

**The Role of Impulsivity & Emotion Regulation
Difficulties in Predicting Nonsuicidal Self-Injury and
Borderline Personality Disorder Symptoms**

by

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Abstract

Nonsuicidal self-injury (NSSI) and borderline personality disorder (BPD) are complex mental health problems with common developmental pathways. Adverse childhood environments coupled with trait impulsivity and emotion dysregulation have been shown to increase the risk of NSSI and BPD (e.g., Chapman, 2019; Crowell et al., 2009, 2014). The primary aim of this study was to examine models of the association of these risk factors with NSSI and BPD over a one-year period among young adults (N = 229; aged 18-35; 75.5% female). Participants completed measures of relevant variables at baseline and at 4 follow-ups over 12-months. Consistent with hypotheses, multilevel modelling analyses indicated that emotion regulation difficulties (ERD) mediated the association of CM with both NSSI and BPD. Contrary to hypotheses, impulsivity did not moderate the association of CM with ED. These findings highlight the importance of ERD in the course of NSSI and BPD among young adults.

Keywords: borderline personality disorder; nonsuicidal self-injury; childhood maltreatment; trait impulsivity; emotion regulation; development

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Introduction

Nonsuicidal self-injury (NSSI) and borderline personality disorder (BPD) are complex mental health problems that share common developmental pathways and exact a significant toll on the healthcare system (Comtois et al., 2007). NSSI is included in the diagnostic criteria for BPD and is highly prevalent among people with the disorder (American Psychiatric Association, 2013; Black et al., 2004; Nock et al., 2006). Individuals without BPD also engage in NSSI at elevated rates, such as those with depression and post-traumatic stress-disorder (Forbes et al., 2019). Along with an increased risk of suicide (Klonsky et al., 2013; Nock et al., 2006), NSSI is associated with impairment of interpersonal relationships (Gratz, 2006) and negative feelings towards the self, such as shame and internalizing symptoms (Vanderhei et al., 2014). Similarly, negative consequences and correlates of BPD include increased healthcare utilization (Comtois et al., 2007), increased suicide risk (American Psychiatric Association, 2013; Black et al., 2004; DeShong & Tucker, 2019) as well as persistent hopelessness, impulsivity, anger, shame, and social isolation (Brown et al., 2009; Zanarini et al., 2007). Research illuminating predictors of BPD symptoms and NSSI as well as moderators of these predictors will improve our understanding, prevention, and treatment of BPD and NSSI.

Evidence suggests that an invalidating or adverse childhood environment coupled with dispositional tendencies toward trait impulsivity and heightened emotionality increase the risk of emotion dysregulation (consisting of difficulty regulating emotions sufficiently to achieve context-relevant goals; Chapman, 2019). Emotion dysregulation, in turn, increases risk for NSSI and BPD (Beauchaine, Hinshaw & Bridge, 2019; Chapman, 2019; Crowell et al., 2009, 2014; Martin et al., 2011). To my knowledge, however, studies have yet to examine in greater depth the effects of impulsivity and emotion dysregulation on the association of key risk factors with both BPD symptoms and NSSI severity over time.

The primary aim of this study was to examine empirically based models of the association of childhood maltreatment, trait impulsivity, emotion regulation difficulties, BPD, and NSSI among young adults. These models propose that trait impulsivity serves as a key vulnerability factor, moderating the association of child maltreatment with the

development of emotion regulation difficulties, such that this association is stronger among people with higher trait impulsivity (Beauchaine & McNulty, 2013; Crowell et al., 2009, 2014; Linehan, 1993). Emotion regulation difficulties, in turn, impact the trajectory of BPD and NSSI symptoms over time. Findings that these associations occur among young adults could illuminate directions for research, prevention, and intervention. Treatments, for example, that improve emotion regulation could be particularly advantageous among younger adults, helping at a time when NSSI behaviours and BPD symptoms often become entrenched. Earlier preventative interventions to stem the negative effects of childhood maltreatment could include family-based treatment focused on both improving effective parenting and attachment relationships and improving emotion regulation (Beauchaine et al., 2015, Chanen & McCutcheon, 2013; Kuo et al., 2015; Moretti & Obsuth, 2009). Although the current study provides a limited snapshot of twelve months in the lives of at-risk young adults, longitudinal associations of childhood maltreatment, impulsivity, difficulties with emotion regulation, BPD, and NSSI were explored. Primary hypotheses for this research were that (a) emotion regulation difficulties would mediate the association of childhood maltreatment with BPD symptoms and NSSI severity, and (b) impulsivity would moderate the association of childhood maltreatment with emotion regulation difficulty. Secondary analyses examined whether impulsivity moderated the association of emotion regulation difficulties with NSSI and BPD longitudinally.

Borderline Personality Disorder and Nonsuicidal Self-Injury

Nonsuicidal self-injury (NSSI), also referred to as deliberate self-harm, is defined by the International Society for the Study of Self-Injury as “The intentional infliction of immediate physical injury to oneself, without suicidal intent, that is not culturally or socially acceptable” (International Society for the Study of Self-injury, 2007). Prevalence rates of NSSI (usually operationalized as at least one historical act of NSSI) may be as high as 15% among adolescents, 10% among young adults, and 4% among adults (Beauchaine et al., 2019; Swannell et al., 2014) with some studies finding a lifetime prevalence of 17% among young adults (Whitlock et al., 2006). Although NSSI is distinguishable from suicidal behaviour due to the lack of intent to cause death, findings have suggested that NSSI is among the most robust predictors of suicide attempts (Franklin et al., 2017). Theories have proposed that this strong link between NSSI and

suicide may occur because NSSI leads to habituation to the negative physical and psychological effects of serious self-harm (Beauchaine et al., 2019; Klonsky et al., 2013; Van Orden et al., 2010; Whitlock et al., 2013).

Young adulthood is a particularly important period for research on NSSI (Swannell et al., 2014). The age of onset of NSSI ranges from 5-27 years (Ammerman et al., 2018), with some studies finding an average age of onset at 14 (Ammerman et al., 2018) and 17 years (Turner et al., 2015). The majority of individuals engaging in NSSI, therefore, will likely have begun this behaviour by young adulthood. Further, NSSI is strongly associated with risk for suicidal behaviour and may operate as a “gateway” behaviour for future suicide attempts (Whitlock et al., 2013). Therefore, understanding factors that increase or reduce risk of NSSI among young adults could provide crucial information to inform the prevention of a riskier, escalating pattern of behaviour.

A complex disorder, BPD is characterized by instability in a number of areas, including emotions, behaviour, and interpersonal relationships (American Psychiatric Association, 2013). Often developing in early adolescence to early adulthood (Chanen, 2015), the median lifetime prevalence of BPD is estimated to be between 1.6% and 5.9% with rates up to 20% in inpatient settings (American Psychiatric Association, 2013). The requirement for a BPD diagnosis is 5 out of 9 BPD criteria as delineated in the Diagnostic and Statistical Manual of Mental Disorders fifth edition (DSM-5, American Psychiatric Association, 2013; Chapman, 2019). These criteria include frantic avoidance of abandonment, unstable personal relationships, unstable self-image, impulsivity or self-damaging behaviour, suicidal behaviour or self-harm, affective instability, feeling empty, inappropriate or difficult to control anger, and paranoia or dissociative behaviour (American Psychiatric Association, 2013). People with BPD often experience difficulties with emotions and emotion regulation (emotion dysregulation), interpersonal relationships, self-damaging behaviours and risk taking (including NSSI), identity, mood, and impulse control (Chapman, 2019). As indicated earlier, BPD is associated with a high monetary burden upon health services. Developmental theory and research also have indicated potentially similar pathways to the development of NSSI and BPD and suggested that NSSI is a strong predictor of the future development of BPD (Beauchaine et al., 2019; Crowell et al., 2009, 2014). BPD and NSSI have been found to be related

and often co-occurring (Nock et al., 2006), possibly indicating a similar etiology and similar risk and protective factors. The proposed research, therefore, will focus on common risk factors for both NSSI and BPD: an invalidating or abusive childhood environment, trait impulsivity, and emotion regulation difficulties or emotion dysregulation (Beauchaine et al., 2019; Chapman, 2019; Crowell et al., 2014; Dixon-Gordon et al., 2017).

Theory of the Development of BPD and NSSI

Developmental models of BPD emphasize the interaction and transaction of key heritable vulnerabilities with social/environmental experiences throughout childhood and adolescent development (Crowell et al., 2009, 2014). Some of the heritable vulnerabilities include high trait impulsivity and a vulnerability to strong emotional responding referred to as emotional vulnerability or lability, which can develop into emotion dysregulation, or difficulty regulating emotions (Crowell et al., 2014). Trait impulsivity is highly heritable and biologically-based personality trait consisting of difficulty inhibiting ongoing behaviour, repeated engagement in actions despite negative consequences, a lack of forethought before action, and delay discounting (discounting the value of delayed rewards), among other tendencies (Beauchaine & McNulty, 2013; Crowell et al., 2014; Lockwood et al., 2017).

The social/environmental component of the biosocial developmental model consists of the invalidating environment. Invalidation environments are those that dismiss or criticize emotional expression, convey that the child's stressors or challenges are minimal, and provide intermittent reinforcement of emotional escalation. Invalidation environments also may be characterized by coercive interaction patterns, whereby both the caregivers and child are reinforced for conflict escalation tactics (extreme emotional expression, yelling, threatening). Invalidation environments can also consist of abuse, neglect, and traumatic experiences.

The biosocial developmental model of BPD (Crowell et al., 2009, 2014; see also Linehan, 1993, for an earlier version of this model) propose that trait impulsivity confers a marked vulnerability to the negative effects of invalidating rearing environments. As such, if they are raised in adverse environments, children who are highly impulsive are more likely than others to develop emotion regulation difficulties (ERD). Common

characteristics of ERD include (a) difficulty modulating emotional responses, and (b) emotional responses that are so intense and prolonged that the individual has difficulty engaging in valued or goal-directed behaviour (Chapman, 2019; Salsman & Linehan, 2012). As the environment reinforces emotional escalation and lability, the child develops a pattern of strong, unregulated emotional responses and behaviours. Over time, these emotional response tendencies can become trait-like (Crowell et al., 2009). Impulsive and emotionally dysregulated youth also may tend to associate with similar peers and develop dysfunctional coping strategies to regulate their emotions, such as drug and alcohol abuse, risky or reckless behaviours (e.g., unsafe sex, dysregulated eating, and so forth), or NSSI.

NSSI has been shown to predict the development of BPD and is a significant clinical problem area in its own right outside of BPD. Models similar to the biosocial model, specifically, find that both maltreatment and impulsivity increase risk for self-injury in adolescent girls (Beauchaine et al., 2019) and in general (Serafini et al., 2017). NSSI may act as a maladaptive emotion regulation strategy (Chapman et al., 2006; Gratz, 2001; Klonsky, 2007a,b; Voon & Hasking, 2017). Once maladaptive emotion regulation strategies such as NSSI are employed and become a common method for emotion regulation, they can have detrimental effects on wellbeing and be difficult to reverse (Beauchaine et al., 2019). Additionally, trouble regulating emotions (poor emotion regulation) can exacerbate and maintain NSSI (Voon & Hasking, 2017).

In summary, extant models have suggested an important role for impulsivity, difficulty regulating emotions, and adverse childhood experiences in the development of BPD and NSSI (Beauchaine et al., 2019; Crowell et al., 2009, 2014; Serafini et al., 2017). Research findings have been consistent with these models, with studies showing greater levels of emotion dysregulation in individuals who self-injure (Kim et al., 2020). Further, ERD are strongly associated with BPD (Chapman, 2019; Dixon-Gordon et al., 2017; Glenn & Klonsky, 2009; Salsman & Linehan, 2012; Turner et al., 2015). Research also indicates that impulsivity is a predisposing risk factor related to both BPD and NSSI (Beauchaine et al., 2019; Valencia-Agudo et al., 2018; Zanarini et al., 2007) and childhood maltreatment confers increased risk for both BPD and NSSI (Beauchaine et al., 2019; Brown et al., 2018; Guérin-Marion et al., 2020; Swannell et al., 2012; Valencia-Agudo et al., 2018). As BPD tends to develop in mid-to-late adolescence, with NSSI developing concurrently or a little earlier, young adulthood is a particularly important

period in which to study factors associated with BPD symptoms and NSSI. One area that is relatively understudied, however, pertains to the moderating role of impulsivity on the association of childhood maltreatment with emotion regulation difficulties.

The Current Study

The primary aim of the current study is to examine the association of childhood maltreatment, impulsivity, and emotion regulation difficulties with BPD symptoms and NSSI severity longitudinally. A visualization of the hypotheses are represented by Figure 1. Hypothesis 1a is that, over the course of baseline and 4 follow-ups, emotion regulation difficulties will mediate the association between childhood maltreatment with NSSI (see Figure 1, Pathway A and B). Hypothesis 1b is that over the course of baseline and 4 follow-ups, ERD will mediate the association between childhood maltreatment with BPD (see Figure 1, Pathway A and B). Hypothesis 2 is that impulsivity will moderate the association of childhood maltreatment with ERD. Specifically, among participants with higher impulsivity, the positive association of childhood maltreatment with ERD (longitudinally) will be stronger, compared with participants lower in impulsivity (see Figure 1, Pathway ax). Finally, secondary, and more exploratory analyses will examine impulsivity as a moderator of the association of emotion regulation difficulties with NSSI and BPD features. Specifically, it was hypothesized that among participants with higher impulsivity, the positive association of ERD with NSSI (Hypothesis 3a) and BPD (Hypothesis 3b) will be stronger, compared with participants lower in impulsivity (see Figure 1, Pathway bx).

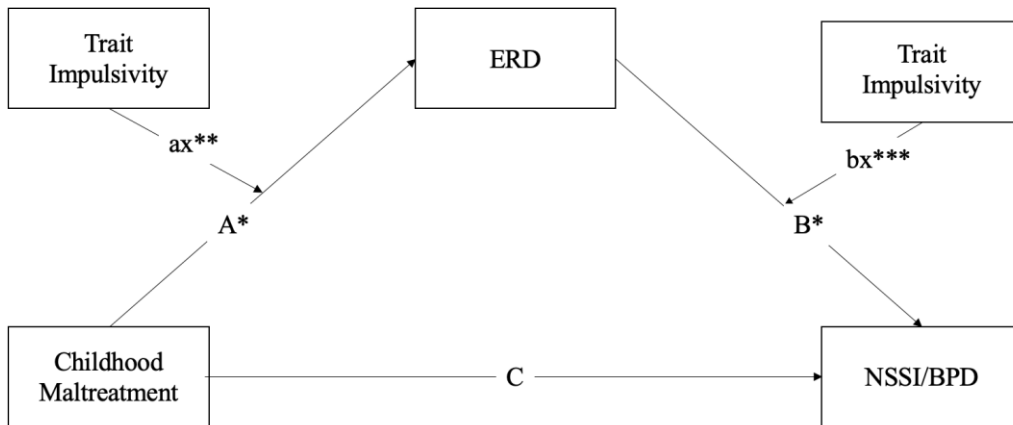


Figure 1. Hypothesized Moderated Mediation of Emotion Regulation Difficulties and Impulsivity on the Associations of Childhood Maltreatment with NSSI/BPD

* Hypothesis 1a,1b ** Hypothesis 2 ***Hypothesis 3a, 3b

Methods

Overview

The current study uses data from a larger, multisite prospective study on implicitly measured motivations for NSSI (Gratz et al., 2016), funded by the Canadian Institutes of Health Research and conducted at both Simon Fraser University and the University of Mississippi Medical Center. This longitudinal study was conducted over a 12-month period and included 5 separate timepoints.

Participants

Participants were recruited through online advertisements as well as community advertisements placed in clinics, stores, hospitals, and other locations. Participants were N=229 high-risk young adults (43.7% Caucasian, 75.5% female, mean age = 23.6 years) reporting recent, recurrent NSSI (N = 74) or controls without NSSI (N = 153) recruited from community, treatment, and university settings through advertisements and referrals. Of this sample, 80.5% of the participants identified as heterosexual, 37% of the sample was employed and 33 % of the sample were students. Participants had to meet inclusion criteria indicating they were between ages 18 and 60, they could not be colour blind or meet criteria for current manic or hypomanic episodes, current psychosis, current substance dependence, or cognitive impairment. Participants meeting criteria for BPD were included, but having BPD was not an inclusion criterion. There were five timepoints that included different measures across the 12-month study period, these included the baseline measures and four follow-ups: 3 months, 6 months, 9 months, and 12 months.

Procedure

All of the procedures described below received approval from the appropriate institutional review boards. A power analysis for the current study was not conducted as the procedures to calculate power for Multilevel Modelling (MLM) are not accessible to the majority of people at present (Mathieu & Chen, 2011). Studies utilizing MLM to examine similar variables including NSSI and ED have sample sizes varying from 60-240 (Johnson et al., 2016; Selby et al., 2013; Turner et al., 2019). The present study's

sample was in the upper portion of this range. The longitudinal models investigated in the current study will be fit using a series of multilevel models to analyze a conceptual moderated mediation model (see Figure 1).

Prior to participating in the study, participants who were interested completed a brief screening either in-person, online, or by phone. If participants consented during this screening to participate, they received several questionnaires about demographics as well as NSSI history including items from the Deliberate Self Harm Inventory (DSHI; Gratz, 2001) and the Questionnaire for Non-suicidal Self-injury (QNSSI; Kleindienst et al., 2008). Participants also responded to questions about their BPD symptoms at this time on measures including the Personality Assessment Inventory- Borderline scale (PAI-BOR; Morey, 1991), and the SCID for Axis II (First et al., 1996). The results of these items allowed participants to be separated into groups for the study including BPD and NSSI/DSH, NSSI/DSH and control.

After completing the screening, potentially eligible participants completed a diagnostic interview. In this diagnostic interview, participants completed several questionnaires, with those relevant to the current study including the DSHI (DSHI; Gratz, 2001). In this session, participants also responded to items concerning BPD symptoms that include the Structured Clinical Interview for the DSM-V Axis II (SCID-II; First et al., 1996). All measures used are described below. Among 332 potential participants who underwent the diagnostic interview, 261 completed the lab session. The remaining 71 did not complete the lab session for a variety of reasons, including not attending the scheduled lab session, not wanting to be video recorded, experiencing psychotic symptoms, and not having a suitable mini mental status exam score. Participants not completing the lab session and follow-ups were filtered out of all cross sectional and longitudinal analyses for the current study.

The lab session required participants to complete a variety of behavioural, physiological, and self-report measures. Self-report measures used in the lab session that were relevant to the current study included the Childhood Trauma Questionnaire Short Form (CTQ-SF; Bernstein & Fink, 1998), and the Barratt Impulsivity Scale (BIS; Patton et al., 1995), and the Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004), which was the measure of ERD. After this laboratory session, participants completed a follow up every 3 months for 12 months following. These follow

ups consisted of a subset of the self-report measures previously answered by participants including the Personality Assessment Inventory- Borderline scale (PAI-BOR; Morey, 1991), The DERS (Gratz & Roemer, 2004) and the DSHI (Gratz, 2001). Of the 261 participants completing the laboratory session, 245 continued with the longitudinal portion of the study and completed at least 1 follow up assessment. Of these participants retention rates were 229, 223, 221, and 212 for the 3-, 6-, 9-, and 12-month assessment points, respectively. On average, participants completed 2.7 of the 4 possible follow-ups, leading to a total of 1155 observations including the baseline session and follow ups.

Measures

Demographics

Demographic information assessed in the current study included age, gender, ethnicity/race, marital status, highest educational attainment, and income range.

Barratt Impulsivity Scale (BIS-11)

The Barratt Impulsivity scale (Appendix C) is a 30-item questionnaire. This is a self-report four-point scale rated from 1 to 4 with 1 indicating rarely or never and 4 indicating always. The BIS-11 measures attention, self-control, motor, cognitive instability, cognitive complexity, and perseverance with items such as: "I do things without thinking" (Patton et al., 1995). These categories can be combined into second-order factors of attentional impulsiveness, motor impulsiveness, and non-planning impulsiveness (Patton et al., 1995). Alpha coefficients indicate internal consistency ranging from .79-.83 in several different populations (Patton et al., 1995). Higher scores on this measure indicate a greater degree of trait impulsivity. The 34-item version used in the current study demonstrated internal consistency of $\alpha = .864$.

Childhood Trauma Questionnaire Short Form

The CTQ Short form (Appendix D) measures experiences of childhood physical or psychological maltreatment. The short form of the CTQ reduced the item number from 70 to 28 items (Bernstein et al., 2003). The 28 items use a 5-point rating scale from 1-5. 1 indicates never true and 5 indicates often true. Items assess various forms of physical

and emotional neglectful behaviour, physical abuse, emotional abuse, and sexual abuse, for example: “When I was growing up, someone in my family yelled and screamed at me” (Bernstein et al., 2003). The CTQ items were found to significantly predict therapist observations of the same constructs (Bernstein et al., 2003). This measure is suitable for use across diverse populations and has good criterion validity (Bernstein et al., 2003). Test-retest reliability has been found to range from .66-.94 (Paivio & Cramer, 2004). Higher scores on the CTQ-SF indicate more childhood maltreatment. In the current study, this measure demonstrated internal consistency of $\alpha = .942$.

Difficulties in Emotion Regulation Scale

The DERS (Appendix E; Gratz & Roemer 2004) is a 36 item self-report questionnaire. The DERS is designed to assess difficulties with emotion regulation and includes items that address different domains of emotion regulation difficulty including; nonacceptance of emotional responses, impulse control difficulties, difficulties engaging in goal directed behaviour, lack of emotional awareness, lack of emotional clarity and limited access to emotion regulation strategies. The items are rated on a Likert scale from 1-5, with 1 indicating almost never and 5 indicating almost always. Most items begin with “When I am upset” and include statements like; “When I’m upset, I feel out of control” (Gratz & Roemer, 2004, p.48), or “When I’m upset, it takes me a long time to feel better” (Gratz & Roemer, 2004, p.48). The DERS demonstrates adequate construct and predictive validity given that all correlations between the DERS and the constructs it is intended to measure were significant and in the correct direction, as well as internal consistency of $\alpha = .93$ (Gratz & Roemer, 2004). Higher scores on the DERS indicate greater difficulty with emotion regulation. In the current study, the DERS demonstrated internal consistency of $\alpha = .958$.

Deliberate Self Harm Inventory

The DSHI (Appendix F) is a 17 item, self-report questionnaire. The DSHI assesses frequency (lifetime and past 4 month), type, severity, and duration of self-harm. The DSHI begins by asking participants: “Have you ever intentionally (i.e., on purpose) cut your wrist, arms, or other area(s) of your body (without intending to kill yourself)?”(Gratz, 2001). It then continues if participants answer yes to ask questions about the nature of this self-injury such as “Have you ever intentionally carved pictures,

designs, or other marks into your skin?” (Gratz, 2001). The DSHI has been found to have internal consistency ranging from $\alpha = .81$ to $.82$ with a split half reliability of $r = .78$ and a mean of item total correlations of $r = .43$. The DSHI also demonstrates test-retest reliability ranging between $f = .49$ and $f = .68$, and construct validity displayed by strong correlations with other measures of NSSI. The DSHI demonstrates discriminate validity displayed by small or nonsignificant correlations with unrelated factors and convergent validity displayed by agreement with other measures of self-harm ($ICC = .79$) among non-clinical and clinical samples (Fliege et al., 2006; Gratz et al., 2014; Gratz, 2001). Higher scores on the items regarding past 4 month NSSI frequency on the DSHI indicate more occurrences of NSSI.

Personality Assessment Inventory- Borderline scale

The PAI-BOR contains 24 items rated on a four-point scale. These items range from False or Not at all true to Very true. One example of these item's is “My relationships have been stormy” (Morey, 1991). The features assessed by this measure are affective instability, negative relationships, identity problems and self-harm (referring to impulsivity) (Morey & McCredie, 2019). The PAI-BOR has demonstrated internal consistency of $\alpha = .88$ and demonstrated convergent validity with other BPD scales in both clinical and non-clinical groups ($r = .77$ and $r = .63$ respectively) (Morey, 1991). The PAI-BOR has also been found to demonstrate both convergent and divergent validity as indicated by positive and significant correlations ($.58 p < .01$) with BPD diagnoses and low/nonsignificant correlations with other Cluster B personality disorders ($-.08$ to $.3$ non-significant) (Jacobso et al., 2007). Reliability estimates have been found to be $\alpha = .93$ which is higher than other measures in a non-clinical sample (Gardner & Qualter, 2009). There is no appendix provided of the PAI-BOR because it is a subscale from a larger, copyrighted measure. Higher scores on the PAI-BOR indicated more BPD features or symptoms. Morey (1991) outlines that a score of 38 or above is indicative of significant BPD features. In the current study, the PAI-BOR demonstrated internal consistency of $\alpha = .923$.

Results

Distribution Properties and Preliminary Analyses

Table 1 displays the means, standard deviations, skewness, and kurtosis coefficients for study variables at baseline.

Table 1. Distribution Properties Predictors and Outcomes

Variable	N	Mean	SD	Range	Skewness	Kurtosis
1. NSSI	227	6.5	21.7	0-202	5.82	40.57
2. Impulsivity	220	74	13.87	41-115	.42	-.14
3. Childhood Maltreatment	220	41.9	14.9	25-92	1.16	.81
4. BPD Symptoms	223	22.6	11.9	0-50	.33	-.79
5. Emotion Regulation Difficulties	227	78.2	27.5	36-166	.61	-.26

Participants who completed less than 3 timepoints have been filtered out and 2 outliers were removed, see text for more details

The planned analyses require basic statistical assumptions of normality, homoscedasticity, and multicollinearity. To test for normality of dependent variables, a Shapiro Wilk test was run on each outcome including emotion regulation difficulties ($p < .000$), NSSI ($p < .000$), and BPD ($p < .000$), these indicated the assumption of normality was not met, QQ plots examined confirmed this. Skewness coefficients indicated that BPD symptoms, and emotion regulation difficulties were not significantly skewed as they were between -1 and 1. Kurtosis coefficients were < 1 for both BPD and emotion regulation difficulties and as such were acceptable. NSSI was found to be significantly positively skewed (skewness = 5.82) and the Kurtosis was much larger than 1 (40.57); however, this is expected from self-injury data. Regression-based analyses are robust to normality violations and as such analyses continued (Allison, 1999).

An outlier analyses indicated two participants who reported extremely high frequencies of NSSI in the 4 months prior to the baseline assessment. One participant reported 400 instances of NSSI, and another reported 2300 instances. These two participants were removed prior to any analyses as this frequency of NSSI was more than 3 standard deviations above the mean, and this number of instances appears unrealistic and invalid. It is likely these participants misinterpreted questions or did not respond to them properly. All correlations and demographics above do not include these two outliers.

The data set was also filtered such that participants who completed less than 3 timepoints were not included in the analyses*. This was done to ensure a more reliable data set and to filter out anyone who was deemed not eligible for the study, i.e., those who completed the baseline analyses and then discontinued or were deemed ineligible.

Preliminary analyses revealed that NSSI and BPD were not highly correlated ($r_{(229)} = 0.224, p = .001$)(see Table 2). As such, NSSI and BPD were kept as separate outcomes in the models described below. Keeping BPD and NSSI as separate outcomes is also theoretically appropriate, as they are distinct but related phenomena and should be analyzed individually to better inform future research, treatment, and prevention. Table 2 displays the correlations between predictor and outcome variables of interest.

* After the current study was completed, analyses were re-run with individuals who completed only 2 time points. None of the results of the present study changed regarding their significance. Given this, and the need for more reliable data the analyses with at least 3 completed time points required were retained.

Table 2. Correlations at Baseline Between Predictors and Outcomes

Variable	1	2	3	4	5
1. NSSI Frequency (4 month)	1.00				
2. Impulsivity	.15*	1.00			
3. Childhood Maltreatment	.12	.28**	1.00		
4. BPD Symptoms	.23**	.49**	.50**	1.00	
5. Emotion Regulation Difficulties	.19**	.51**	.48**	.78**	1.00

* p<.05 ** p<.01

Data Analysis Plan

Given the dependence within this data (i.e., repeated measures across time nested within individuals), a series of multilevel models were employed to test the moderated mediation model illustrated in Figure 1 (Bolger & Laurenceau, 2013). Specifically, the MIXED function in SPSS Version 27 was used and a first order autoregressive (AR1) covariance structure was specified for the repeated statement (see recommendations by Bolger & Laurenceau, 2013).

First, to test Hypothesis 1a and 1b, two mediation models were tested to examine whether the association between childhood maltreatment and NSSI/BPD across time was mediated by emotion regulation difficulties across time. All predictors were grand mean centred. Three pathways were examined in each mediation model. Path C was the association between childhood maltreatment and NSSI or BPD. Path A was the relationship between childhood maltreatment and emotion regulation difficulties (this pathway remained the same in both mediation models). Finally, path B and C' examined childhood maltreatment and emotion regulation difficulties predicting NSSI or BPD individually. R Mediation (Tofghi & MacKinnon, 2011) was used to test for

mediation by calculating confidence intervals for the indirect effects of these mediation models.

Next, in order to test for the moderating effect of trait impulsivity (hypotheses 2, 3a, and 3b), Path A and Path B of the mediation models were re-run to include the main and interaction effects of trait impulsivity.

Because the PAI-BOR, used to measure BPD symptoms, includes some items assessing self-injury, each of the previously mentioned models was calculated for the PAI-BOR total score without self-harm items included. Before self-injury items were removed, PAI-BOR scores at baseline indicated that 54 individuals scored at or above 38 indicating 23.6% of the N-229 individuals endorsed significant BPD features.

Primary Analyses – Multilevel Models

Mediating effect of ERD on the association between CM and NSSI

For this mediation model, the total effect of CM on NSSI was not significant (Path C, $\beta = .121$, $t_{(256.442)}=1.290$ $p = .198$). Path A indicating the effect of CM on ERD was significant (Path A, $\beta = .794$, $t_{(229.73)}=8.058$ $p < .001$): Individuals who report greater levels of maltreatment also report greater levels of ERD. The effect of ERD on NSSI controlling for CM also was significant (Path B, $\beta = .138$, $t_{(309.784)}=2.654$ $p = .008$) indicating that individuals who experience greater ERD endorse more NSSI. The direct effect of CM on NSSI was nonsignificant (Path C', $\beta = .006$, $t_{(255.718)}=.055$ $p = .956$), indicating that childhood maltreatment alone was not significantly associated with the frequency of NSSI. The indirect effect of CM on NSSI through the mediator ERD was significant (indirect effect = 0.11 95% CI= [0.028, 0.201]).

These findings supported Hypotheses 1a. Greater CM appears to be associated with more ERD, and ERD is associated with greater frequency of NSSI. In addition, CM appears to be associated with greater frequency of NSSI because of its association with ERD.

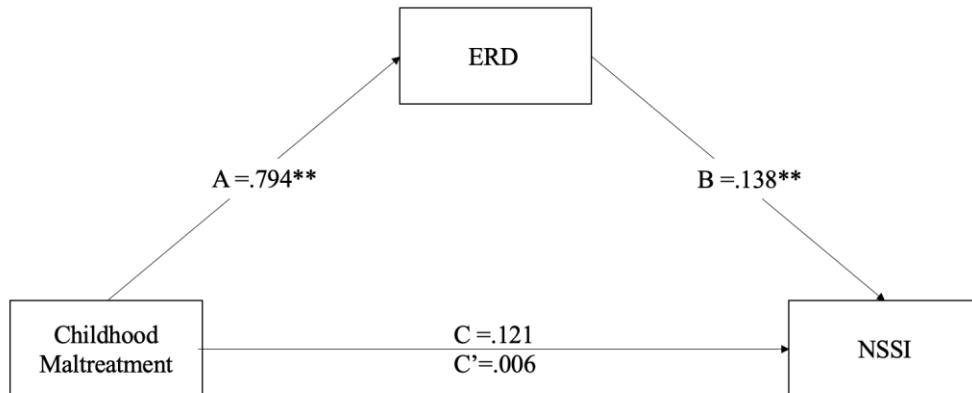


Figure 2 Analyses Examining the Potential Mediation Effect of Emotion Regulation Difficulties on the Association of Childhood Maltreatment and NSSI

**Significant at a level of $p < .05$

Mediating effect of ERD on the association between CM and BPD

The second mediation model included ERD as the mediator in the relationship between CM and BPD symptoms. Path A indicating the effect of CM on ERD was significant (Path A, $\beta = .794$, $t_{(229.73)} = 8.058$ $p < .001$): Individuals who report greater levels of maltreatment also report greater levels of ERD. Path C indicating the total effect of CM on BPD was also significant (Path C, $\beta = .378$, $t_{(229.048)} = 8.814$ $p < .001$), indicating that as levels of CM increase so do levels of BPD symptoms. Path C', indicating the direct effect of CM on BPD also remained significant (Path C', $\beta = .203$, $t_{(238.316)} = 6.69$ $p < .001$). Path B, the effect of ERD on BPD symptoms when controlling for CM was significant (Path B, $\beta = .218$, $t_{(892.494)} = 18.72$ $p < .001$) indicating individuals who experience more ERD endorse more BPD symptoms (Figure 3). The indirect pathway through ERD also was significant (indirect effect = .173 95% CI is [0.128, 0.22]). This pattern of findings suggests that ERD partially mediated the relationship between CM and BPD symptoms. These findings partially supported Hypotheses 1b. Greater CM is associated with greater levels of BPD features at least in part because CM is related to greater ERD.

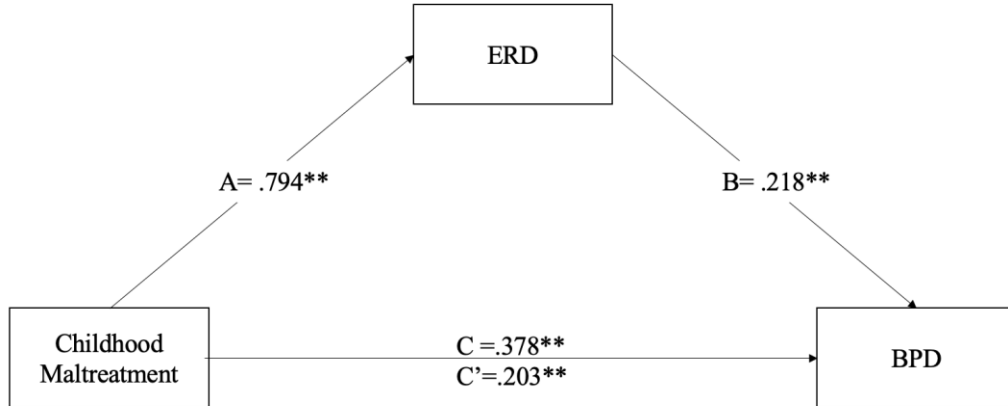


Figure 3. Analyses Examining the Potential Mediation Effect of Emotion Regulation Difficulties on the Association of Childhood Maltreatment and BPD

**Significant at a level of $p < .001$

Moderating effect of impulsivity on the association between CM and ERD

Moderation analyses were also conducted using the MIXED function in SPSS, and examined the role of impulsivity (Hypothesis 2, 3a, and 3b). The first model examined the relationship between CM and ERD with trait impulsivity as the moderator (Hypothesis 2; Table 3). The results indicated that although the main effects between CM and ERD and impulsivity and ERD were both significant ($p < .001$), the addition of the impulsivity x CM interaction term did not result in the model accounting for significantly more variance in ERD, ($\beta = .007$, $t_{(222.781)} = .77$ $p = .441$).

Table 3. The Moderating Effect of Impulsivity on the Association Between Childhood Maltreatment and Emotion Regulation Difficulties.

Parameter	B	Std. Error	df	t	p
1. Intercept	79.412	1.379	222.428	57.55	<.001
2. Childhood Maltreatment	.591	.092	222.890	6.405	<.001
3. Impulsivity	.745	.099	222.409	7.516	<.001
4. CM X Impulsivity	.006	.006	224.573	.945	.346

Secondary Analyses – Multilevel Models

Moderating effect of impulsivity on the association between ERD and NSSI

A MLM examined the relationship between ERD and NSSI with trait impulsivity as the moderator (Hypothesis 3a; Table 4). Results indicated that main effect between ERD and NSSI was significant ($p=.008$); however, the association of impulsivity with NSSI was non-significant, ($\beta =.069$, $t_{(263.476)}= 1.133$ $p=.258$). The addition of the impulsivity x ERD interaction term did not result in the model accounting for significantly more variance in ERD ($\beta =.001$, $t_{(530.336)}= .574$ $p =.566$).

Table 4. The Moderating Effect of Impulsivity on the Association Between Emotion Regulation Difficulties and NSSI Controlling for Childhood Maltreatment.

Parameter	B	Std. Error	df	t	Significance
1. Intercept	4.13	.832	262.516	4.97	<.001
2. Emotion regulation difficulties	.077	.028	631.539	2.682	.008
3. Impulsivity	.069	.061	263.476	1.133	.258
4. Childhood Maltreatment	.012	.056	260.283	.212	.832
5. Emotion regulation difficulties X Impulsivity	.001	.002	530.336	.574	.566

Outcome: NSSI

Moderating effect of impulsivity on the association between ERD and BPD

A MLM examined the relationship between ERD and BPD symptoms with trait impulsivity as a moderator (Table 5) The results indicated that, although the main effects of ERD and impulsivity on BPD were significant ($p < .001$), the addition of the impulsivity x ERD interaction term did not result in the model accounting for significantly more variance in BPD symptoms, ($\beta = .001$, $t_{(867.756)} = -.818$ $p = .413$).

Table 5. The Moderating Effect of Impulsivity on the Association Between Emotion Regulation Difficulties and BPD Controlling for Childhood Maltreatment.

Parameter	B	Std. Error	df	t	Significance
1. Intercept	22.765	.452	233.915	50.404	<.001
2. Emotion regulation difficulties	.205	.012	919.564	16.667	<.001
3. Impulsivity	.156	.033	229.334	4.698	<.001
4. Childhood Maltreatment	.169	.031	227.222	5.501	<.001
5. Emotion regulation difficulties X Impulsivity	-.001	.001	867.756	-.818	.413

Outcome: BPD Symptoms not including NSSI

Discussion

Using longitudinal self-report data, I investigated the relationship between childhood maltreatment (CM) and nonsuicidal self-injury (NSSI) and borderline personality disorder (BPD) symptoms among young adults, focusing on the effects of both trait impulsivity and emotion regulation difficulties (ERD) on these relationships. The models examined are partially consistent with biosocial developmental models of both NSSI and BPD (Crowell et al., 2009, 2014; Linehan, 1993). Beyond the availability of data from another project, it was important to examine whether key postulates of biosocial developmental models apply to emerging adults. In addition, NSSI and BPD features are particularly applicable to young adults and indeed tend to peak in prevalence and frequency within young adulthood (Swannell et al., 2014).

Several key hypotheses guided this work. I hypothesized that ERD would mediate the relationship between CM and NSSI frequency and BPD symptoms (Hypotheses 1a-1b). I hypothesized that impulsivity would moderate the relationship between CM and ERD (Hypothesis 2). Additionally, I explored whether impulsivity moderated the relationships between ERD and BPD and NSSI (Hypothesis 3a-3b). Findings indicated mixed support for these hypotheses. ERD mediated the association of CM with NSSI and partially mediated the association of CM with BPD, but none of the moderation effects of impulsivity were significant. I further discuss these findings below.

Emotion regulation difficulties and the development of NSSI & BPD

The results supported Hypothesis 1a that ERD would mediate the effect of CM on NSSI. Results indicate that ERD fully mediated the relationship between CM and NSSI frequency. CM and NSSI were not significantly associated either in terms of total or direct effects, but the indirect effect of CM on NSSI through ERD was significant. This suggests that ERD explains why CM is associated with NSSI. If someone experiences greater CM, this can lead to trouble regulating emotions. In turn, they might resort to maladaptive emotion regulation strategies such as NSSI.

The mediating effect of emotion dysregulation supports biosocial developmental models of NSSI (see Beauchaine et al., 2019) as well as several other theories of the

development of NSSI and its emotion regulation function (Chapman et al., 2006; Mackenzie & Gross, 2014). In several of these theories, NSSI is conceptualized as an emotion regulation strategy, negatively reinforced by the reduction of emotional states that are experienced as intolerable or overwhelming (Chapman et al., 2006; Klonsky, 2007b; Mackenzie & Gross., 2014; Nicolai et al.,2016). Indeed, several lines of research have suggested that the most common function or purpose people report for engaging in NSSI is to reduce, avoid, or escape from emotions (Chapman et al., 2006; Klonsky, 2007b; Mackenzie & Gross., 2014; Nicolai et al.,2016) and NSSI frequency has previously been found to be related to the non-acceptance of emotions (Gratz and Roemer, 2004). In fact, ecological momentary assessment research has found that negative affect reportedly increases in the moments preceding NSSI, and positive affect significantly increases following NSSI (Muelenkamp et al., 2009) supporting its use for emotion regulation. Physiological research examining vagal tone during NSSI episodes has demonstrated that this behaviour might regulate physiological activity related to emotional states (Nock et al., 2017 as cited in Franz et al., 2019).

It was unexpected that the direct effect of CM on NSSI was not significant. In the present study, the CTQ assessed multiple types of childhood maltreatment including neglect, physical abuse, sexual abuse, and emotional abuse and created an overall aggregate score that included all measured types of abuse. A recent meta-analysis (Serafini et al., 2017) found that specifically, childhood sexual abuse seems to increase risk for NSSI and suicide in women when compared to other forms of maltreatment (that have more inconsistent associations with NSSI in the literature). The current study, therefore, could have combined types of CM that are associated with NSSI (e.g., sexual abuse) with those that are not, diluting the association. The CTQ also does not assess other aspects of invalidating environments, such as criticism, rejection, oversimplification or conflict escalation. These aspects could be important in the development of ERD and NSSI.

Findings partially supported Hypotheses 1b that ERD would mediate the association of CM with BPD. Greater reported CM was associated with more severe BPD symptoms, and ERD partially mediated this association. Unlike the findings with NSSI, partial mediation here suggests that the association of CM with BPD is only partially accounted for by ERD, as the direct effect of CM on BPD remained significant in the model, suggesting additional explanations for the CM-BPD association.

There are a few possible explanations for this result. First, there is a strong and well-established association of CM with BPD and BPD symptoms (Crowell et al., 2009; 2014; Wilson 2021). Second, BPD criteria cover a broad spectrum of difficulties, some of which are more directly related to ERD than others. BPD consists of 9 symptoms, 5 of which are required to make the diagnosis. ERD may be more central to some symptoms, such as affective instability, suicidality, and inappropriately intense anger or difficulty controlling anger. Other symptoms, such as frantic efforts to avoid abandonment and identity disturbance are not as obviously related to emotion dysregulation. In fact, other BPD symptoms such as frantic efforts to avoid abandonment, identity disturbance, and dissociative symptoms, are often found to be related to trauma (Vonderlin et al., 2018). Finally, unstable interpersonal relationships may be related to both emotion regulation difficulties and past experiences with childhood maltreatment. Therefore, CM on its own likely contributes more to some symptoms and presentations of symptoms than ERD, and vice versa.

Overall, despite mixed support for hypotheses, these findings underscore the important role of ERD in the development and course of BPD features and NSSI. The role emotion dysregulation plays in the development of BPD is central to the biosocial developmental model (Crowell et al., 2009; 2014). Crowell's (2009; 2014) biosocial developmental model indicates that emotion dysregulation is shaped through familial and environmental interactions that also reinforce escalated emotional expression. Over time, the at-risk individual learns to experience easily prompted and intense, unregulated emotional reactions, as this has been adaptive to resolve conflict (i.e., the person who yells the loudest or acts the most aversively wins or terminates the conflict). These invalidating environments that encourage ERD may often result in attachment relationships with greater insecurity (Cicchetti et al., 2006; Martin et al., 2011) and attachment insecurity tends to be associated with higher levels of negative emotion regulation strategies and negative affect (Girme et al., 2020; Glazebrook et al., 2015; Kissil, 2011; Mikulincer & Shaver, 2019). Insecure attachment patterns may impede the development of coping strategies (Girme et al., 2020; Glazebrook et al., 2015) and have detrimental effects on the child's wellbeing and relationships throughout the lifespan (Godbout et al., 2014); thus, invalidating parental relationships are important to examine. Both biosocial developmental and attachment-based models, therefore, suggest that the familial environment plays a critical role in shaping emotion regulation tendencies.

Impulsivity and the associations of CM, ERD, NSSI and BPD

Another postulate of biosocial developmental models of NSSI and BPD is that impulsivity is a key, biologically-based, heritable risk factor (Crowell et al., 2009; 2014). Impulsivity theoretically moderates the association of CM with ERD, which then increases the risk of NSSI and BPD. Specifically, those who are high in trait impulsivity are more prone to the negative effects of CM. As such, Hypothesis 2 was that impulsivity would moderate the association of CM with ERD, such that young adults who are higher in impulsivity would show a stronger association between these variables. As the moderating effect of impulsivity was non-significant, findings did not support this hypothesis.

There may be a couple of key reasons for the lack of a moderating effect for impulsivity. First, the sample included a group of recently and repeatedly self-injuring young adults, where ERD may have already become well established by young adulthood. Some research indicates that sensation seeking increases during adolescence and decreases (particularly in females) in early adulthood, while at the same time, impulse control increases steadily (Shulman et al., 2015). It is possible that impulsivity may moderate these associations only in adolescence, when impulse control is not yet at a high enough level to balance out sensations seeking, and when maladaptive emotion regulation strategies are being learned. Perhaps the current study did not find that impulsivity moderated these associations because, by the time young adults were responding to our impulsivity questionnaires, they had developed sufficient levels of impulse control. Second, it is possible that perhaps CM alone is so influential on emotion regulation that impulsivity is not sufficient to affect this relationship despite being correlated with both the predictor CM and outcome.

Multilevel analyses run on baseline and follow up data did not support the secondary, more exploratory hypotheses (3a and 3b) that among participants with higher impulsivity, the positive association of ERD with NSSI and BPD (cross sectionally) would be stronger, compared with participants lower in impulsivity. Among participants with higher impulsivity, the positive association of ERD with NSSI or BPD was not any stronger than for those lower in impulsivity.

There are several possible explanations for the lack of significance in these exploratory findings. First, trait impulsivity may be less observable than behavioral impulsivity (Bresin et al., 2013). It's possible that because trait impulsivity is not always expressed outwardly individuals may not recognize it in their own behaviour. As such, it is unclear whether the result of the current study might have been significant had behavioural impulsivity also been measured as many factors such as executive function can interact with both trait and state impulsivity in different ways (Stanford et al., 2009). Parsing apart this interaction by using both the BIS-11 and a measure of state impulsivity may allow researchers to better understand which (if any) type of impulsivity interacts with emotion regulation difficulties. Second, levels of anxiety have been found to modulate trait impulsivity's expression in some populations (Haines et al., 2020). This may also have affected results because, if participants were high in anxiety this could have had a balancing effect on trait impulsivity. Third, many other factors outside of trait impulsivity influence BPD symptoms. Impulsivity might not be sufficient to affect borderline personality features when compared to other factors, such as ERD and CM that have stronger and more consistent relationships with BPD symptoms. In baseline correlational analyses, BPD and ERD were strongly and significantly correlated, as were CM and BPD. In general, BPD is very closely related to ERD, and BPD symptoms including interpersonal problems have been found to be related to difficulties with emotion regulation (Herr et al., 2012). The most likely explanation for these nonsignificant results is that trait impulsivity alone is not sufficient to impart any change to the strong relationships that exist between childhood maltreatment, emotion regulation difficulties, and BPD.

Analyses examining the moderating effect of impulsivity on the relationship between ERD and NSSI were also not significant. There was also no significant main effect between impulsivity and NSSI, indicating impulsivity may not play a large role in frequency of self-injury. There is a possibility that impulsivity may play a role in incidence of self-injury but not in its maintenance, which should be examined in future research. The main effect of difficulties with emotion regulation was significant when outliers were removed. Much past literature indicates that NSSI can be conceptualized as a maladaptive emotion regulation strategy (Chapman et al., 2006; Klonsky, 2007b; Mackenzie & Gross., 2014; Nicolai et al., 2016) and is often related to NSSI. The most likely explanation for these nonsignificant results, is that trait impulsivity alone is not

sufficient to impart any change to strong relationships that exist between difficulties with emotion regulation and NSSI, particularly once NSSI is used consistently as a strategy to regulate negative emotion.

Strengths & Limitations

The current study has several notable strengths. First, it has a large sample size which allows good statistical power. This statistical power is increased by utilizing MLM methods, which provide the current study with over 1000 data points for analysis. Multilevel modelling also controls for attrition and the covariance matrix used controls for similarity in participants scores between time points. Second, the current study utilized widely used measures that have been shown to accurately measure constructs such as NSSI, BPD, ERD, CM, and impulsivity. The current study also excluded individuals with difficulties that could substantially alter their responses, and matched participants on sex and age between the two sites. Finally, the current study also did not limit co-occurring disorders aside from psychosis and as such results could be generalizable to females between the ages of 18-35.

The current study had several limitations that warrant discussion. First, the majority of the sample was female, rendering possible comparisons between genders difficult. While both NSSI and BPD are more commonly seen among individuals who identify as female, it would still be valuable to examine gender differences, particularly with regards to impulsivity and emotion dysregulation. Future research should aim to have more balanced samples in terms of gender and should also strive to examine these variables in more diverse samples with a range of gender identities. Second, there was only a minor subset of the N=229 participants who self-injured during the 4 months leading up to baseline or during any follow ups. 74 individuals in total endorsed at least one instance of past 4-month NSSI at baseline. A larger subset of the sample who self-injured may have made relationships between emotion dysregulation, impulsivity, and NSSI clearer. Third, the assumptions of the normality of outcome variables as required by regression-based statistical tests was not met. Although this was deemed acceptable due to regression-based analyses being robust against assumptions it may have nonetheless impacted the analyses.

Finally, many of the measures in the current study were self-report measures completed at multiple time points. Self-report measures have several benefits, including easy administration and honesty as some participants feel more comfortable answering questions when they are anonymized in this way. Self-report measures, however, may also be subject to biases and there is a chance for individuals to over or underreport their symptoms and experiences on these measures. This may have inflated reports of self-injury frequency or BPD symptoms or caused an underestimate of BPD symptoms or NSSI. Related to this, given that the data involved self-reported correlational analyses, causal associations could not be determined between any of the variables because none were experimentally manipulated. Another limitation is the use of a past-4-month record of NSSI when follow-ups were three months apart. This limitation is minor however, because the covariance matrix used (first order autoregressive covariance structure for repeated effects) should act to control for this aspect of the data, and because the data was already collected for a previous study, there was no avoiding this limitation.

Implications & Future Directions

The results of the current study provide evidence that emotion regulation skills are an important target for both treatment and prevention of BPD symptoms and to some extent NSSI. Not only are emotion regulation problems (emotion dysregulation) a partial mediator of the relationship between childhood maltreatment and BPD, but they have also been found to indirectly mediate the relationship between childhood maltreatment and self-injury. The results of the current paper also offer important implications since impulsivity was not significant in its moderation of the relationship between CM and BPD or CM and NSSI. This finding, although conflicting with existing models (Crowell et al., 2009; 2014), suggests that emotion regulation should be the main target of intervention and prevention efforts. This is a promising discovery, as emotion regulation is something that can easily be targeted by intervention and prevention efforts for at risk children, adolescents, and young adults, as opposed to childhood maltreatment, which cannot be targeted in young adults (as it has already occurred). Further, for children experiencing ERD and CM, child and parent treatments targeting emotion regulation strategies can be combined and adapted to address the familial context of NSSI and BPD. The current findings indicate that if emotion regulation is targeted, children who are at risk due to

experiencing maltreatment can still receive prevention and treatment to avoid negative outcomes in young adulthood.

To date, treatments that address emotion regulation as a core mechanism of change have shown promise in the treatment of NSSI (Turner, Austin, & Chapman, 2014). Therefore, the present findings further emphasize the important role of emotion dysregulation in the development of NSSI and suggest that treatment and preventative interventions should help at-risk younger adults to improve emotion regulation skills. Regarding this prevention and treatment of NSSI, the current study supports movement toward the use of DBT skills and DBT therapy to treat self-injury, even in individuals who do not have other borderline personality disorder symptoms (Berk et al., 2020; Cook & Gorraiz, 2016). There is already some evidence for DBT being an effective treatment for NSSI. The current study provides evidence for this likely being a result of emotion regulation skills taught in DBT, and phone coaching that allows individuals to consult with their therapist about these skills when they feel self-injury urges. Future studies in this area should aim to investigate if DBT teaching of emotion regulation skills alone would be sufficient to reduce self-injury in order to streamline treatment for individuals who self-injure and do not require the same intensity of therapy as those who self-injure and have co-occurring BPD.

The current study findings also provide useful insights into the possibilities of prevention of both BPD and NSSI prior to symptoms becoming more severe or requiring intervention or medical attention. Because children who experience childhood maltreatment are at an increased risk for BPD and NSSI, and emotion dysregulation mediates both pathways, prevention programs based on DBT skills training should be piloted with at-risk children and adolescents. Since NSSI and BPD symptoms often emerge in adolescents, the current research provides support for intervening and providing maltreated and non-maltreated children with emotion regulation skills training prior to these symptoms emerging. This will likely have positive effects on other areas of mental health as well, as childhood maltreatment is a risk factor for many mental health problems. Future research may also want to investigate invalidating relationships that may not be maltreating but may still increase the risk for negative outcomes including BPD later in life.

To answer the research questions I posed, I analyzed longitudinal data by averaging the effects of five time points. I did not, however, use growth curve modelling or try analyzing time sequenced data, as no consistent changes would be expected given the timeline of the study and the vast range of ages and life stages of participants. Future research should aim to examine change trajectories in BPD symptoms and NSSI and the effect difficulty with emotion regulation has on these changes over time. Examining these relationships over time using growth curve modelling in both children and adolescents would help researchers ascertain if there is a specific time when emotion regulation problems begin to have more of an effect on maladaptive behaviour. The use of these methods would provide insight into the most optimal time to provide children with prevention programs.

The implications of the current study and the lack of effects of impulsivity are also important and can provide researchers with confidence that targeting emotion dysregulation is justified. This is a beneficial result as trait impulsivity would not be easily targeted by interventions whereas there already exist many emotion regulation-based interventions that can be adapted and applied to children and adolescents. This is a very important area of research, and future researchers should strive to design treatment and prevention programs that utilize emotion regulation for both BPD and NSSI in order to reduce possible distressing and negative outcomes that result from these conditions.

Conclusion

The current study examined the effects of both emotion regulation difficulties and impulsivity on the associations between childhood maltreatment and two important outcomes: NSSI and BPD. While the current study did not find support for impulsivity as a moderator in these associations, difficulties with emotion regulation was found to be an important mediator of associations between childhood maltreatment and both NSSI and BPD. This has important implications for future prevention and treatment of both self-harm and BPD symptoms and indicates that emotion regulation skills should be an important target of future treatment and prevention efforts of both clinical problems. With both NSSI and BPD exacting a significant toll on the healthcare system, research illuminating predictors of BPD symptoms and NSSI as well as moderators of these predictors is vital to improving treatment and prevention of BPD and NSSI and can improve the mental wellbeing of many affected individuals if properly implemented.

References

- Allison. (1999). *Multiple regression : a primer* / Paul D. Allison. Pine Forge Press.
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (Author. (ed.); 5th ed.).
- Ammerman, B. A., Jacobucci, R., Kleiman, E. M., Uyeji, L. L., & McCloskey, M. S. (2018). The Relationship Between Nonsuicidal Self-Injury Age of Onset and Severity of Self-Harm. *Suicide and Life-Threatening Behavior, 48*(1), 31–37. <https://doi.org/10.1111/sltb.12330>
- Beauchaine, T. P., & McNulty, T. (2013). Comorbidities and continuities as ontogenic processes: Toward a developmental spectrum model of externalizing psychopathology. *Development and Psychopathology, 25*(4 PART 2), 1505–1528. <https://doi.org/10.1017/S0954579413000746>
- Beauchaine, T. P., Neuhaus, E., Gatzke-Kopp, L. M., Reid, M. J., Chipman, J., Brekke, A., Olliges, A., Shoemaker, S., & Webster-Stratton, C. (2015). Electrodermal responding predicts responses to, and may be altered by, preschool intervention for ADHD. *Journal of Consulting and Clinical Psychology, 83*(2), 293–303. <https://doi.org/10.1037/a0038405>
- Beauchaine, T. P., Hinshaw, S. P., & Bridge, J. A. (2019). Nonsuicidal Self-Injury and Suicidal Behaviors in Girls: The Case for Targeted Prevention in Preadolescence. *Clinical Psychological Science, 7*(4), 643–667. <https://doi.org/10.1177/2167702618818474>
- Berk, M. S., Starace, N. K., Black, V. P., & Avina, C. (2020). Implementation of Dialectical Behavior Therapy with Suicidal and Self-Harming Adolescents in a Community Clinic. *Archives of Suicide Research, 24*(1), 64–81. <https://doi.org/10.1080/13811118.2018.1509750>
- Bernstein, D., & Fink, L. (1998). *Childhood Trauma Questionnaire: A retrospective self-report*. The Psychological Corporation.
- Bernstein, D. P., Stein, J. A., Newcomb, M. D., Walker, E., Pogge, D., Ahluvalia, T., Stokes, J., Handelsman, L., Medrano, M., Desmond, D., & Zule, W. (2003). Development and validation of a brief screening version of the Childhood Trauma Questionnaire. *Child Abuse and Neglect, 27*(2), 169–190. [https://doi.org/10.1016/S0145-2134\(02\)00541-0](https://doi.org/10.1016/S0145-2134(02)00541-0)
- Black, D. W., Blum, N., Pfohl, B., & Hale, N. (2004). Suicidal behavior in borderline personality disorder: Prevalence, risk factors, prediction and Prevention. *Journal of Personality Disorders, 18*(3), 226–239.

- Bolger N., & Laurenceau J. (2013). *Intensive Longitudinal Methods: An Introduction to Diary and Experience Sampling Research (Methodology in the Social Sciences)*. The Guilford Press.
- Bresin, K., Carter, D. L., & Gordon, K. H. (2013). The relationship between trait impulsivity, negative affective states, and urge for nonsuicidal self-injury: A daily diary study. *Psychiatry Research*, 205(3), 227–231. <https://doi.org/10.1016/j.psychres.2012.09.033>
- Brown, M. Z., Linehan, M. M., Comtois, K. A., Murray, A., & Chapman, A. L. (2009). Shame as a prospective predictor of self-inflicted injury in borderline personality disorder: A multi-modal analysis. *Behaviour Research and Therapy*, 47(10), 815–822. <https://doi.org/10.1016/j.brat.2009.06.008>
- Brown, R. C., Heines, S., Witt, A., Braehler, E., Fegert, J. M., Harsch, D., & Plener, P. L. (2018). The impact of child maltreatment on non-suicidal self-injury: Data from a representative sample of the general population. *BMC Psychiatry*, 18(1), 1–8. <https://doi.org/10.1186/s12888-018-1754-3>
- Chanen, A. M., & McCutcheon, L. (2013). Prevention and early intervention for borderline personality disorder: Current status and recent evidence. In *British Journal of Psychiatry* (Vol. 202, Issue SUPPL. 54). <https://doi.org/10.1192/bjp.bp.112.119180>
- Chanen, A. M. (2015). Borderline Personality Disorder in Young People: Are We There Yet? *Journal of Clinical Psychology*, 71(8), 778–791. <https://doi.org/10.1002/jclp.22205>
- Chapman, A. L., Gratz, K. L., & Brown, M. Z. (2006). Solving the puzzle of deliberate self-harm: The experiential avoidance model. *Behaviour Research and Therapy*, 44(3), 371–394. <https://doi.org/10.1016/j.brat.2005.03.005>
- Chapman, A. L. (2019). Borderline personality disorder and emotion dysregulation. *Development and Psychopathology*, 31(3), 1143–1156. <https://doi.org/10.1017/S0954579419000658>
- Cicchetti, D., Rogosch, F. A., & Toth, S. L. (2006). Fostering secure attachment in infants in maltreating families through preventive interventions. *Development and Psychopathology*, 18(3), 623–649. <https://doi.org/10.1017/S0954579406060329>
- Comtois, K. A., Elwood, L., Holdcraft, L. C., Smith, W. R., & Simpson, T. L. (2007). Effectiveness of Dialectical Behavior Therapy in a Community Mental Health Center. *Cognitive and Behavioral Practice*, 14(4), 406–414. <https://doi.org/10.1016/j.cbpra.2006.04.023>
- Cook, N. E., & Gorraiz, M. (2016). Dialectical behavior therapy for nonsuicidal self-injury and depression among adolescents: Preliminary meta-analytic evidence. *Child and Adolescent Mental Health*, 21(2), 81–89. <https://doi.org/10.1111/camh.12112>

- Crowell, S. E., Beauchaine, T. P., & Linehan, M. M. (2009). A Biosocial Developmental Model of Borderline Personality: Elaborating and Extending Linehan's Theory. *Psychological Bulletin*, *135*(3), 495–510. <https://doi.org/10.1037/a0015616>
- Crowell, S. E., Kaufman, E. A., & Beauchaine, T. P. (2014). A Biosocial Model of BPD: Theory and Empirical Evidence. In *Handbook of Borderline Personality Disorder in Children and Adolescents* (pp. 1–480). <https://doi.org/10.1007/978-1-4939-0591-1>
- DeShong, H. L., & Tucker, R. P. (2019). Borderline personality disorder traits and suicide risk: The mediating role of insomnia and nightmares. *Journal of Affective Disorders*, *244*(October 2018), 85–91. <https://doi.org/10.1016/j.jad.2018.10.097>
- Dixon-Gordon, K. L., Turner, B. J., Zachary Rosenthal, M., & Chapman, A. L. (2017). Emotion Regulation in Borderline Personality Disorder: An Experimental Investigation of the Effects of Instructed Acceptance and Suppression. *Behavior Therapy*, *48*(6), 750–764. <https://doi.org/10.1016/j.beth.2017.03.001>
- First, M. B., Spitzer, R. L., Gibbon, M., & Williams, J. B. W. (1996). *Structured clinical interview for DSM–IV Axis I disorders, patient edition (SCID-I/P, version 2.0)*. Psychiatric Institute.
- Fliege, H., Kocalevent, R. D., Walter, O. B., Beck, S., Gratz, K. L., Gutierrez, P. M., & Klapp, B. F. (2006). Three assessment tools for deliberate self-harm and suicide behavior: evaluation and psychopathological correlates. *Journal of Psychosomatic Research*, *61*(1), 113–121. <https://doi.org/10.1016/j.jpsychores.2005.10.006>
- Forbes, C. N., Tull, M. T., Richmond, J. R., Chapman, A. L., Dixon-Gordon, K. L., & Gratz, K. L. (2019). Motives for Nonsuicidal Self-Injury in Individuals with Lifetime Depressive Disorders and Posttraumatic Stress Disorder. *Journal of Psychopathology and Behavioral Assessment*, *41*(4), 652–661. <https://doi.org/10.1007/s10862-019-09739-w>
- Franklin, J. C., Ribeiro, J. D., Fox, K. R., Bentley, K. H., Kleiman, E. M., Huang, X., Musacchio, K. M., Jaroszewski, A. C., Chang, B. P., & Nock, M. K. (2017). Risk factors for suicidal thoughts and behaviors: A meta-analysis of 50 years of research. *Psychological Bulletin*, *143*(2), 187–232. <https://doi.org/10.1037/bul0000084>
- Franz, P. J., Kleiman, E. M., & Nock, M. K. (2019). Why Do People Hurt Themselves? In *The Oxford Handbook of Positive Emotion and Psychopathology* (pp. 452–464). Oxford University Press. <https://doi.org/10.1093/oxfordhb/9780190653200.013.28>
- Gardner, K., & Qualter, P. (2009). Reliability and validity of three screening measures of borderline personality disorder in a nonclinical population. *Personality and Individual Differences*, *46*(5–6), 636–641. <https://doi.org/10.1016/j.paid.2009.01.005>

- Girme, Y. U., Jones, R. E., Fleck, C., Simpson, J. A., & Overall, N. C. (2020). Infants' Attachment Insecurity Predicts Attachment-Relevant Emotion Regulation Strategies in Adulthood. *Emotion*. <https://doi.org/10.1037/emo0000721>
- Glazebrook, K., Townsend, E., & Sayal, K. (2015). The Role of Attachment Style in Predicting Repetition of Adolescent Self-Harm: A Longitudinal Study. *Suicide and Life-Threatening Behavior*, *45*(6), 664–678. <https://doi.org/10.1111/sltb.12159>
- Glenn, C. R., & Klonsky, E. D. (2009). Emotion dysregulation as a core feature of borderline personality disorder. *Journal of Personality Disorders*, *23*(1), 20–28. <https://doi.org/10.1159/000322806>
- Godbout, N., Briere, J., Sabourin, S., & Lussier, Y. (2014). Child sexual abuse and subsequent relational and personal functioning: The role of parental support. *Child Abuse and Neglect*, *38*(2), 317–325. <https://doi.org/10.1016/j.chiabu.2013.10.001>
- Gratz, Kim L. (2001). Measurement of deliberate self-harm: Preliminary data on the deliberate self-harm inventory. *Journal of Psychopathology and Behavioral Assessment*, *23*(4), 253–263. <https://doi.org/10.1023/A:1012779403943>
- Gratz, Kim L., & Roemer, L. (2004). Multidimensional Assessment of Emotion Regulation and Dysregulation: Development, Factor Structure, and Initial Validation of the Difficulties in Emotion Regulation Scale. *Journal of Psychopathology and Behavioral Assessment*, *26*(1), 41–54. <https://doi.org/10.1023/B:JOBA.0000007455.08539.94>
- Gratz, Kim L. (2006). Risk factors for deliberate self-harm among female college students: The role and interaction of childhood maltreatment, emotional inexpressivity, and affect intensity/reactivity. *American Journal of Orthopsychiatry*, *76*(2), 238–250. <https://doi.org/10.1037/0002-9432.76.2.238>
- Gratz, K. L., Tull, M. T., & Levy, R. (2014). Randomized controlled trial and uncontrolled 9-month follow-up of an adjunctive emotion regulation group therapy for deliberate self-harm among women with borderline personality disorder. *Psychological Medicine*, *44*(10), 2099–2112. <https://doi.org/10.1017/S0033291713002134>
- Gratz, Kim L., Chapman, A. L., Dixon-Gordon, K. L., & Tull, M. T. (2016). Exploring the association of deliberate self-harm with emotional relief using a novel implicit association test. *Personality Disorders: Theory, Research, and Treatment*, *7*(1), 91–102. <https://doi.org/10.1037/per0000138>
- Guérin-Marion, C., Martin, J., Lafontaine, M. F., & Bureau, J. F. (2020). Invalidating Caregiving Environments, Specific Emotion Regulation Deficits, and Non-suicidal Self-injury. *Child Psychiatry and Human Development*, *51*(1), 39–47. <https://doi.org/10.1007/s10578-019-00908-2>

- Haines, N., Beauchaine, T. P., Galdo, M., Rogers, A. H., Hahn, H., Pitt, M. A., Myung, J. I., Turner, B. M., & Ahn, W. Y. (2020). Anxiety Modulates Preference for Immediate Rewards Among Trait-Impulsive Individuals: A Hierarchical Bayesian Analysis. *Clinical Psychological Science*, 8(6), 1017–1036. <https://doi.org/10.1177/2167702620929636>
- Herr, N. R., Rosenthal, M. Z., Geiger, P. J., & Erikson, K. (2012). *Difficulties with emotion regulation mediate the relationship between borderline personality disorder symptom severity and interpersonal problems*. <https://doi.org/10.1002/pmh>
- Hinshaw, S. P., Owens, E. B., Zalecki, C., Huggins, S. P., Montenegro-Nevado, A. J., Schrodek, E., & Swanson, E. N. (2012). Prospective follow-up of girls with attention-deficit/hyperactivity disorder into early adulthood: continuing impairment includes elevated risk for suicide attempts and self-injury. *Journal of consulting and clinical psychology*, 80(6), 1041–1051. <https://doi.org/10.1037/a0029451>
- International Society for the Study of Self-Injury. (2007). What is self-injury? ISSS. <https://itriples.org/about-self-injury/what-is-self-injury>.
- Jacobo, M. C., Blais, M. A., Baity, M. R., & Harley, R. (2007). Concurrent validity of the personality assessment inventory borderline scales in patients seeking dialectical behavior therapy. *Journal of Personality Assessment*, 88(1), 74–80. https://doi.org/10.1207/s15327752jpa8801_10
- Johnson, J., O'Connor, D. B., Jones, C., Jackson, C., Hughes, G. J., & Ferguson, E. (2016). Reappraisal Buffers the Association Between Stress and Negative Mood Measured Over 14 Days: Implications for Understanding Psychological Resilience. *European Journal of Personality*, 30(6), 608–617. <https://doi.org/10.1002/per.2080>
- Kim, K. L., Galione, J., Schettini, E., DeYoung, L. L. A., Gilbert, A. C., Jenkins, G. A., Barthelemy, C. M., MacPherson, H. A., Radoeva, P. D., Kudinova, A. Y., & Dickstein, D. P. (2020). Do styles of emotion dysregulation differentiate adolescents engaging in non-suicidal self-injury from those attempting suicide? *Psychiatry Research*, 291(June), 113240. <https://doi.org/10.1016/j.psychres.2020.113240>
- Kissil, K. (2011). Attachment-based family therapy for adolescent self-injury. *Journal of Family Psychotherapy*, 22(4), 313–327. <https://doi.org/10.1080/08975353.2011.627801>
- Kleindienst, N., Bohus, M., Ludäscher, P., Limberger, M. F., Kuenkele, K., Ebner-Priemer, U. W., Chapman, A. L., Reicherzer, M., Stieglitz, R. D., & Schmahl, C. (2008). Motives for nonsuicidal self-injury among women with borderline personality disorder. *Journal of Nervous and Mental Disease*, 196(3), 230–236. <https://doi.org/10.1097/NMD.0b013e3181663026>

- Klonsky, E., May, A. M., & Glenn, C. R. (2013). The relationship between nonsuicidal self-injury and attempted suicide: Converging evidence from four samples. *Journal of Abnormal Psychology, 122*(1), 231–237. <https://doi.org/10.1037/a0030278>
- Klonsky, E. D. (2007a). Non-suicidal self-injury: An introduction. *Journal of Clinical Psychology, 63*(11), 1039–1043. <https://doi.org/10.1002/jclp.20411>
- Klonsky, E. D. (2007b). The functions of deliberate self-injury: A review of the evidence. In *Clinical Psychology Review* (Vol. 27, Issue 2, pp. 226–239). <https://doi.org/10.1016/j.cpr.2006.08.002>
- Kuo, J. R., Khoury, J. E., Metcalfe, R., Fitzpatrick, S., & Goodwill, A. (2015). An examination of the relationship between childhood emotional abuse and borderline personality disorder features: The role of difficulties with emotion regulation. *Child Abuse and Neglect, 39*, 147–155. <https://doi.org/10.1016/j.chiabu.2014.08.008>
- Linehan, M. M. (1993). *Cognitive-behavioral treatment of borderline personality disorder*. Guilford Press.
- Lockwood, J., Daley, D., Townsend, E., & Sayal, K. (2017). Impulsivity and self-harm in adolescence: a systematic review. In *European Child and Adolescent Psychiatry* (Vol. 26, Issue 4, pp. 387–402). Dr. Dietrich Steinkopff Verlag GmbH and Co. KG. <https://doi.org/10.1007/s00787-016-0915-5>
- Martin, J., Bureau, J. F., Cloutier, P., & Lafontaine, M. F. (2011). A Comparison of Invalidating Family Environment Characteristics Between University Students Engaging in Self-Injurious Thoughts & Actions and Non-Self-Injuring University Students. *Journal of Youth and Adolescence, 40*(11), 1477–1488. <https://doi.org/10.1007/s10964-011-9643-9>
- Mathieu, J. E., & Chen, G. (2011). The etiology of the multilevel paradigm in management research. *Journal of Management, 37*(2), 610–641. <https://doi.org/10.1177/0149206310364663>
- McKenzie, K. C., & Gross, J. J. (2014). Nonsuicidal self-injury: an emotion regulation perspective. *Psychopathology, 47*(4), 207–219. <https://doi.org/10.1159/000358097>
- Mikulincer, M., & Shaver, P. R. (2019). Attachment orientations and emotion regulation. *Current Opinion in Psychology, 25*, 6–10. <https://doi.org/10.1016/j.copsyc.2018.02.006>
- Moretti, M. M., & Obsuth, I. (2009). Effectiveness of an attachment-focused manualized intervention for parents of teens at risk for aggressive behaviour: The Connect Program. *Journal of Adolescence, 32*(6), 1347–1357. <https://doi.org/10.1016/j.adolescence.2009.07.013>

- Morey, Leslie C. & McCredie, M. N. (2019). Personality Assessment Inventory. In *The Cambridge Handbook of Clinical Assessment and Diagnosis* (pp. 231–248). <https://doi.org/https://doi-org.proxy.lib.sfu.ca/10.1017/9781108235433.017>
- Morey, L. C. (1991). *The Personality Assessment Inventory professional manual*. Psychological Assessment Resources.
- Muehlenkamp, J. J., Engel, S. G., Wadeson, A., Crosby, R. D., Wonderlich, S. A., Simonich, H., & Mitchell, J. E. (2009). Emotional states preceding and following acts of non-suicidal self-injury in bulimia nervosa patients. *Behaviour Research and Therapy*, *47*(1), 83–87. <https://doi.org/10.1016/j.brat.2008.10.011>
- Nicolai, K. A., Wielgus, M. D., & Mezulis, A. (2016). Identifying Risk for Self-Harm: Rumination and Negative Affectivity in the Prospective Prediction of Nonsuicidal Self-Injury. *Suicide and Life-Threatening Behavior*, *46*(2), 223–233. <https://doi.org/10.1111/sltb.12186>
- Nock, M. K., Joiner, T. E., Gordon, K. H., Lloyd-Richardson, E., & Prinstein, M. J. (2006). Non-suicidal self-injury among adolescents: Diagnostic correlates and relation to suicide attempts. *Psychiatry Research*, *144*(1), 65–72. <https://doi.org/10.1016/j.psychres.2006.05.010>
- Paivio, S. C., & Cramer, K. M. (2004). Factor structure and reliability of the Childhood Trauma Questionnaire in a Canadian undergraduate student sample. *Child Abuse and Neglect*, *28*(8), 889–904. <https://doi.org/10.1016/j.chiabu.2004.01.011>
- Patton, J. H., Stanford, M. S., & Barratt, E. S. (1995). Factor structure of the Barratt Impulsiveness Scale. *Journal of Clinical Psychology*, *51*(6), 768–774.
- Salsman, N. L., & Linehan, M. M. (2012). An investigation of the relationships among negative affect, Difficulties in emotion regulation, and features of Borderline Personality Disorder. *Journal of Psychopathology and Behavioral Assessment*, *34*(2), 260–267. <https://doi.org/10.1007/s10862-012-9275-8>
- Selby, E. A., Yen, S., & Spirito, A. (2013). Time Varying Prediction of Thoughts of Death and Suicidal Ideation in Adolescents: Weekly Ratings over 6-month Follow-Up. *Journal of Clinical Child and Adolescent Psychology*, *42*(4), 481–495. <https://doi.org/10.1080/15374416.2012.736356>
- Serafini, G., Canepa, G., Adavastro, G., Nebbia, J., Murri, M. B., Erbuto, D., Pocai, B., Fiorillo, A., Pompili, M., Flouri, E., & Amore, M. (2017). The relationship between childhood maltreatment and non-suicidal self-injury: A systematic review. *Frontiers in Psychiatry*, *8*(AUG), 149. <https://doi.org/10.3389/fpsy.2017.00149>
- Shulman, E. P., Harden, K. P., Chein, J. M., & Steinberg, L. (2015). Sex Differences in the Developmental Trajectories of Impulse Control and Sensation-Seeking from Early Adolescence to Early Adulthood. *Journal of Youth and Adolescence*, *44*(1), 1–17. <https://doi.org/10.1007/s10964-014-0116-9>

- Stanford, M. S., Mathias, C. W., Dougherty, D. M., Lake, S. L., Anderson, N. E., & Patton, J. H. (2009). Fifty years of the Barratt Impulsiveness Scale: An update and review. In *Personality and Individual Differences* (Vol. 47, Issue 5, pp. 385–395). <https://doi.org/10.1016/j.paid.2009.04.008>
- Swannell, S., Martin, G., Page, A., Hasking, P., Hazell, P., Taylor, A., & Protani, M. (2012). Child maltreatment, subsequent non-suicidal self-injury and the mediating roles of dissociation, alexithymia and self-blame. *Child Abuse and Neglect*, *36*(7–8), 572–584. <https://doi.org/10.1016/j.chiabu.2012.05.005>
- Swannell, S. V., Martin, G. E., Page, A., Hasking, P., & St John, N. J. (2014). Prevalence of nonsuicidal self-injury in nonclinical samples: Systematic review, meta-analysis and meta-regression. *Suicide and Life-Threatening Behavior*, *44*(3), 273–303. <https://doi.org/10.1111/sltb.12070>
- Tofighi, D. & MacKinnon, D. P. (2011). RMediation: An R package for mediation analysis confidence intervals. [PDF](#) *Behavior Research Methods*, *43*, 692-700.
- Turner, B. J., Austin, S. B., & Chapman, A. L. (2014). Treating nonsuicidal self-injury: A systematic review of psychological and pharmacological interventions. *Canadian Journal of Psychiatry*, *59*(11), 576–585. <https://doi.org/10.1177/070674371405901103>
- Turner, B. J., Dixon-Gordon, K. L., Austin, S. B., Rodriguez, M. A., Zachary Rosenthal, M., & Chapman, A. L. (2015). Non-suicidal self-injury with and without borderline personality disorder: Differences in self-injury and diagnostic comorbidity. *Psychiatry Research*, *230*(1), 28–35. <https://doi.org/10.1016/j.psychres.2015.07.058>
- Turner, B. J., Baglole, J. S., Chapman, A. L., & Gratz, K. L. (2019). Experiencing and Resisting Nonsuicidal Self-injury Thoughts and Urges in Everyday Life. *Suicide and Life-Threatening Behavior*, *49*(5), 1332–1346. <https://doi.org/10.1111/sltb.12510>
- Valencia-Agudo, F., Burcher, G. C., Ezpeleta, L., & Kramer, T. (2018). Nonsuicidal self-injury in community adolescents: A systematic review of prospective predictors, mediators and moderators. *Journal of Adolescence*, *65*(February), 25–38. <https://doi.org/10.1016/j.adolescence.2018.02.012>
- Van Orden, K. A., Witte, T. K., Cukrowicz, K. C., Braithwaite, S. R., Selby, E. A., & Joiner, T. E. (2010). The Interpersonal Theory of Suicide. *Psychological Review*, *117*(2), 575–600. <https://doi.org/10.1037/a0018697>
- Vanderhei, S., Rojahn, J., Stuewig, J., & McKnight, P. E. (2014). The effect of shame-proneness, guilt-proneness, and internalizing tendencies on nonsuicidal self-injury. *Suicide and Life-Threatening Behavior*, *44*(3), 317–330. <https://doi.org/10.1111/sltb.12069>

- Vonderlin, R., Kleindienst, N., Alpers, G. W., Bohus, M., Lyssenko, L., & Schmahl, C. (2018). Dissociation in victims of childhood abuse or neglect: A meta-Analytic review. *Psychological Medicine*, 48(15), 2467–2476. <https://doi.org/10.1017/S0033291718000740>
- Voon, D., Hasking, P., & Martin, G. (2014). Change in emotion regulation strategy use and its impact on adolescent nonsuicidal self-injury: A three-year longitudinal analysis using latent growth modeling. *Journal of Abnormal Psychology*, 123(3), 487–498. <https://doi.org/10.1037/a0037024>
- Voon, D., & Hasking, P. (2017). Adolescents who Engage in Nonsuicidal Self-Injury (NSSI). In C. A. Essau, S. Leblanc, & T. H. Ollendick (Eds.), *Emotion Regulation and Psychopathology in Children and Adolescents* (Issue August, pp. 398–416). Oxford University Press. <https://doi.org/10.1093/med:psych/9780198765844.003.0019>
- Whitlock, J., Eckenrode, J., & Silverman, D. (2006). Self-injurious behaviors in a college population. *Pediatrics*, 117(1939–1948).
- Whitlock, Janis, Muehlenkamp, J., Eckenrode, J., Purington, A., Baral Abrams, G., Barreira, P., & Kress, V. (2013). Nonsuicidal self-injury as a gateway to suicide in young adults. *Journal of Adolescent Health*, 52(4), 486–492. <https://doi.org/10.1016/j.jadohealth.2012.09.010>
- Wilson, N., Robb, E., Gajwani, R., & Minnis, H. (2021). Nature and nurture? A review of the literature on childhood maltreatment and genetic factors in the pathogenesis of borderline personality disorder. In *Journal of Psychiatric Research* (Vol. 137, pp. 131–146). Elsevier Ltd. <https://doi.org/10.1016/j.jpsychires.2020.12.025>
- Zanarini, Mary C., Frankenburg, F. R., Reich, D. B., Silk, K. R., Hudson, J. I., & McSweeney, L. B. (2007). The subsyndromal phenomenology of borderline personality disorder: A 10-year follow-up study. *American Journal of Psychiatry*, 164(6), 929–935. <https://doi.org/10.1176/ajp.2007.164.6.929>

Appendix A.

Ethics Approval



Minimal Risk Approval – Delegated

Study Number: 30000251

Study Title: The Role of Impulsivity and Emotion Regulation in Predicting Borderline Personality Disorder Symptoms and Nonsuicidal Self-Injury

Approval Date: August 3, 2021

Expiration Date: August 3, 2022

Principal Investigator: Alexander Chapman

SFU Position: Faculty

Faculty/Department: Psychology

SFU Collaborator(s): N/A

External Collaborator(s): Kim L. Gratz, Matthew T. Tull

Research Personnel: N/A

Student Lead: Cassandra Turner

Funding Source: N/A

Funding Title: N/A

Document(s) Approved in this Application:

- Data Permission Letter – Dated May 11, 2020
- TCPS2 Core Certificate – Cassandra Turner, Dated May 13, 2016

Document(s) Acknowledged in this Application:

- 2010s0648 Ethics Approval Letter
- Informed Consent – Dated August 21, 2014
- Study Details – Dated January 11, 2021

The application for ethical review and the document(s) listed above have been reviewed and the procedures were found to be acceptable on ethical grounds for research involving human participants.

The approval for this Study expires on the **Expiration Date**. **An Annual Renewal must be completed every year prior to the Expiration Date. Failure to submit an Annual Renewal will lead to your study being suspended and potentially terminated.** The Board reviews and may amend decisions or subsequent amendments made independently by the authorized delegated reviewer at its regular monthly meeting.

This letter is your official ethics approval documentation for this project. Please keep this document for reference purposes.

This study has been approved by an authorized delegated reviewer.

Appendix B.

Ethics Renewal



Annual Renewal Approval

Study Number: 30000251

Study Title: The Role of Impulsivity and Emotion Regulation in Predicting Borderline Personality Disorder Symptoms and Nonsuicidal Self-Injury

Annual Renewal Date: July 12, 2022

Expiration Date: August 3, 2023

Principal Investigator: Alexander Chapman

SFU Position: Faculty

Faculty/Department: Psychology

Supervisor: N/A

Student Lead: Cassandra Turner

SFU Collaborator(s): N/A

Research Personnel: N/A

External Collaborator(s): Kim Gratz; Matthew Tull

Funder: N/A

Funding Title: N/A

Funding Number: N/A

The approval for this study expires on the **Expiration Date**. **Failure to submit an Annual Renewal will lead to your study being suspended and potentially terminated.** If you intend to continue to collect data past the term of approval, you must submit an Annual Renewal least 4 weeks before the expiration date.

This letter is your official Annual Renewal Approval documentation for this project. Please keep this document for reference purposes.

The annual renewal for this study has been approved by an authorized delegated reviewer.

Appendix C.

Barratt Impulsivity Scale (BIS-11; Patton et al., 1995)

DIRECTIONS: People differ in the ways they act and think in different situations. This is a test to measure some of the ways in which you act and think. Read each statement and put an X on the appropriate circle on the right side of this page. Do not spend too much time on any statement. Answer quickly and honestly.				
	○	○	○	○
	Rarely/Never	Occasionally	Often	Almost Always/Always
1	I plan tasks carefully.			<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
2	I do things without thinking.			<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
3	I make-up my mind quickly.			<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
4	I am happy-go-lucky.			<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
5	I don't "pay attention."			<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
6	I have "racing" thoughts.			<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
7	I plan trips well ahead of time.			<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
8	I am self controlled.			<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
9	I concentrate easily.			<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
10	I save regularly.			<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
11	I "squirm" at plays or lectures.			<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
12	I am a careful thinker.			<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
13	I plan for job security.			<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
14	I say things without thinking.			<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
15	I like to think about complex problems.			<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
16	I change jobs.			<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
17	I act "on impulse."			<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
18	I get easily bored when solving thought problems.			<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
19	I act on the spur of the moment.			<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
20	I am a steady thinker.			<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
21	I change residences.			<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
22	I buy things on impulse.			<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
23	I can only think about one thing at a time.			<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
24	I change hobbies.			<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
25	I spend or charge more than I earn.			<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
26	I often have extraneous thoughts when thinking.			<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
27	I am more interested in the present than the future.			<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
28	I am restless at the theater or lectures.			<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
29	I like puzzles.			<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
30	I am future oriented.			<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>

Appendix D.

Childhood Trauma Questionnaire (CTQ; Bernstein et al., 2003)

CTQ-SF

Instruction: These questions ask about some of your experiences growing up as a child and a teenager. Although these questions are of a personal nature, please try to answer as honestly as you can. For each question circle the dot under the response that best describes how you feel. If you wish to change your response, put an X through it and circle your new choice.

When I was growing up as a child and a teenager....	Never True	Rarely True	Sometimes True	Often True	Very often true
1. I didn't have enough to eat.	•	•	•	•	•
2. I knew that there was someone to take care of me and protect me.	•	•	•	•	•
3. People in my family called me things like "stupid," "lazy," or "ugly."	•	•	•	•	•
4. My parents were too drunk or high to take care of the family.	•	•	•	•	•
5. There was someone in my family who helped me feel that I was important or special.	•	•	•	•	•
6. I had to wear dirty clothes.	•	•	•	•	•
7. I felt love.	•	•	•	•	•
8. I thought that my parents wished I had never been born.	•	•	•	•	•
9. I got hit so hard by someone in my family that I had to see a doctor or go to the hospital.	•	•	•	•	•
10. There was nothing I wanted to change about my family.	•	•	•	•	•
11. People in my family hit me so hard that it left me with bruises or marks.	•	•	•	•	•
12. I was punished with a belt, a board, a cord, or some other hard object.	•	•	•	•	•
13. People in my family looked out for each other.	•	•	•	•	•
14. People in my family said hurtful or insulting things to me.	•	•	•	•	•
15. I believe that I was physically abused.	•	•	•	•	•
16. I had the perfect childhood.	•	•	•	•	•
17. I got hit or beaten so badly that it was noticed by someone like a teacher, neighbour, or doctor.	•	•	•	•	•
18. I felt that someone in my family hated me.	•	•	•	•	•
19. People in my family felt close to each other.	•	•	•	•	•

When I was growing up as a child and a teenager....	Never True	Rarely True	Sometimes True	Often True	Very often true
20. Someone tried to touch me in a sexual way, or tried to make me touch them.	•	•	•	•	•
21. Someone threatened to hurt me or tell lies about me unless I did something sexual with them.	•	•	•	•	•
22. I had the best family in the world.	•	•	•	•	•
23. Someone tried to make me do sexual things or watch sexual things.	•	•	•	•	•
24. Someone molested me.	•	•	•	•	•
25. I believe that I was emotionally abused.	•	•	•	•	•
26. There was someone to take me to the doctor if I needed it.	•	•	•	•	•
27. I believe that I was sexually abused.	•	•	•	•	•
28. My family was a source of strength or support.	•	•	•	•	•

Appendix E.

Difficulties with Emotion Regulation Scale (DERS; Gratz & Roemer 2004)

DERS

Please indicate how often the following statements apply to you by writing the appropriate number from the scale below on the line beside each item:

1-----	2-----	3-----	4-----	5-----
almost never (0-10%)	sometimes (11-35%)	about half the time (36-65%)	most of the time (66-90%)	almost always (91-100%)

- _____ 1) I am clear about my feelings.
- _____ 2) I pay attention to how I feel.
- _____ 3) I experience my emotions as overwhelming and out of control.
- _____ 4) I have no idea how I am feeling.
- _____ 5) I have difficulty making sense out of my feelings.
- _____ 6) I am attentive to my feelings.
- _____ 7) I know exactly how I am feeling.
- _____ 8) I care about what I am feeling.
- _____ 9) I am confused about how I feel.
- _____ 10) When I'm upset, I acknowledge my emotions.
- _____ 11) When I'm upset, I become angry with myself for feeling that way.
- _____ 12) When I'm upset, I become embarrassed for feeling that way.
- _____ 13) When I'm upset, I have difficulty getting work done.
- _____ 14) When I'm upset, I become out of control.
- _____ 15) When I'm upset, I believe that I will remain that way for a long time.
- _____ 16) When I'm upset, I believe that I'll end up feeling very depressed.
- _____ 17) When I'm upset, I believe that my feelings are valid and important.
- _____ 18) When I'm upset, I have difficulty focusing on other things.
- _____ 19) When I'm upset, I feel out of control.
- _____ 20) When I'm upset, I can still get things done.
- _____ 21) When I'm upset, I feel ashamed with myself for feeling that way.

1-----2-----3-----4-----5
almost never sometimes about half the time most of the time almost always (0-10%) (11-35%) (36-65%) (66-90%) (91-100%)

- _____ 22) When I'm upset, I know that I can find a way to eventually feel better.
- _____ 23) When I'm upset, I feel like I am weak.
- _____ 24) When I'm upset, I feel like I can remain in control of my behaviors.
- _____ 25) When I'm upset, I feel guilty for feeling that way.
- _____ 26) When I'm upset, I have difficulty concentrating.
- _____ 27) When I'm upset, I have difficulty controlling my behaviors.
- _____ 28) When I'm upset, I believe that there is nothing I can do to make myself feel better.
- _____ 29) When I'm upset, I become irritated with myself for feeling that way.
- _____ 30) When I'm upset, I start to feel very bad about myself.
- _____ 31) When I'm upset, I believe that wallowing in it is all I can do.
- _____ 32) When I'm upset, I lose control over my behaviors.
- _____ 33) When I'm upset, I have difficulty thinking about anything else.
- _____ 34) When I'm upset, I take time to figure out what I'm really feeling.
- _____ 35) When I'm upset, it takes me a long time to feel better.
- _____ 36) When I'm upset, my emotions feel overwhelming.

Appendix F.

Deliberate Self-Harm Inventory (DSHI; Gratz, 2001)



INSTRUCTIONS: 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. 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.

1. In the last 4 months, have you intentionally (i.e., on purpose) cut your wrist, arms, or other area(s) of your body (without intending to kill yourself)?

- No
 Yes

IF YES, please complete questions below:

In the last four months, how many times have you done this?

please write an actual number

When was the last time you did this? **Please make your best guess of the date.**

Month, Day, Year

In the last four months, has this behaviour ever resulted in hospitalization or injury severe enough to require medical treatment?

- Yes
 No

2. In the last four months, have you intentionally (i.e., on purpose) burned yourself with a cigarette?

- No
- Yes

IF YES, please complete questions below:

In the last four months, how many times have you done this?

When was the last time you did this? **Please make your best guess of the date.**

In the last four months, has this behaviour resulted in hospitalization or injury severe enough to require medical treatment?

- Yes
- No

3. In the last four months, have you intentionally (i.e., on purpose) burned yourself with a lighter or a match?

- No
- Yes

IF YES, please complete questions below:

In the last four months, how many times have you done this?

When was the last time you did this? **Please make your best guess of the date.**

In the last four months, has this behaviour resulted in hospitalization or injury severe enough to require medical treatment?

- Yes
- No

4. In the last four months, have you intentionally (i.e., on purpose) carved words into your skin?

- No
- Yes

IF YES, please complete questions below:

In the last four months, how many times have you done this?

When was the last time you did this? **Please make your best guess of the date.**

In the last four months, has this behaviour resulted in hospitalization or injury severe enough to require medical treatment?

- Yes
- No

5. In the last four months, have you intentionally (i.e., on purpose) carved pictures, designs, or other marks into your skin?

- No
- Yes

IF YES, please complete questions below:

In the last four months, how many times have you done this?

When was the last time you did this? **Please make your best guess of the date.**

In the last four months, has this behaviour resulted in hospitalization or injury severe enough to require medical treatment?

- Yes
- No

6. In the last four months, have you intentionally (i.e., on purpose) severely scratched yourself to the extent that scarring or bleeding occurred?

- No
- Yes

IF YES, please complete questions below:

In the last four months, how many times have you done this?

When was the last time you did this? **Please make your best guess of the date.**

In the last four months, has this behaviour resulted in hospitalization or injury severe enough to require medical treatment?

- Yes
- No

7. In the last four months, have you intentionally (i.e., on purpose) bit yourself, to the extent that you broke the skin?

- No
- Yes

IF YES, please complete questions below:

In the last four months, how many times have you done this?

When was the last time you did this? **Please make your best guess of the date.**

In the last four months, has this behaviour resulted in hospitalization or injury severe enough to require medical treatment?

- Yes
- No

8. In the last four months, have you intentionally (i.e., on purpose) rubbed sandpaper on your body?

- No
- Yes

IF YES, please complete questions below:

In the last four months, how many times have you done this?

When was the last time you did this? **Please make your best guess of the date.**

In the last four months, has this behaviour resulted in hospitalization or injury severe enough to require medical treatment?

- Yes
- No

9. In the last four months, have you intentionally (i.e., on purpose) dripped acid on your skin?

- No
- Yes

IF YES, please complete questions below:

In the last four months, how many times have you done this?

When was the last time you did this? **Please make your best guess of the date.**

In the last four months, has this behaviour resulted in hospitalization or injury severe enough to require medical treatment?

- Yes
- No

10. In the last four months, have you intentionally (i.e., on purpose) used bleach, comet, or oven cleaner to scrub your skin?

- No
- Yes

IF YES, please complete questions below:

In the last four months, how many times have you done this?

When was the last time you did this? **Please make your best guess of the date.**

In the last four months, has this behaviour resulted in hospitalization or injury severe enough to require medical treatment?

- Yes
- No

11. In the last four months, have you ever intentionally (i.e., on purpose) 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?

- No
- Yes

IF YES, please complete questions below:

In the last four months, how many times have you done this?

When was the last time you did this? **Please make your best guess of the date.**

In the last four months, has this behaviour resulted in hospitalization or injury severe enough to require medical treatment?

- Yes
- No

12. In the last four months, have you intentionally (i.e., on purpose) rubbed glass into your skin?

- No
- Yes

IF YES, please complete questions below:

In the last four months, how many times have you done this?

When was the last time you did this? **Please make your best guess of the date.**

In the last four months, has this behaviour resulted in hospitalization or injury severe enough to require medical treatment?

- Yes
- No

13. In the last four months, have you intentionally (i.e., on purpose) broken your own bones?

- No
- Yes

IF YES, please complete questions below:

In the last four months, how many times have you done this?

When was the last time you did this? **Please make your best guess of the date.**

In the last four months, has this behaviour resulted in hospitalization or injury severe enough to require medical treatment?

- Yes
- No

14. In the last four months, have you intentionally (i.e., on purpose) banged your head against something, to the extent that you caused a bruise to appear?

- No
- Yes

IF YES, please complete questions below:

In the last four months, how many times have you done this?

When was the last time you did this? **Please make your best guess of the date.**

In the last four months, has this behaviour resulted in hospitalization or injury severe enough to require medical treatment?

- Yes
- No

15. In the last four months, have you intentionally (i.e., on purpose) punched yourself, to the extent that you caused a bruise to appear?

- No
- Yes

IF YES, please complete questions below:

In the last four months, how many times have you done this?

When was the last time you did this? **Please make your best guess of the date.**

In the last four months, has this behaviour resulted in hospitalization or injury severe enough to require medical treatment?

- Yes
- No

16. In the last four months, have you intentionally (i.e., on purpose) prevented wounds from healing?

- No
- Yes

IF YES, please complete questions below:

In the last four months, how many times have you done this?

When was the last time you did this? **Please make your best guess of the date.**

In the last four months, has this behaviour resulted in hospitalization or injury severe enough to require medical treatment?

- Yes
- No

17. In the last four months, have you intentionally (i.e., on purpose) done anything else to hurt yourself that was not asked about in this questionnaire?

- No
- Yes

IF YES, please complete questions below:

In the last four months, how many times have you done this?

When was the last time you did this? **Please make your best guess of the date.**

In the last four months, has this behaviour resulted in hospitalization or injury severe enough to require medical treatment?

- Yes
- No