Stressful Experiences, Emotion Regulation, and Nonsuicidal Self-Injury Among University Students

by

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2018

Abstract

Nonsuicidal self-injury (NSSI) is a widespread mental health concern among students in university (Swannell et al., 2014). Stressful experiences in university may lead to increased risk for NSSI by undermining an individual’s ability to cope with distress. However, longitudinal examinations of the link between stressful experiences in university and NSSI, and the mechanism driving the association, are lacking. The current study investigated the process through which stressful experiences may heighten risk for NSSI in a sample of 1132 undergraduate students (70% female, \( m_{age} = 19.11 \)). Participants reported on daily stressors in university, difficulties in emotion regulation, and NSSI each year for three consecutive years. Path analysis revealed a significant indirect effect from stressful experiences to NSSI through emotion regulation. This association was bidirectional; greater frequency of NSSI predicted increased risk for stressful experiences through emotion regulation. Theoretical and practical implications are discussed.
Acknowledgments

First and foremost, I would like to thank my thesis supervisor, Dr. Chloe Hamza, for her guidance, feedback, and support throughout the course of this process. I would also like to thank her, and Dr. Teena Willoughby, for allowing me to be involved in such an important project. Second, I would like to thank my MA thesis reader, Dr. Abby Goldstein for her thoughtful comments and contributions. I greatly appreciate their time and expertise in helping to make this project the best it could be.
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1 Introduction

1.1 Study Overview

Nonsuicidal self-injury (NSSI; e.g., self-cutting without lethal intent) is a widespread mental health concern among emerging adults (ages 18 – 25) on university campuses (Swannell, Martin, Page, Hasking, & St John, 2014). Recent theory and research suggest that experiencing stressful events in university may contribute to heightened risk for NSSI during the emerging adults years (Burke, Hamilton, Abramson, & Alloy, 2015; Hankin & Abela, 2011; Liu, Cheek, & Nestor, 2016; Nock, 2010). However, there is a lack of research on understanding the developmental pathways to NSSI in emerging adulthood. The present study sought to address this gap in the literature by examining longitudinal relations among stressful events, one theoretically relevant mediator - emotion dysregulation, and NSSI in a large sample of emerging adults enrolled in university. Additionally, the nature of associations were examined and bidirectional effects were explored. A more detailed literature review on NSSI, and research and theory on links among stressful experiences, emotion dysregulation, and NSSI will now be provided.

1.2 Nonsuicidal Self-Injury

1.2.1 Definition

Nonsuicidal self-injury (NSSI) is defined as the direct and deliberate damage or alteration of bodily tissue without lethal intent, and includes behaviours such as self-cutting, self-hitting, or self-burning (Heath, Toste, Nedecheva, & Charlebois, 2008; Nock, 2009). NSSI does not include behaviours that are socially sanctioned (e.g., tattooing, piercing) or habitually repetitive behaviours typically observed among youth with developmental delays (e.g, head banging) (American Psychiatric Association, 2013). Although NSSI is associated with a range of externalizing, internalizing, and personality disorders, the behaviour commonly occurs in the absence of psychiatric diagnoses and risk of NSSI does not differ significantly across psychiatric disorders (Bentley, Cassiello-Robbins, Vittorio, Sauer-Zavala, & Barlow, 2015). The recent inclusion of NSSI in the Diagnostic and Statistical Manual of Mental Disorders (5th ed; DSM-5) (American Psychiatric Association, 2013) as a condition requiring further research highlights the
transdiagnostic nature of the behaviour and the need to develop a more robust understanding of the factors that initiate and maintain NSSI (Hasking, Whitlock, Voon, & Rose, 2017).

1.2.2 NSSI and Suicidal Behaviour

Historically, NSSI and suicidal behaviour (i.e., suicidal attempts) often have been studied together under the umbrella of deliberate self-harm (DSH) due to their common co-occurrence in a variety of populations, ranging from adolescent psychiatric patients to undergraduate university students (Klonsky, May, & Glenn, 2013; Klonsky & Muehlenkamp, 2007; Nock, Joiner, Gordon, Lloyd-Richardson, & Prinstein, 2006). However, recent research suggests that NSSI and suicidal behaviours differ significantly in prevalence, intent, and lethality, and represent distinct behaviours worthy of independent study (Hamza, Stewart, & Willoughby, 2012). NSSI occurs more frequently than suicidal behaviour (Muehlenkamp, 2005), and the majority of individuals engaging in NSSI have never made a suicidal attempt (particularly in community-based samples), and do not have suicidal thoughts at the time of the NSSI act (Muehlenkamp, 2005; Nock, Prinstein, & Sterba, 2009). Further, individuals who engage in NSSI endorse lower levels of suicidal ideation, depressive symptoms, and greater reasons for living compared to individuals who engage in suicidal behaviours (Muehlenkamp & Gutierrez, 2004, 2007). It is also important to note that NSSI typically involves low lethality methods, whereas suicidal behaviours involve more lethal methods. The differential properties of NSSI and suicidal behaviours underscore the value of disentangling these two forms of self-injury in scientific research.

Although NSSI and suicidal behaviour should be considered separate constructs there is recent evidence to suggest that NSSI is associated with increased risk for suicidal behaviour. More specifically, recent findings suggest that NSSI may be a stronger predictor of suicidal behaviour than previous suicide attempts, depression, anxiety, borderline personality disorder, and impulsivity (Klonsky et al., 2013; Hamza, Willoughby, & Good, 2013; Ribeiro et al., 2016; Wilkinson, Kelvin, Roberts, Dubicka, & Goodyer, 2011). In a study of university students, Hamza and Willoughby (2016) found that the odds of experiencing suicidal ideation (i.e., thoughts about taking one’s own life) and odds of attempting suicide over a 5-year period were 2.04 and 3.46 times greater, respectively, for emerging adults who engaged in NSSI at time of initial assessment than for emerging adults who did not engage in NSSI. It has been suggested that NSSI may act as a gateway to suicide overtime by habituating individuals to self-inflicted
pain and decreasing fearlessness towards death (Hamza & Willoughby, 2016; Joiner, Ribeiro, & Silva, 2012; Whitlock, Muehlenkamp, et al., 2013). The understanding that NSSI may lead to increased suicidal behaviour highlights the importance of elucidating the risk and protective factors associated with NSSI as an independent yet interrelated construct.

1.2.3 Prevalence and Age of Onset of NSSI

Engagement in NSSI has become a significant public health concern as lifetime estimates among adolescents and emerging adults reach beyond 20% (Jacobson & Batejan, 2014). Specifically, self-reported prevalence rates range from 15.9 - 20.5% in adolescents, 18.5 - 24% in emerging adults, and 2.5 - 5.4% in adults (Swannell et al., 2014). Prevalence rates are highly variable, and are heavily influenced by methodological factors, such as measurement tool (e.g., checklist or single-item measure) and sample population (e.g., clinical or community sample). A recent meta-analysis investigating the influence of methodological factors on NSSI prevalence found that response format, variability in number of NSSI methods specified, anonymity, mode of measurement (i.e., interview or self-administered questionnaire), incentive, and research focus contributed to 51.6% of the variability in prevalence rates. To then understand the overall prevalence of NSSI while controlling for these methodological factors, researchers pooled prevalence rates among studies examining NSSI engagement in community samples (e.g., nonclinical, nonincarcerated). Pooled lifetime prevalence rates demonstrated that approximately 17.2% of adolescents, 13.4% of young adults, and 5.5% of adults engaged in NSSI (Swannell et al., 2014). Further, prevalence rates ranged drastically between community and clinical samples, with clinical samples presenting with NSSI rates 2 – 3 times higher than community samples of both adolescents and adults (Briere & Gil, 1998; Cloutier, Martin, Kennedy, Nixon, & Muehlenkamp, 2010; Klonsky, Fiedler, Turkheimer, & Oltmanns, 2003). Nevertheless, prevalence rates for both community and clinical samples place NSSI engagement at a higher prevalence than a wide range of other disorders such as anorexia and bulimia nervosa (< 2%), panic disorder (< 2%), obsessive-compulsive disorder (< 1%), and borderline personality disorder (2%) (Nock, 2010).

Across clinical and community samples, initial onset of NSSI typically occurs between the ages of 14 and 16 years (Gandhi et al., 2018; Plener, Schumacher, Munz, & Groschwitz, 2015). Recently, Gandhi et al. (2018) investigated the distribution of NSSI age of onset in a pooled
sample of adolescents and emerging adults. The authors found that the probability of age of onset peaked at 14 – 15 years for both community and clinical samples, and peaked a second time at 20 years for community and 24 years for clinical samples. Similar findings appeared in a literature review of 27 longitudinal studies by Plener et al. (2015), who found that prevalence of NSSI steadily increased from the age of 12 years, peaked at 14 – 16 years, and began to decrease at 18 years. These findings seem to illustrate that both adolescence (10 – 18 years) and emerging adulthood (18 – 25 years) represent periods of increased risk for NSSI engagement (also see Heath et al., 2008; Whitlock et al., 2011).

Recent research suggests that the university years may specifically represent a period of increased risk for NSSI engagement. As many as 20 – 30% of university students have engaged in NSSI, and emerging adults in university are two times more likely to engage in NSSI than their same age peers not in university (Swannell et al., 2014). NSSI may also be increasing on university campuses; a longitudinal study by Wester, Ivers, Villalba, Trepal, and Henson (2016) demonstrated that across three cohorts of first-year university students, lifetime engagement and current engagement in NSSI significantly increased from 2008 to 2015. Specifically, lifetime engagement in NSSI increased from 16.0% to 45.0%, with almost half of students reporting engaging in NSSI behaviours at some point in their lifetime. Moreover by 2015, 20% of students reported currently engaging in NSSI – an increase of seven times the rate of the students in 2008 (2.6%) (Wester et al., 2016). These findings are consistent with other research that has unscored that university years represent a period of increased risk for NSSI onset (Heath et al., 2008; Whitlock et al., 2011). The prevalence of NSSI among university samples highlights the importance of studying NSSI during this particular period of development.

1.2.4 Gender Differences

Research on the link between gender and NSSI has been highly variable, with inconsistency as to whether NSSI is more prevalent among females than among males. Some studies suggest that females engage in NSSI more than males (Laye-Gindhu & Schonert-Reichl, 2005; Rodham, Hawton, & Evans, 2004), whereas other studies have found no difference in NSSI engagement between females and males (Heath et al., 2008; Klonsky et al., 2003; Muehlenkamp & Gutierrez, 2004; Victor et al., 2018). A recent meta-analysis by Bresin and Schoenlebeber (2015) found that females were slightly more likely than males to report engaging in NSSI, but this effect was
small. It is interesting to note that gender differences were more pronounced among clinical samples than in community or university samples. Moreover, gender differences were also reported in the location of NSSI, as well as the social context in which NSSI occurred (Bresin & Schoenleber, 2015; Burke et al., 2015; Whitlock et al., 2011). Females were more likely to injure arms and legs, while males were more likely to injure chest, face, and areas that were more visible (Sornberger, Heath, Toste, & McLouth, 2012). Drawing from a representative sample of university students, Whitlock et al. (2011) found that the context in which individuals engaged in NSSI differed by gender as well, such that females were more likely to injure in private, while males were more likely to injure in the presence of others.

Despite findings that females may be more likely to engage in NSSI than males (Laye-Gindhu & Schonert-Reichl, 2005; Rodham et al., 2004), it is important to highlight that several researchers have observed that gender differences may stem more from biases around the methods used to assess NSSI, rather than true gender differences in frequency of behaviour (Bresin & Schoenleber, 2015; Swannell et al., 2014). As outlined previously, there are a variety of methodological factors (e.g., number of NSSI methods included) that can affect the overall observed prevalence of NSSI engagement. Similarly, methodological factors may influence the prevalence of NSSI engagement specifically between genders. For example, mounting research suggests that females are more likely to engage in behaviours that draw blood (e.g., cutting, scratching) whereas males are more likely to engage in behaviours such as head banging, self-hitting, and burning (Bresin & Schoenleber, 2015; Sornberger et al., 2012). Accordingly, research that has utilized more limited assessments of NSSI behaviours (e.g., cutting) may yield higher prevalence rates among females than assessments tapping into behaviours also relevant to males (e.g., burning, self-hitting, etc.) (Swannell et al., 2014).

1.2.5 Functions of NSSI

In the last 10 years, research on NSSI has moved from focusing on correlates associated with NSSI to addressing the functions (or motivations) underlying NSSI behaviour. A functional perspective to understanding NSSI stresses understanding the antecedents to and consequences of NSSI engagement, in order to elucidate the function this behaviour serves for a particular individual (Nock & Prinstein, 2004, 2005). This perspective is crucial to the understanding of psychopathology because it elucidates factors that may be central to behaviour initiation and
maintenance, and can lead to successful prevention and treatment efforts (Klonsky, Glenn, Styer, Olino, & Washburn, 2015; Nock, 2009). The most common function of NSSI, endorsed by more than 80% of individuals who engage in the behaviour, is emotion regulation (Whitlock et al., 2011). In this context, emotion regulation refers to using NSSI as a tool to alleviate intense negative emotions, such as stress and anxiety (Brown, Comtois, & Linehan, 2002; Klonsky & Glenn, 2009; Klonsky & Muehlenkamp, 2007). Other NSSI functions have been identified including self-punishment, anti-dissociation (e.g., causing pain to stop feeling numb), anti-suicide (e.g., stopping suicidal thoughts), peer bonding (e.g., fitting in with others), interpersonal influence (e.g. letting others know the extent of emotional pain), and sensation seeking (e.g., generate excitement) (Klonsky & Glenn, 2009; Klonsky & Muehlenkamp, 2007; Klonsky et al., 2015); however, these functions are less commonly endorsed than emotion regulation (Whitlock et al., 2011). Klonsky et al. (2015) examined the functions endorsed by individuals receiving acute-care treatment for NSSI, as well as university students (Klonsky & Glenn, 2009), and found evidence for a two-factor structure. In both studies, the most commonly endorsed factor represented intrapersonal functions, such as emotion regulation and self-punishment, and a second factor represented interpersonal functions, such as interpersonal influence and peer bonding. This two-factor structure has been replicated among community and clinical samples of adolescents, emerging adults in university, and older adults, and suggests intrapersonal functions, and to a lesser extent interpersonal functions, are predictive of NSSI engagement (Klonsky & Glenn, 2009; Nock & Prinstein, 2005).

In a recent paper, Hooley and Franklin (2018) suggested that engaging in NSSI for interpersonal reasons, or intrapersonal reasons other than emotion regulation, are still likely to be maintained through emotional processes. For example, some individuals may engage in NSSI to attain or affirm their affiliation with a peer group (i.e., interpersonal function) (Prinstein, Guerry, Browne, & Rancourt, 2009). The desire to achieve status in a peer group may override barriers to NSSI, such as avoidance of physical pain, by establishing a sense that the physical pain is worth the feeling of securing a stronger sense of peer affiliation. In other words, while peer bonding is a social function of NSSI, the motivation is nonetheless rooted in the positive emotions derived from peer group acceptances (i.e., an emotion regulation need and/or desire). This work underscores the emotion regulating function NSSI may serve for most individuals who engage in NSSI behaviour, and highlights the need to investigate this primary function further.
1.3 Development and Maintenance of NSSI

1.3.1 Integrated Theoretical Model of Development and Maintenance of NSSI

Research on NSSI has increased dramatically over the past two decades (Nock, 2014); however, research on the developmental processes through which NSSI has its onset and is maintained over time is still limited. In 2009, Nock proposed an integrative etiological model of NSSI underscoring both distal and proximal processes thought to be relevant to engagement in NSSI (Nock, 2009). In this model, it is thought that early distal risk factors (e.g., childhood maltreatment, familial hostility/criticism, genetic predisposition) lead to emotional and social deficits (e.g., heightened emotional reactivity, poor communication and problem solving). As a result, when an individual experiences a stressful event, they may have difficulty coping with the stressor in real time, which in turn leads to NSSI engagement (i.e., a proximal process). The overarching conceptualization informing the model is that NSSI functions as a method to regulate negative emotions derived from stressful experiences, essentially acting as an immediate method of emotion regulation (see Figure 1). This model is consistent with other affect regulation models of NSSI (e.g., Chapman, Gratz, & Brown, 2006; Jacobson & Batejan, 2014; Turner, Chapman, & Layden, 2012), but provides a more comprehensive developmental lens through which NSSI may be initiated and maintained across development. Although research to date supports the role of early distal risk factors in the prediction of NSSI (Baetens et al., 2015; Buser & Hackney, 2012; Smith, Steele, Weitzman, Trueba, & Meuret, 2015), less research has explored the proximal processes that contribute to NSSI.

1.4 Stressful Experiences and NSSI

Stressful experiences play a central role in initiating NSSI engagement in Nock’s (2009) model. Exposure to stressful experiences is a common risk factor for negative mental health outcomes such as schizophrenia, depression, and suicide (Blaauw, Arensman, Kraaij, Winkel, & Bout, 2002; Fergusson, Woodward, & Horwood, 2000; Monroe & Harkness, 2005; Walker, Mittal, & Tessner, 2008), and existing research seems to support a positive relation between stressful experiences and NSSI (Burke et al., 2015; Hankin & Abela, 2011; Liu et al., 2016). In a systematic review by Lui et al. (2016), a significant relationship between stressful events and NSSI was found even after controlling for publication bias (i.e. the bias in which studies with
small effect sizes or non-significant findings are not published). Prior to controlling for publication bias, the pooled odds of engaging in NSSI were approximately 80% greater after experiencing stressful events than when these events were absent; once adjusting for publication bias, weighted odds were 33% (Liu et al., 2016). These findings suggest a positive and modest association between stressful experiences and NSSI. Similarly, the presence of stressful experiences also distinguished between individuals who engaged in NSSI compared to individuals who did not engage in NSSI in other studies (Liu & Miller, 2014; O’Connor, Rasmussen, & Hawton, 2012). In a study of adolescents in post-secondary school, individuals who engaged in NSSI reported significantly more stressful experiences compared to individuals who only thought about engaging in NSSI and those who did not think about/or engage in NSSI (O’Connor et al., 2012). Lui and Miller (2014) had similar findings over a three-year period, such that those who engaged in NSSI experienced more stressful events at baseline and greater stressful events over the study period compared to those who did not engage in NSSI. Among university students specifically, 25% of students endorsed engaging in NSSI as a way to regulate life stress (Wilcox et al., 2012), and students who reported engaging in NSSI also reported significantly higher levels of stress (Kokaliari, Roy, & Koutra, 2017). Further, the central role stress plays in NSSI etiology is highlighted by the finding that adolescents who engage in NSSI show higher physiological reactivity (as indexed by skin conductance) in response to an experimentally induced stressor, and a reduced ability to tolerate this distress compared to those who do not engage in NSSI (Nock & Mendes, 2008). This suggests that individuals who engage in NSSI experience increased arousal when exposed to stress, and have a more difficult time regulating their response to stressful situations when compared to individuals who do not engage in this behaviour. Therefore, empirical work not only supports stress acting as a potential initial contributor, but also highlights its central role in the etiology of NSSI engagement and maintenance.

Extending upon the cross-sectional analyses of stressful experiences and NSSI, there are few longitudinal studies assessing the temporal relationship between these constructs. Hankin and Abela (2011) conducted a 2.5 year longitudinal study among a community sample of youth aged 11 – 14 years. Stressful experiences were found to be a significant predictor of NSSI engagement at the 2.5 year follow-up. This finding was replicated by Hasking and colleagues (2013), who also found that stressful events (referred to as negative life events) predicted the onset of NSSI
within the study period, and differentiated those who self-injured from those who did not self-injure. These results suggest that stressful experiences are a prominent proximal predictor of NSSI engagement among youth, further supporting Nock’s theoretical model of NSSI. Perhaps an increased number of stressful events provides repeated opportunities for adolescents to experience distress, the cumulative effect of which may exacerbate negative affect, resulting in maladaptive coping such as NSSI.

More recently, research has begun to look at the transactional relationship between stressful experiences and psychopathology. This perspective proposes that individuals not only react to environmental stressors, but also select, process, and contribute to their social contexts. As such, individuals who engage in NSSI may demonstrate characteristics that lead to the experience of increased stressful events. Although research exploring the reciprocal nature of stressful experiences and NSSI is limited, in one study Burke et al. (2015) conducted an initial assessment of this transactional process by examining whether NSSI increases the risk of experiencing stressful events, specifically interpersonal life stress. Results from a sample of late-adolescents demonstrated support for this transactional process; authors found that frequency of lifetime and past year NSSI predicted occurrence of interpersonal stressful events. However, this finding only occurred for adolescent girls, suggesting that there may be a gender difference in the relationship between stressful experiences and NSSI.

1.5 Emotion Regulation and NSSI

Emotion regulation can be defined as the modulation of emotional arousal, the awareness, understanding, and acceptance of emotions, and the ability to act in a desired way regardless of emotional state (Gratz & Roemer, 2004). Emotion regulation is often engaged in following exposure to an aversive stimulus, in which the individual is motivated to regulate ensuing negative thoughts and/or experiences through a variety of strategies. These strategies can function in either healthy or unhealthy ways, which reflect one’s psychological well-being (Gross & John, 2003). Healthy emotion regulation strategies, such as cognitive reappraisal, are associated with positive health outcomes, improved relationships, academic, and work performance (Aldao, Nolen-Hoeksema, & Schweizer, 2010; Gross & John, 2003). While unhealthy emotion regulation strategies, such as expressive suppression, often emerge in the context of psychological disorders, such as NSSI, and result in poor mental health, distress, and
other risky behaviours (Aldao et al., 2010; Linehan, Bohus, & Lynch, 2007; Nolen-Hoeksema, Wisco, & Lyubomirsky, 2002; Weiss & Sullivan, 2015). As such, understanding how frequently and intensely individuals experience emotion regulation problems is pertinent to understanding the development and maintenance of unhealthy coping behaviours such as NSSI.

As previously discussed, individuals who engage in NSSI self-report that NSSI primarily functions as an emotion regulation strategy, serving to reduce negative mood states (e.g., anger, sadness) (Hamza & Willoughby, 2015; Klonsky & Glenn, 2009; Nock & Prinstein, 2004). The role of NSSI in emotion regulation has been further supported by research using experimental and ecological momentary assessment techniques. For example, Hamza and Willoughby (2015) conducted a meta-analysis of lab-based experimental (e.g., guided imagery, acute pain) and moment sampling approaches to NSSI. Overall, the researchers found decreased negative affect following administration of pain for both those who engaged in NSSI and those who did not engage in NSSI, a phenomena referred to in the literature as pain-offset relief (Hooley & Franklin, 2018). Findings from ecological momentary sampling (EMA, participants complete multiple assessments of their thoughts, emotions and behaviours over time) were also compelling; negative affect (e.g., stress, anxiety, anger toward the self) was found to increase before NSSI engagement and urge to engage (Armey, Crowther, & Miller, 2011; Muehlenkamp et al., 2009; Nock et al., 2009). Following engagement in NSSI, negative affect decreased (Armey et al., 2011; Bresin & Gordon, 2013; Franklin et al., 2010), and in some studies it was also found that positive affect moderately increased (Franklin, Lee, Hanna, & Prinstein, 2013; Muehlenkamp et al., 2009; Selby, Nock, & Kranzler, 2014). Notably, these findings have been replicated across community and clinical samples (Andrewes, Hulbert, Cotton, Betts, & Chanen, 2017; Kranzler et al., 2018), and support the affect regulating function of NSSI.

1.6 Stressful Experiences, Emotions, and NSSI in Emerging Adulthood

As previously noted, the emerging adult years (ages 18 – 25) seem to represent a period of increased risk for NSSI onset and engagement. According to Arnett’s Theory of Emerging Adulthood (2016), this time represents a period of opportunity and vulnerability that is unique from other developmental stages. Emerging adulthood is regarded as a time of increased possibilities and optimism, where individuals can explore multiple academic interests, develop
new social and romantic relationships, and make independent decisions as they begin to establish their adult identities (Arnett, 2000). However, emerging adulthood is also characterized by challenges including feeling ‘in-between’ two developmental stages (e.g., no longer an adolescent, but not yet an adult), instability due to frequent changes, and identity exploration (Arnett, 2000). For those enrolled in university (approximately 80% of emerging adults; Statistics Canada, 2018), many of the challenges associated with emerging adulthood are acutely experienced; during this period students experience new financial and academic pressures, move out of the family home for the first time, and experience a marked decrease in dependence on individual and organizational supports (e.g., parents/families, mandatory schooling). For some students, these changes and challenges may be very overwhelming and elicit feelings of stress, anxiety, and other negative emotions (Azmitia, Syed, & Radmacher, 2013; Krypel & Henderson-King, 2010; Nelson & Padilla-Walker, 2013). Specifically, Krypel and Henderson-King (2010) found that stress was particularly high throughout an emerging adults’ academic career, and recent research suggests that many students report feeling stressed and overwhelmed in university (American College Health Association, 2016). The significant relationship between stress and negative mental health outcomes for university students has been well documented (Asberg, Bowers, Renk, & McKinney, 2008; Dyson & Renk, 2006; Hamza & Willoughby, 2013; Kokaliari et al., 2017; Reynolds, 2015).

Based on Nock’s (2009) theoretical model, it is possible that stressors encountered in university during the emerging adult years may undermine an individual’s ability to cope with distress, leading to NSSI as a form of coping behaviour. Indeed, as many as 1 in 5 undergraduate students engages in NSSI, and these rates are two times higher among emerging adults in university than emerging adults not in university (Swannell et al. 2014). The increased experience of stress during the university years, coupled with a lack of effective coping mechanisms during this sensitive period, may result in a time of high risk for NSSI. However, research on the link between stress and NSSI over time among emerging adults and research on the mechanism through which stress may lead to increased risk for NSSI are lacking. Given that students who engage in NSSI are at increased risk for other problem behaviours (e.g., substance use, eating pathology) (Claes, Houben, Vandereycken, Bijttebier, & Muehlenkamp, 2010; Serras, Saules, Cranford, & Eisenberg, 2010), as well as at heightened risk for suicidal behaviour during the later university years (Hamza et al., 2012; Hamza & Willoughby, 2016), understanding the
processes through which NSSI is initiated and/or maintained during the university years is critically important.

1.7 Current Study

Despite increased research on the link between stressful experiences and NSSI, there are a number of important limitations. First, much of the research to date has been cross-sectional, and there is a paucity of literature elucidating the mechanism through which stressful experiences may increase risk for NSSI engagement (Liu et al., 2016). Longitudinal research is crucial for understanding why stressful events may lead to NSSI, and can serve to inform the development of evidenced-informed early prevention and intervention strategies. Although recent theory (i.e., Nock’s theoretical model) and findings seem to support emotion regulation as a potential mechanism, this relationship has not been explicitly empirically tested in a longitudinal manner. Second, given the lack of longitudinal research on stress and NSSI, it also is difficult to determine the nature of the association between stressful experiences and NSSI. Importantly, the findings of Burke et al. (2015) suggest this relation may in fact be bidirectional, underscoring the necessity of examining the direction of effects between stressful experiences and NSSI to fully elucidate the proximal processes contributing to NSSI engagement. Third, much of the research to date has focused on adolescents specifically, but less is known about proximal processes during the emerging adult years. Given findings that emerging adulthood may also represent a sensitive period for the onset of NSSI behaviour (Swannell et al., 2014), it is important to elucidate developmentally relevant factors contributing to NSSI engagement during this period as well. The relation between stressful experiences and NSSI may be particularly relevant among undergraduate students due to the unique stressors experienced (e.g., navigating living away from home for the first time, new residence, new financial pressures), and given the high prevalence of stress reported among this population.

In the present study, we address these gaps in the literature by examining associations among stressful experiences, emotion regulation, and NSSI among emerging adults in university using a large scale longitudinal research design. Based on Nock’s (2009) theoretical model, we hypothesized that emotion regulation would mediate the relationship between stressful experiences and NSSI engagement, such than an increase in stressful events would lead to heightened emotion dysregulation, and, subsequently, to increased NSSI engagement. Further,
based on the findings of Burke et al (2015), we also hypothesized that this would be a bidirectional relationship such that increased NSSI engagement would also lead to heightened emotion dysregulation, and in turn lead to more frequent stressful experiences.

2 Method

2.1 Participants

In the present study, 1132 emerging adults in university (70.5% female, \(\text{mean} = 19.11, \text{SD} = 1.05\)) completed a variety of measures as part of a five-year longitudinal research project at a mid-sized Canadian university. Students completed the survey in February or March of their first, second, and third year of university and all assessments were completed one year apart. Consistent with the demographics for the region, 87.5% of participants were born in Canada and reported a Canadian ethnic background. Other ethnic backgrounds included British (19%), Italian (17%), French (10%), and German (9%). Mean level of education for both mothers and fathers fell between “some college, university or apprenticeship program” and “completed a college/apprenticeship/technical diploma.” Most participants (76%) lived in campus residence, 15% lived at home with one or both parents, and 9% lived off-campus with roommates.

2.2 Procedure

Students in first-year university were invited to complete a survey examining adjustment to university through posters, classroom announcements, website postings, and residence visits. Students could participate regardless of academic discipline, and were informed at time of recruitment of the longitudinal nature of the project. Participants who completed the first-wave of the project were given either monetary compensation ($10) or a course credit. Participants were compensated at Time 2 and Time 3 with $20 and $30, respectively. Only participants who previously completed the study at Time 1 were eligible to participate at Time 2 and Time 3. Assessments at Time 1 and Time 2 were completed in person, and were completed online at Time 3. The study was approved by the University Research Ethics board prior to survey administration at all three assessments, and all participants provided informed active consent prior to participation. Participants were informed at time of consent that they would be asked questions related to self-injurious behaviours. Although asking emerging adults about self-injury
does not have iatrogenic effects (Muehlenkamp, Walsh, & McDade, 2010; Whitlock, Pietrusza, & Purington, 2013), to ensure the safety of participants a full debrief was provided at the end of each survey, and all participants were given a list of mental health supports and the contact information of researchers. Participants were also given the option of providing their contact information so that they could be contacted by a mental health professional if they were experiencing any distress.

2.3 Missing Data Analysis

Missing data occurred because some participants did not complete the entire questionnaire at each of the three waves (average missing data = 3.5%). Missing data also occurred because not all participants completed the survey at all three waves. At Time 2, 73% of participants from Time 1 completed the survey, and at Time 3 72% of participants from Time 1 completed the survey. Results from an independent samples t-test revealed that compared to participants who completed the survey at all three waves, participants who did not complete the survey at Time 2 and/or 3 were more likely to be male ($p < 0.01$), but did not significantly differ on any of the other study variables. Missing data analysis revealed that the probability of missingness on a given variable was not significantly related to any variable scores (i.e., $p > 0.01$, data were missing at random; Enders, 2010). Thus, missing data for the main model were estimated using the full information maximum likelihood (FIML) estimation method. FIML retains cases that have missing data, thus avoiding the biased parameter estimates that can occur with pairwise or listwise deletion (Schafer & Graham, 2002).

2.4 Measures

2.4.1 Demographics

A demographic questionnaire was administered at Time 1 to assess participant age, gender (1 = male, 2 = female), ethnicity, whether the individual was born in Canada, and parental education. Parental education was assessed with one item per parent, (averaged for participants reporting on both parents, $r = .40$) on a scale of 1 = did not finish high school to 6 = professional degree.
2.4.2 Nonsuicidal Self-Injury

At Times 1, 2, and 3, participants completed a shortened version of the Inventory of Statements about Self-injury (ISAS) (Klonsky & Glenn, 2009). A list of seven self-injurious behaviours that involved direct tissue damage (e.g., self-cutting, self-burning, head banging, biting, severe scratching to the point of bleeding, preventing wounds from healing, and rubbing skin against a rough surface) was provided. Participants were asked to indicate how many times in their life they had intentionally engaged in each of the behaviours listed without suicidal intent. To create a normalized measure of NSSI frequency, participant responses were collapsed into six categories: 1 incident, 2 - 4 incidents, 5 - 10 incidents, 11 - 50 incidents, 51 - 100 incidents, more than 100 incidents (see Heath et al., 2008 for a similar categorization). The ISAS has good internal consistency, structural and construct validity (Bildik et al., 2012; Klonsky & Glenn, 2009), and test-retest reliability (Glenn & Klonsky, 2011) among university undergraduate populations.

2.4.3 Emotion Dysregulation

At each assessment point, participants completed six-items from the Difficulties with Emotion Regulation Scale (DERS) (Gratz & Roemer, 2004). Participants were asked to rate the frequency with which six different emotion regulation strategies were applicable to them (e.g., “When I am upset or stressed, I have difficulty thinking about anything else”). Responses ranged from 1 (almost never) to 5 (almost always). Higher scores indicated more difficulties with emotion regulation. The DERS has been shown to have high internal consistency, test-retest reliability, and construct validity (Gratz & Roemer, 2004; Neumann, van Lier, Gratz, & Koot, 2010), and convergent and divergent validity among university students (Ritschel, Tone, Schoemann, & Lim, 2015).

2.4.4 Stressful Experiences

To assess subjective stressful experiences, at each time point participants completed a 26-item measure of Daily Hassles adapted from Willoughby (2008). Participants were asked to indicate the frequency of being bothered by daily hassles with friends, peers, and university work (e.g. “What I am going to do after my undergraduate degree is done,” “problems with roommates”). Responses ranged from 1 (almost never bothers me) to 3 (often bothers me). Responses were
summed such that higher scores represented higher perceived stressful events. In past research, this measure has demonstrated good internal consistency among undergraduate students (Armiento, Hamza, & Willoughby, 2014; Hamza & Willoughby, 2013).

3 Results

3.1 Preliminary Analyses

Prior to running the primary analyses, descriptive analyses were explored for all variables (Table 1). Frequencies were examined to obtain demographic information across scales (e.g., male to female proportion, age frequencies). Skewness and kurtosis were examined to test assumptions of normality, and variables were normally distributed. Correlations among study variables are provided in Table 2. In the present sample, 35.6% reported NSSI at Time 1, 40.1% of students reported NSSI at Time 2, and 43.8% reported a history of NSSI at Time 3.

3.2 Primary Analyses

Path analysis in MPlus 7 (Muthén & Muthén, 2015) was used for the primary analysis. An autoregressive cross-lagged model was tested with daily hassles, DERS, and NSSI assessed at each of the three time points. The model included stability paths within variables across time (i.e., autoregressive paths), concurrent associations among variables within each assessment wave, and associations between variables across time (i.e., cross-lagged paths). Age, gender, place of birth, and parental education assessed at Time 1 were included as covariates, with paths to each of the variables at each assessment point. Overall model fit was evaluated using the comparative fit index (CFI) and the root-mean-square error of approximation (RMSEA; Bentler, 1995). As recommended by Hu and Bentler (1999), CFI values greater than .95 and RMSEAs less than .06, simultaneously, were used to indicate good model fit.

In order to identify the best fitting overall model, it was first tested whether the pattern of results was invariant over time by comparing a model in which all cross-lagged paths were constrained to be equal across time to an unconstrained model in which all cross-lagged paths were free to vary. The Chi-Square Difference Test of Relative Fit indicated that the unconstrained model was not a significantly better fit than the constrained model, \( \chi^2 \text{diff} (6) = 7.078 \) \( p > .05 \). All further interpretations were based on the constrained model, as this model was more parsimonious. As
the pattern of associations were invariant across time, the regression coefficients presented below refer only to results from Time 1 to Time 2, as the pattern of results are the same from Time 2 to Time 3. The standardized paths estimates are provided in Table 3. As can be seen in Table 3, auto-regressive paths were significant for all study variables.

3.2.1 Indirect Effects

To assess the potential mediating role of emotion regulation between NSSI and stressful experiences, we tested two indirect effects. Specifically, we assessed whether: (1) NSSI engagement would predict stressful experiences through emotion regulation and (2) stressful experiences would predict NSSI engagement through emotion regulation. Analyses for indirect effects indicated a significant indirect path from NSSI (at Time 1) to stressful experiences (at Time 3) through emotion regulation (at Time 2), $B = .008, SE = .003, p = .003, 95\%$ CI [.003, .014], and also a significant indirect path from stressful experiences (at Time 1) to NSSI (at Time 3) through emotion regulation (at Time 2), $B = .003, SE = .001, p = .031, 95\%$ CI [.000, .006]. It is also important to note that the model was re-run using gender as a moderating variable, rather than a covariate. The Chi-square difference test revealed that gender did not significantly moderate the pattern of associations among variables, $X^2$diff (6) = 5.736, $p > .05$.

4 Discussion

Although there has been increasing interest regarding the relationship between stressful experiences and NSSI (Liu et al., 2016), there has been little research to address the mechanism through which this relationship may occur. Nock’s model (2009) provides a conceptual foundation, suggesting that experiencing a stressful event may contribute to NSSI engagement by leading to increased difficulty regulating emotions (a proximal process that may account for NSSI initiation and contribute to NSSI maintenance over time) (Nock, 2009). Understanding pathways to NSSI may be especially important in emerging adulthood given that this is a period of marked stress and transition for some individuals (Arnett, 2000, 2016), as well as period of increased risk for NSSI (Swannell et al., 2014). However, theoretically relevant examinations of the processes through which NSSI has its onset and is maintained during emerging adulthood are limited. To address these gaps in the literature, the present study examined associations among stressful experiences, emotion regulation, and NSSI among university students using a
longitudinal research design. As predicted, stressful experiences significantly predicted NSSI engagement through emotion regulation over time. Interestingly, it was also found that this relationship was bidirectional such that NSSI engagement predicted stressful experiences through emotion regulation over time.

4.1 Development and Maintenance of NSSI in Emerging Adulthood

According to the Theory of Emerging Adulthood, the early adult years are a sensitive period of development, characterized by frequent transitions and changes that some individuals may find stressful and/or overwhelming (e.g., leaving home for the first time, navigating new social relationships, and becoming financially independent) (Arnett, 2000, 2016). The experience of these developmentally relevant stressors, in turn, may undermine emerging adults’ abilities to develop healthy coping strategies, potentially leading to increased risk for a variety of unhealthy coping behaviours (e.g., alcohol use, substance use, etc.). In his integrated model on the development and maintenance of NSSI, Nock (2009) underscores the impact of stressful experiences specifically on the onset and maintenance of NSSI, suggesting that exposure to stressors may lead to NSSI through increased emotion dysregulation. In the present study, we examined Nock’s theory, and found that increased daily stressors in university predicted increased risk for NSSI engagement over time. Our findings are consistent with a large body of cross-sectional literature suggesting that greater experience of stressful events are associated with an increased risk of NSSI engagement (e.g., Baetens, Claes, Muehlenkamp, Grietens, & Onghena, 2011; Hankin & Abela, 2011). Moreover, our findings extend limited longitudinal research by elucidating an association between stressful experiences and NSSI, specifically in a university population.

To further extend previous research on the link between stressful experiences and NSSI, we also examined difficulties with emotion regulation as a potential mediating factor. Consistent with Nock’s theory (2009), it was found that increased stressful experiences predicted increased difficulties in emotion regulation, which in turn predicted greater risk for NSSI. Theoretical and empirical evidence provide support for including emotion regulation as a mediator linking stressful experiences and NSSI; in addition to emotion regulation acting as a key function of NSSI (Hamza & Willoughby, 2015; Klonsky & Glenn, 2009; Nock & Prinstein, 2004), an emerging field of literature suggests that individuals who engage in NSSI report more difficulties
regulating their emotions (e.g., Martin, Swannell, Harrison, Hazell, & Taylor, 2010; Voon et al., 2014a). For example, those who engage in NSSI report more difficulties with cognitive reappraisal (an emotion regulation strategy) compared to those who do not engage in NSSI (Martin et al., 2010). However, the present study was the first to our knowledge to test emotion dysregulation as a mediator of stressful experiences and NSSI in a longitudinal analysis. By moving beyond cross-sectional analyses, the present study has contributed to a more nuanced understanding of the link between stressful experiences and NSSI, elucidating emotion regulation as a crucial pathway through which stressful experiences and NSSI are associated.

4.2 Bidirectional Associations among NSSI and Stressful Experiences

On the basis of previous research (Burke et al., 2015), we also examined whether the relation between stressful experiences and NSSI was bidirectional. As predicted, it was found that increased NSSI lead to increased stressful experiences, via difficulties in emotion regulation. This finding is complimentary to previous literature in two areas: 1) the difficulties with emotion regulation that may result from NSSI engagement; and 2) the impact that emotion dysregulation may have on future stressful experiences.

4.2.1 NSSI as a Predictor of Emotion Dysregulation

Although NSSI is a well-established affect regulation strategy in that it immediately reduces negative emotions (Andrewes et al., 2017; Armey et al., 2011; Bresin & Gordon, 2013; Kranzler et al., 2018), there is also some evidence that the behaviour may lead to an increase of negative emotions in the long-term. For example, Favazza and Conterio (1989) found that while majority of females in their sample reported an increase in positive emotions immediately following NSSI, 50% reported feeling worse a few days following engagement. Similarly, in a study of adolescent inpatients, 92.9% reported feeling relief following an episode of self-injury, but 64.3% reported feeling shame, 59.5% reported feeling guilt, and 50% reported feeling disappointment (Nixon, Cloutier, & Aggarwal, 2002; also see Laye-Gindhu & Schonert-Reichel, 2005). Thus NSSI may serve as an effective emotion regulation strategy in the short-term, but may have detrimental effects in the long-term and contribute to further emotion dysregulation over time.
Previous research related to emotion regulation and emotional inexpressivity also suggests that individuals who engage in NSSI may experience emotions more intensely and have an inability or unwillingness to express their emotions verbally to others (Andover, Pepper, Ryabchenko, Orrico, & Gibb, 2005; Gratz, 2006; Lüdtke, In-Albon, Michel, & Schmid, 2016). For example, Gatta and colleagues (2016) found that, compared to adolescents who have not engaged in NSSI, a group of adolescents who were currently engaging in NSSI reported more difficulty identifying and describing feelings, which has been referred to as alexithymia. Alexithymia appears to be characteristic of the psychological functioning of individuals engaging in NSSI, such that more severe presentations of NSSI are associated with higher levels of alexithymia (Paivio & McCulloch, 2004; Polk & Liss, 2007). This inability to identify and communicate negative emotions may lead to further emotion dysregulation, in that effective coping strategies are not employed to successfully address overwhelming emotions (e.g., expressing emotions). This relationship is supported by the finding that individuals high in alexithymia demonstrated more difficulties in emotion regulation compared to individuals low in alexithymia, and that difficulties with emotion regulation contributed to future mental health related problems (e.g., increased prevalence in symptoms of depression and anxiety) (Pandey, Saxena, & Dubey, 2011).

Finally, there is evidence that individuals who engage in NSSI may have a limited repertoire of adaptive strategies to cope with distress, as those who engage in NSSI employ fewer problem-solving and more avoidance coping strategies (Chapman et al., 2006; Heath et al., 2008). This is perhaps indicative of the reinforcement properties of NSSI; as NSSI is effective at reducing negative emotions in the short-term, the behaviour may be reinforced and become one’s primary coping strategy. In turn, repetitive use of NSSI then undermines the development of other coping mechanisms and emotion regulating strategies. Altogether, the above research provides support for mechanisms through which NSSI may lead to further difficulties with emotion regulation.

4.2.2 Emotion Dysregulation as a Predictor of Stressful Experiences

The idea that emotion dysregulation may lead to a further increases in stressful events is in line with Hammam’s (1991, 2006) stress generation hypothesis. According to this hypothesis, certain characteristics individuals possess may confer risk for subsequent stressful events. The hypothesis posits that individuals are active, rather than passive, players in their environment; underscoring that stressful events are, in some ways, dependent on an individual’s
characteristics, beliefs, and behaviours. The stress generation hypothesis was originally derived from the depression literature following the finding that individuals with depressive disorders experienced more dependent stressful events (i.e., occurrences within one’s influence, such as the end of a relationship) than individuals without a history of depression, but no difference in the occurrence of independent stressful events (i.e., occurrences outside one’s influence, such as death of a loved one) (Hammen, 1991, 2006). The hypothesis has been applied to other forms of psychopathology, particularly with anxiety and bipolar disorders (Liu & Alloy, 2010), and more recently to NSSI (Burke et al., 2015; Liu et al., 2016). For example, a recent study found that adolescents with a lifetime history of NSSI experienced greater levels of interpersonal stress, but not non-interpersonal stress over a six-month period (Burke et al., 2015). Further, Liu & Kleiman (2012) found that negative urgency, defined as the tendency to act rashly when experiencing negative affect, predicted more frequent negative dependent events (i.e., interpersonal events) over a four-week period, yet did not predict events that were independent of individuals characteristics, behaviours and beliefs (i.e., non-interpersonal events). Negative urgency, a dimension of impulsivity, is an established risk factor of NSSI (Bresin, Carter, & Gordon, 2012) and is related to emotion dysregulation (Weiss, Tull, Viana, Anestis, & Gratz, 2012). Given that individuals who engage in NSSI have a more difficult time regulating their emotions, consequential behaviours associated with emotion regulation difficulties (i.e., impulsivity, aggressiveness), intuitively may lead to the occurrence more interpersonal stressful events. The findings presented above may reflect the proposed relationship of NSSI engagement and stressful experiences.

4.3 Limitations and Future Directions

Despite the many strengths of the present study, including a longitudinal design, the examination of the direction of effects among variables, a large sample, and theoretical relevance, the study is not without limitations. First, although the present study included a large sample representative of the specific university in Canada, the majority of the participants were white and middle-class; therefore, our findings may not generalize to other geographic regions, specifically those with different ethnic and demographic backgrounds. Second, participants were required to recall their lifetime engagement of NSSI at each time point and so it is possible that our study is subject to recall errors. It would be useful for future research to assess the relationship among stressful
experiences, emotion regulation, and NSSI using ecological momentary sampling techniques (i.e., daily diary) to obtain a recall of more recent NSSI events and capture proximal processes as they occur in real time. Third, the study utilized a subjective measure of stressful experiences, designed to assess the participants’ specific perceptions around the stressfulness of particular events. The measure used provides strength due to its incorporation of personal and contextual factors in addition to event occurrence (Cohen & Wills, 1985; Folkman, 2013; Roberti et al., 2006). However, it is important for future research to consider inclusion of other measures of stressful experiences in order to differentiate the impact subjective and objective stressful events.

4.3.1 Interpreting Effects in Longitudinal Research

It is important to highlight that while the effect sizes in the present study are relatively small compared to effect sizes that may be found in cross-sectional studies, the effects represent meaningful relationships. Small effect sizes are common in longitudinal research, as in these models (i.e., autoregressive models) the strong stability in an outcome often attenuates the effects between other predictors and the outcome. Adachi and Willoughby (2015) provide evidence that in longitudinal research, small effect sizes are meaningful when there is strong stability in the outcome and at least moderate overlap between the predictor and the outcome variables at time of onset; both conditions were met in the present study (see Table 2). As such, interpreting effect sizes in the current study according to Cohen’s (1992) guidelines may be misleading. The statistical analyses utilized were based on a conservative model that controlled for previous scores on outcome measures, covariates (age, gender, birth place, and parental education), and covariances within each time assessment. Therefore, findings indicate that the association of stressful experiences and NSSI engagement through emotion regulation is more predictive of future NSSI behaviour than even past NSSI behaviour which, itself, has strong predictive ability overtime.

4.4 Conclusion

The current study emphasizes the importance of stressful experiences on NSSI engagement, and, in turn, the importance of NSSI engagement on future stressful experiences, among emerging adults in university. Results of the present study also highlight the crucial role that emotion regulation plays in explaining the bidirectional link between stressful experiences and NSSI. The
current study has important implications for theoretical models on NSSI initiation and maintenance. Specifically, findings highlight the importance of considering a bidirectional, or transactional, relationships between stressful experiences and NSSI through emotion regulation. In other words, stressful experiences may not only lead to increased risk for NSSI engagement as proposed by Nock (2009), but repetitive engagement in NSSI also may undermine an individual’s ability to cope with distress, and lead to increased experience of daily stressful events. The present study also has several implications for practice, and can serve to inform efforts to support students on university campuses. Specifically, our findings suggest that providing students with supports to reduce daily stressors (e.g., teaching effective study habits, conflict resolution skills with loved ones and roommates) may reduce risk for NSSI during the university years. Moreover, equipping students with strategies to manage their emotional responses to stressors in university, may help to prevent use of NSSI as a primary emotion coping strategy. Interventions aimed at reducing NSSI behaviour may also be important, given that repetitive engagement in NSSI may undermine an individual’s emotion coping strategies, making them vulnerable to additional stressful experiences while in university.
References


Assessment Reported Affect Associated With Episodes of Nonsuicidal Self-Injury. 


Bresin, K., & Schoenleber, M. (2015). Gender differences in the prevalence of nonsuicidal self-

https://doi.org/10.1016/j.cpr.2015.02.009


https://doi.org/10.1037/h0080369


https://doi.org/10.1016/j.psychres.2015.06.021


https://doi.org/10.1177/0963721412454873

https://doi.org/10.1176/appi.ajp.160.8.1501

https://doi.org/10.1007/s10862-008-9107-z


Table 1

Descriptive Statistics

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<th>Variable</th>
<th>M(SD)</th>
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<td>AGE (YEARS)</td>
<td>19.06(.97)</td>
<td>17.75 – 25.51</td>
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<td>GENDER</td>
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<td>PARENTAL EDUCATION</td>
<td>3.66(1.3)</td>
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<tr>
<td>BIRTH PLACE</td>
<td>87.5% born in Canada</td>
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<tr>
<td>HASSLES1</td>
<td>1.96(.32)</td>
<td>1.08 – 2.96</td>
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<td>HASSLES2</td>
<td>1.96(.29)</td>
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<td>HASSLES3</td>
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<td>1.12 – 3</td>
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<td>DERS1</td>
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<td>DERS2</td>
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<td>DERS3</td>
<td>2.84(.69)</td>
<td>1.00 – 4.83</td>
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*Note: DERS = Difficulties in emotion regulation. HASSLES = Daily hassles.*
Table 2

Correlations among study variables

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<td>-.028</td>
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<td>-.038</td>
<td>.282**</td>
<td>-.034</td>
<td>.074*</td>
<td>.130**</td>
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<td>.258**</td>
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<td>.547**</td>
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<td>.073*</td>
<td>.212**</td>
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<td>.240**</td>
<td>.452**</td>
<td>.503**</td>
<td>.560**</td>
<td>.619**</td>
<td>.687**</td>
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* Correlation is significant at .005 level (2-tailed).

** Correlation is significant at .001 level (2-tailed).
Table 3

*Path Coefficients for autoregressive and cross-lagged paths*

<table>
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<tr>
<th>Path</th>
<th>$B$</th>
<th>$SE$</th>
<th>$p$</th>
<th>95% CI</th>
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<tr>
<td>HASSLES1 $\rightarrow$ HASSLES2</td>
<td>.519</td>
<td>.027</td>
<td>.000</td>
<td>[.446,.565]</td>
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<tr>
<td>DERS1 $\rightarrow$ HASSLES2</td>
<td>.137</td>
<td>.023</td>
<td>.000</td>
<td>[.038,.076]</td>
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<tr>
<td>NSSI1 $\rightarrow$ HASSLES2</td>
<td>.025</td>
<td>.018</td>
<td>.151</td>
<td>[-.002,.011]</td>
</tr>
<tr>
<td>GENDER $\rightarrow$ HASSLES2</td>
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<td>.030</td>
<td>.087</td>
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<td>HASSLES1 $\rightarrow$ DERS2</td>
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<td>.025</td>
<td>.000</td>
<td>[.135,.361]</td>
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<td>DERS1 $\rightarrow$ DERS2</td>
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<td>.028</td>
<td>.000</td>
<td>[.453,.577]</td>
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<tr>
<td>NSSI1 $\rightarrow$ DERS2</td>
<td>.060</td>
<td>.018</td>
<td>.001</td>
<td>[.010,.041]</td>
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<tr>
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<td>.031</td>
<td>.572</td>
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<td>.013</td>
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<td>.012</td>
<td>.014</td>
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<td>.009</td>
<td>.000</td>
<td>[.913,.999]</td>
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<td>.018</td>
<td>.003</td>
<td>[-.448,-.083]</td>
</tr>
</tbody>
</table>

*Note:* Numbers after construct names indicate Time 1 or Time 2 - only two time points are provided as cross-lagged paths were invariant across Time. $B =$ standardized coefficient; $SE =$ standard error. *DERS* = Difficulties in emotion regulation. *HASSLES* = Daily hassles.
Figure 1

*Integrated theoretical model of NSSI initiation and maintenance.*

Stressful experience → Difficulties in Emotion Regulation → NSSI

Proximal Process contributing to NSSI initiation and maintenance