	24 (6.70)	7 (1.77)	31 (4.12)
Marital Status (%)			
Single	141 (39.39)	130 (32.91)	271 (35.99)
Cohabiting/ Common-law	44 (12.29)	27 (6.84)	71 (9.43)
Married	147 (41.06)	208 (52.66)	355 (47.14)
Other ^d	26 (7.26)	30 (7.59)	56 (7.44)
Highest Education Achieved (%)			
Grade 8 or earlier	5 (1.40)	5 (1.27)	10 (1.33)
High school	70 (19.55)	53 (13.42)	123 (16.33)
College or trade school	53 (14.80)	58 (14.68)	111 (14.74)
Undergraduate degree	170 (47.49)	199 (50.38)	369 (49.00)
Graduate degree (MA/ PhD)	60 (16.76)	80 (20.25)	140 (18.60)

Note. NSSI = Non-suicidal self-injury.

^a number of participants who did not respond to the question; ^b Self-identified as asexual, demisexual, pansexual, or queer; ^c Self-identified as Native Americans, Pacific Islanders, or West Asian; ^d Self-identified as separated, divorced, or widowed.

Table 2
Participants' Mental Health Presentation

Mental Health Presentation	NSSI Group (<i>n</i> =358)	Control Group (<i>n</i> =395)	Pooled (<i>N</i> =753)
Received mental health assistance (%)			
Past			
No	165 (46.09)	301 (76.20)	466 (61.89)
Yes	193 (53.91)	93 (23.54)	286 (37.98)
Unknown ^a	-	1 (0.26)	1 (0.13)
Present			
No	284 (79.33)	365 (92.41)	649 (86.19)
Yes	73 (20.39)	29 (7.34)	102 (13.55)
Unknown ^a	1 (0.28)	1 (0.25)	2 (0.26)
Current Mental Health Diagnosis (%)			
No	221 (61.73)	340 (86.08)	561 (74.50)
Yes	136 (37.99)	52 (13.16)	188 (24.97)
Unknown ^a	1 (0.28)	3 (0.76)	4 (0.53)
Currently Taking Prescribed Medication for Mental Health (%)			
No	264 (73.74)	349 (88.35)	613 (81.41)
Yes	91 (25.42)	43 (10.89)	134 (17.80)
Unknown ^a	3 (0.84)	3 (0.76)	6 (0.79)
Lifetime Suicidal Ideation (%)			
No	103 (28.77)	293 (74.18)	396 (52.59)
Yes	252 (70.39)	100 (25.32)	352 (46.75)
Unknown ^a	3 (0.84)	2 (0.50)	5 (0.66)
Suicidal Ideation in the past 12 months (%)			
No	217 (60.61)	358 (90.63)	575 (76.36)
Yes	140 (39.11)	33 (8.35)	173 (22.97)
Unknown ^a	1 (0.28)	4 (1.02)	5 (0.67)
Lifetime Suicide Attempts (%)			
No	260 (72.63)	378 (95.70)	638 (84.73)
Yes	94 (26.26)	14 (3.54)	108 (14.34)
Number of Lifetime Suicide Attempts			
<i>M</i> (<i>SD</i>)	2.68 (2.79)	2.57 (1.70)	2.67 (2.67)
Range	1-20	1-6	1-20
Unknown ^a	4 (1.11)	3 (0.76)	7 (0.93)
Suicidal Attempts in the past 12 months (%)			
No	335 (93.58)	391 (98.98)	726 (96.41)
Yes	22 (6.14)	2 (0.51)	24 (3.19)
Unknown ^a	1 (0.28)	2 (0.51)	3 (0.40)
Anxiety Cases (HADS-Anxiety)			
Noncase	96 (26.81)	211 (53.42)	307 (40.77)
Borderline Case	87 (24.30)	87 (22.03)	174 (23.11)
Caseness	170 (47.49)	80 (20.25)	250 (33.20)
Unknown ^a	5 (1.40)	17 (4.30)	22 (2.92)
Depression Cases (HADS-Depression)			
Noncase	183 (51.12)	268 (67.85)	451 (59.89)
Borderline Case	93 (25.98)	67 (16.96)	160 (21.25)
Caseness	78 (21.79)	42 (10.63)	120 (15.94)
Unknown ^a	4 (1.11)	18 (4.56)	22 (2.92)

Note. NSSI = Non-suicidal self-injury

^a Number of participants who did not respond to the question.

Table 3

NSSI Behaviours Presentation

Methods	Number of Participants (%)	Average Age of First Incident (<i>SD</i>)	Number of Medical Treatment Required (%)
Cutting	178 (49.86)	16.79 (6.67)	36 (20.22)
Burned with a cigarette	57 (15.97)	19.43 (6.11)	6 (10.53)
Burned with a lighter	58 (16.25)	16.34 (5.28)	6 (10.34)
Carved words	48 (13.44)	17.04 (6.30)	4 (8.33)
Carved pictures	43 (12.25)	17.00 (5.42)	4 (9.30)
Scratched	125 (35.51)	16.38 (8.44)	8 (6.40)
Biting	33(9.32)	16.11 (8.70)	1 (3.03)
Sandpaper	12 (3.41)	19.25 (10.54)	1 (8.33)
Dripped acid	3 (0.85)	17.33 (17.24)	1 (3.33)
Scrubbed skin with bleach or cleaner	14 (3.97)	17.42 (4.52)	3 (21.43)
Pins or other sharp objects	68 (19.37)	16.19 (6.85)	4 (5.88)
Rubbed glass into body	4 (1.14)	20.33 (9.29)	0 (0.00)
Broken bones	5 (1.42)	18.60 (9.86)	2 (0.40)
Banged head	62 (17.71)	17.93 (9.81)	6 (9.68)
Punched self	56 (15.91)	18.55 (9.97)	3 (5.36)
Prevented wounds from healing	38 (10.83)	13.59 (5.37)	7 (18.42)

Note. $n=358$. NSSI = Non-suicidal self-injury.

Table 4

NSSI Behaviours Changes During COVID-19

NSSI Behaviours Changes	Number of Participants (%)
The frequency of NSSI	
Much more frequent	2 (5.00)
Somewhat more frequent	18 (45.00)
About the same	13 (32.50)
Somewhat less frequent	4 (10.00)
Much less frequent	2 (5.00)
Unknown ^a	1 (2.50)
The number of methods used to NSSI	
More methods	4 (10.00)
About the same	25 (62.50)
Fewer methods	11 (27.50)
The severity of injuries	
Much more severe	3 (7.50)
Somewhat more severe	9 (22.50)
About the same	21 (52.50)
Somewhat less severe	3 (7.50)
Much less severe	4 (10.00)
The length of time spent thinking before self-harming	
Spend much longer time	2 (5.00)
Spend somewhat longer time	7 (17.50)
Spend about the same time	15 (37.50)
Spend somewhat less time	9 (22.50)
Spend much less time	7 (17.50)
The reason(s) of NSSI	
Same reason(s)	39 (97.50)
Different reason(s)	1 (2.50)
NSSI achieving the same degree of desired outcomes	
Definitely higher	2 (5.00)
Slightly higher	0 (0.00)
Remain the same	26 (65.00)
Slightly lower	8 (20.00)
Definitely lower	4 (10.00)

Note. $n=40$. NSSI = Non-suicidal self-injury

^a Number of participants who did not respond to the question.

Table 5

Bivariate Correlations of Attachment Styles (ASQ), NSSI Functions (FASM), Hospital Anxiety and Depression Scale (HADS), Age, and Sex

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1. ASQ secure ^a												
2. ASQ fearful ^a	-.63 ^{***}											
3. ASQ anxious ^a	-.33 ^{***}	.50 ^{***}										
4. ASQ avoidant ^a	-.09 [*]	.18 ^{***}	-.16 ^{***}									
5. FASM automatic negative reinforcement ^a	-.18 ^{**}	.18 ^{**}	.34 ^{***}	-.08								
6. FASM automatic positive reinforcement ^a	-.16 [*]	.16 [*]	.36 ^{***}	-.03	.74 ^{***}							
7. FASM social negative reinforcement ^a	-.12	.14 [*]	.11	.01	.25 ^{***}	.35 ^{***}						
8. FASM social positive reinforcement ^a	-.03	.09	.17 [*]	-.05	.24 ^{***}	.37 ^{***}	.79 ^{***}					
9. HADS-Anxiety ^a	-.47 ^{***}	.54 ^{***}	.54 ^{***}	-.08 [*]	.31 ^{***}	.32 ^{***}	.21 ^{**}	.22 ^{**}				
10. HADS-Depression ^a	-.51 ^{***}	.47 ^{***}	.45 ^{***}	-.07	.26 ^{***}	.30 ^{***}	.26 ^{***}	.21 ^{**}	.69 ^{***}			
11. Age ^a	.10 ^{**}	-.19 ^{***}	-.29 ^{***}	.11 ^{**}	-.17 ^{**}	-.14 [*]	.01	.04	-.25 ^{***}	-.16 ^{***}		
12. Sex ^b	-.01	.06	.10 ^{**}	-.10 ^{**}	.32 ^{***}	.24 ^{***}	-.13 [*]	.00	.10 ^{**}	.01	-.01	

^a Pearson correlation; ^b point biserial correlation

* $p < .05$, ** $p < .01$, *** $p < .001$

Table 6

Correlations Among Attachment Styles (ASQ), NSSI Functions (FASM), Sexual Orientation, Marital Status, Ethnicity, and Level of Education

	Sexual Orientation	Marital Status	Ethnicity	Level of Education
1. ASQ secure	.19	.14	.06	.12
2. ASQ fearful	.16	.14	.09	.10
3. ASQ anxious	.19	.21	.10	.13
4. ASQ avoidant	.07	.05	.11	.08
5. FASM automatic negative reinforcement	.26	.14	.13	.24
6. FASM automatic positive reinforcement	.26	.13	.19	.19
7. FASM social negative reinforcement	.19	.20	.19	.14
8. FASM social positive reinforcement	.20	.19	.25	.15

Table 7
Subscale Mean and Standard Deviation

Methods	NSSI Group (<i>n</i> =358)	Control Group (<i>n</i> =395)	Pooled (<i>N</i> =753)
HADS-Anxiety			
Mean	10.22	6.68	8.39
<i>SD</i>	4.56	4.76	4.99
HADS-Depression			
Mean	7.27	5.18	6.19
<i>SD</i>	4.11	4.15	4.26
ASQ secure			
Mean	3.32	3.69	3.51
<i>SD</i>	0.78	0.71	0.77
ASQ fearful			
Mean	3.34	2.85	3.08
<i>SD</i>	0.91	1.00	0.98
ASQ anxious			
Mean	3.37	2.83	3.09
<i>SD</i>	0.82	0.86	0.88
ASQ avoidant			
Mean	3.61	3.65	3.63
<i>SD</i>	0.61	0.58	0.59
FASM automatic negative reinforcement			
Mean	2.46		
<i>SD</i>	0.99		
FASM automatic positive reinforcement			
Mean	2.31		
<i>SD</i>	0.79		
FASM social negative reinforcement			
Mean	1.36		
<i>SD</i>	0.61		
FASM social negative reinforcement			
Mean	1.55		
<i>SD</i>	0.61		

Note. The Control group did not complete the FASM because it relates to NSSI behaviours.

Table 8

Hierarchical Regression Results for FASM Automatic Negative Reinforcement

Variable	<i>B</i>	95% CI for <i>B</i>		<i>SE_B</i>	β	<i>R</i> ²	ΔR^2
		<i>LL</i>	<i>UL</i>				
Step 1						.20	.20***
Constant	1.38***	.83	1.94	.28			
HADS-Anxiety	.04*	.00	.07	.02	.17*		
HADS-Depression	.03	-.01	.07	.02	.12		
Age	-.01	-.02	.00	.01	-.11		
Sex	.61***	.37	.84	.12	.30***		
Step 2						.23	.03
Constant	1.28	-.16	2.72	.73			
HADS-Anxiety	.02	-.01	.06	.02	.11		
HADS-Depression	.02	-.02	.06	.02	.09		
Age	-.01	-.02	.00	.01	-.08		
Sex	.59***	.36	.82	.12	.30***		
ASQ Secure	-.10	-.30	.10	.10	-.08		
ASQ Fearful	-.12	-.29	.06	.09	-.12		
ASQ Anxious	.25**	.08	.42	.09	.22**		
ASQ Avoidant	.04	-.17	.25	.11	.02		

Note. *N* = 244; *CI* = confidence interval; *LL* = lower limit; *UL* = upper limit

p* < .05. *p* < .01. ****p* < .001.

Table 9

Hierarchical Regression Results for FASM Automatic Positive Reinforcement

Variable	<i>B</i>	95% CI for <i>B</i>		<i>SE_B</i>	β	<i>R</i> ²	ΔR^2
		<i>LL</i>	<i>UL</i>				
Step 1						.16	.16***
Constant	1.55***	1.09	2.00	.23			
HADS-Anxiety	.03	-.00	.05	.01	.16		
HADS-Depression	.03*	.00	.06	.02	.17*		
Age	-.01	-.01	.00	.00	-.07		
Sex	.34***	.15	.53	.10	.22***		
Step 2						.22	.05**
Constant	.81	-.34	1.97	.59			
HADS-Anxiety	.02	-.01	.04	.02	.09		
HADS-Depression	.03	-.00	.06	.02	.16		
Age	-.00	-.01	.01	.00	-.04		
Sex	.34***	.15	.52	.09	.21***		
ASQ Secure	-.02	-.18	.14	.08	-.02		
ASQ Fearful	-.13	-.27	.01	.07	-.16		
ASQ Anxious	.26***	.12	.40	.07	.29***		
ASQ Avoidant	.12	-.05	.29	.09	.09		

Note. *N* = 240; *CI* = confidence interval; *LL* = lower limit; *UL* = upper limit

p* < .05. *p* < .01. ****p* < .001

Table 10

Hierarchical Regression Results for FASM Social Negative Reinforcement

Variable	<i>B</i>	95% CI for <i>B</i>		<i>SE_B</i>	β	<i>R</i> ²	ΔR^2
		<i>LL</i>	<i>UL</i>				
Step 1						.09	.09***
Constant	1.23***	.86	1.69	.19			
HADS-Anxiety	.01	-.01	.03	.01	.11		
HADS-Depression	.03*	.00	.05	.01	.20*		
Age	.00	-.00	.01	.00	.06		
Sex	-.17*	-.33	-.02	.08	-.14*		
Step 2						.09	.06
Constant	1.01*	.05	1.98	.49			
HADS-Anxiety	.01	-.01	.04	.01	.11		
HADS-Depression	.03*	.00	.06	.01	.21*		
Age	.00	-.00	.01	.00	.06		
Sex	-.17*	-.33	-.02	.08	-.14*		
ASQ Secure	.04	-.10	.17	.07	.05		
ASQ Fearful	.02	-.10	.14	.06	.03		
ASQ Anxious	-.01	-.12	.11	.06	-.01		
ASQ Avoidant	.01	-.13	.15	.07	.01		

Note. *N* = 242; *CI* = confidence interval; *LL* = lower limit; *UL* = upper limit

p* < .05. **p* < .001.

Table 11

Hierarchical Regression Results for FASM Social Positive Reinforcement

Variable	<i>B</i>	95% CI for <i>B</i>		<i>SE_B</i>	β	<i>R</i> ²	ΔR ²
		<i>LL</i>	<i>UL</i>				
Step 1						.07	.07**
Constant	1.14***	.76	1.51	.19			
HADS-Anxiety	.02	-.00	.04	.01	.17		
HADS-Depression	.02	-.01	.04	.01	.11		
Age	.01	-.00	.01	.00	.10		
Sex	-.02	-.17	.14	.08	-.02		
Step 2						.08	.02
Constant	.59	-.38	1.57	.50			
HADS-Anxiety	.02	-.00	.04	.01	.16		
HADS-Depression	.02	-.01	.05	.01	.15		
Age	.01	-.00	.01	.00	.12		
Sex	-.03	-.19	.13	.08	-.02		
ASQ Secure	.11	-.03	.24	.07	.13		
ASQ Fearful	-.00	-.12	.12	.06	-.00		
ASQ Anxious	.06	-.05	.18	.06	.09		
ASQ Avoidant	-.02	-.16	.13	.07	-.01		

Note. *N* = 240; *CI* = confidence interval; *LL* = lower limit; *UL* = upper limit

p* < .01. *p* < .001.

Appendix A

Cover Page and Consent Form for Standard Recruitment



Department of Psychology
Lakehead University
955 Oliver Rd.,
Thunder Bay ON P7B 5E1

Project: Nonsuicidal Self-Harm

Researchers: Chiao-En (Joanne) Kao (M.A. Clinical Psychology student), ckao@lakeheadu.ca

Dr. Josephine Tan (research supervisor), jtan@lakeheadu.ca

Thank you for your interest in our study that is designed to help us understand the factors behind nonsuicidal self-harm by hearing from people who engage in nonsuicidal self-harm and those who do not. Nonsuicidal self-harm are behaviours in which people hurt themselves deliberately without the intention to kill themselves.

Eligibility: To be eligible to participate in this study, you must be at least 18 years old and reside in either Canada or the United States. Although we are looking for people who have engaged in nonsuicidal self-harm, we are equally interested in individuals who have not engaged in self-harm. If you meet the eligibility criteria and would like to be part of this study, it is important that you read the following information below before starting.

Procedure: In this study you will be asked a series of questions about your current feelings about yourself, your feelings regarding your relationships with others, and your history of self-harm acts in which there were no suicidal intent, if you have one. Please know that even if you have never harmed yourself, you can still take part in this study. You will also be asked to reflect on how the COVID-19 pandemic have affected you. For each question, please select the answer that best represents you. We encourage you to think thoroughly, and answer each question as honestly as possible. This study will take approximately 40 minutes to complete.

Risks/Benefits: Although we do not foresee psychological or physical harm to you as a result of participating in this study, you might experience some emotional discomfort or feel upset when answering some of the questions. At the end of the study, we will provide a list of mental health resources in case you find it helpful. You will derive no benefit as a result of taking part in this study. However, the collective information that is obtained in this project can add to the body of knowledge on nonsuicidal self-harm that can be used to potentially help others. As a way to show our gratitude for your participation, you will have the opportunity to enter your information to win one of three random prize draws for \$100 USD Amazon gift cards. Entry into the random prize draws is limited to participants who meet the eligibility criteria in the study as described above.

Confidentiality: All information you provide will be kept confidential and anonymous. The questionnaire that you will be filling out is designed in such a way that you will not be identified through your responses. Data will be kept in secure storage in Dr. Tan's laboratory in the Department of Psychology at Lakehead University, Thunder Bay, Ontario, Canada, for a period of at least five years, after which time it may be destroyed. You will not be identified by name or other identifying information in the final report or in any publications to come out of this research project. Please note that the online survey software used in this study, SurveyMonkey[®], is hosted by a server located in the USA. As such it is subjected to the US Patriot Act, which allows the American law enforcement officials to seek a court order that allows access the records of internet service providers.

Voluntary Nature: Your participation is completely voluntary. You can choose to skip questions if they make you uncomfortable. You are also free to discontinue the survey at any time before the submission of the survey. However, we will not be able to delete your responses once you submit because we have no way of linking your responses back to you.

Feedback: If you wish to receive a summary of the findings from this study, we will be pleased to send it to you. This will not interfere with the anonymity of the information you provided, as the contact information you provide for feedback will be kept entirely separate and unconnected from the completed surveys.

Use of data: The findings from this study will be disseminated among the scientific and professional community via presentations at meetings and publications in scientific journals or books. This will add to the body of knowledge that can be used by researchers or health professionals in their work with individuals who engage in nonsuicidal self-harm. Only aggregated data and no identifying information will be provided during our dissemination efforts.

This study has been approved by the Lakehead University Research Ethics Board. If you have any questions related to the ethics of the research and would like to speak to someone outside of the research team, please contact Sue Wright at the Research Ethics Board at 807-343-8283 or research@lakeheadu.ca.

If you still wish to participate in this study, please click on the NEXT button below. By doing so, you are indicating that you have read and understood the above information and that you provide your informed consent to participate in this study.

<NEXT>

Appendix B

Cover Page and Consent Form for MTurk Recruitment



Department of Psychology
Lakehead University
955 Oliver Rd.,
Thunder Bay ON P7B 5E1

Project: Nonsuicidal Self-Harm

*Researchers: Chiao-En (Joanne) Kao (M.A. Clinical Psychology student), ckao@lakeheadu.ca
Dr. Josephine Tan (research supervisor), jtan@lakeheadu.ca*

Thank you for your interest in our study that is designed to help us understand the factors behind nonsuicidal self-harm by hearing from people who engage in nonsuicidal self-harm and those who do not. Nonsuicidal self-harm are behaviours in which people hurt themselves deliberately without the intention to kill themselves.

Eligibility: To be eligible to participate in this study, you must be at least 18 years old and reside in either Canada or the United States. Although we are looking for people who have engaged in nonsuicidal self-harm, we are equally interested in individuals who have not engaged in self-harm. If you meet the eligibility criteria and would like to be part of this study, it is important that you read the following information below before starting.

Procedure: In this study you will be asked a series of questions about your current feelings about yourself, your feelings regarding your relationships with others, and your history of self-harm acts in which there were no suicidal intent, if you have one. Please know that even if you have never harmed yourself, you can still take part in this study. You will also be asked to reflect on how the COVID-19 pandemic have affected you. For each question, please select the answer that best represents you. We encourage you to think thoroughly, and answer each question as honestly as possible. This study will take approximately 40 minutes to complete.

Risks/Benefits: Although we do not foresee psychological or physical harm to you as a result of participating in this study, you might experience some emotional discomfort or feel upset when answering some of the questions. At the end of the study, we will provide a list of mental health resources in case you find it helpful. The collective information that is obtained in this project can add to the body of knowledge on nonsuicidal self-harm that can be used to potentially help others. As a way to show our gratitude for your participation, you will have the opportunity to enter your information to win one of three random prize draws for \$100 USD Amazon gift cards. Entry into the random prize draws is limited to participants who meet the eligibility criteria in the study as described above. You will also receive \$0.30 USD through MTurk as a compensation for taking part in this study.

Confidentiality: All information you provide will be kept confidential and anonymous. The questionnaire that you will be filling out is designed in such a way that you will not be identified through your responses. Data will be kept in secure storage in Dr. Tan's laboratory in the Department of Psychology at Lakehead University, Thunder Bay, Ontario, Canada, for a period of at least five years, after which time it may be destroyed. You will not be identified by name or other identifying information in the final report or in any publications to come out of this research project. Please note that the online survey software used in this study, SurveyMonkey[®], is hosted by a server located in the USA. As such it is subjected to the US Patriot Act, which allows the American law enforcement officials to seek a court order that allows access the records of internet service providers.

Voluntary Nature: Your participation is completely voluntary. You can choose to skip questions if they make you uncomfortable. You are also free to discontinue the survey at any time before the submission of the survey. However, we will not be able to delete your responses once you submit because we have no way of linking your responses back to you.

Feedback: If you wish to receive a summary of the findings from this study, we will be pleased to send it to you. This will not interfere with the anonymity of the information you provided, as the contact information you provide for feedback will be kept entirely separate and unconnected from the completed surveys.

Use of data: The findings from this study will be disseminated among the scientific and professional community via presentations at meetings and publications in scientific journals or books. This will add to the body of knowledge that can be used by researchers or health professionals in their work with individuals who engage in nonsuicidal self-harm. Only aggregated data and no identifying information will be provided during our dissemination efforts.

This study has been approved by the Lakehead University Research Ethics Board. If you have any questions related to the ethics of the research and would like to speak to someone outside of the research team, please contact Sue Wright at the Research Ethics Board at 807-343-8283 or research@lakeheadu.ca.

If you still wish to participate in this study, please click on the NEXT button below. By doing so, you are indicating that you have read and understood the above information and that you provide your informed consent to participate in this study.

<NEXT>

Appendix C

Demographics Questionnaire

Feel like talking to someone? Here are some mental health resources you might find helpful <Insert link here >

1. **Age:** _____ years
2. **Biological Sex** (physical sex you were born with):
 Female Male Other (please specify): _____
3. **Gender** (gender with which you identify with):
 Female Male Other (please specify): _____
4. **Sexual orientation:**
 Straight Gay Lesbian Bisexual
 Other (please specify): _____ I am not sure
 Prefer not to say
5. **Marital Status** (select one):
 Married Separated Divorced Widowed
 Single, never married Cohabiting/living together but not married
6. **Where do you currently reside (city, country)** _____
7. **Which of the following best describes your background?**
(you may choose more than one category.)
 White (for example, British, French, German, Icelandic, Italian, Jewish, New Zealander, Portuguese, Russian, Ukrainian)
 Black (African, African American, Caribbean)
 Latin, Central and South American (for example, Brazilian, Chilean, Mexican)
 Aboriginal (First Nations, Inuit, Métis), American Indian, Alaska Native, Indigenous
 East Asian (for example, Chinese, Japanese, Korean)
 Southeast Asian (for example, Cambodian, Filipino, Indonesian, Laotian, Malaysian, Vietnamese,)
 South Asian (for example, East Indian, Pakistani, Bangladeshi, Sri Lankan)
 West Asian or Arab (for example, Egyptian, Saudi Arabian, Syrian, Iranian, Iraqi, Afghan, Lebanese, Palestinian)

- Pacific Islands (for example, Native Hawaiian, Fijian)
- Other, please specify _____

10. Household total income in the past 12 months?

- Under \$10,000 \$10,000 to \$19,999 \$20,000 to \$29,999
- \$30,000 to \$39,999 \$40,000 to \$49,999 \$50,000 to \$59,999
- \$60,000 to \$69,999 \$70,000 to \$79,999 \$80,000 to \$89,999
- \$90,000 to \$99,999 \$100,000 to \$149,999 \$150,000 and over

11. Highest level of education achieved (select one):

- No certificate, diploma or degree
- Completed junior high school (Grade 8) or earlier
- Completed high school (Grade 12)
- Completed community college, junior college, or trade school
- Completed undergraduate university degree program
- Completed Masters level graduate university degree program
- Completed doctoral level graduate university degree program

12. In the past, have you ever received mental health assistance from a counsellor, therapist, social worker, psychologist, or psychiatrist?

- Yes No
- If yes, what was the reason for the assistance? _____

13. Currently, are you receiving or waiting to receive mental health assistance from a counsellor, therapist, social worker, psychologist, or psychiatrist?

- Yes No
- If yes, what is the reason for the assistance? _____

14. Currently, do you have a diagnosis of a mental health disorder?

- Yes No
- If yes, what is/are the diagnoses? _____

15. Currently, are you taking any prescribed medication for mental health reasons?

- Yes No
- If yes, what is/are the medication for? _____

16. In your lifetime, have you ever thought about killing yourself?

Yes No

If yes, within the last 12 months, have you had thoughts about killing yourself?

Yes No

17. In your lifetime, have you ever tried to kill yourself?

Yes No

If yes, how many times in your lifetime have you tried to kill yourself? _____

If yes, within the last 12 months, have you made an attempt to kill yourself?

Yes No

Appendix D

COVID-19 Mental Health Questionnaire

Feel like talking to someone? Here are some mental health resources you might find helpful <Insert link here >

Instruction

As the COVID-19 pandemic continues, it has influenced the lives and psychological functioning of people around the world. In this section, we wonder how it has affected you. Please read each of the following statements and choose the reply that is closest to how you have been feeling.

1. In general, how would you rate your mental health **before** the COVID-19 pandemic?
 - Very good
 - Good
 - Fair
 - Poor
 - Very poor

2. In general, how would you rate your mental health currently **during** the COVID-19 pandemic?
 - Very good
 - Good
 - Fair
 - Poor
 - Very poor

3. In general, how would you rate the amount of stress in your life **before** the COVID-19 pandemic?
 - Extremely stressful
 - Very stressful
 - Moderately stressful
 - Slightly stressful
 - Not at all stressful

4. In general, how would you rate the amount of stress in your life currently **during** the COVID-19 pandemic?
 - Extremely stressful
 - Very stressful
 - Moderately stressful
 - Slightly stressful
 - Not at all stressful

5. Compare to before the COVID-19 pandemic, how hopeful are you currently about the future?
 - I am **much more hopeful now**
 - I am **slightly more hopeful now**
 - There has been **no change** in my hopefulness for the future

- I am **slightly less hopeful now**
- I am **much less hopeful now**

6. How concerned are you currently about the impact of COVID-19 in these areas?

- a. My own health **during** the pandemic
 - Extremely concerned
 - Very concerned
 - Moderately concerned
 - Slightly concerned
 - Not at all concerned
- b. Health of my family members **during** the pandemic
 - Extremely concerned
 - Very concerned
 - Moderately concerned
 - Slightly concerned
 - Not at all concerned
- c. Health of people who are vulnerable (e.g., older people, individuals with pre-existing health conditions) **during** the pandemic
 - Extremely concerned
 - Very concerned
 - Moderately concerned
 - Slightly concerned
 - Not at all concerned
- d. Health of the people in my country **during** the pandemic
 - Extremely concerned
 - Very concerned
 - Moderately concerned
 - Slightly concerned
 - Not at all concerned
- e. Health of the people in other countries **during** the pandemic
 - Extremely concerned
 - Very concerned
 - Moderately concerned
 - Slightly concerned
 - Not at all concerned
- f. Ability of the health system to meet health needs in my community **during** the pandemic
 - Extremely concerned
 - Very concerned
 - Moderately concerned
 - Slightly concerned
 - Not at all concerned
- g. My ability to maintain social ties **during** the pandemic
 - Extremely concerned
 - Very concerned
 - Moderately concerned

- Slightly concerned
- Not at all concerned
- h. My ability to support others **during** the pandemic
 - Extremely concerned
 - Very concerned
 - Moderately concerned
 - Slightly concerned
 - Not at all concerned
- i. My ability to support others **after** the pandemic
 - Extremely concerned
 - Very concerned
 - Moderately concerned
 - Slightly concerned
 - Not at all concerned
- j. My ability to meet financial obligations or essential needs (e.g., rent, mortgage payments, utilities, groceries, debt payments, etc.) **during** the pandemic
 - Extremely concerned
 - Very concerned
 - Moderately concerned
 - Slightly concerned
 - Not at all concerned
- k. My ability to meet financial obligations or essential needs (e.g., rent, mortgage payments, utilities, groceries, debt payments, etc.) **after** the pandemic
 - Extremely concerned
 - Very concerned
 - Moderately concerned
 - Slightly concerned
 - Not at all concerned
- l. Family psychological stress **during** the pandemic
 - Extremely concerned
 - Very concerned
 - Moderately concerned
 - Slightly concerned
 - Not at all concerned
- m. Domestic/family violence **currently** in your home (violence can be verbal and/or physical in nature)
 - Extremely concerned
 - Very concerned
 - Moderately concerned
 - Slightly concerned
 - Not at all concerned
- n. Civil disorder in your community **during** the pandemic
 - Extremely concerned
 - Very concerned
 - Moderately concerned
 - Slightly concerned

- Not at all concerned
- o. My physical appearance **during** the pandemic
 - Extremely concerned
 - Very concerned
 - Moderately concerned
 - Slightly concerned
 - Not at all concerned
- p. Physical distance between people **during** the pandemic
 - Extremely concerned
 - Very concerned
 - Moderately concerned
 - Slightly concerned
 - Not at all concerned
- q. Personal hygiene **during** the pandemic
 - Extremely concerned
 - Very concerned
 - Moderately concerned
 - Slightly concerned
 - Not at all concerned
- r. My social life **during** the pandemic
 - Extremely concerned
 - Very concerned
 - Moderately concerned
 - Slightly concerned
 - Not at all concerned
- s. My social life **after** the pandemic
 - Extremely concerned
 - Very concerned
 - Moderately concerned
 - Slightly concerned
 - Not at all concerned
- t. Being alone **during** the pandemic
 - Extremely concerned
 - Very concerned
 - Moderately concerned
 - Slightly concerned
 - Not at all concerned
- u. Being liked by others **during** the pandemic
 - Extremely concerned
 - Very concerned
 - Moderately concerned
 - Slightly concerned
 - Not at all concerned
- v. If there are other areas about which you have concerned because of the COVID pandemic, please note them below and indicate the degree of your concern for each.

Did you indicate in the previous section that you have never deliberately injured yourself without suicidal intent?

- ➔ If yes, please tick off the box to the right and skip the rest of this section
- ➔ If no, please continue with this section below.

7. Compare to before the start of the COVID-19 pandemic, how has your desire to engage in nonsuicidal self-harm acts changed?

- Definitely stronger now
- Somewhat stronger now
- About the same
- Somewhat weaker now
- Much weaker now

8. Since the start of the COVID pandemic, have you engaged in acts of nonsuicidal self-harm?

- No, I have not engaged in acts of non-suicidal self-harm during the pandemic
- Yes, I have engaged in acts of nonsuicidal self-harm during the pandemic

If you answered “Yes” to question 8 above, please answer the next question. Otherwise, please skip the rest of this section.

9. Compare to before the start of the COVID-19 pandemic, how has the pattern of your nonsuicidal self-harm behaviours changed?

- a. The **frequency** of nonsuicidal self-harm
 - Much more frequent now
 - Somewhat more frequent now
 - About the same
 - Somewhat less frequent now
 - Much less frequent now
- b. The **number of methods** used to self-harm without suicidal intent
 - I use more methods to self-harm now
 - About the same number of methods
 - I use fewer methods to self-harm now
- c. The **severity** of injuries
 - Much more severe now
 - Somewhat more severe now
 - About the same
 - Somewhat less severe now
 - Much less severe now
- d. The **length of time** spent thinking before self-harming
 - I spend much longer time thinking before I self-harm now
 - I spend somewhat longer time thinking before I self-harm now
 - About the same
 - I spend somewhat less time thinking before I self-harm now
 - I spend much less time thinking before I self-harm now
- e. The **reason(s)** of nonsuicidal self-harm
 - I self-harm for the same reason(s)

- I self-harm for different reason(s) now (please specify)
- f. People engage in nonsuicidal self-harm for different reasons and to achieve different outcomes. Since the start of the COVID pandemic, has your use of self-harm acts achieved the same degree of desired outcomes for you?
 - The degree of desired outcomes is definitely lower
 - The degree of desired outcomes is slightly lower
 - The degree of desired outcomes remains the same
 - The degree of desired outcomes is slightly higher
 - The degree of desired outcomes is definitely higher
- g. Are there other changes in your self-harm that we have not asked above? If yes, please note them below.

Appendix E

Infrequency Scale

Appendix F

Hospital Anxiety and Depression Scale

Feel like talking to someone? Here are some mental health resources you might find helpful <Insert link here >

Instruction

Please read each of the following statements and choose the reply that is closest to how you have been feeling in the **past week**. Don't take too long over your replies: your immediate response is best

<p>1. I feel tense or 'wound up':</p> <p>③ Most of the time ② A lot of the time ① From time to time, occasionally ④ Not at all</p>
<p>2. I still enjoy the things I used to enjoy:</p> <p>③ Hardly at all ② Only a little ① Not quite so much ④ Definitely as much</p>
<p>3. I get a sort of frightened feeling as if something awful is about to happen:</p> <p>③ Very definitely and quite badly ② Yes, but not too badly ① A little, but it doesn't worry me ④ Not at all</p>
<p>4. I can laugh and see the funny side of things:</p> <p>③ Not at all ② Definitely not so much now ① Not quite so much now ④ As much as I always could</p>
<p>5. Worrying thoughts go through my mind:</p> <p>③ A great deal of the time ② A lot of the time ① From time to time, but not too often ④ Only occasionally</p>
<p>6. I feel cheerful:</p> <p>③ Not at all ② Not often ① Sometimes ④ Most of the times</p>

7. I can sit at ease and feel relaxed:
<ul style="list-style-type: none"> ③ Not at all ② Not often ① Usually ④ Definitely
8. I feel as if I am slowed down:
<ul style="list-style-type: none"> ③ Nearly all the time ② Very often ① Sometimes ④ Not at all
9. I get a sort of frightened feeling like 'butterflies' in the stomach:
<ul style="list-style-type: none"> ③ Very Often ② Quite Often ① Occasionally ④ Not at all
10. I have lost interest in my appearance:
<ul style="list-style-type: none"> ③ Definitely ② I don't take as much care as I should ① I may not take quite as much care ④ I take just as much care as ever
11. I feel restless as I have to be on the move:
<ul style="list-style-type: none"> ③ Very much indeed ② Quite a lot ① Not very much ④ Not at all
12. I look forward with enjoyment to things:
<ul style="list-style-type: none"> ③ Hardly at all ② Definitely less than I used to ① Rather less than I used to ④ As much as I ever did
13. I get sudden feelings of panic:
<ul style="list-style-type: none"> ③ Very much indeed ② Quite often ① Not very often ④ Not at all
14. I can enjoy a good book or radio or TV program:
<ul style="list-style-type: none"> ③ Very seldom ② Not often ① Sometimes ④ Often

Appendix G

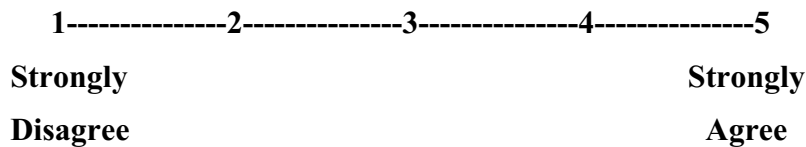
Attachment Style Questionnaire

Feel like talking to someone? Here are some mental health resources you might find helpful <Insert link here >

Instruction

This questionnaire asks about a number of different ways people feel regarding their relationships with others. Please read each of the following statements and rate the extent to which it describes your feelings. **Please think about all your relationships (past and present) and respond in terms of how you generally feel in these relationships.** Please be sure to read each question carefully and respond honestly; truthful responses to these questions will provide us with greater understanding and knowledge. Please be assured that your responses are completely confidential.

Please use the scale below by placing a number between 1 and 5 in the space provided to the right of each statement.



- 1. I feel at ease in emotional relationships. _____
- 2. I avoid close ties. _____
- 3. I trust other people and I like it when other people can rely on me. _____
- 4. I find it easy to get engaged in close relationships with other people. _____
- 5. I feel at ease in intimate relationships. _____
- 6. I think it is important that people can rely on each other. _____
- 7. I trust that others will be there for me when I need them. _____
- 8. I would like to be open to others, but I feel I can't trust other people. _____
- 9. I would like to have close relationships with other people, but I find it difficult to fully trust them. _____
- 10. I'm afraid that my hopes will be deceived when I get too closely related to others. _____
- 11. I am wary to get engaged in close relationships because I'm afraid to get hurt. _____
- 12. I feel uncomfortable when relationships with other people become close. _____

13. I often wonder whether people like me. _____
14. I have the impression that usually I like others better than they like me. _____
15. I am often afraid that other people don't like me. _____
16. I fear to be left alone. _____
17. I don't worry whether people like me or not. _____
18. I find it important to know whether other people like me. _____
19. I usually find other people more interesting than myself. _____
20. I feel comfortable without having close relationships with other people. _____
21. It is important to me to be independent. _____
22. I prefer that others are independent of me, and that I am independent of others. _____
23. I like to be self-sufficient. _____
24. I don't worry about being alone: I don't need other people that strongly. _____

Appendix H

Relationship Questionnaire

Feel like talking to someone? Here are some mental health resources you might find helpful <Insert link here >

Instruction

Following are four general relationship styles that people often report how they feel regarding their relationships with others. Please read the following four statements carefully, and **select one that best describes you or is closest to the way you are.**

_____ It is easy for me to become emotionally close to others. I am comfortable depending on them and having them depend on me. I don't worry about being alone or having others not accept me.

_____ I am uncomfortable getting close to others. I want emotionally close relationships, but I find it difficult to trust others completely, or to depend on them. I worry that I will be hurt if I allow myself to become too close to others.

_____ I want to be completely emotionally intimate with others, but I often find that others are reluctant to get as close as I would like. I am uncomfortable being without close relationships, but I sometimes worry that others don't value me as much as I value them.

_____ I am comfortable without close emotional relationships. It is very important to me to feel independent and self-sufficient, and I prefer not to depend on others or have others depend on me.

Appendix I

Deliberate Self-Harm Inventory

Feel like talking to someone? Here are some mental health resources you might find helpful <Insert link here >

Instruction

This questionnaire asks about a number of different things that people sometimes do to hurt themselves. Please be sure to read each question carefully and respond honestly. Often, people who do these kinds of things to themselves keep it a secret, for a variety of reasons. However, honest responses to these questions will provide us with greater understanding and knowledge about these behaviours and the best way to help people.

Please answer yes to a question only if you did the behaviour *intentionally, or on purpose, to hurt yourself, without intending to kill yourself.* Do not respond yes if you did something accidentally (e.g., you tripped and banged your head on accident). Also, please be assured that your responses are completely confidential.

<p>1. Have you ever intentionally (i.e., on purpose) <i>cut your wrist, arms, or other area(s) of your body (without intending to kill yourself)?</i> ___ Yes ___ No</p> <p><i>If yes:</i> How old were you when you first did this? _____ How many times have you done this? _____ When was the last time you did this? _____ How many years have you been doing this? (If you are no longer doing this, how many years did you do this before you stopped?) _____ Has this behaviour ever resulted in hospitalization or injury severe enough to require medical treatment? _____</p>
<p>2. Have you ever intentionally <i>burned yourself with a cigarette?</i> ___ Yes ___ No</p> <p><i>If yes:</i> How old were you when you first did this? _____ How many times have you done this? _____ When was the last time you did this? _____ How many years have you been doing this? (If you are no longer doing this, how many years did you do this before you stopped?) _____ Has this behaviour ever resulted in hospitalization or injury severe enough to require medical treatment? _____</p>
<p>3. Have you ever intentionally <i>burned yourself with a lighter or a match?</i> ___ Yes ___ No</p> <p><i>If yes:</i> How old were you when you first did this? _____ How many times have you done this? _____ When was the last time you did this? _____ How many years have you been doing this? (If you are no longer doing this, how many years did you do this before you stopped?) _____ Has this behaviour ever resulted in hospitalization or injury severe enough to require medical treatment? _____</p>

<p>4. Have you ever intentionally carved words into your skin? <u> </u> Yes <u> </u> No</p> <p><i>If yes:</i> How old were you when you first did this? _____ How many times have you done this? _____ When was the last time you did this? _____ How many years have you been doing this? (If you are no longer doing this, how many years did you do this before you stopped?) _____ Has this behaviour ever resulted in hospitalization or injury severe enough to require medical treatment? _____</p>
<p>5. Have you ever intentionally carved pictures, designs, or other marks into your skin? <u> </u> Yes <u> </u> No</p> <p><i>If yes:</i> How old were you when you first did this? _____ How many times have you done this? _____ When was the last time you did this? _____ How many years have you been doing this? (If you are no longer doing this, how many years did you do this before you stopped?) _____ Has this behaviour ever resulted in hospitalization or injury severe enough to require medical treatment? _____</p>
<p>6. Have you ever intentionally severely scratched yourself, to the extent that scarring or bleeding occurred? <u> </u> Yes <u> </u> No</p> <p><i>If yes:</i> How old were you when you first did this? _____ How many times have you done this? _____ When was the last time you did this? _____ How many years have you been doing this? (If you are no longer doing this, how many years did you do this before you stopped?) _____ Has this behaviour ever resulted in hospitalization or injury severe enough to require medical treatment? _____</p>
<p>7. Have you ever intentionally bit yourself, to the extent that you broke the skin? <u> </u> Yes <u> </u> No</p> <p><i>If yes:</i> How old were you when you first did this? _____ How many times have you done this? _____ When was the last time you did this? _____ How many years have you been doing this? (If you are no longer doing this, how many years did you do this before you stopped?) _____ Has this behaviour ever resulted in hospitalization or injury severe enough to require medical treatment? _____</p>
<p>8. Have you ever intentionally rubbed sandpaper on your body? <u> </u> Yes <u> </u> No</p> <p><i>If yes:</i> How old were you when you first did this? _____ How many times have you done this? _____ When was the last time you did this? _____ How many years have you been doing this? (If you are no longer doing this, how many years did you do this before you stopped?) _____ Has this behaviour ever resulted in hospitalization or injury severe enough to require medical treatment? _____</p>

<p>9. Have you ever intentionally dripped acid onto your skin? <u> </u> Yes <u> </u> No</p>	
<p><i>If yes:</i> How old were you when you first did this? _____ How many times have you done this? _____ When was the last time you did this? _____ How many years have you been doing this? (If you are no longer doing this, how many years did you do this before you stopped?) _____ Has this behaviour ever resulted in hospitalization or injury severe enough to require medical treatment? _____</p>	
<p>10. Have you ever intentionally used bleach, comet, or oven cleaner to scrub your skin? <u> </u> Yes <u> </u> No</p>	
<p><i>If yes:</i> How old were you when you first did this? _____ How many times have you done this? _____ When was the last time you did this? _____ How many years have you been doing this? (If you are no longer doing this, how many years did you do this before you stopped?) _____ Has this behaviour ever resulted in hospitalization or injury severe enough to require medical treatment? _____</p>	
<p>11. Have you ever intentionally stuck sharp objects such as needles, pins, staples, etc. into your skin, not including tattoos, ear piercing, needles used for drug use, or body piercing? <u> </u> Yes <u> </u> No</p>	
<p><i>If yes:</i> How old were you when you first did this? _____ How many times have you done this? _____ When was the last time you did this? _____ How many years have you been doing this? (If you are no longer doing this, how many years did you do this before you stopped?) _____ Has this behaviour ever resulted in hospitalization or injury severe enough to require medical treatment? _____</p>	
<p>12. Have you ever intentionally rubbed glass into your skin? <u> </u> Yes <u> </u> No</p>	
<p><i>If yes:</i> How old were you when you first did this? _____ How many times have you done this? _____ When was the last time you did this? _____ How many years have you been doing this? (If you are no longer doing this, how many years did you do this before you stopped?) _____ Has this behaviour ever resulted in hospitalization or injury severe enough to require medical treatment? _____</p>	
<p>13. Have you ever intentionally broken your own bones? <u> </u> Yes <u> </u> No</p>	
<p><i>If yes:</i> How old were you when you first did this? _____ How many times have you done this? _____ When was the last time you did this? _____ How many years have you been doing this? (If you are no longer doing this, how many years did you do this before you stopped?) _____ Has this behaviour ever resulted in hospitalization or injury severe enough to require medical treatment? _____</p>	

<p>14. Have you ever intentionally <i>banged your head against something</i>, to the extent that you <i>caused a bruise to appear</i>? <u> Yes </u> <u> No </u></p>
<p><i>If yes:</i> How old were you when you first did this? _____ How many times have you done this? _____ When was the last time you did this? _____ How many years have you been doing this? (If you are no longer doing this, how many years did you do this before you stopped?) _____ Has this behaviour ever resulted in hospitalization or injury severe enough to require medical treatment? _____</p>
<p>15. Have you ever intentionally <i>punched yourself</i>, to the extent that you <i>caused a bruise to appear</i>? <u> Yes </u> <u> No </u></p>
<p><i>If yes:</i> How old were you when you first did this? _____ How many times have you done this? _____ When was the last time you did this? _____ How many years have you been doing this? (If you are no longer doing this, how many years did you do this before you stopped?) _____ Has this behaviour ever resulted in hospitalization or injury severe enough to require medical treatment? _____</p>
<p>16. Have you ever intentionally <i>prevented wounds from healing</i>? <u> Yes </u> <u> No </u></p>
<p><i>If yes:</i> How old were you when you first did this? _____ How many times have you done this? _____ When was the last time you did this? _____ How many years have you been doing this? (If you are no longer doing this, how many years did you do this before you stopped?) _____ Has this behaviour ever resulted in hospitalization or injury severe enough to require medical treatment? _____</p>
<p>17. Have you ever intentionally <i>done anything else to hurt yourself</i> that was not asked about in this questionnaire? <u> Yes </u> <u> No </u></p>
<p><i>If yes:</i> What did you do to hurt yourself? _____ How old were you when you first did this? _____ How many times have you done this? _____ When was the last time you did this? _____ How many years have you been doing this? (If you are no longer doing this, how many years did you do this before you stopped?) _____ Has this behaviour ever resulted in hospitalization or injury severe enough to require medical treatment? _____</p>

Appendix J

Functional Assessment of Self-Mutilation

Feel like talking to someone? Here are some mental health resources you might find helpful <Insert link here >

Did you indicate in the previous section that you have never intentionally injured yourself?

➔ If yes, please tick off the box to the right and skip this section

➔ If no, please continue with this section below.

Instruction

If you previously responded that you have deliberately injured yourself, please answer the following questions related to your self- injuring behaviours. Please be sure to read each question carefully and respond honestly.

1. How long did you think about injuring yourself before actually doing it?

___ none

___ a few minutes

___ 1 hour or less

___ More than 1 hour but less than a day

___ more than 1 day but less than a week

___ more than a week

2. Did you performed any of the self- injuring acts while you were taking drugs or alcohol?

___ Yes ___ No

3. Did you experience pain during self- injuring?

___ Severe pain

___ Moderate pain

___ little pain

___ No pain

4. Did you performed any of the self- injuring acts while in the presence of other people?

___ Yes ___ No

5. Did you harm yourself for any of the reasons listed below? Please answer all that apply.

1 = Never 2 = Rarely 3 = Some 4 = Often	
Reason	Rating
1. To avoid school, work, or other responsibilities	
2. To relieve feeling “numb” or empty	
3. To get attention	
4. To feel something, even if it was pain	
5. To avoid doing something unpleasant you don’t want to do	
6. To get control of a situation	
7. To try to get a reaction from someone, even if it’s a negative reaction	
8. To receive more attention from your parents or friends	
9. To avoid being with people	
10. To punish yourself	
11. To get other people to act differently or change	
12. To be like someone you respect	
13. To avoid punishment or paying the consequences	
14. To stop bad feelings	
15. To let other know how desperate you were	
16. To feel more a part of a group	
17. To get your parents to understand or notice you	
18. To give yourself something to do when you’re alone	
19. To give yourself something to do when with others	
20. To get help	
21. To make others angry	
22. To feel relaxed	
23. Other:	

Appendix K

Study Recruitment Advertisement

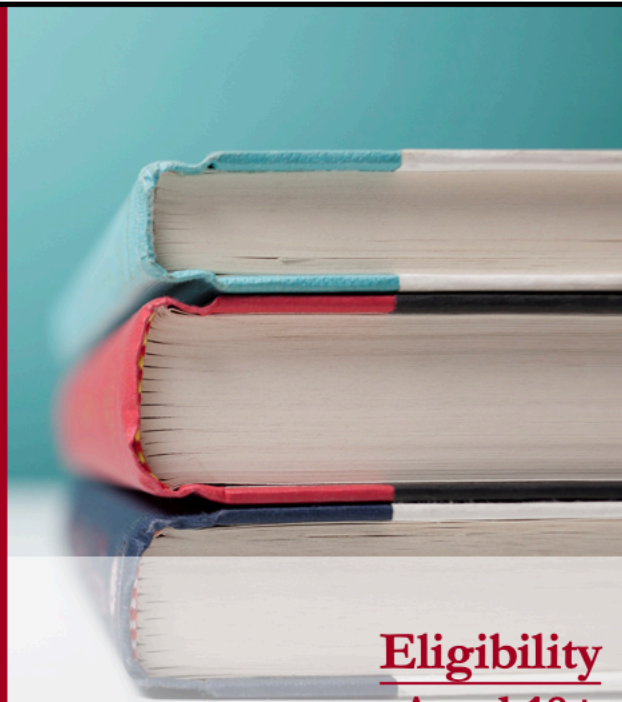
**RESEARCH
VOLUNTEERS
WANTED**

**A STUDY ON
NON-SUICIDAL
SELF-HARM**

**40 Minutes Anonymous
Online Questionnaires**

**Win 1 of 3 \$100 USD
Amazon Gift Card**

We are looking for volunteers for a research study being conducted by the Department of Psychology, Lakehead University, Canada. We are interested in hearing from individuals who have a history of engaging in acts of self-harm without suicidal intent, as well as those who do not have such a history. Participation consists of filling out an online confidential and anonymous research questionnaire.



**Eligibility
Aged 18+
Living in Canada or USA**

**For details and/or to participate
please visit
<INSERT QUESTIONNAIRE LINK>
or scan the QR code**



For more information
please contact Joanne Kao
ckao@lakeheadu.ca

Appendix L

Debriefing Form for Standard Recruitment

Feel like talking to someone? Here are some mental health resources you might find helpful <Insert link here >

Thank you for your participation in the *Nonsuicidal Self-Harm Study* research. Your involvement is valuable to us and it would not be possible to run this study without your assistance. Now that your participation is complete, we would like to offer you more details about the study. We were not able to give you a lot of information prior to your participation because we did not wish to influence your responses in anticipation of what you think we might expect to find.

The questionnaire that you participated in is conducted by M.A. clinical psychology student Joanne Kao under the supervision of Dr. Josephine Tan in the Department of Psychology at Lakehead University, Canada. We are interested in the relationship between nonsuicidal self-harm, current feelings about the self and body, and relationship quality or attachment style. Furthermore, we are interested in understanding whether there is a connection between the reasons for engaging in nonsuicidal self-harm, feelings, and attachment style.

We are highly aware that this questionnaire is being implemented during an extraordinary time when the entire world is going through the COVID-19 pandemic. Many people have reported significant increase in psychological stress and worries in different aspects of their lives. We therefore asked you the COVID-related questions so that we might be able to contextualize your answers. As well, researchers have found that stress increases the likelihood of engaging in acts of nonsuicidal self-harm among some individuals. We therefore asked additional COVID-related questions of those who have a history of self-harm so that we might understand the impact of the COVID-19 pandemic on their self-harm behaviours. The information we gather in this study will be used to further our understanding as to why individuals engage in deliberate acts of self-harm without suicidal intent, and to inform the development of prevention and intervention strategies in the future. We want to reassure you that your responses will be kept strictly confidential and anonymous, and that no identifying information is linked to your answers.

We believe that results of our study will be ready in early 2021. If you would like to receive a copy of the summary of our findings, please let us know and we will send it to you. We will also be carrying out three random prize draws for \$100 USD Amazon gift cards each after the study has been completed. Entry into prize draws are restricted to those who meet the eligibility criteria of being at least 18 years old and living in either Canada or the US. To enter the prize draws and/or to request for a summary of our findings, please copy and paste the link below into

the address bar of your web browser. It will take you to a separate webpage so that the identifying information you provide will not be linked to your answers in the research questionnaire:

<Insert link here for entering prize draw and/or requesting summary of findings>

On the next page is a list of mental health resources that you or someone you know might find useful. It is also available on a separate weblink <insert link here> that can be accessed outside of this study. If you have any questions for us, please feel free to contact us. We are highly appreciative of your help in this study. Thank you.

Joanne Kao (ckao@lakeheadu.ca)

Dr. Josephine Tan (jtan@lakeheadu.ca)

<click HERE for the next page>

Appendix M

Debriefing Form for MTurk Recruitment

Feel like talking to someone? Here are some mental health resources you might find helpful <Insert link here >

Thank you for your participation in the *Nonsuicidal Self-Harm Study* research. Your involvement is valuable to us and it would not be possible to run this study without your assistance. Now that your participation is complete, we would like to offer you more details about the study. We were not able to give you a lot of information prior to your participation because we did not wish to influence your responses in anticipation of what you think we might expect to find.

The questionnaire that you participated in is conducted by M.A. clinical psychology student Joanne Kao under the supervision of Dr. Josephine Tan in the Department of Psychology at Lakehead University, Canada. We are interested in the relationship between nonsuicidal self-harm, current feelings, and relationship quality, or attachment style. Furthermore, we are interested in understanding whether there is a connection between the reasons for engaging in nonsuicidal self-harm, feelings, and attachment style.

We are highly aware that this questionnaire is being implemented during an extraordinary time when the entire world is going through the COVID-19 pandemic. Many people have reported significant increase in psychological stress and worries in different aspects of their lives. We therefore asked you the COVID-related questions so that we might be able to contextualize your answers. As well, researchers have found that stress increases the likelihood of engaging in acts of nonsuicidal self-harm among some individuals. We therefore asked additional COVID-related questions of those who have a history of self-harm so that we might understand the impact of the COVID-19 pandemic on their self-harm behaviours. The information we gather in this study will be used to further our understanding as to why individuals engage in deliberate acts of self-harm without suicidal intent, and to inform the development of prevention and intervention strategies in the future. We want to reassure you that your responses will be kept strictly confidential and anonymous, and that no identifying information is linked to your answers.

We believe that results of our study will be ready in early 2021. If you would like to receive a copy of the summary of our findings, please let us know and we will send it to you. We will also be carrying out three random prize draws for \$100 USD Amazon gift cards each after the study has been completed. Entry into prize draws are restricted to those who meet the eligibility criteria of being at least 18 years old and living in either Canada or the US. To enter the prize draws and/or to request for a summary of our findings, please copy and paste the link below into

the address bar of your web browser. It will take you to a separate webpage so that the identifying information you provide will not be linked to your answers in the research questionnaire:

<Insert link here for entering prize draw and/or requesting summary of findings>

You will also be compensated for joining our study; please enter the word <NSSI Study> in MTurk to receive \$0.30 USD.

On the next page is a list of mental health resources that you or someone you know might find useful. It is also available on a separate weblink <insert link here> that can be accessed outside of this study. If you have any questions for us, please feel free to contact us. We are highly appreciative of your help in this study. Thank you.

Joanne Kao (ckao@lakeheadu.ca)

Dr. Josephine Tan (jtan@lakeheadu.ca)

<click HERE for the next page>

Appendix N

Contact Information Collection for Participants Entering Prize Draw

Dear participants,

Thank you so much for participating in our study. As a way of saying thank you, three random prize draws for \$100 USD Amazon gift cards will be held after the data collection has been completed. We need your name and contact information so that we can reach you if you are one of the winners for the random prize draw. **None of the information you provide on this form will be linked to your responses on the research questionnaire.** Please note that entry into prize draws are restricted to those who meet the eligibility criteria of being at least 18 years old and living in either Canada or the US.

Your Name: _____

Your Email: _____

Date: _____

- Please check this box if you would like us to email you a summary of the results upon completion of this study. Make sure that you have provided your name and email address above.

If you have any questions, please feel free to contact us:

Joanne Kao (ckao@lakeheadu.ca)

Dr. Josephine Tan (jtan@lakeheadu.ca)

Appendix O

Resources for Counseling and Therapy

We know that life stresses can sometimes be overwhelming. When this happens, sometimes seeking professional assistance becomes a necessity to bring good balance to one's life. This is particularly important if one's daily functioning has become affected by stress (e.g., withdrawal from friends and family, work and/or academic performance is impaired, self-grooming deteriorates, personal relationships are strained, thoughts of harming oneself, etc.).

Please know that there are therapy and counseling services that are available and accessible. If you or anyone you know could use some assistance, you can contact your family physician, look up resources on your local phone book and yellow pages, or head straight to nearby hospital or emergency room if there is a crisis, **or call 911**. You can also consider the following options:

Resources for the Online Self-Harm Community:

- Canadian residents can access:
 - Self-Injury Outreach and Support: <http://www.sioutreach.org>
 - CAMH: <https://cmha.ca/documents/youth-and-self-injury>,
<https://ontario.cmha.ca/documents/understanding-and-finding-help-for-self-harm/>,
<https://cmha.bc.ca/documents/self-harm-2/>
- US residents can access:
 - S.A.F.E. Alternatives (Self-Abuse Finally Ends): Call 1-800-366-8288, or visit <https://selfinjury.com/>
 - Cornell Research Program on Self-Injury and Recovery: <http://www.selfinjury.bctr.cornell.edu>
 - MHA: <https://www.mhanational.org/conditions/self-injury-cutting-self-harm-or-self-mutilation>

Resources for the Online Community:

- Canadian residents can access:
 - **Crisis responses:** Call 1-833-456-4566 toll free (In QC: 1-866-277-3553), or text 45645, or visit www.crisisservicescanada.ca.
 - <http://www.mentalhealthhelpline.ca/>
 - <http://www.heretohelp.bc.ca/screening/online/>
 - <https://cmha.ca/documents/getting-help>
 - Good2Talk helpline for postsecondary students: 1-866-925-5454
 - For a national list of crisis response services, please go to: <https://www.crisisservicescanada.ca/en/looking-for-local-resources-support/>

- US residents can access:
 - **Crisis responses:** Call 1-800-273-TALK (8255); En Español 1-888-628-9454, or text “HELLO” to 741741
 - **Crisis responses:** Call 1-800-SUICIDE (784-2433)
 - <https://www.nimh.nih.gov/health/find-help/index.shtml>
 - <http://www.mentalhealthamerica.net/finding-help>
 - <http://www.healthyplace.com/>
 - <http://psychcentral.com/>

Local Resources for Thunder Bay Residents:

- Emergency services are available from the Thunder Bay Regional Hospital.
- Your family physician or a walk-in clinic physician can help make a referral to a mental health resource in Thunder Bay.
- Lakehead University Health and Counseling Services – free to all Lakehead students: (807) 343-8361
- Thunder Bay Counselling Centre: (807) 684-1880
- You can make a self-referral to any mental health professional in private practice (look up in the Yellow Pages or online under *Psychologists, Psychological Associates, Psychotherapy, or Marriage, Family, and Individual Counselors*).
- More resource information can be obtained from the Thunder Bay Canadian Mental Health Association: (807) 345-5564

Resources for the COVID-19 and Mental Health:

- World Health Organization:
 - <http://www.euro.who.int/en/health-topics/health-emergencies/coronavirus-covid-19/novel-coronavirus-2019-ncov-technical-guidance/coronavirus-disease-covid-19-outbreak-technical-guidance-europe/mental-health-and-covid-19>,
 - <https://apps.who.int/iris/bitstream/handle/10665/331490/WHO-2019-nCoV-MentalHealth-2020.1-eng.pdf>
- Canadian residents can access:
 - Government of Canada: <https://www.canada.ca/en/public-health/services/publications/diseases-conditions/taking-care-mental-health.html>
 - CAMH: <https://www.camh.ca/en/health-info/mental-health-and-covid-19>

- o Mental Health commission of Canada:
<https://www.mentalhealthcommission.ca/English/covid19>
- US residents can access:
 - o Centers for Disease Control and Prevention:
<https://www.cdc.gov/coronavirus/2019-ncov/daily-life-coping/managing-stress-anxiety.html>
 - o The National Institute of Mental Health Information Resource Center:
<https://www.nimh.nih.gov/news/science-news/2020/supporting-mental-health-during-the-covid-19-pandemic.shtml>
 - o Mental Health America: <https://mhanational.org/covid19>